

Information: Nature, importance and functions

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Information is all around us and next to matter and energy it is the most important and common entity in this world. It moves the world. Being a much over used term it is least understood and there is no consensual definition of it. But its properties are numerous and well recognized. It keeps moving a system be it bio, astro, social or mechanical. For an animal it is the product of being conscious. It is formed through sense perception in the brain but needs a physical media for its recording and communication. It is recorded as graphic visuals or electrical pulses or electromagnetic waves both in audio and visual forms. The article enumerates its various physical, economic, political and social properties and functions. Information has become a great and inexhaustible resource in national development. To live effectively is to live with authentic and adequate information. But it needs knowledge for its effective application. Without knowledge, information may be all heat and smoke without any light. The article emphasises that information literacy is instrumental in empowering citizens in this complex and sophisticated social world.

Key words: Data, Information, Information literacy, Knowledge, Properties of information, Sense perception

Introduction

The entire cosmos and all its geo, astro and bio constituents and phenomena comprise of only two entities matter and energy which are inter-convertible by the Einsteinian equation $E=mc^2$. Next to these, the all pervasive information is the basic component of this universe. It is the life blood of any system be it mechanical, biological or social. Despite being all pervasive it is not easy to define information. When used loosely it means everything and nothing. Consensual definition of information is a problematic area of philosophy and science. Though its properties are well known, its functions are unaccountable. No wonder its definitional essence is elusive due to its broadness and vagueness¹. It is the much overused but least understood term of our times².

It may best be defined as “Patterned matter-energy that affects the probabilities available to an individual making decisions”³. It is inherent in culturally recognisable symbols, signs, signals, images and values. It is the content of sciences, arts, facts, fiction, opinion, artefacts, mentefacts, literature, memories, religion, mores, myths, beliefs, folklore, expressions, culture, rituals, customs, tradition and values and whatever we see or do. Is there anything in this universe which is not information, aptly asks Buckland⁴.

What is information?

Vaguely speaking, it is what is communicated or formed through sense perceptions. It has no existence

of its own. Intercepted as signals by the sense organs it is constructed in the mind. Information depends on bio-brains for its primeval generation when it perceives signals from the environment voluntarily or involuntarily. It may not be out of place to say that a computer does not create information, it only manipulates it. Aboriginal information comes in the form of signs and symbols from the environment both physical, social and from internal human body. A living organism is always and constantly interacting with the surrounding environment through sense organs which receive and intercept signals which are ultimately communicated to the brain. Latter commands and processes every signal to convert that into data and information. A changing environment produces information; a static one does not. But it is impossible to keep the environment static. Something or the other is happening which may or may not be perceived. These signals get automatically decoded with knowledge already within the organism. An unfamiliar signal requires more input to understand it. It ultimately helps the organism to know its position, situation and status, and instantly provides guide to further action. It comes from everything around us and shapes our perceptions of the environment and society we live in⁵. Information is a cognitive process, so consequently the human behaviour is a form of information processing and taking cognitive or physical actions. Every action

is scripted by the mind. Ultimately all actions are cognitive. "To live effectively is to live with information" aptly says Norbert Weiner as quoted by McGarry⁶. It is thus the product of being conscious. And receiving signals in the form of energy from the environment and to process these into meaningful data and information is the function of every organism as long as it is alive. Brain's need for signals from the environment is more than body's need for food. Every moment being bombarded with myriads of signals from the environment, the brain learns automatically to pick up relevant signals and bounce back or ignore the unwanted ones. Mercifully, human sense organs are not sensitive or resolute enough to receive or intercept every signal around us. Many signals go undetected or unperceived due to our biological limitations Range, capacity and sensitivity and resolution power of our sense organs is limited. For example, our sense of smell is very weak compared to other animals. We augment our limited visual power with telescopes and microscopes. Humans cannot hear sounds which a bat can hear. This inbuilt limitation of our sense organs is a blessing in disguise. Perceiving, thinking, learning, memorising and reasoning are the functions of information processing. Mind is a information processing organ of the human machine. Genetic information, called the somatic information which resides in the bio-body cells, is transmitted from the parents to the offspring at the time of conception. This vast sum of genetic information in the form of DNA molecules in a human body is equal to 4000 books of 500 pages each. Somatic information enshrined in the genes guides the animal body in its growth and physiological processes throughout life. Genetic information is regulated by extra-genetic information in the brain in the form of neurons⁷. Figure 1 depicts kinds of information.

Relation with knowledge

Data, facts, information, opinion, knowledge being airy intangibles are elusive entities to define. Comparison is like entering a blind alley. Knowledge and information consist of the same stuff that is ideas. They are mutually dependent and are derivable from one another. Though the terms are even used interchangeably but the entities are different, indeed. Data, information and knowledge all comprise of ideas and cannot be neatly separated. However, the evolutionary chain below depicts the increasing maturity, enhanced organisational value and more enduring life span of each link.

Signals -- Data -- Information -- Knowledge -- Wisdom -- Tradition.

Table 1 makes a broader comparison between information and knowledge:

From the above it is clear that information answers questions of what, which, who, how and many other types. Knowledge answers how-to questions. Information presupposes a perspective and purpose of the enquirer. Understanding is the completion of data processing by the mind. It is explanatory; it answers all questions. Understanding presupposes knowledge and information⁸. Intelligence is the capacity and efficiency of the brain to apply knowledge and information quickly, or to interconnect two seemingly isolated data.

Information needs knowledge and experience, in other words familiarity with the idiom of the field to give it context for its effective application. Without knowledge, information cannot be used to make decisions or solve problems. Man's judgement cannot be better than the information on which it is based. Without current and authentic information input knowledge may lead to disastrous decisions. It needs an astronomer to fully appreciate the grandeur and beauty of a starry night. Repugnant to a layperson, a wayside dirty looking bone may provide clues to the palaeontologist to reconstruct the anatomy of that animal which lived millions of years ago. Data tables require background knowledge to be interpreted meaningfully. A computer can store tremendous amount of data and information, but is not knowledgeable. Not even the entire knowledge in the world can give us wisdom to discern and discriminate between the good and the evil. Here only wisdom can help which is the socially correct application of knowledge. Wisdom, being social and cultural, is the preserve of human beings --- animals and computers have no knowledge and wisdom. What is technically possible with knowledge may not be socially and morally acceptable --- human cloning is still banned. Spiritualist and moralist advise the scientists not to play God.

Importance and functions of information

Information is the content or message of communication. Importance of communication in organisations and human society cannot be gainsaid. Its functions being so many it is difficult to single out any one. Every system functions on information flow within its components and from the environment. Thus information is what keeps a system going.

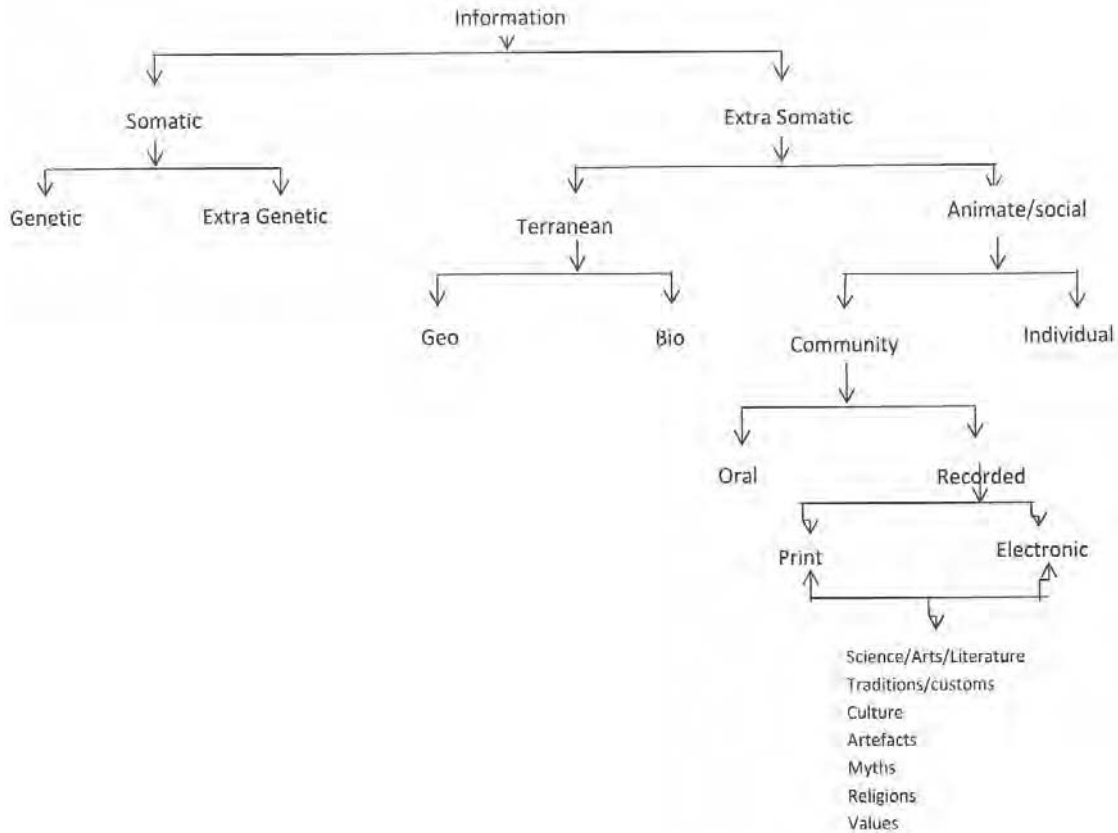


Fig. 1—Kinds of information

Table 1—Information and knowledge compared

Knowledge	Information
Durable	Transient and soon becomes obsolete
General and personal	Specific but common
Theoretical	Practical
Cultural	Applied/Business like
Descriptive	Instructive
Context free	Context dependent
Vertical/Hierarchical	Horizontal
Rule like	Case like
Expresses relations between variables	Expresses values
Resides in the mind	Resides in documents
Accretes in the mind with experience over time	Cultivated with research and observation
Cannot be replicated	Can be easily and instantly replicated
When communicated becomes information	Is the essence of communication and can lead to knowledge formation
Is harvested through knowledge management(KM)	Communicated through numerous media and channels
Cannot be measured quantitatively	Can be measured

S R Ranganathan (1973) very aptly said that communication is essential for living, nay survival, in biological, social and spiritual planes⁹. It is the flow of information which keeps the human society alive, moving and progressing. Our social, political and economic relations are more or less structured by what we call information¹⁰. Information is thus

a prime agent of action and change. It pervades all constituents, processes and every act of a human society to make life safe, richer and to realise its full potential. More complex and sophisticated an organisation or society, more information it generates and consumes. The history of mankind on this planet is the progress in accumulation and use of

information. Information has the longest history, even no beginning¹. It is the information which has transformed a cave dweller hunter, who was always at the mercy of raw nature, into a space traveller who lords over and commands all he sees. In an information society it is a commodity, resource and the substitute of all resources. Information of social significance is gathered on formal and regular basis, organised in some form and pattern and transmitted to be used in some meaningful way by the user¹¹. Social information depends on the human user for generation, use and further generation. Computers merely store and transmit data and information, these do not utilise it.

Role of information

Information has been defined as a flow; hence communication is its essence. Information and its communication are vital:

- a) to create a survival mechanism of defence and protection at all levels.
- b) as a basis for cooperation in society which in essence is interdependence and cooperation. Flow of information within a society leads to its social integration and development. It is used in large scale to coordinate and control the activities of people for their collective survival, safety, wellbeing and progress.
- c) to gain and maintain power over others. A Government in a country is the largest producer, consumer, collector and disseminator of information. It also includes input by the intelligence agencies. The Right to Information Act (2005) is a mile stone in the history of empowering citizens in India.
- d) to dominate other species, and manipulate nature: humans preside over this earth and space.
- e) and as a means to transcend
 - i. biological and hereditary constraints. We can fly, move faster than any animal, and see what is invisible to the naked eye.
 - ii. space and times constraints: distance has vanished in this globalised village.
 - iii. limitations of natural resources for social and technological development. Information is the substitute for all natural resources

Only information helps us to augment our limited biological, sensual and muscular power.

Physical properties:

Some of its other properties are:

- It has no independent existence of its own. It is a mental construct having no prior existence.

It comes into existence only when perceived, received or gathered

- It essentially needs a media for its communication and storage, as there is nothing as pure information. It is always embedded in something. There is nothing as information per se. There is always a channel/medium between the source and receiver of information. It is physically stored in graphic form, in electrical signals, magnetic patterns, or in the form of electrical pulses. Though a conceptual entity, it can easily be recorded stored and transmitted in the form of signs, signals (audio/video) and symbols⁶.
- It is a means not an end in itself.
- It is transportable at the speed of light.
- It is intangible and acts on the mind and alters our perceptions. Results of changed perceptions are seen through action, new ideas, changed values, new techniques, services and products, and through material progress of a society. New social, cultural, economic trends, changed life styles and values are its visible impacts on society.
- It has a quality which is always progressive and improving. But with time it becomes obsolete and irrelevant to be replaced by new information. It is thus alive and has its life cycle.
- It has a quantity though it cannot be easily quantified¹².
- Information can be generated endlessly. Only constraints are the time available to a human being and limitations of our imagination, instruments and sense perception organs.
- It can be expanded or compressed and is highly affected by the media of its communication. This led Marshall McLuhan (1911-1981) to his highly quoted axiom: "medium itself is the message"¹³. A three hours movie, say Ramayana, can be expanded into three hundred hours of a TV serial. One can write a full book on what does Shakespeare's Hamlet mean by uttering "To be, or not to be". A single formula equation or a one line statement may be the summation of a long train of facts and figures. In some situations, précis, summaries and abstracts are as good as their original unabridged texts. A surrogate may be a satisfactory substitute of its original.
- It is diffusive in nature without getting diluted or rarefied. As a corollary, more it is used, more it expands and leads to the creation of more information and knowledge.

- It easily takes the shape of its container. Digital information can be formatted in various physical shapes without any trace of its previous *avatar*.
- Internally, it can be formatted from a text or numerals into pictures, data tables, graphs, maps, charts or even into a documentary film. Computers have helped to manipulate and format information not possible in manual methods. Multimedia integrates texts with audio, visual and animation, or their combinations.
- Being diffusive, it is restless and difficult to be chained, suppressed or concealed for a longer time. It leaks out ultimately. It has been rightly said that in the age of mind boggling technologies even the best kept secrets invariably end up on the table of interested parties. Today WikiLeaks are giving sleepless nights to rulers and powers that be.
- It has to be given a context by knowledge to be used and applied. Information begins and ends in knowledge in the minds of the people.

Social and economic importance

Information is vital input for decision making. It helps to move from chaos to order. By reducing entropy it increases certainty and decreases the number of probable choices before us to take informed decisions. "I have a simple and strong belief: How you gather, manage and use information will determine whether you win or lose" says Bill Gates¹⁴.

- It is an essential ingredient for social, economic, political, educational, technological and moral developments of a society.
- It provides the means for improving all conditions pertaining to management and services of all kinds of an enterprise. Business intelligence is a prized entity to have an edge over the rivals and competitors.
- It is the basic input for marketing, innovation and research, both pure and applied.
- It gives competitive advantage over rivals be that in business, education or military conflict and others endeavours of community life.
- It is an inexhaustible economic resource and commodity. As a commodity it can be purchased and sold in the market.
- Being an essential factor in organising and coordinating it is vital to maintain political power, manage, control and govern an organisation or a system. According to Alvin Toffler (1991) the three sources of power are money, muscles

and knowledge. Of these three knowledge is a superior power, he asserts and elaborates in his famous book the *Power Shift*¹⁵.

- It is a commodity as well as a resource which can be sold and purchased in the market governed by the economic law of demand and supply.
- Information, as a commodity, is a magical good not governed by the rules regulating other economic goods and services. It is shareable endlessly without the original being lessened or diluted. It is not exhausted or depleted on being transmitted or given away. It is a cake that you can eat fully and give it away wholly at the same time. More you eat/give away more it multiplies as knowledge distribution leads to knowledge creation⁸.
- It saves energy, time and space; and thus replaces capital and labour. It is an ultimate substitute for any resource. For example, now comparatively there is less land for agriculture cultivated by lesser percentage of population, but agriculture production has multiplied. Information increases machine efficiency and multiplies production.
- When information flows, people, goods and money also flow. In other words flow of information is accompanied by physical and cash flow, says Alvin Toffler¹⁴.

No wonder then any national government is the largest consumer and producer of information in any country. An information improvised nation is always economically underdeveloped and may endanger its security and safety. Cultural invasion is another real threat to such societies. It has been very clearly pointed out that "due to lack of adequate and qualitative information a major underdevelopment can occur; the growth of human population can be irregular; its size may decrease, thereby causing a shortage of man power, or become too large causing underdevelopment or lack of food, and as a consequence, famine. Human functions may be changed or destroyed altogether. The society, if at all able to survive, may be very poor, under educated, without proper moral, religious, philosophical or socio-political leadership, or what might be worse, inappropriate people may take upon themselves social roles for which they have not been equipped by nature"¹⁶. To provide shelter, food, security and proper leadership, the human race needs information. For an individual or a society to develop to its full potential, it is imperative to have an adequate, reliable, well organised and well served body of information.

Qualities of information

Qualities of information are timeliness, relevance, precision, clarity, accuracy, authenticity, impartiality, comprehensiveness, and accessibility. It should be noise free. Noise is defined as unwanted or extraneous information that enters the channel during its transmission from the source to receiver. Obsolete or incomplete information, misinformation, disinformation and propaganda can be damaging socially and economically to the users. Misinformation is wrong or misleading information; disinformation is deliberately false information whereas propaganda is a mix of both with exaggeration of factual information¹⁷. Information literacy, be it of media, law, health or IT is the skilled process of accessing the right information from the right or reliable source in right format and quantity (to escape information overload) and using it effectively and ethically. Information literacy equips us to be able and aware citizens and to live life to its full potential. No wonder it is being advocated as a human right¹⁸.

But information alone in itself will lead to disinformation and disillusion of power. It is not an end in itself. Without knowledge information may be all heat and smoke without any light. It must be converted into knowledge and wisdom as rhetorically asked by the invincible T S Eliot (1888-1965) in *The Rock* (1934):

Where is the life we have lost in living?

Where is the wisdom we have lost in knowledge?

Where is the knowledge we have lost in information?

Conclusion

Information is the most over-used but least understood term of our times. It does not exist yet is everywhere around us. It is all around us yet cannot be captured in to a consensual definition. All want information but few dare to give it truly. It causes every move in turn every move causes it. There is nothing as information per se, yet there is nothing which is not information. Without knowledge it cannot be used effectively yet all knowledge is formed of it. More it is given away more it multiplies. Despite being the most used resource it will never get depleted. It needs recording for survival yet it cannot be chained. It leaks out. It has the longest history yet very short life. It is the sole basis of progress of the human civilisation yet it is subversive. Who is not afraid of Julian Assange whose WikiLeaks is tumbling many a ghost? In many ways it is mysterious in itself but solves all mysteries of the

universe. Without it life is nothing yet it needs a life to be born.

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