Information, Knowledge and Life in the 21st century

Bhakti Vijnana Muni, PhD

1.0 Introduction

India is a leading nation with a large pool of well educated people in the Information Technology (IT) sector. Information is so important today that our whole lives depend on it as a social necessity. The influence is so widespread that even in the advanced study of biology information has become an important criterion. But India is also a traditional country. It has contributed to the whole world in science, philosophy, religion, universal peace, solidarity and happiness. Media in the 21st century has come to deal with matters of social engineering as a responsible dispensation. Keeping the broad picture within our heart, a synergy between the scientific structure of information and its intimate meaningful compliment on the human side, or knowledge, is essential to achieving necessary fulfillment in societal dynamics.

2.0 What is Information

Information is a sequence of symbols from an alphabet. Information processing in the technical apparatus consists of functions of inputs and outputs or a map between an input sequence to an output sequence. Strictly speaking the information in a string of symbols can be measured in terms of Shannon's entropy or by Kolmogorov's compressibility [1, 2].

The semantic side to information is not within the purview of the definitions given by the mathematical foundations in probability [1]. The syntactic side of information refers to the non-mental and user-independent string of symbols that is embedded in the physical implementations like newspapers, databases, web, compact disks etc [3]. Thus the standard definition of information is an abstract objective entity. Information can be encoded and transmitted, but information itself is that part of an encoded message that is independent of its encoding and transmission [4].

3.0 Information is meaningless and Knowledge is meaningful

Companies have to deal with something called 'knowledge management'. Today we have moved from an industrial age to the information age. Miller has considered this in some detail by identifying some contradictions that can be found in the notion of knowledge management [5].

When Shannon wrote his landmark paper on a mathematical theory of information in 1948 [1], he wrote in the abstract that, "Frequently the messages have *meaning*; that is they refer to or are correlated according to some system with certain physical or conceptual entities. These semantic aspects of communication are irrelevant to the engineering problem. The significant aspect is that the actual

message is one *selected from a set* of possible messages." Thus the strict mathematical definition that is useful for objectifying the message as a string of symbols of an alphabet becomes devoid of any meaning whatsoever.

But as we are confronted with knowledge management, it becomes crucial that the two words, information (as defined in technical jargon) and knowledge be distinguished. In the actual world of real people and relations we intend to connect people with reusable codified knowledge that is meaningful to both the sender as well as the recipient. Thus knowledge is a core asset and there is a heavy and aggressive effort to exploit and manage knowledge in the use of information technology.

Sometimes we take it for granted that meaning is intrinsic to messages (like words, sentences, etc.). So we imply some meaning to our idiomatic expressions such as, "if I have told you once, I have told you a thousand times." [5] In this way we attach meaning to our words. Without meaning, words are empty. Thus people take so much effort to present their words by considering time, place and the person for whom the message is intended. A book of poetry contains soulful reflections of the author on a subject. Without the author, why should a particular arrangement of letters of an alphabet have to convey any meaning? We rarely stop to consider these deeper aspects of information, but knowledge management is qualitative and cannot be expressed in mathematical definitions of information alone [6]. When information includes meaning it is called knowledge. In itself information has no intrinsic meaning, so knowledge means that meaning has to be personally assigned to information.

Sveiby [7] enumerates several distinctions between information and knowledge. Information is static, is independent of individual, explicit, digital, easy to duplicate, broadcast and has no intrinsic meaning. But knowledge is dynamic, dependent on individuals, tacit, analogue, must be recreated, and requires a personal aspect, either face to face or at a distance, and has to be assigned meaning by persons. Thus knowledge is personal and information is an abstract impersonal feature of personality. Knowledge means what we know, but syntactic information is devoid of any knowledge or meaningfulness in itself, when viewed objectively as a symbol [8].

But still information has its importance because it provides triggers to an alert person or interpretation by a cognitive agent like humans. Thus the life-long learning process could be accepted as the on-going re-construction of meaning stimulated by a perpetual series of I=0 events (I=0 is an expression coined by Miller to express that information has zero intrinsic meaning [5]). Information becomes knowledge at the moment of its human interpretation. Abstract symbols need mediation through personal experience to have any meaning. According to Myer words have no meaning and there is no direct relationship between the thing we are talking about and the words we use [9]. Only as these words are related through the thoughts of a person do they have meaning. Meaning is not intrinsically in the object or in the symbol but in the interaction of these through the human person [10].

Thus the most important necessity in knowledge management includes the dimension of humanness. In this way it becomes managing what people know and not merely what string of symbols are etched on a physical matrix. Therefore it is impossible to categorize and catalog knowledge through the limited notions of symbol manipulation that we have learnt in mathematics and physical-chemical sciences.

4.0 What all this means in the Study of Life?

The basic strategy in modern science has been to study the morphological forms of the body and cell objectively. The basic elements of modern science like atoms, molecules and forces account for the

predictability of physical and chemical phenomena but they fail to explain either the origin, behavior or evolution of living organisms. This is evident from the vast polemic literature that has accumulated about the inadequate concepts like Darwinism, neo-Darwinism, DNA Code etc [11].

By the turn of the 21st century, living organisms became recognized as intelligent and cognizant beings. They are goal oriented and adaptable within the definition of species. A standard test for animal intelligence is often tested by placing food within a maze. The same is found true for plants, for they also compete for sunlight and thus are considered intelligent and cognizant [12].

Thus the limited abstract symbol manipulation and the laws of analytical thought that underlie the logic of mechanisms don't work for living organisms. We cannot start from raw materials of matter and construct any living organism. All the experiments done with an already existing living organism, only demonstrate that the logic of life is not to be found within mechanism. Like animals and human beings, scientists have observed from the studies on plant movements that plants also play as well as sleep and thus there is the question of desire and fulfillment in plants also [13, 14].

All these discoveries mean that the paradigmatic logic of living organisms is that they are 'knowing beings.' Merely intrinsically meaningless information is not only inadequate but a false premise about the science of Life. Biologists like Shapiro [15, 16] indicate that when they say that cells are cognitive entities, they mean that cellular informatics is intrinsically cognitive or a paradigm of intrinsic knowledge management within the cell and the whole organism. The cellular processes can be written down as a series of algorithmic instructions in which the whole cellular apparatus participates without any Cartesian dualism. To unravel this mystery is going to be the major biological research goal of the present century. Thus gone are the hypotheses like the cellular automata of von Neumann, Chaitin and others like Alan Turing. The teleological concepts of Kant are confirmed within the biological world as the systemic concept of new biology [17]. The seed is the cause of the whole tree and the tree is cause of the seed. The cause and effect co-produce each other. Within the seed all the knowledge is self contained. Thus no amount of strenuous efforts in the last 150 years since Darwin gave his idea of evolution of life from simple to more complex forms, and of abiogenesis to biogenesis could be experimentally confirmed. Rather the idea of biogenesis or life comes from life has been confirmed. A cell comes from a previously existing cell of the same species. Another point is that living form is also the source of matter. Every life form produces matter that it needs. So much biomass exists in the whole earth and the biosphere that it is concluded that without living organisms the biosphere cannot be maintained.

One important point is that gene centrism, coming from the idea of central dogma of living organisms, has been invalidated [18], and thus the intellectual basis of cellular biochemistry experienced a significant change leaving the materialists completely bewildered. The call for a new biology became widespread. Shapiro coined a term called "Natural genetic Engineering" meaning that the cells have the knowledge to engineer their own DNA to adapt to the functional demands of their existence. Thus the cognitive tinkering within the cell is non-random, non-mutational, goal-oriented and self-directed cognitive activity which means it is intrinsically knowledge based activity and not explained by genetic reductionism of 20th century biology.

In a conference on the Origin of life organized by Sripad Bhaktisvarupa Damodar Swami in Protometica Hall, Rome [19], it was concluded that in 20th century science advanced by selecting relatively simple problems and has neglected the more difficult questions that are related to life. Words like God, soul, faith etc. have meaning for human beings and they are in the dictionary. They contain important content

and meanings. And we need to find how we can include them in our study of living organisms in view of the experimental knowledge that we have gained. This implies that we have to graduate from information to knowledge paradigm in biology.

This age of information that began in the last century changed everything for us who were in the industrial age previously, where most of the contact within human beings was personal. But information age meant that it became possible to deliver information (i.e. messages in symbolic form) accurately and instantly to others anywhere in the globe, whether we have any life experience in common with each other or not. Therein lays the essence of our problems that causes so many of our quite tragic human, social and organizational dilemmas. We can send information telegraphically, by media, by print or by voice instantly but we cannot be sure whether our message was received well meaningfully as we intended unless we had a personal knowledge of whom we are exchanging messages with, how they have interpreted it. The particular moods, thoughts and particularities that are there within each of us in our consciousness are not explainable with abstract symbols alone.

Thus the distinction between living organisms and artifacts is firmly in process of being established as a difference between knowledge paradigm and information paradigm. An engineer arranges wood, metal, stones etc. according the abstract thought in his mind in that physical matrix to make it work according to physical laws. He applies his knowledge to make an artifact work. A person who has not designed it but is well versed in design principles would conclude that intelligence was involved there but was external to it. And thus when we see a well structured sequence of symbols, we could infer there was intelligence external to it, but that the artifact works strictly according to the laws of physics and chemistry, and initial conditions as there is no more intelligence present intrinsically to find new end-points. But in living organisms knowledge seeking is intrinsically present and therefore as intelligence or cognition is present intrinsically, they are called as internally teleological process or end-point determining process, and thus are not describable by initial conditions, physical laws and mathematics alone.

Today in the age of advanced science and technology and within a multicultural and multi-religious background the greatest need has become that we have to deal with all aspects of reality comprehensively. We have a need to extract and distill the essence from the scientific knowledge in the light of the religious wisdom. There is a need of a very serious dialogue between the qualified and well trained scholars of all walks of life, including science, technology and religion. This will be the greatest social welfare activity as mentioned in *Srimad Bhagavatam*:

tava kathāmṛtaṁ tapta-jīvanaṁ kavibhir īḍitaṁ kalmaṣāpaham
śravaṇa-maṅgalaṁ śrīmad ātataṁ bhuvi gṛṇanti ye bhūri-dā janāḥ

“The nectar of Your (Supreme Personality of Godhead) words and the descriptions of Your activities are the life and soul of those suffering in this material world. These narrations, transmitted by learned sages, eradicate one's sinful reactions and bestow good fortune upon whoever hears them. These narrations are broadcast all over the world and are filled with spiritual power. Certainly those who spread the message of Godhead are most munificent [20].”

5.0 Conclusion: The Solution in Vedantic Paradigm

In the light of the information age and its meaningfulness only in its relation to human experience, it could be said that we cannot have a scientific concept of a reality without including the study of

cognition. As Hegel said, “The Idea of Life is concerned with a subject matter so concrete, and if you will, so real, that with it we may seem to have overstepped the domain of logic as it is commonly conceived. Certainly, if logic were to contain nothing but empty, dead forms of thought, there could be no mention in it at all of such a content as the Idea of Life. But if absolute truth is the subject matter of logic, and truth as such is essentially in cognition, then cognition at least would have to be discussed.” [21]

We cannot conceive of an object without a subject and a subject without an object. Material science’s bane was that it attempted to separate what was inseparable. Life means an object that reflects onto itself. Life means a sentient being. Life means sentience, where a subjective paradigm is intrinsic, and not merely external to it. Life is thus a sentient object. Life is both a subject as well as an object, both a mind and body. It is an object that is object to itself. But an object that is object outside itself is called inorganic or matter. Life as subject means that it is for itself. It thus supercedes matter as it is an object for a subject.

This is the critical presentation of Vedanta: life is superior to matter. Matter is the objective knowledge of a subject, or its self-externality. In today’s meaningless world of science and technology, we cannot deal with human needs adequately. We can only study the abstract molecules and symbols: but as Nobel Laureate Szent György [22] said, in that approach life had slipped out of his fingers and in old age he was retracing his steps. Scientific advancement alone cannot give us fulfillment.

When we reflect deeply we can understand easily that words are abstract representation of the thoughts of the author. Thus the Scriptures come from the thoughts of the Supreme Being. It was the advice of Sripad Bhakti Svarupa Damodar Maharaja that we can take the scriptural axioms and apply them to our day to day life, and when we will get results, they will be scientific. As Hegel says, the beginning, the process and the result all are there in the movement. When we will develop more respect for what is God-given then we can find meaning in our lives and we can truly begin our search for eternity, cognition and fulfillment tangibly in the right direction. The words of the pure devotees of the Lord which are broadcast all over the world are full of meaning and substance, and they can fulfill the purpose of human experience. The author would take this opportunity to acknowledge his indebtness to his most kind teacher Sripad Bhakti Madhav Puri Maharaja, PhD, for encouraging him and teaching him the fundamentals of science, philosophy and Vedanta, only on whose strength the author has humbly attempted to write something. The author is also indebted to Srila Bhakti Nirmal Acharya Maharaja for the encouragement he is giving for all works meant for the welfare of the whole of humanity.

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