Information is a Form

of Energy

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INTRODUCTION

As science has extended our vision and perception, it has become clear or known to us that information or information systems have existed since the existence of matter and life. It has now been theorized that all forms of matter and life are made of the same basic materials, though in different arrangements. (1)

The importance of information was recognised in all stages of human history though in different degrees. As man, society and their accompanying technology become more and more complex, the problems more complicated. Compared with their counterparts of fifty or a hundred and difficulties facing leaders, managers, administrators, scientists, engineers and teachers etc., whether in peace or war, become increasingly years ago, today's leaders and managers etc., are confronted with the need to make decisions much more frequently in situations and conditions which involve an array of variables, each of which has a different outcome. Man and society today are living in an age of information explosion or revolution which has certainly had a profound impact upon all types of organisations. Various estimates have been made in connection with this revolution, some for example, said that man's knowledge is doubling every five to ten years and that this rate of information is accelerating. Some estimate that 85 to 90 percent of the scientists of all time are now living. (2) Thus, a relevant stand-by information system for today's man and society is vital. For this reason societies and organisations that want to survive must undertake a specific effort to design and institute information systems which best fit or meet their current and future needs.

A. Information manifestation in matter and life :

1. Information Manifestation in Matter

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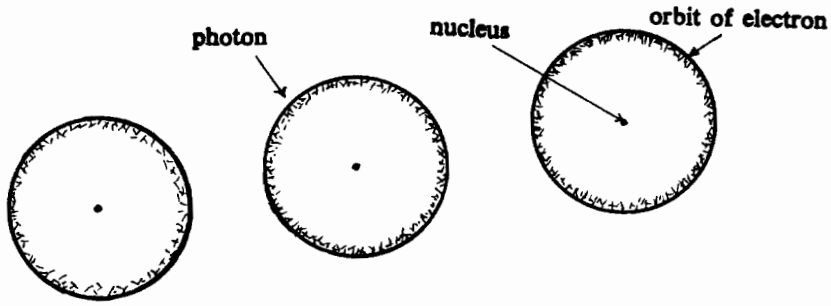
Chemists, physicists and biologists have fairly recently began to consider chemicals, sub atomic particles, atoms, molecular aggregate, huge megomolecules to the lowest phylogenetic level of life the cell, at their basic levels as pieces of information or data (3). They are considered as specialised sorts of "Memories". An atom of hydrogen, for example accepts only very limited frequencies of energy to transfer its electron to an outer orbit around the nucleus. If the quantuum of energy, the photon, is not in agreement with the frequencies of the hydrogen atom, the atom will reject it. On the other hand, if the frequencies of energy match with the hydrogen atom frequencies, it excites the atom to absorb the energy and consequently move to a higher energy state, called the "excited" metastable state. The electrons in the outer orbit of the hydrogen atom will concurrently expand their boundaries to a new horizon (4).



Atomic "growth" exemplified in an atom of hydrogen. As energy of the proper frequency enters, the system expands to a higher energy state and the electron moves to a new orbit.

Even at the most fundamental level of matter there is some "meaning" to the different frequencies or forms of energy available to an atom. This kind of "Meaning" can be defined as information.

According to chemists and physicists "the chemical and physical properties of an element are governed by the number of arrangements or (programmes, frequencies) of the orbital electrons, that is by the atomic number".(5)

If we proceed to higher levels of matter we find that atoms will likewise relate only to certain other atoms and molecules. "The electrons in the outermost shell of an atom are generally the ones concerned with bond and compound formation, and from energy considerations molecules are formed only if each atom acquires a stable electron configuration in the process'.(6)

In other words, atoms carry their own information to each other, by for example, the number and type of possible bonds available. The particular set of such physical information determines whether the bond is obtained by losing, gaining, or sharing of electrons, and whether a molecule will be, say, sulphur or gold. In each case, we cannot produce a particular molecule unless we put together the physical information required. In the formation, the atoms of the original molecule make up the language — the code — that carries information necessary for other atoms to join the group in a specific formation. "They experience what is called a "stereochemical sympathy" between each other. Here as elsewhere in our universe, information determines the probabilities of occurance of an event."(7)

2. Information in Living Organisms

Although a mixture of chemicals does not make a living organism, a living organism, like the rock and the cloud, is composed of molecules and atoms, arranged or programmed in a special way unique to living organisms.

The phenomenon of information in living organisms is most eloquently expressed in the complex bits of information carried by the molecules of DNA and RNA in the chromosomes of biological systems. Whether a person has blue or brown eyes, dark or light skin, long or short arms, and the rest of the data needed to construct a living human made up of sixty billion cells are orderly encoded in the chemical memory of the germ cells. (8)

Every species of animals has a limited number of chromosomes, that appear when the cells of its body undergo mitosis. Every cell in the body contains the same number of chromosomes of the same size, shape and quality. "Observations indicate that

chromosomes do not move at random, but form a sort of mosaic with respect to one another in a definite order. They retain their individuality and genetic continuity from generation to generation". (9) Therefore, if the internal genetic information for brown eyes is present in enough quantity, brown eyes will occur, on the other hand, if the genetic information available is for blue eyes, blue eyes will occur. Otherwise, if a person born with blue eyes wants, for some reason, to change them to brown, he can be provided appropriately with this by the use of external information, with tinted contact lens, so that brown eyes result. "In all cases, in the phenomenological universe an event can occur only if the proper information is present."(10)

Norbert Wiener, a remarkable pioneer in the science of cybernetics expressed his belief in the necessity of information to organisms by saying "any organism is held together — by the possession of a means for the acquisition, use, retention and transmission of information". (11)

3. Information in Human Life

Being able to form new responses and to learn more complex behaviour from experience, example, imitation of animals copying the animal use of physical tools), the advantages of large-scale and long term memory and the functionality of his hand, Man began to learn how to extend his capacities beyond his genetic information (inherited equipment). He began to add new kinds of information to his already existing internal system. Thus, he greatly increased the opportunities for his survival and reproductive growth potentials.

"The discovery of Man that he could actually copy and amplify his own sophisticated biological system set the stage for the so-called 'Technology' that would one day sseem to threaten the world he had revolutionized". (12) Another major step or leap in the advancement of Man's mastery over other species took place, perhaps, three million years ago, when man developed the power of extended symbolic speech. If we dig deeply into this major development, we find that the emergence of language was not different from cells using DNA and RNA code information to carry protein messages. The emergence of language became the dividing line separating Man from less advanced

animals. It became the primary departure point which separated the physical growth from the new, high level continuun of psycological growth. Only through a language can Man accumulate the information he gets through his interation with his fellow men and the environment. Such information caused great changes in the basic behavioural patterns of Man. With this means,trans mission and diffusion of new information from generation to generation became possible.

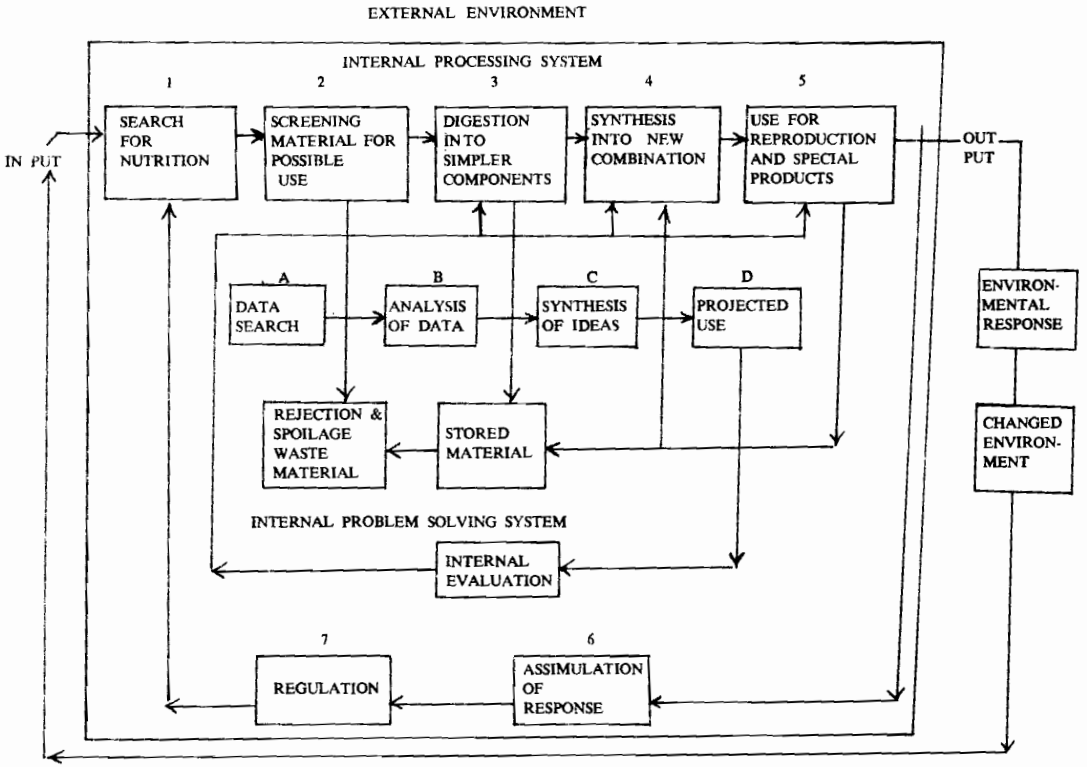
Recognition of the enormous "Magic" usefulness of language lead Man to protect it and preserve it in different forms and techniques such as towtem, taboo, and secret rituals. By such memorial techniques (socialization or programming) acquired information was memorized (recorded) in the hearts of the tribe and then passed by to new generation.

The third major step or leap in Man's march toward advancement took place, perhaps 50 to 100 thousand years ago when he could develop an extra-ordinary new information — presentation and handling system, later on called writing. Man's primitive cave paintings, markings on bones and pebbles preserved information which was considered most critical or most important by him and to him. In these times "The development of information coding from the thing itself to a realistic representation, to a stylised symbol, and then to a brief code, is much like the way we save information in simple codes in computer memories and the like. The result is to enable storage of much data in the same space, whether it is a brain or a filing cabinet." (13)

It is self-evident that this new information — storage process — led in a relatively short time to the technological society we witness today. Analogically speaking, recorded information became the new genetic construction or ectogentic system of writing which enabled Man to make vast leaps in development.

In light of this, the development and advancement of societies, groups and individuals could be considered a function of information. Stated in other words, the difference between societies, groups, and individuals could be accrued to the difference in the amount and quality of information each possesses. The development gap which today exists between individuals, groups in the same country and between countries is in fact a reflection of the information gap that exists between them.

FUNCTIONAL BIOPSYCHOLOGICAL PROCESSES AND SYSTEMS AS THEY OCCUR WITHIN ORGANISMS, HUMAN THINKING AND PROBLEM SOLVING PROCESSES.



COMPILED FROM GEORGE T. LAND, OP. CIT. FIGURE 18 PAGE 77 AND .....
FIGURE 37 PAGE 102.

1-9 To increase in size, quantity or degree, or in some specialised manner.

1-10 To increase the quality of metabolically active protoplasm, accompanied by an increase in cell number or cell size or both.

1-11 In natural science, growth is clustering, joining, bonding, synthesis, dynamics.

1-12 Growth is information.

In spite of this diversity and confusion, growth — oriented definitions and explanations have not been abandoned. Being in desperate need to describe, explain or understand any fundamental processes known to us from the joining of sub-atomic particles to the putting together of thoughts into ideas, we have to use some word, and the word "Grow" comes as the closest to express the phenomenon. If we dig deep into the basic nature of the concept of growth and of the definitions, we find a common denominator — "Growth cannot occur independently — it requires interaction and interrelation between the growing thing and its environment". (14)

In other words, nothing grows totally from within or from without only, something from both must be integrated to make growth occur. Whether the word we use is growth or otherwise, the process — requires a joining of things. Accordingly, an atom organism acts on its environment before it reacts to it. This is a very basic law of nature which is manifested in all processes : actions produce reactions, neither one is separated from the the other.

In light of this law, we can say that things act on each other by their mere presence, and if they join in some manner, growth occurs.

B. Forms of Growth — Information

Growth forms can be divided into three distinctly different forms, each of which emerges into the other in a continuum of levels of growth.

B-1 The accretive (additive of sameness) form. It is purely additive in nature. It is merely the extension or expansion of the existing boundaries. It is the enlargement or accumulation of sameness without change in the basic form. Accretive growth or information is static, with little new data combination possible.

In human terms, children were once considered — in early stages of human development or in backward societies — literal extensions of their parents. They were socialised or socially programmed to be the same as their parents or strict copies of them. Information/culture was rigidly controlled and passed to new generations almost unchanged. Thus, the earliest and underdeveloped cultures are fundamentally accretive. Accordingly, a system or society which closes the doors against new information to guard old patterns finally becomes isolated or strange in the over all system (society at large) around it. Such systems especially in the public sector, (15) may be for a time maintained by perpetuation but a day will come when such systems become extinct and are replaced by other advanced ones.

Education and training in many Arab countries and developing countries as they exist today can be characterized as an accretive act in which the teacher/trainer attempts to store in the brain of the student/trainee the same information stored in his mind and to impose on him the same traditions, habits, dress, speech and thoughts. This kind of education and training does not contribute to effective growth because it inhibits discovery and mutual growth of the young.

B-2 The replicative growth/information form

The main characteristics of this form is the influence the initiator exerts on the initiatee to take on its form. When a cell grows it divides, the two daughter cells become replicas of the mother cell, and the boundaries are no longer within the boundaries of the original cell.

Children in more advanced information/cultures were once

taught to be similar to their parents but not identical. Some room was left for individual differences. In replicative growth, although the basic character of the initial information is present in the originated cell or child, there is some opportunity to introduce new ideas.

B-3 The reciprocal interactive growth/information form :

This form is a truly two-sided exchange of information or communication. (16) Mutual growth or information provides enormously increased openings for new information data to be generated or combined. This form of growth or information can be noted easily in a more advanced information/culture of parent — child relationship in which the parents (or teachers) learn from their children/students as their children learn from them.

The main characteristic of this level of growth or information is the give and take or the sharing or joining process. It is the highest or most advanced level of growth or information. It is the product or the culmination of growth at the accretive and replicative levels. If we look into all forms of matter and life we find that the process of growth continually transforms itself into even higher levels of growth, trying to reach this level.

Growth of sub-particles leads to atoms, atoms to molecules, molecules proceed to cells, cells join to become multicullars and organisms repliculate the growth processes at the biological, psychological and cultural levels.

With the arrival of large-scale printing and other broad information — sharing and communication media, the pressures for mutuality began to overcome replicative defenses. The industrial revolution and lately the technological revolution (post-industrial revolution) were land-marks or milestones in the widespread mobility, and information sharing situations which weakened conformity to old patterns, and created much higher probabilities for combining new and different information ideas and cultures. History tells us clearly that a blind conservation of the past is not a setting for survival but for extinction.

The pressures of new information naturally create a strong demand for higher growth levels. This eventually creates constant disequilibrium in environmental and life systems, and this inevitably results in the dynamism that some rulers, managers, supervisors, and teachers, etc. see as uncomfortable and threatening. Although human life, with the intelligence and will of Man, has developed to higher levels because of such disequilibriums, some see this disequilibrium as the enemy who will usurp their privileges. Thus, they blindly try to keep the old patterns of growth which served the purpose (performed and accomplished their role) in the past and handicap new patterns which best fit the requirements of the new stage of development. They try to use the old frames (of reference) to embrace the new pictures of growth. They try to prevent new information from performing its normal growth function which is, in the long run, impossible. Perhaps this is the dilemma of development and change in most developing countries.

What does this mean?

It means that an individual born in an information-rich-culture becomes a more successful environment transformer than the one born in an information-poor-culture. "For teachers and parents, this means that providing a belief in dignity, respect and self-affirmation by being willing not only to educate but to learn and mutualize with children and allow the expression of their growth through affecting their environment." (17)

As for other institutions, they should recognise the latent developmental values existing in all men, and provide opportunities for all to contribute to mutual growth by abandonment of the "I alone know" approach.

Mutual growth laws tell us that withholding too much information can be detrimental to business effectiveness, especially if the organization is trying to encourage participative management, since participative management seeks to narrow the information gap between managers and subordinates by having them, at all levels, help formulate decisions and solve problems that affect their jobs.

A BRIEF ANOLOGY BETWEEN GROWTH/ INFORMATION SYSTEMS

No. The Biological System (the Cell)	The Psychological System (the Psyche)	HUMAN MADE SYSTEM	
		Problem solving system (Research)	The Business organisation
All organisms convert materials from their environment into living and life facilitating substances in seven basic acts.	All "Psyches" try to convert new information from environment into living and life facilitating information in seven basic acts.	Problems solving in its basic form, is the seeking of answers to question or hypothesis.	One of the most common and useful methods of classifying managerial functions is grouping them around the following activities :
1. Act of searching or probing-ingestion of resources (a hungry cell). This act is a manifestation of an open system.	1. Act of searching. The first psychological function to occur in all normal infant behaviour is that of a hungry "psyche" curiosity. The what is it? preflex. The child's why. Accordingly, the first prerequisite for psychological growth is the availability of sufficient "nutrition" information.	1. Act of searching for available knowledge and information (a hungry researcher or manager/ student etc.).	**A. Planning**
2. Act of screening or discriminating selection or rejection of substance.	2. Act of screening of information/data for usefulness (selective perception).	2. Act of analysing or breaking down of information and digesting of data.	1. Setting of objectives.
3. Act of digesting; another act of screening to determine which chemical components into new compounds often dealt with previously stored information (conversion of resources into fuel).	3. Act of digesting and analysing of screened information.	3. Act of manipulating knowledge and information through imagination into new synthesis, e.g. into a hypothesis or ideas.	2. Perception of opportunities, problems and alternatives.
4. Act of synthesisting or recombining of usable components into new compounds often dealt with previously stored information (conversion of resources into fuel).	4. Act of reassembling or synthesising of information into new arrangments.	4. Act of internally projecting the use of the idea.	3. Diagnosis of opportuities, analysis of objectives, and selection a course of action.
			4. Designing a programme for action to achieve the objectives.
			B. Directing
			1. Leadership is the necessary organisational action required to achieve the designed programme including communication and motivation of subordinates.
			C. Organizing
			1. Supervision of action plan through the organization whose task relationships are defined and understood.

5. Use of the converted material fuel (energy) for growth or expansion of cell for reproduction or for specialised products to be used later by the organism. 6. Act of assimilating the environment's reaction (feedback). Being an open system, the cell listens for both negative and positive feedback to open or close the loop of systematic activity. 7. Use of feedback information (criticism) to regulate or mediate subsequent growth activities. The cell is a self renewal growth and duplication machine. This is the basic difference between life and non-life systems. Cybernetic systems depend on self corrective feedback, while an organic system development of potentialities depends on the possibility of a positive-nutritive informative feedback from the environment. The amount and type of feedback that take place in an organization often determines its climate. The climate can be described in terms of the organization-information-communication policies.	5. Storage of the recombined information as memory for later use as reflected in behaviour, articraft, or a special product. 6. Act of assimilating responses (feedback) of the social environment by internal and external expansion absorption from the environment. 7. Act of regulating subsequent activities. Feedback either closes or opens the loop of the human psychological growth system.	5. Act of executing the solutions for their "fitness" e.g. their potential effect and value and the probable feedback that will be received.	**D. Controlling** 1. Observation and measurement of performance against standards set for achieving objectives and correction of performance when required. 2. Observations of significant trends, so the objectives and programmes may be modified as necessary. **E. Feedback** Recycling of information concerning plans and actions and progress at different stages of the management process.

FUNCTION OF ORGANIC SYSTEMS & THEIR TECHNOLOGIC EXTENSIONS DEVELOPED THROUGH HISTORY

Ectogenetic Period (yr. Approx.)	Boundary Protection	Mechanical & Support	Energy	Transport	Communication	Perception	Processesing & Control	
	Skin, hair etc.	Bone Skeleton Cartilage	Food Muscle	Circulation Systems	Nerve Systems Signals	Senses	Brain	
5,000,000 B.C. pre-writing & Notation	Animal skin tents fences huts armor	hand axe wedge lever drill throwing stick bow	fire human group-effort	paths rafts beats	messengers verbal & skin language notation drum horn paintings			Surface phenomena exploration
10,000 B.C. Writing & block printing	bricks cloth fortified village buildings	crank wheels pulleys looms force pump molds valves	animals wind water gun-power agricul-ture mills	wheel roads carts carriage ships irrigation canal & locks	writing paper scribes block printing books relay stations towers navigation	spectacles telescope clocks		
1500 A.D. movable type printing	Iron structures cement glass cities	Gears lathe machines bearings	steam agricul-ture implements electri-city food-can-ing fertilizers	Steamboat railroads bicycle	movable type printing camera typewriter	miscroscope sepectros-cope thermometer barometer	automatic valves tabulators	substructure exploration anatomy chemistry biology
1900 A.D. electric & electronic communica-tion	Synthetic & alloyed mts. Plastics etc.	cantilever machine tool factories mass produc-tion	internal combustion turbines nuclear power	automobile aircraft rockets	phonograph motion pictures telegraph telephone radio television Xerograph	X-rays electron microscopes remote cameras sensing instruments	automation cybernetics computers	infrastructure exploration

SOURCE : George T.L. Land, op. cit., p. 62

C. Information is a form of energy

If we enlarge our perception of information, life, energy, and matter, we can begin to comprehend a large body of phenomena. Enlargement of our perception of information is necessary to explain why information accumulates at higher levels of organization. In this papers we have looked at information as something "that determines the probabilities of an event". If we examine closely this new concept of information we find it introducing the idea that information is a form of energy in both the potential and kinetic forms, for energy is a capacity or ability to do fork. Information, as we have seem, causes atoms to bond, and molecules to form. It, in fact, provides our food and our thoughts. In each case of interaction, whether in matter, life or between individuals, groups and societies specific forms or programmes (frequencies) of information must be available to get work done. Energy must be expressed in a form that can be meaningful (understood) at every level of growth or interaction. Information is a form of energy in both kinetic (when used or applied) and potential (when stored) forms.

As we have stated earlier, growth is a process that depends on the joining of information. Growth occurs when there is meaning or agreement in the linking of information. When growth occurs, higher levels of organization come into being as expressions of growth. "A photon of light is omitted from the sun and through photo-synthesis, becomes plant life, converting carbon dioxide into oxygen and into the vegetative informational nutrition that sustains animal life. As this level of organized information is absorbed in the animal world, it reaches new heights of organization, joining in larger and larger molecules, becoming cells and the energy to drive them. It can ultimately become the material by which we move, speak, and think. If information is in an inappropriate forms as a chemical for example — it can become toxic and cause life to cease. Yet it constantly finds the right forms to support life and to support its own transformation to becoming parts of larger organization". (19)

Just as the atom — "knows" what information it can accept for growth at the level of the photon, we, psychologically speaking, recapitulate the use of information we learn by communicating with one another using the same mechanics. We, through and due to the process of socialization, become programmed like the atom. We accept information/data or not, depending on their frequencies

(waves) of energy. If these information/data frequencies we are exposed to match with ours, mutual transmission and receiving — interaction — and consequently growth takes place. Physically speaking, our ears are able to absorb certain waves of sound. The method of arrangement of the "sound energy" gives us specific information. A similar thing happens with our eyes : they are able to absorb certain photons of light. The method of arrangement of the "light energy" gives us specific information. The same happens with the rest of our senses. Through the forms of information/ energy we get by our senses, we become able to grow. If we enlarge our perception of information a little bit further, we can consider information as power or capital. Other forms of capital are equal, organisms, organizations, groups and societies that successfully grow are able to do so as a function of the information they possess. Accordingly, organizations, groups and societies may be easily defeated or made extinct by much smaller organizations, groups and societies which have relevant or better information or new ideas in the area of competition or conflict. The force of information or ideas whose time has come is irresistable except by better information or ideas. While the process or concept of entropy (originated in thermo-dynamics) disorganises the matter and organisations, syntropy reorganises them at the same time. That is to say, disorganization and disorder can be resisted only by organization and organization depends mainly on information.

Syntropy seems to be a second basic principal in the activity which tends towards unity, symmetry and coherence, a force of attraction comparable to the universal force of gravity. Because no organization of information can achieve an absolute state, entropy and syntopy are complementary: entropy disorganizies and syntropy organizes. Entropy aids syntropy (reorganization) by helping break down old materials, and syntropy aids antropy by resynthesising new materials. Entropy's function is catabolic and syntropy's function is anabolic. Organization cannot exist without disorganization as life cannot exist without death, for organization or life would have nothing to recombine or resynthesize to achieve higher levels of organization, (growth). If they were in a static equilibrium, disequilibrium would stand as a means for higher and more definite dynamic equilibrium or organization. Disequilibrium contributes to dynamic equilibrium in a specific casual chain.

This phenomenon suggests that organizations and institutions whether for services or for production form local spaces within their bodies in which the general increase of entropy is arrested by allowing meaningful (usuable in decision and problem solving) information flow in the organization or institution. Otherwise, a high degree of disorder (entropy) confronted with a low degree of order (syntropy) takes place. If a survey of human progress from the vacuum of space to the ocean deeps, inventions and technologies (extensions of man's biological functions) is made, we may find that the total progress of man achieved was by combining information in new ways. Man became the Master of our planet and superior to all biological organisms due to his unique capacity to store and to use the massive and growing pool of information in an integrative manner, which allows new information to contribute to the growth of mankind as a whole.

In conclusion, it is crucial to regard information as literally a form of energy, the fuel for engines that carry the processes of life toward higher levels of organisation. Sharing of information provides the possibilities of growth. The more appropriate the available information is, the more growth occurs. If information is absent or inappropriate, growth will not occur.

D. **How can an information system contribute to the purposefulness of an organization?**

Information, as we have seen, is the life-blood of organizations, consequently no organization can survive without a functional information system. To be functional, designers and installers of information systems should ensure that the information systems they design and install produce information characterised by :

1. Fitness — significance, relevance and usefulness — otherwise natural selection will extinguish the organization at least until such time as it can fit into it. Although repeated exposure to information is enough to establish preferences, information to survive must be satisfying and self-reinforcing to the legitimate user. Stated in other words, information must be useful to the subject of growth in order to be substantially accepted. Biologically and psychologically speaking, organizations and ideas survive and reproduce only when they serve either the biological system or the psychological system. Information becomes most useful or most energetic if : (20)

a. It deals with vital aspects of the organization concerned.

b. It is sufficiently liable to serve its purpose.

c. It reaches soon enough to enable those concerned to act.

d. It comes in an understandable (digestive) form.

e. It is accompanied by an appropriate basis for comparison.

In other words, designers and installers of information systems should design and install quality filters which should be directed, explicity at filtering unreliable, irrelevant and meaningless information/data at the point when the information is received, and later throw out information when it is no longer of any use. (21)

2. Information is less likely to produce new higher levels of organization in closed or static systems or environments. It flourishes in those that are open and flux. The destiny of dinasours and dictators testifies that aggressive intruders in the course of normal growth/information cannot survive.

3. Successful information is not restricted to correct or feasible information. It cannot be known if information is good or not until it has been tested within the system. Information surviving in practice in the system is automatically reproduced over and over, and consequently, becomes part of the preferred information in social/psychological systems. There has been a growing awareness that the prevailing information system in organization may not be the best to serve it in the changing environment in which it must operate today. Expressed in another way, we should not claim that the information we have is the last or the best information we may have.

4. The leader, the manager, the supervisor, the administrator, the engineer and the teacher, etc. who make things happen realize that information/communication is at the core of most problems and work to facilitate the information flow every day. They are conscious of the many variables (pieces of information) that influence the people they interact with, and take these variables into account when they make decisions which affect them.

To achieve highly functional information, the leader, the manager, etc. should consider the total environment in which his followers/subordinates operate. He should try to become sensitive to those variables which abolish barriers of communication and information. By doing this, information "frequencies" can match their built-in "frequencies". As we have already indicated, every individual, through socialization/education and training has a kind of "black box" similar to that of an aeroplane. To stir communication or to originate information we in him. To stir communication or to originate information we need to look into the box to get acquainted with its information contents. Using the terminology of today's communication/ information, the brain of almost every individual person is being filled with files, cassettes and/or cartridges on which information about different subjects, social, politics, religious, etc. are being recorded through socialization. To be able to communicate with and understand others we should be sensitive to their feelings, social needs, and the physical and psychological fields they grew up in. If we master this skill in an information exchange, we become able to transmit and receive information from our colleagues, superiors and subordinates. To achieve a very high level of success, a person must be able to diagnose or pinpoint the causes of information breakdowns and abolish them, before they critically expose the life of the system to death.

Just a final worthy note to remember : The unique characteristic of information is that it increases as much it is used. This resourceful characteristic of information as energy is not enjoyed by the other forms of energy which decrease as much as their use is increased.

(1) Karl A. Stiles, et al, **College Zoology,** (London : The Macmillan Company, 1969) P. 11-22.

(2) Speed of computation in the electronic computer has gone from 100,000 additions per second in the mid-sixty to 200 million operation per second in 1974. The index of industrial research and development in U.S.A. has climbed from 100 in the base year of 1953 to over 400 in 1965. The C-141 star lifter air craft, required about 250 engineering design change per week. Papers published on maser-laser grew from 10 in 1950 to 300 in 1960. From : Robert G. Murdic and Joe E. Ross, Information Systems for Modern Management, (Englewood Cliffs, New Jersey : Prentice-Hall Inc., 1975) P. 18.

(3) Some writers make distinction between information and data. To them, "information is the behaviour-initiating stimul between sender and receiver transferred through communication". Information affects the behaviour of men and machine, while data are recorded symbols and observations that are not currently affecting behaviour. Data base for computer systems consists of massive of such signs that are not affecting behaviour. Until the data are actually viewed, and properly organised for a manager, supervisor etc., so that he reacts to them, they are not information. Ibid P. 439.

(4) George T. Land, **The Unifying Principle of Transformation,** (New York : The Golden Press, 1973) P. 12, 13.

(5) J.D. Lee, **Concise Inorganic Chemistry,** (London : D. Van Nostrand Co. Ltd., 1969) P. 7, 9.

(6) **Ibid,** P. 10.

(7) George T. Land, **op. cit.** P. 13.

(8) **Ibid,** P. 13.

(9) Karl A. Stiles, et al., **College Zoology,** London : The MacMillan Co., 1969) P. 21-22.

(10) George T. Land **op. cit.,** P. 14.

المعلومات كشكل من أشكال الطاقة

حسني عايش

تتناول الدراسة هنا موضوع المعلومات واهميتها في شتى المجالات .

وقد ربط الكاتب هنا ــ فيما يبــدو انه ربط غريب ــ بين المعلومــات والطاقة ، ولعل ذلك يكون حافزا لمزيد من مثل هذه الدراسة في المستقبل .

ولعل هذاالربط ينطلق اساسا من دور المعلومات واهميتها في ادارة كافة المؤسسات العامة والخاصة عن طريق وسائل الاتصال المختلفة التي تقــوم فيهـــا .