Information Era. Conscience Society. Creativity.

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Attendees will learn about the research and development which will be effected by scientists in the branch of Conscience Society creation in next decades of XXI century. Conscience is usually seen as linked to a morality inherent in all humans, to a beneficent universe and/or to divinity. It is increasingly conceived of as applying to the world as a whole and as a main feature of conscience society. It has motivated its numerous models, characteristics and functions of Conscience for creation the societal intelligent adaptable information systems in Conscience Society. The moral life is a vital part for the world to maintain a Conscience (civilized) Society, so always keep in mind to: accept differences in others; respond promptly to others; leave some "free" time; care about others as if they were you; treat everyone similarly; never engage in violent acts; have an inner sense of thankfulness; have a sense of commitment. Creativity is a result of brain activity which differentiates individuals and could ensure an important competitive advantage for persons, for companies, for Society in general, and for Conscience Society in special. Very innovative branches – like software industry, computer industry, car industry – consider creativity as the key of business success. Natural Intelligence' Creativity can develop basic creative activities, but Artificial Intelligence' Creativity, and, especially, Conscience Intelligence' Creativity should be developed and they could be enhanced over the level of Natural Intelligence. The basic idea for present communication represent the research results communicated at the last two annual AESM conferences [1] [2].

***Keywords**: Conscience, Adaptability, Creativity, Intelligence, Conscience Society*

1 Introduction

Conscience is ability or a faculty that distinguishes whether one's actions are right or wrong. It can lead to feelings of remorse when a human does things that go against his/her moral values, and of rectitude or integrity when actions conform to such norms [1]. Conscience represents individual spirit feelings, a set of conscientious actions of each individual member of Society.

Commonly used metaphors for conscience include the "voice within" and the "inner light" [2]. Conscience, as is detailed in sections below, is usually see as linked to a morality inherent in all humans, to a beneficent universe and/or to divinity; it is increasingly conceived of as applying to the world as a whole and as a main feature of conscience society.

Academician Mihai Draganescu in community with other researchers analyzed the possibility to create the Conscience Society in the next decades of XXI Century. In his essay [5] have been underlined: "… it is not possible for any kind of Artificial Intelligence (AI: electronic or in the future nano-electronic) to possess Intuition, Creativity and Spirituality without to resort to other structural natural elements, which reality become more and more plausible. The equality of Artificial Intelligence with Structured Natural Intelligence (AI = NIstructured) will happened, after a set of opinions of Moravec, Kurzweil, Buttuzzo, Broderick and a., in the period of 2019-2035 years. Some of researchers believe that in the moment when it will be obtained the equality AI = NIstructured automatically such electronic brain will possesses the phenomenological properties of Intuition, Creativity and Spirituality…".

There was motivated Conscience numerous models, characteristics and functions [3] for creation the Societal Intelligent Adaptable

Information Systems in Conscience Society. Present communication will discussed the evolution of notion of information and also its interaction on phases of activity and component parts of Computer Based Intelligent Information Systems in past Information Society, present Knowledge-based Society, and in near future Conscience Society.

Creativity is a result of brain activity which differentiates individuals and could ensure an important competitive advantage for persons, for companies, and for Society in general. Very innovative branches – like software industry, computer industry, car industry - consider creativity as the key of business success. Natural Intelligence' Creativity can develop basic creative activities, but Artificial Intelligence' Creativity, and, especially, Conscience Intelligence' Creativity should be developed and they could be enhanced over the level of Natural Intelligence.

It is very important to discuss the evolution of notion of Creativity and to analyze Creativity from basic point of view: Creativity as a Brain Activity; Mastering Daily Life; Creativity and Profession; Piirto's six Steps; When and where Creativity Occurs; How Creative People are looked upon.

1 From Information Society, through Knowledge-based Society to Conscience Society.

Luciano Floridi in his book [4] "Information - A Very Short Introduction (Oxford University Press)" underlined that information: (1) explores a concept central to modern science and society, from thermodynamics and DNA to our use of the mobile phone and the Internet, (2) considers concepts such as 'Infoglut' (too much information to process) and the emergence of an *information society*, (3) addresses the meaning and value of information in science, sociology, and philosophy, (4) raises the broader social and ethical issues relating to privacy, accessibility, and ownership of information.

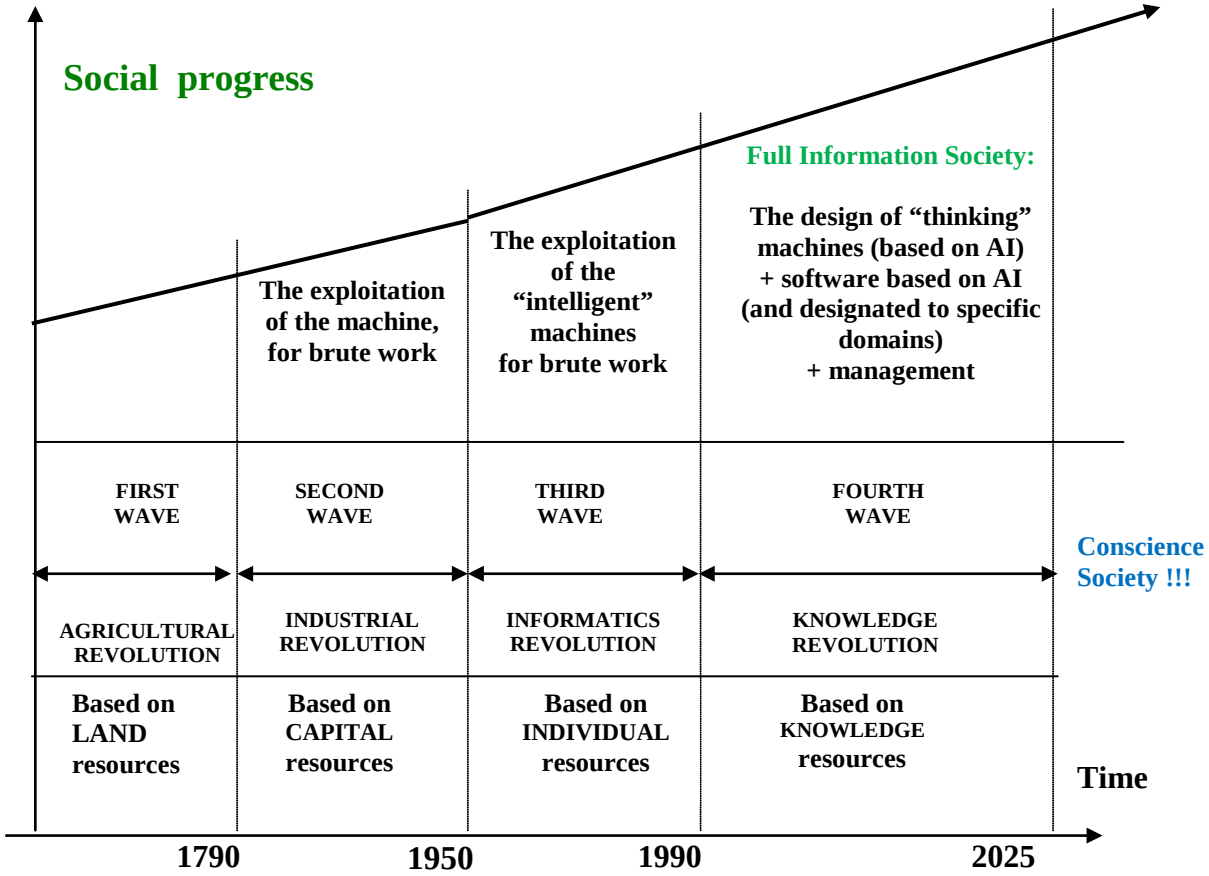

Fig. 1. What comes after the Full Information Society?

For the point of view of *Conscience Society' Information Systems' creation* [1] the information is discussed as (5) signification in natural language, (6) Shannonian information, (7) genetic information, (8) information as an ontology factor, and (9) information as an economic resource and the service of first necessity.

Since the 70s, Alvin Toffler was pointing, in his work "Shock wave", the unprecedented acceleration of the transformation of the whole society. This transformation has been mainly generated by the informatics revolution. The annalists identified this new type of revolution in economy and society, next to the industrial revolution.

In "The fourth wave", Alvin Toffler's work published in 1993, he predicted the approach of a new wave of progress. This wave follows the post-industrial economies and is indebt to a revolution of knowledge, especially of the knowledge sprang from Intuition, Imagination and Creative capacity of the human being. This stage, together with the previous ones, is represented in the Figure 1.

As we already crossed the first years of the new millennium, one wonders how human life would be like… We have already seen much transformation in our lifestyle over the past several decades gradually leading us towards the so called "Information age".

1.1 Information Society (IS) is a Society with human, economic and significant impact. In the Information Era the dimension sphere of Information and Knowledge-based Societies' interactions are without ambiguities [1]. From structural and organization points of view Information Society is supported by Computer Based Information Systems (CBIS: Table 1).

Table 1. Information Society's Computer Based Information Systems (IS-CBIS)

IS-CBIS' phase -- /--/--/ -- IS-CBIS' component part	**Input**	**Storage**	**Processing**	**Output**
Hardware	Mouse; Microphone	RAM; Hard disc	CPU; Support for program-products	Printer; Monitor
Software	Drivers for keyboards & mouses	Algorithm's codification	Debugging & / V digitizing of information	Drivers for loudspeakers, printers, VIDEO-camera
People	Problem formulation	Documentation	Monitoring	Results' analysis
Knowledgeware (data / information)	Problem formalization	Virtual libraries; museums	Digital books, images, video-clips	INTERNET Art-galleries
Brainware (methods, modules, algorithms, procedures)	Tele-elections	Modules, algorithms, program storage	Resources interpretation; environment protection	Tele-insurance; e-Teaching; e-Learning
Groupware (communications)	E-mailing; distance education	Data pocketing; e-Money	WWW; e-Marketing, e-Banking, e-Learning.	Internet; e-Trading; results distribution

At the intersection of each component part of IS-CBIS with each activity phase in Table 1 are presented examples of activities in the Information Society' CBIS.
The IS-CBIS is represented by Software, Hardware, People, Knowledgeware, Brainware, and Groupware component parts which manipulate information in such evolution phases of computerized information process as information capture, storage, processing, and its distribution. Information Society supposes correlations of such main factors as: information technology, MULTIMEDIA production, and communication technology.

1.2 Knowledge-based Society

(http://www.oas.org/en/topics/knowledge_society.asp**)** refers to the type of society that is needed to compete and succeed in the changing economic and political dynamics of the modern world. It refers to societies that are well educated, and who therefore rely on the knowledge of their citizens to drive the innovation, entrepreneurship and dynamism of that society's economy.

Knowledge-based Society of Information Era represents some intermediate period [5] between Information and Conscience Societies. That intermediate period will continue to the moment when AI will be equal with Structured Natural Intelligence (NIstructured) which will not possess Intuition, Morality, Creativity, and Spirituality. For Knowledge-based Society the Artificial Intelligence (AI) is essential both by its Technological vectors and by its Functional vectors.
Knowledge-based Society have to be thought of and developed in direction of Conscience Society which will be a Society of Truth, Morality, Creativity, and Spirituality. Knowledge-based Society' Information System (KBSIS : Table 2) is represented by its technological (internet, WWW, e-books, artificial intelligence, nano-electronics) and functional (knowledge management for enterprises, global moral usage of knowledge, biological knowledge, care knowledge, durable and sustainable environment knowledge, thoroughgoing study, knowledge and innovation culture development, e-learning) vectors [1].

Table 2. Knowledge-based Society's Information Systems (KBSIS)

KBSIS' Technological Vectors //////////////// KBSIS' Functional Vectors	**Internet, World Wide Web**	**E-Book, E-Library**	**Artificial Intelligence**	**Nano - electronics**
Knowledge management for enterprises, organizations, institutions, local and national administration.				
Management of global moral usage of knowledge.				
Biological and genomic knowledge				
Social and Individual Health System.				
Environment protection				
Societal Existence' Knowledge development.				
New Technologies' Knowledge Generation.				
Development of New Culture of Knowledge and Innovation.				
E-learning				

Knowledge-based Society's Information Systems (KBSIS) is evidently a hierarchical

evolution of IS-CBIS [1]. Component parts and Activity' phases of Knowledge-based Society' Information System mostly represent the emergent evolution and creative development Information Society's Computer Based Information Systems (IS-CBIS: Table 1). Contents of KBSIS' cells can be easy "filled" by Knowledge-based Society' functional technologies.

Knowledge-based Society provides the basis of future Society of Conscience, Truth, Morals, Creativity, and of Spirits.

1.3 Creativity Society

While the *Information Society* already taking into shape, its full impact is still a long way to be realized. The form of fully developed information society can only became a reality through an evolutionary process over the years into the feature. It is, however, possible to conceptualize its basis and therefore an assessment of specific issues in this process can be undertaken.

Revolution in economy and society, next to the Industrial, Information, and Knowledge revolutions, is post-knowledge revolution (Figure 1), especially of knowledge sprang from *Intuition*, *Imagination***,** and *Creative capacity* of the human being; it represents Creative society (Figure 2.)

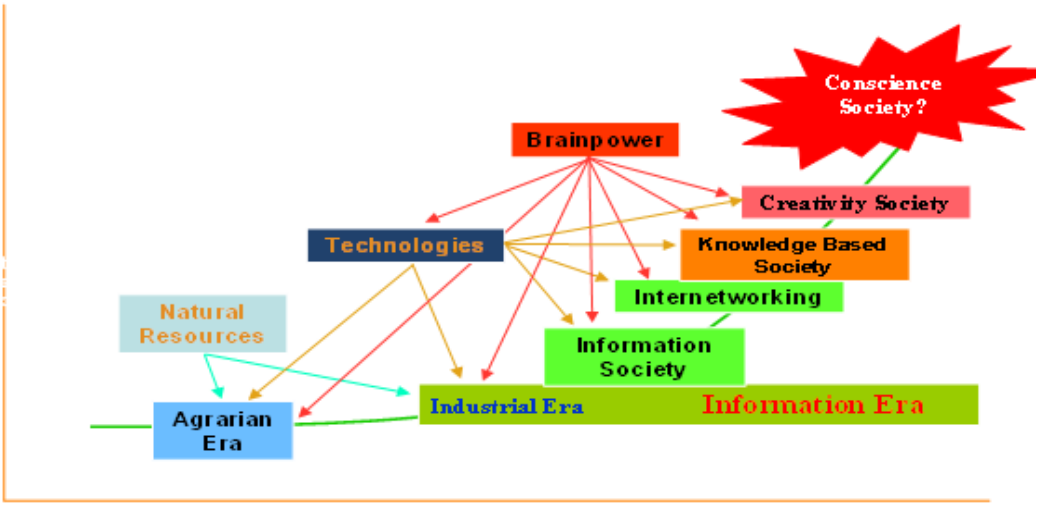

Fig. 2. Information Society: 1970, Creativity Society: 2015, Conscience Society: 2019-2035

Modern societies of Information Era evolve under the sign of rapid changes. Change has become a reality at all levels: (a) everyday-life of the individuals, (b) the life of the organizations, and (c) social systems. In our modern society, change equals to "a new way of life". Transformation of the whole society has been mainly generated by the informatics and knowledge revolutions. Permanent innovation through the creative capacity of the individuals in all domains of knowledge in Creative society of Information Era is equivalent to a huge amount of information and an implicit step towards progress.

1.4 New orientations in actual informatics

In the last decade collaboration of computer science with biology became simply spectacular new orientations in actual informatics. Two landmark examples are: (1) the completion of the genome project, a great success of bio-informatics, of using computer science in biology and

(2) Adleman's experiment (1994) of using DNA molecules as support for computing. The latter example is illustrative for the direction of research opposite to traditional one, of using computers in biology: in Adleman's experiment, biological materials and techniques were used in order to solve a computational problem. This was the "official birth certificate" of what is now called DNA Computing, and this gave a decisive impulse to Natural Computing. Actually, the whole history of computer science can be seen as the history of

attempting to discover, study and, if possible, to implement computing ideas, models, and paradigms from the way nature – the humans included – "computes". This starts with Alan Turing himself who, in 1935 – 1936, when he defined the Turing machine, now the standard reference for what is "mechanically computable".

One decade later, McCullock, Pitts, Kleene founded the finite automata theory starting from modeling the neuron and the neural nets. Later, this lead to the area known now as Neural Computing. A special mentioning deserve genetic algorithms and evolutionary computing / programming, which are now well-established (and much applied practically) areas of computer science. This area is special because it perfectly illustrates the (unexpected) benefits for computer science to look and get inspired from biology.

The optimistic lesson – for other areas of natural computing - is that that nature has prepared for billions of years processes, operations, mechanisms having goals different from those of computer science, but which turned out to be very useful also to computer science. The challenge is to discover the right processes, operations, mechanisms to abstract and implement them in silico in the right way.

The following Figure 3 illustrates this dilemma, also summarizing the situation of the other branches of natural computing.

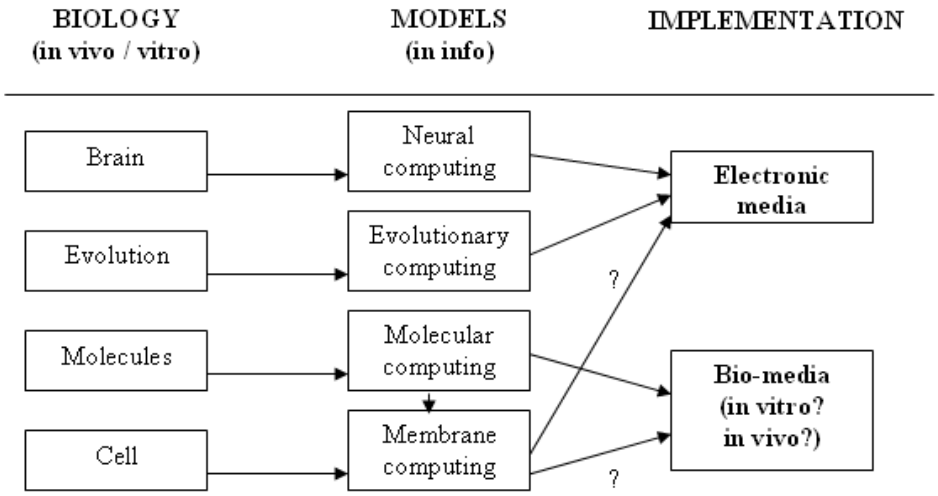

Fig. 3. The four bio-domains of natural computing

The history making Adleman's experiment mentioned above has the merit of opening (actually, confirming, because speculations about using DNA as a support for computations were made since several decades, while theoretical computer models inspired from the DNA structure and operations were already proposed in the eighties) a completely new research vista: we can not only get inspired from biology for designing better algorithms for electronic computers, but we can also use a biological support (a bio-ware for computing). The objective was no longer to improve the use of standard electronic computers, as it was the goal of neural nets and evolutionary computing, but to have a new computer, based on using bio-molecules, in a bio-chemical manner.

Membrane Computing is a part of this general intellectual enterprise, in some sense extending the DNA computing (more generally – Molecular Computing), which starts from the observation that nature has evolved during billions of years a marvelous tiny machinery, with a complex structure, an intricate inner activity and an exquisite relationship with the environment – the living cell. The challenging issue suggested by this observation is whether or not the structure and the functioning cell can provide any suggestions to computer science. Membrane computing emerged as an answer to this challenge, proposing a series of

models inspired from the cell structure (a compartmentalized space, defined by a hierarchical arrangement of membranes) and functioning as well as from the cell organization in tissue. The field (founded in 1998) simply flourished at this level. The "strategic" similarities and differences between membrane computing and the other areas of natural computing are the following:

- these areas start from biological facts and abstract computing models;
- neural nets and evolutionary commuting are already implemented (rather successfully, especially in the care of evolutionary computing) on the usual computer;
- DNA computer has a bigger ambition, that of providing a new hardware, leading to bio-chips, to "wet computers";
- for membrane computing it is not yet clear which direction is the best (the most realistic): trying to get implemented in silico (this started already to be a trend and some successes are already reported) or in vitro (no attempt was made up to now).

1.5 Conscience Society is based on the notion of Conscience, World Conscience and the methods, models, and technologies to create Conscience CBIS [1,2] which will support Human-Human and Human-Machine communications in Conscience Society.

1.5.1 Conscience

(http://en.wikipedia.org/wiki/Conscience) is an aptitude, faculty, intuition, or judgment of the intellect that distinguishes right from wrong. Moral evaluations of this type may reference values or norms (principles and rules). In psychological terms conscience is often described as leading to feelings of remorse when a human does things that go against his/her moral values, and to feelings of rectitude or integrity when actions conform to such norms. The extent to which conscience informs moral judgment before an action and whether such moral judgments are, or should be, based wholly in reason has occasioned debate through much of the history of Western philosophy.

1.5.2 World conscience

(http://en.wikipedia.org/wiki/Conscience) is the universalist idea that with ready global communication, all people on earth will no longer be morally estranged from one another, whether it be culturally, ethnically, or geographically; instead they will conceive ethics from the utopian point of view of the universe, eternity or infinity, rather than have their duties and obligations defined by forces arising solely within the restrictive boundaries of "blood and territory".

1.5.3 Conscience Society's Intelligent Information System (CSIIS) is represented by Conscience' Software and Hardware, People in Conscience Society, Knowledge-ware (data, information, knowledge, consciences), Brain-ware (methods, algorithms, procedures and conscience's models) and Groupware (conscience's communications) [1]. These components parts of *CSIIS* will activate with data, information, knowledge and conscience in such evaluation phases of Intelligent Information Interactions of Conscience Society as: conscience emphasize, conscience storage, conscience processing, and conscience distribution (Table 3).

Table 3. Conscience Society' Intelligent Information System (CSIIS)

CSIIS' phase \\\\\\\\\\\\\\ CSIIS' component part	**Conscience capture**	**Conscience Storage**	**Conscience Processing**	**Conscience Distribution**
Conscience' Hardware	Conscience capture organs and tools	Conscience fixation in two brain hemispheres	Neuronal connection of conscience from two brain hemispheres	Neuronal connection of conscience with sub-conscious and unconscious

Conscience' Software	Drivers of organs and tools of conscience capture	To include conscience in memory	Conscience processing in two brain hemispheres	Drivers of organs of conscience delivering in sub-conscious
People in Conscience Society	Conscience initiation	Conscience documentation and crystallization	Group conscience and society conscience formation	Group conscience evolution, its implementation in society
Consciences' Knowledgeware (data, information, knowledge, consciences)	Conscience formalization	Knowledge accumulation in conscience and sub-conscious	Data, information, and knowledge transformation in conscience	Crossing of individual and group conscience subjects in sub-conscious
Consciences' Brainware (methods, algorithms, procedures, consciousness models)	Conscience elements capture	Conscience storage in intelligent memory	Conscience creativity and conscience interpretation technologies	Conscience, sub-conscious and unconscious creativity
Consciences' Groupware (consciousness communications)	Individual and group conscience capture	Conscience storage of group interactions	Coordination of individual and group conscience processing	Human conscience transmission and its crystallization in sub-conscious

CSIIS will be based on conscience definition parts (knowledge, activity, sentiment, spirit, thought, lucidity) and conscience functions (informational-cognitive, finalist, anticipative-predictive, adjustment, creative-projective) which supply conscience reproduction characteristics (etymology of conscience word, mental goal presence, goals are established before, mental activity organization, people don't reproduce reality into itself).

Evidently CSIIS (Table 3) is exponential extrapolation of Information Society's Computer Based Information Systems (IS-CBIS: Table 1) and of Knowledge-based Society's Information Systems (KBSIS: Table 2). This Conscience Society' Intelligent Information System constitutes exponential evolution, qualitative and quantitative adaptation and correlation [3] between the Conscience definitions, Data & Knowledge definitions, and derivation from them Reproduction of Conscience characteristics and functions (Table 4).

Table 4. Correlation between the Conscience & Data & Knowledge definitions, and derivation from them Reproduction of Conscience characteristics and functions

Reproduction of Conscience characteristics & its function \\\\\\\\\\\/////////// Conscience DEI-definition	Etymology of conscience word & its information-cognitive function	Goal mental presence & conscience finalist function	Preventive goal establishment & conscience anticipative-predictive function	Activity' mental organization & conscience adjustment function	People don't reproduce self-reality &conscience creative-projective function
Knowledge					
Activity					
Feeling					
Spirit, thought;					
Lucidity					

In Table 4: (1) Etymology of conscience word (con-scientia; con-science, so-znanie) demonstrates that conscience organization is a reflection with science, which surprisingly are reflected in adaptable tools of computer based information systems [7]. In this reflection with science person disposes o a series of information, which can be utilized in the process of: decoding, understanding, and interpretation of new object, phenomenon, or event; (2) Goal mental presence is essential in the conscience reflection which is a reflection with goal or orientation towards goal; (3) Preventive goal establishment is done before the beginning of activity, activation. People using conscience has a capacity to anticipate the results of his activity, of its establishment before its realization in its concrete form. Conscience in such a way is anticipative reflection of reality, for this one the difference between people and animals is fundamental; (4) But for each realization it is necessary the mental organization of activity, that is: activity's fragmentation in compound elements, establishment succession of its development, component parts' hierarchy, establishment of activity's corresponding place in comparison with other activities; (5) People don't reproduces the pure reality with the only the goal of its reproduction but with the goal of its (a) modification, (b) exchange, and (c) of its adaptation to people necessities which represents the creative character of conscience, implicitly its creative-projective function.

Conscience Society' Intelligent Information System (CSIIS) constitute the Kernel of Artificial Intelligence Systems and Artificial Conscience Systems of Conscience Society of Information Era.

2 Creativity in Conscience Society

Academician Mihai Draganescu [5] predicted that Conscience is the Science frontier, the Humanity frontier. The Information Systems of Knowledge Based Society as the successor of Information Society were analyzed in [1]. Guiding marks on Conscience Society's creation in Information Era, definition and characteristics, functions and models, and adaptability's features and motivation of its numerous models, characteristics and functions for creation Societal Intelligent Adaptable Information Systems in Conscience Society were discussed in [3].

It is necessary to discuss the evolution of notion of Creativity (what It Is, why It Is Important, where It Is Used) in Conscience Society, analyze different approaches to achieve Creativity in Conscience Society (Creativity as a Brain Activity; Mastering Daily Life; Creativity and Profession; Piirto's six Steps; When and where Creativity Occurs; How Creative People are looked upon), and also manage Individual and Group Creativity in combination with Company Goals (Individual Creativity; Teams, Creativity and Product Development; Company's Product Development Goals; Entrepreneur's and Small Companies' Product Development).

2.1 What Creativity Is, why It Is Important, where It Is Used

There are two notions with similar meaning: *Creativity* and *Ideation*. Creativity has a more general meaning.

(1) Creativity is man's (in our opinion not only man's (Natural Intelligence) but and exclusive important computer's, that is, Artificial Intelligence's) capacity to produce insights, new ideas, inventions or artistic objects, which are accepted of being of social, spiritual, esthetic, or technological value. Creativity is a mental process.

There are two parts in this definition [2]:

- The *first* one considers a very large activity spectrum – starting from having insights and / or having new ideas – up to developing inventions and artistic objects. This opens the creativity door to every one: almost everyone has several new ideas daily. Therefore Creativity - in a larger sense - is a common activity of mankind (Natural Intelligence) and computer-kind (Artificial Intelligence): it belongs to the self Adapting Process to every day's life of natural and artificial

intelligence. A given level of minimum creativity is crucial to survive in the initial period of Conscience Society. Jane Piirto [6] said: "Creativity is the process of a life."

- The *second* part introduces a bottom limit in the very large creativity spectrum from insights to artistic objects: only these ideas, etc. which have intrinsic value – for others - are considered results of a Creative Process. All other, more personal results of a thinking process – necessary for individuals to cope with daily life - do not belong to creativity as this is defined through the quoted definition. Creative results are normally related to profession results: when we speak about creativity we mean professional creativity.

(2) Ideation is the mind process of forming and relating ideas, typically connected with new product development. The term ideation is often used interchangeably with "brainstorm", though brainstorm typically implies following a more specific group process while ideation is a more general term. Ideation is a concept utilized in the study of new product development.

Because Ideation is also a Creative Process, it could be regarded as a part of **Creativity**. A boundary between creativity and ideation cannot be defined, but we can consider that the creative processes are going much further and the results are more dramatic. Both could be considered also as a Psychological State of Mind in which an individual generates alternate scenarios or imagines things in a way that may contradict actual known and accepted reality

2.2 Analyzing Creativity

Creativity manifests itself in all situations of daily life. It is interesting also to analyze Daily Creativity Aspects, which serve only a person and therefore are not considered as belonging to creativity (see above definition): their mechanism could be the same as for more important Discoveries.

2.2.1 Creativity as a Brain Activity

Creativity is the result of brain activity. *Brain* develops many kinds of *Activities*; two of them are:

(a) activities which are ordered from the human will. It allows to the human being to move, to learn and to communicate with other human beings. It is a Conscious Activity. The conscious activities could be improved, trained, developed, and modified.

(b) activities which are not consciously coordinated: body's growth and evolution, breathing and supplying cells with oxygen, eating and transforming food in energy, birth of a new life and probably…creating new ideas. It is a *Subconscious* and/or *Unconscious Activity*. These activities – normally - cannot be influenced from the human will. They follow automatically, as if they were coordinated from a good programmed computer - analogy with *Artificial Intelligence Systems* is often used to explain brain functions [4].

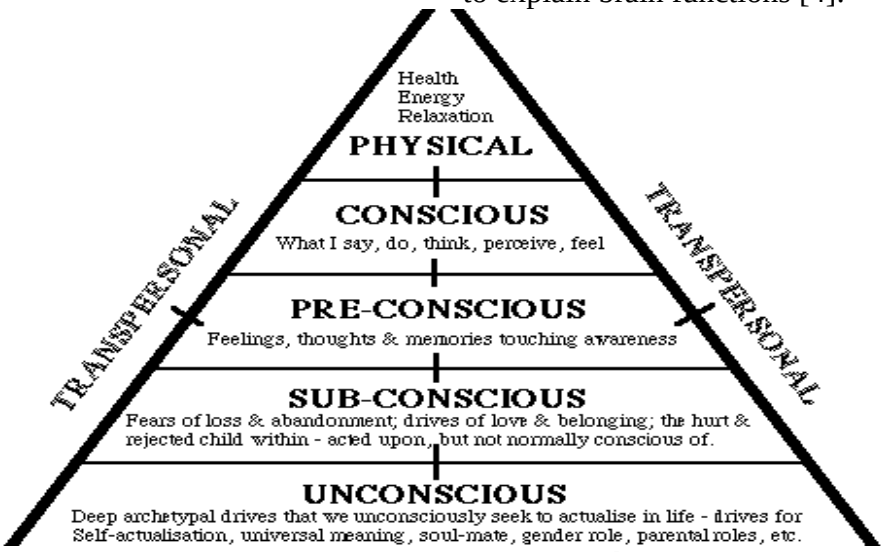

Fig. 4. Conscience pyramid

Consciousness (Figure 4) is subjective experience, awareness or wakefulness, the executive control system of the mind. It is an umbrella term that may refer to a variety of mental phenomena [3]. Although humans realize what everyday experiences are, consciousness refuses to be defined, philosophers note: *"Anything that we are aware of at a given moment forms part of our consciousness, making conscious experience at once the most familiar and most mysterious aspect of our lives."*

Some Asian populations – especially Indians - developed procedures to influence *not consciously coordinated body activities*. For instance some special trained people could reduce their own heart frequency to values around 10 beats per minute which, from the point of view of scientific medicine, means almost dead: but they survive without damages. They could also reduce the breath frequency to values under one breathing per minute, they could renounce at food many days: they survive. They could "meditate": that means they could eliminate every thought from their brain. All this capabilities show that the *"unconscious functions"* could be consciously changed. A scientific explanation for this possibility is not available today.

Some possibilities to enhance the personal creativity using procedures not checked from modern science are shown were used intensively and successfully from some managers, secrets agents and other persons who should keep a very high awareness level over long time under stress conditions.

The brain itself consists of some 100 billion neurons which are interconnected over 100.000 billion synapses. The number of synapses varies with the age and with the kind of intellectual activity: especially hearing regularly classical music contribute to an increase up to 30% of synapses' number [2]. Information is transmitted from a neuron to the next using chemical an electrical supports [2] every 0.005 seconds. Therefore the brain is the siege of a furious activity which occurs permanently. The advantage is that it allows a quick response to all excitements: a good trained and healthy person need only about 0.1 s to respond to a visual signal. But it has also a disadvantage: it hinders the brain's concentration on a subject. In order to do so, every person needs both special environment conditions and training

*Exercise***.** Please take a comfortable position in a chair in a dark room, close the eyes, remain quit and silent and concentrate yourself on your thoughts: do not follow any one of them! Let them pass through your brain and remain relaxed. Count the thoughts which you register. Don't follow them! Let them pass. You will find a number between 5 and 25 thoughts every minute. These are only the thoughts registered consciously: it is possible that some hundreds of other thoughts are circulating simultaneously in your brain but they don't came into your conscious. The conclusion could be that a chaos of thoughts reigns in the brain: this is probably his normal functional state.

In order to create a new solution it is probably necessary to concentrate the brain activity only on a problem: creativity is the result of concentrate brain activity. All other thoughts should be blend out.

Because the creativity process occurs in a particular brain, the result is attributed to an individual also in the case when a team contributed to realize favorable environmental conditions. "*Team Creativity*" means that such conditions were realized during team activity that one of the team members had a new idea.

2.2.2 Mastering the Daily Life

Daily personal activities happen following established routines; hence only changes in the environment could require a new solution. Small changes generate a spontaneous reaction: many of "new" situations occurred in the past, so the brain could review quickly one *in its own "archive"* and choose an already used solution. For instance: a person living alone would not think very long to prepare for

breakfast the same what he prepared yesterday: a toast with spread and a coffee with milk and sugar. This solution is available in "archive" and was recently checked.

2.2.3 Creativity and Profession

The thinking process of professionals is formed during their study time and completed during their professional practice. The profession specific thinking process influences decisively the *creativity*. Let analyze some people with *Identically Creativity.*

Mechanical engineers are using daily notions like: performance, consumption, efficiency, specific weight, cost, optimization, and the like. When they are thinking about *Creativity*, they would consider all possibilities to improve these parameters.

Designers are using daily notions like: shape, color, nuances, comfort, customer feeling, and costs. When they are speaking about *Creativity*, they would modify some of these parameters in order to enhance the customer's experience.

Marketers are working with notions like: customer value, competitors' position, strategic positioning, price, and many others alike. For them, *Creativity* means to find a unique combination of product parameters, product price, and advertising actions which would ensure the highest possible revenue for his company in a specific market. The *Creativity* worlds of these three professions couldn't be more different. It couldn't be a more difficult task than to balance them. But the company's success depends of a harmonious collaboration of these specialists and on synchronizing their *Creative Efforts*.

2.2.4 The Piirto's Six Steps

Creativity in the work place is connected with a special understanding for the working world, which isn't described sufficiently in the literature and wasn't discussed with young people. Only few of the young professionals know, share, and use it.

The activity in the work place is more than a job, a source of income, to pay living expenses, although many employees think this way. These employees are interested to keep their job, to do what they need to, and to go home as soon as possible: nothing less, nothing more.

But the work place is at the same time a permanent, very intensive, professional training place. If someone is interested and shows this interest to his employers, he would be assigned more and more complex tasks, with more and more responsibility. He would be encouraged to acquire deeper knowledge and experience, first in his own professional field and later in other, related fields. He would be asked to solve problems first related to new aspects of his profession, later to solve personnel management problems, accounting problems, marketing problems, and / or financing problems. The combination of specific techniques from every one of these fields offers the possibility to develop *Unlimited Creativity*. Successes in accomplishing such tasks bring not only a higher qualification, a higher income but also an important personality change: the personal attitude evolves from curiosity to professionalism. It brings also an incredible, incomparable fun in solving professional tasks.

Jane Piirto describes *Six Steps* to the *Creativity* top [2] as follows: 1) (acquire) Knowledge; 2) (develop) Curiosity; 3) (become) Interested; 4) Passion; 5) Dedication; 6) Professionalism.

Jane Piirto describes *Six Steps* to the *Creativity* top [6] as follows:

(1) (**acquire**) **Knowledge**. This is the first step in today's very challenging professional life. But knowledge alone is not sufficient, because it is a static concept. Most knowledge could be found in a library but there it has a static existence: nothing happens!

(2) (**develop**) **Curiosity**. Knowledge become interesting when someone become curios: how can this knowledge be used? Why it is so, and how can it be modified? Curiosity brings life in a package of

knowledge. But curiosity is still static; it means only accumulating more knowledge.

(3) (**become**) **Interested**. This means, a person starts to check what and how things can be done, how knowledge can be made useful for himself, for his company, for his country, or for mankind. The first **Creativity** attempts are made in this phase. When the first results are obtained, the interest has the chance to transform itself in.

(4) **Passion**. Man works intensively to develop knowledge, to create new devices, machines, or art works. The work brings satisfaction and this feeling makes work more interesting. The interest springs from special knowledge to the work place: man is passionately active and this gives him a sense of self accomplishment. His own **Creativity** level becomes higher.

(5) **Dedication**. Many years of passionate work achieves a blend between the person's own personality, knowledge, and the work field. Man is living to create values in his work place through knowledge. The person identifies himself with his work field and his knowledge. He starts to transfer his knowledge and personal passion to others, he creates a school which disseminates his own concept and knowledge. **Creativity** becomes permanent.

(6) **Professionalism**. This is the highest level of activity: man challenges himself and expects to deliver under every condition the highest quality of thoughts, products, or services. The person becomes a living example of perfection in his profession. His own **Creativity** is spread among his followers

2.2.5 The Piirto's 7i

We already discussed the problem of **Creativity** differences between people. Jane Piirto identified the following features which characterize highly creative people: (1) **Inspiration;** (2) **Imagery**; (3) **Imagination;** **(**4) **Intuition; (**5) **Insights; (**6) **Improvisation;** (7) **Incubation.**

Jane Piirto identified the following features which characterize highly creative people (the **7i**):

1) **Inspiration.** It is defined as "…an infusion into the mind or soul of an exaltation." (Oxford English Dictionary). Inspiration is a result of brain activity and is perceived as a sudden established connection between disjoined facts or ideas, which brings solution to a problem. How it occurs, it is not known today.

2) **Imagery. "**…is the ability to mentally represent imagined or previously perceived objects accurately and vividly".

3) **Imagination.** "…is a mental faculty whereby one can create concepts or representations of objects not immediately present or seen".

4) **Intuition.** It is the capacity to "feel" which one is the most promising solution, although a lot of important information is missing. It brings immense competitive advantages toward others, who are looking for scientifically or in other way defined "best solution". Creative people not only trust their intuition, they prefer to use it.

5) **Insights.** It is "the ability to see and understand clearly the inner nature of things, especially by intuition." (Webster's New World College Dictionary)

6) **Improvisation.** It means the replacement of necessary but not available best instruments, machines, devices, software, etc. through others, which are not so good, not so efficient, not so performing, but which are available. It means reaching results with improper tools. Improvisation itself is a highly *Creative Activity.*

7) **Incubation.** Incubation is both a personal characteristic and a parameter (incubation time) of work planning. Above, in chapter **"**Mastering the Daily Life", we discussed about the fact that *Creativity* cannot offer an immediate solution: it needs time to find one. For easier problems, a time period of some several hours to one day could be sufficient. In order to find solution for more sophisticated problems, weeks, moths, or

years are often necessary. "The mind is at rest. The body is at rest. You have gone to something else. The problem is percolating silently through mind and body. This is incubation."
The first six features listed in "7i" cannot be met very often in a given population. Only few people exhibit some of them. Only few exceptional personalities exhibit all features. Training methods are few and their results are not guaranteed but is very interesting to investigate its in the perspective to create The Artificial Conscience based on Piirto's Six Steps to the Creativity top (Table 5). That illustrate how seldom creative people can be encountered.

Table 5. Piirto's Six Steps to the Creativity top versus Piirto's 7i features which characterize highly creative people

Creativity top versus Creative feature	**Acquire Knowledge**	**Develop Curiosity**	**Become Interested**	**Passion**	**Dedication**	**Professionalism**
Inspiration						
Imagery						
Imagination						
Intuition						
Insights						
Improvisation						
Incubation						

In the process of creation of Conscience Society we will be very interesting to analyze many of possibilities to achieve the performance in Natural Intelligence and Artificial Intelligence, and, especially, of Artificial Conscience using the table **"**Piirto's Six Steps to the Creativity top versus Piirto's 7i features which characterize highly creative people". What have to be introduced in the cells of this Table (for example in the cell: *Passion / Incubation*)?

2.2.6 When and where Creativity Occurs

Statistical studies made in Europe [2] about creativity in technical and scientific field show that creative idea appear only seldom in the work place, but much more during free time.

New idea appeared during working time	**%**
Brainstorming and similar activities	1
During breaks	3
At work	4
During tiring meetings	6
During boring meetings	10
Total	**24**

New idea appeared during free time	**%**
During meals	3
During sport activities	4
While watching TV	6
During business trips	11
During holidays	13
Walking alone	28
During other activities	11
Total	**76**

That suggests a more complicated structure of the creative process, which could be characterized through the following:
(a) Most ideas do not appear during the intensive, concentrated, conscious effort to solve the problem. A new idea is "born" later, at a time when the person relaxes. (b) A new idea appears after a period of time: an "incubation" time – see Piirto - is required.

(c) It seems that in the time period from formulating a problem to the time when the solution is found, the brain is further working at the problem, even during the time when the person is not thinking or is not aware of it. It happens in the same way as other brain functions – breathing, digesting the food, growing tissue, etc.: *unconsciously* and *automatically*.

2.2.7 How Creative People are Looked upon

What seems to be sure is the perception that creativity cannot be planed. To be creative takes time, the result cannot be foreseen and it comes unexpectedly. *Creativity* needs conditions which do not match well with planned activities- used extensively in management. Therefore it is difficult to integrate creative people in a team: they are considered – very often – as arrogant, stubborn, uncompromising, tenacious, and persistent. All these are qualities which allow them to follow their own pathway and to create a new idea, very often against an important resistance and against generally accepted opinions. But these qualities are very different from the qualities which are asked for in a harmonious team. One needs a total team dedication to the final goal in order to integrate and support *Creative People.*

When the *Creativity* is working, the individuals, the team and the company hit success!

3. Conclusion

The Information Era is presented by and is developed consecutively beginning with Information Society through Knowledge-based Society and finishing in near future with Conscience Society.

Human-machine interaction in Information Society is provide by CBIS with its Software, Hadrware, People, Brainware, Knowledgeware, and Groupware component parts which develop their activities in Input, Storage, Processing, and Output phases.

Human-machine interaction is supported by KBSIS, which are represented by its technological (internet, WWW, e-books, artificial intelligence, nano-electronics) and functional (knowledge management for enterprises, global moral usage of knowledge, biological knowledge, care knowledge, durable and sustainable environment knowledge, thoroughgoing study, knowledge and innovation culture development, e-learning) vectors.

The Knowledge-based Society is a society with high educated habitants and therefore rely on the knowledge of their citizens to drive the innovation, entrepreneurship and dynamism of that society's economy.

Knowledge-based Society of Information Era represents some intermediate period between Information and Conscience Societies. This Society have to be thought of and developed in direction of Conscience Society.

Conscience Society will be a Society of Truth, Morality, Creativity, and Spirituality. It is based on conscience, which is usually see as linked to a morality inherent in all humans, to a beneficent universe and/or to divinity. Conscience is increasingly conceived of as applying to the world as a whole and as a main feature of Conscience Society.

In this communication was discussed some steps of Information Era Societies' evolution and some features of Creativity (Creativity as a Brain Activity; Mastering Daily Life; Creativity and Profession; Piirto's six Steps; When and where Creativity Occurs; How Creative People are looked upon) as one of the basic notions of Natural Intelligence development and Artificial Intelligence creation in Conscience Society.

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