# Information Science – Information as a Dialectic Interactive System

*Emilia Currás*

*Gabinete de Documentación Científica, Departamento Química-Física Aplicada. Facultad de Ciencias, Universidad Autónoma de Madrid, Madrid, Spain.*

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## 1.- Introduction

Mankind is passing through historical moments of great change and transformation. The human being, from the centre of his own world, is trying to get to know and analyse the surrounding macrocosmos and microcosmos, also part of his environment, in order to discern and create his own mesocosmos. This process of anaysis and synthesis affects human activities related to the human intellect to such an exent that there is not an abstract or real idea, intellectual or mechanical action that does not undergo examination and evaluation. Information, as part of the mesocosmos, within the neosystems, is likewise thrown into confusion.

Nowadays, we refer to the information era and the information society. It would seem that something new had been discovered! Information, however, has always existed, it is an inherent part of the human being. Without information he cannot develop. Neither would society evolve; that society formed from the relation and communication with his peers with whom he inevitably has to live. A communication is based on a reciprocal and concordant flow and transfer of information. If this is so, how can we explain with information is referred to with such interest and animation? The answer perhaps lies in the large quantities produced and circulated due to the discoveries and inventions of the last two centuries. The information, in turn, gives rise to new inventions and discoveries which, again, produce more information. A spiralling circuit results, advancing with time, with discontinuous and variable intensities depending on the parameters of space and social development.

We are therefore inundated with information and surrounded by it. We have to try to dominate and channel it. Hence the interest in its study.

## 2.- The study of Information

Within the complex organization of present-day society, various types of professionals have dedicated their study to the subject of information, particularly the specialist in the field. It is curious to see how these have mainly centred they efforts in the practical aspects of collection, analysis, indexing, retrieval and storage. Databases, experts systems and retrieval methods are designed. There are very few of us who study the theoretical bases of information although interest has been growing in the last few years. There are still people who feel this is a waste of time. Hence, the introduction to the abstract sent to the Organising Committee of the Second International ISKO Conference.

In the study of the theoretical bases of information, its plurality and diversity have been verified. I ventured to refer to a theory of informationism back in 1981, and, taking "documentation sciences" as the basis, parallelism were established with other epistemological theories.

So as not to have to go too far back in time and considering that Shannon´s theories really refer to communication and that Shera still referred to "documentation", we can regard a period from the early 80´s until today, for a brief summary of the most relevant theories relating to the aims of this paper.

Without following a strict chronological order, we will begin with Farradane´s "*Knowledge, information and information science"* in which he establishes a difference between information and information science. Arntz refers to ontogenic and genetic information. Mc Hale assumes that information is stored in the brain and processed for further use. Dretske distinguishes between sense information and conscious information. He differentiates between information from knowledge and information from meaning. Leupolt proposes an informatology. Wersig assumes that there is intentionality and an ontogenic characteristics in the person receiving information and this modifies his sense of action. Baird refers to "information theory and processing". Voque considers an energetic component of information when he speaks of "infodynamics". Similarly, Le Moigne likens his "inforgetics" to energetics. More recently, Froehling postulates "I am, therefore I think", where information is implicity responsible for human thought processes. Bergstrom compares the brain to a machine that processes information. Buckland makes a distinction between information as thing, information as knowledge and information as process. Finally, Stonier attributes economic development to information and distinguishes between structured, kinetic and intelligent information. (Figure I).

The theories of these authors and of others given in the references provide widely varying ideas on how to define information: from a purely materialistic concept to an ontologic and almost metaphysical component.

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| 1966 … SHERA | DOCUMENTATION AND THE ORGANIZATION OF KNOWLEDGE |
| 1978 … LEUPOLT | SOME CONSIDERATIONS ON THE NATURE OF INFORMATION |
| 1980 … FARRADANE | KNOWLEDGE INFORMATION AND SCIENCE |
| 1981 … WERSIG | INFORMATIONSTATIGKEIT |
| 1981 … DRETSKE | KNOWLEDGE AND THE FLOW OF INFORMATION |
| 1981 … McHALE | EL ENTORNO CAMBIANTE DE LA INFORMACIÓN |
| 1981 … CURRÁS | ESTAREMOS EN LA ÉPOCA DEL INFORMACIONISMO |
| 1983 … ARNTZ | INFORMATION AND THE MERGENCE OF MAN |
| 1984 … BAIRD | INFORMATION THEORY AND INFORMATION PROCESSING |
| 1987 … VICKERY | INFORMATION SCIENCE IN THEORY AND PRACTICE |
| 1988 … BERSTROM | MAN AS A INFORMATION PROCESSOR |
| 1988 … FROEHLIG | |
| 1991 … BUCKLAND | INFORMATION AS THING |
| 1991 … STONIER | TOWARDS A NEW THEORY OF INFORMATION |

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| INFORMATION SCIENCE---INFORMATION AS A DIALECTIC INTERACTIVE SYSTEM | FIG. I |

## 3.- Personal Ideas

In fact all information scientists wonder what information could be, its nature, where it is. Answer are many and varied and sometimes contradictory. From my own personal point of view, I feel it is important to establish the difference between datum, document, object, event, which can transmit information. Information, however, is only produced in our brain when we perceive, analyse and judge it according to the intentionally we believe it to have. In other words, information does not exist in itself, despite linguistic laxness and traditional terminological customs that leads us to believe the contrary.

In addition to that ontegenic information that is often subconsciously perceived and processed in the brain, there is information that we want and look for, that has to be precisely prepared from data, documents, objects. Information should therefore be considered in two ways:

As a phenomenon

Produced around us, independently of us, and perceived either consciously or subconsciously.

Produced by the environment of our surrounding that marks the development of our daily activities.

As a process

Elaborated by us from certain documents for further use. Resulting from documentation, that consciously conditions the activities of the human intellect and scientifically, technically or artistically affects the progress of mankind.

This might serve to understand and summarise the different notions and definitions of information. (Fig. II).

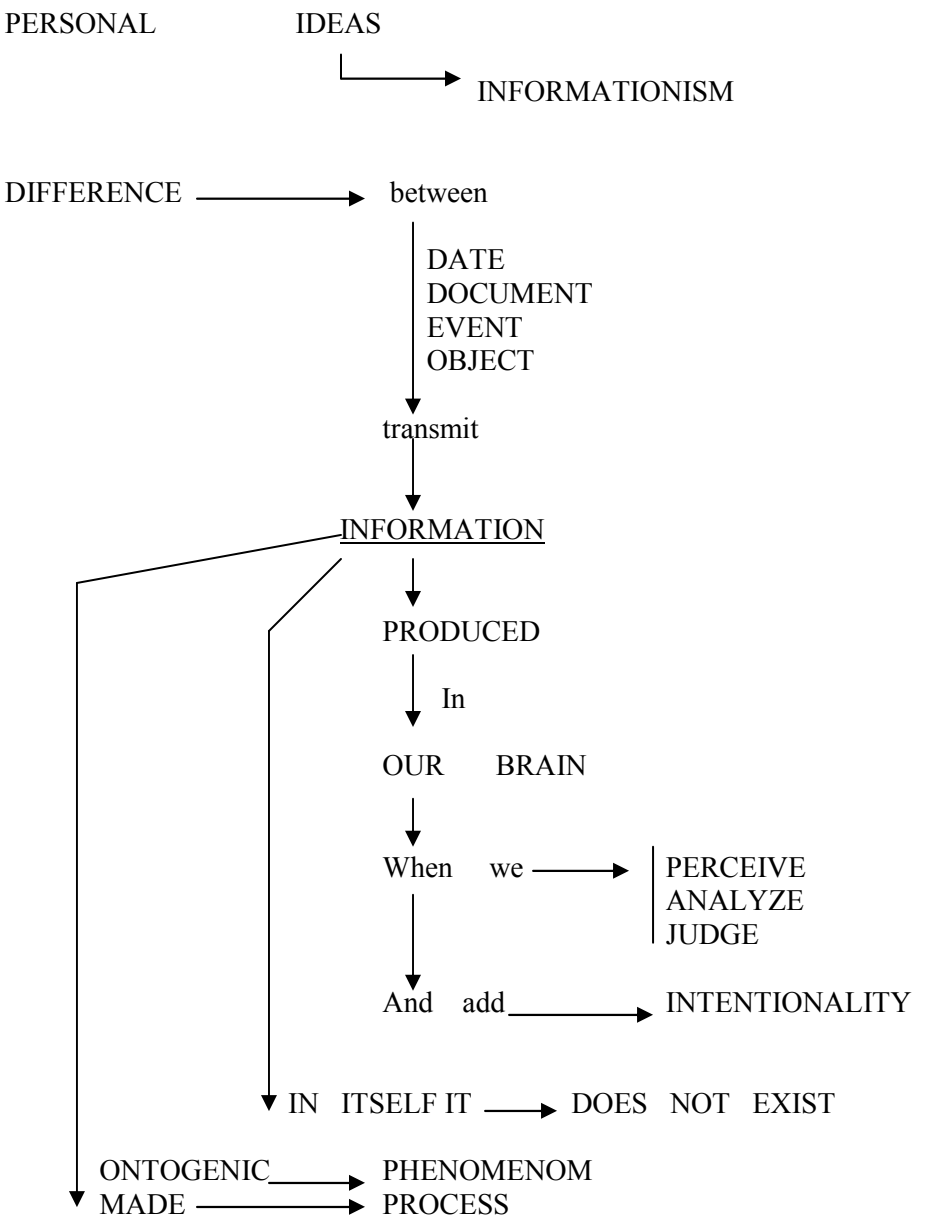
**4.- Information – Information Science**

From before, information as a whole and as a system can be considered like other branches of human knowledge within the concept of science as a unit. It forms a logically and methodologically formed body of doctrines, allowing impressions from the outside world to be brought to our mind so that we can build their image within ourselves. This coincides with other scholars such as Manzelli who states that we cannot know the reality of the outside world, cosmos, or even our own planet, only its image in our brain. We live in a fictitious world of our own making.

Information, from this point of view, should have a cosmic and terrestrial approach. (Figure III).

This could certainly be the case, despite the fact that to each of us the world seems extremely real, particularly when living on a day to day basis, where information continues being the centre of our thoughts and activities.

"Information Science" has still not been mentioned. Logically, if information is considered as another branch of human knowledge, it should be called "Information Science". This might, or might not, be. As old as information is. Drestke assumes that in the beginning there was information and the world came after, there is still speculation regarding its nature and ideas are constantly evolving. The opinions of today could be modified tomorrow. From the thoughts and statements of many other information professionals, it could be safe to considers "information science" as referring to its nature as a "process". Would it therefore be better to speak of "information process"? This in fact does happen, although I would not like to detract from the customs of so many colleagues nor contravence terminological traditions.

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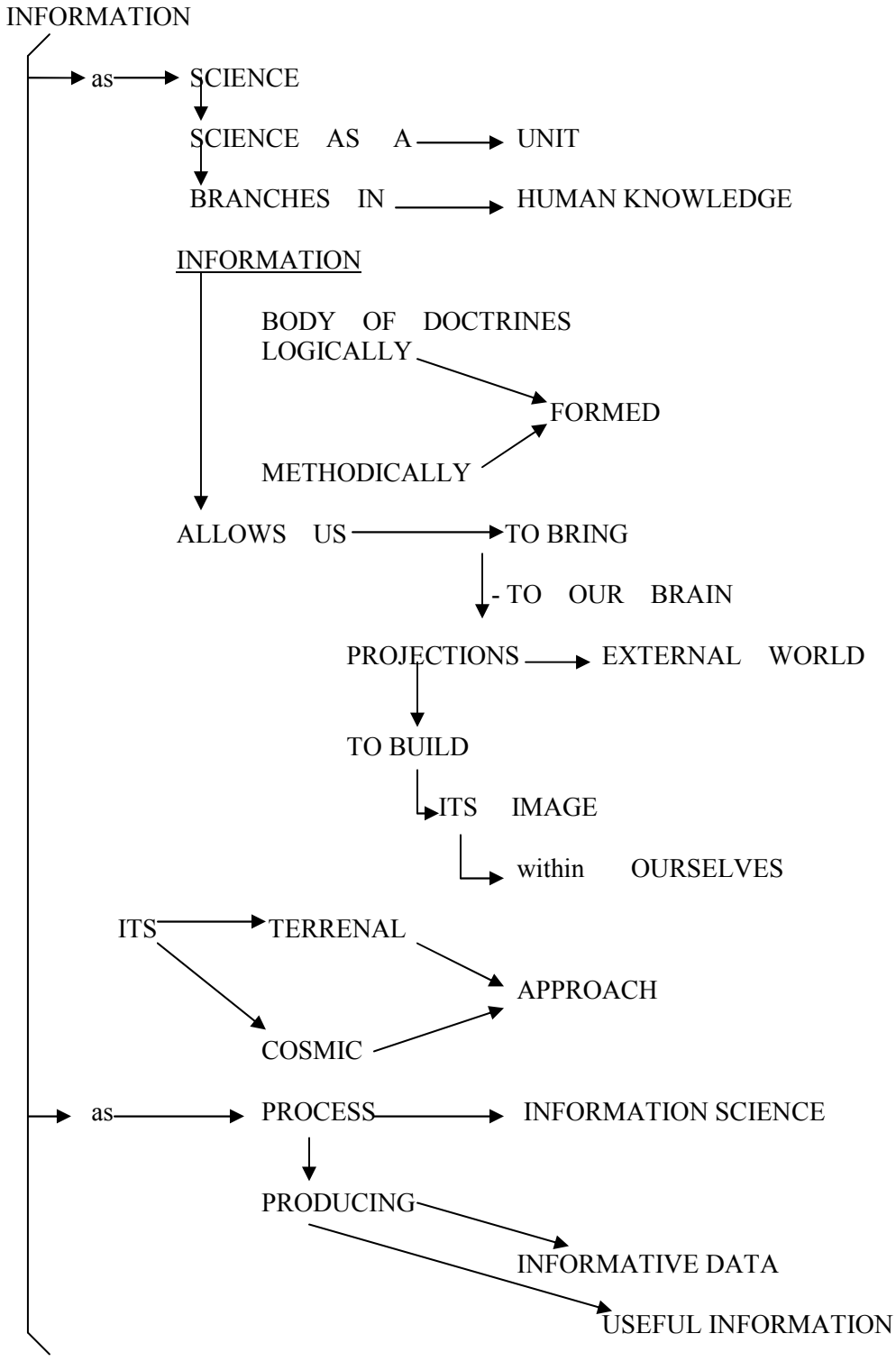
| INFORMATION SCIENCE---INFORMATION AS A DIALECTIC INTERACTIVE SYSTEM | FIG. II |

As a result, "information" is considered here as a whole, as a branch of human knowledge, with its corresponding theories, a subject in the set of learnings comprised in science as a unit. "Information Science", on the other hand, refers solely to the theory and practice involved in orientating the widely known processes of preparing data and documents and mankind them available for further use as an "informative datum" or "useful information". (Figure III).

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| INFORMATION SCIENCE---INFORMATION AS A DIALECTIC INTERACTIVE SYSTEM | FIG. III |

## 5.- Its Systemic Approach

Another characteristic of today is the extent of the concepts we consider. It is considered impossible to study or mediate on s given subject in isolation. Matters of interest now have to be situated within a concept, connected with other matters, conceptually closer or more removed. They are within an environment or relationships where each simple or complex element comprises that is connected to itself, to other system and to its environment. We view our world today with a systemic approach. This conceptual idea is perfectly in the English term “systems thinking”.

Both information, -IN-, and information science, -IS- form an open, trellis-like, dynamic, evolving, fuzzy and complex system. In turn, this is made up of complex subsystem, determined by a series of parameters and influenced by continually moving input, output and feedback loops, and by time and space vectors that are not concordant. The evolution of the system is therefore not uniform and varies according to the space in which it moves and the time period considered.

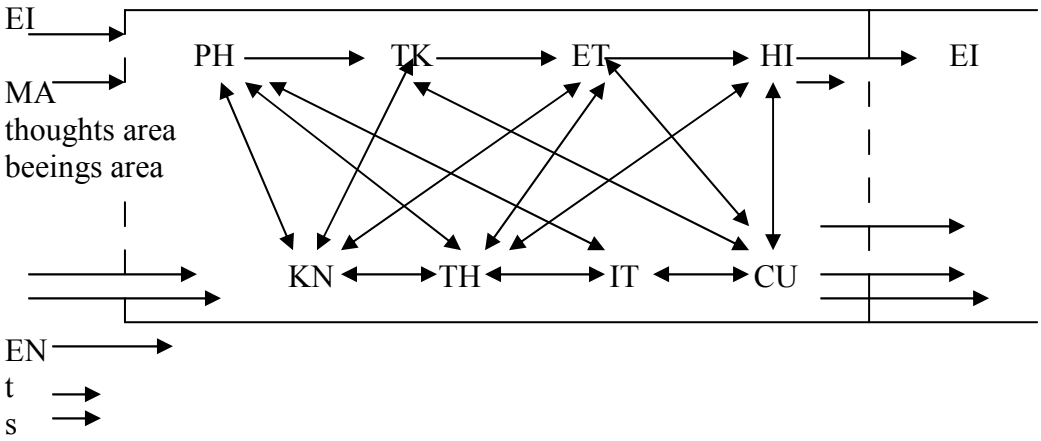
Information is both input and output in a conventional system. In our case, both the –IN- system and the –IS- system feed on information, hence increasing their complexity. For a better understanding, one has to reach a greater level of abstraction, referred to as a “jump in level” by Fernando de Elzaburu. Likewise, there is the growing idea of the “birth of a new man”.

In the –IN- system, philosophy, -PH-, knowledge, -KT-, ethics, -ET-, history, -HI-, as part of the thought environment, take part as parameters, knowledge, -KN-, thoughts, -TH-, intelligence, -IT-, and culture, -CU- also intervene as part of the environment of a being. In other words, there are two types of parameters, that are likewise complex, clearly differentiated subsystems, and are related though mutual and reciprocal influences of varying intensity. The internal framework of the –in- systems in highly complex, in which external information to the system, -EI- and matter, -MA-, as semantic content of he transmitted message, are feedback vectors. The energy, -EN-, time, -t- and space, -s-, vectors exert a similar influence in the –IN- system, which can lead to an internal transformation, and are therefore transformable. The –IN- system behaves like a dialectic system. (Disgram 1).

In the –CI- system the basic parameters are: the subject background, -SB-, data collection, -DC-, indexing method, -IM-, software system, -SS-, information retrieval, -IR-, information needs, -INN-, user types, -UT-, etc. each of these is a complex subsystem. Of these, SB, DC, IR, INN make up the thought environment, while –SS- and –IM- belong to the environment of the being related to the part in which the human factor does not directly intervene. All these parameters are influenced by the input, output and internal vectors, principally the information needs, -INN- and subject background, -B-. The time, -t-, space, -s- and information needs, -INN-, can cause an internal transformation in the –IC- system and are therefore transformable. This is clearly a highly complex system, for certain complex subsystem are parameters, input and internal vectors, all in mutual reciprocal and dialectic interaction at the same time. Time and space parameters intervene in the working of the –IC- system, in the direction of its evolution, its economical yield and social and moral optimisatioon. Diagram 2.

SYSTEMIC APPROACH OF INFORMATION

System → Information → SIN




Note: The parameters in both areas all Interconected

LEGEND

PH = Philosophy
TK = Theory of Knowledge
ET = Ethics
HI = History

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KN = Knowledge
TH = Thoughts
IT = Intelligence
CU = Culture

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EI = External Information
MA = Matter

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EN = Energy
t = Time
s = Space

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| INFORMATION SCIENCE---INFORMATION AS A DIALECTIC INTERACTIVE SYSTEM | DIAG. 1 |

## 6. Dialectic Interrelations of Both Systems

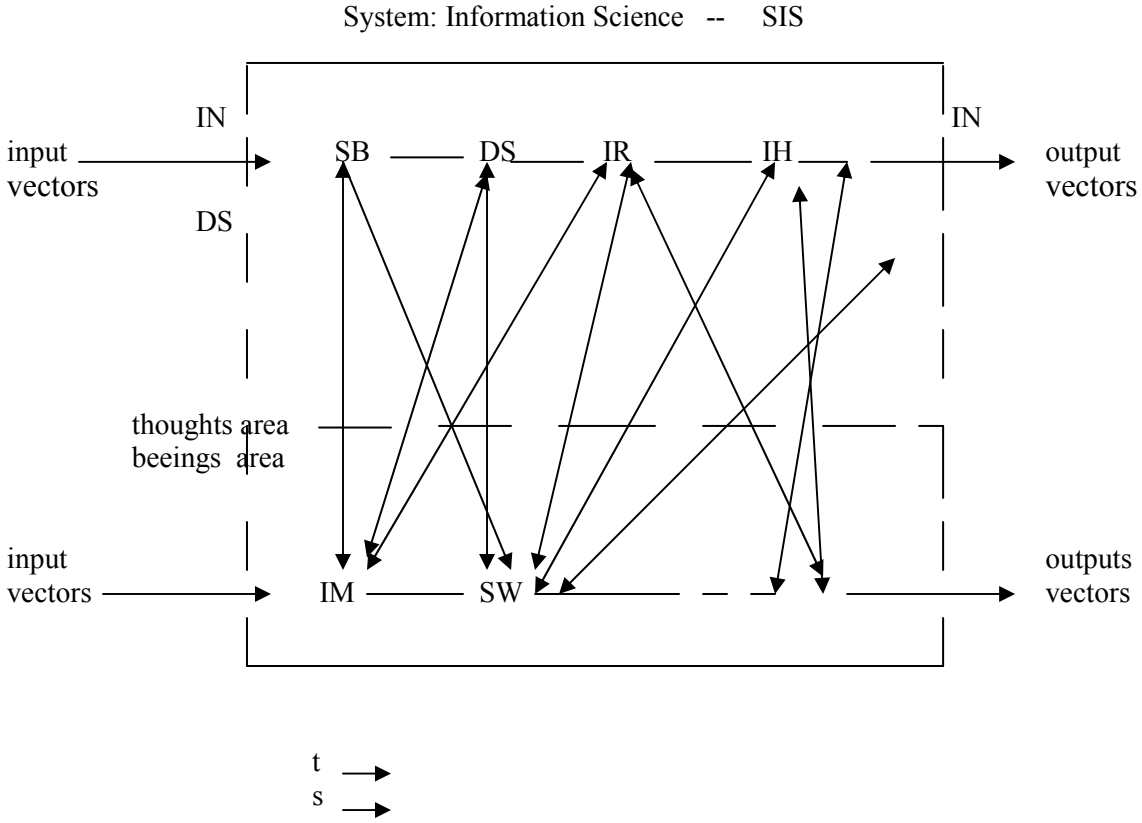
We are faced with two highly complex systems, each with its own structure and working, in which the place, or space, and time in which they work and evolve have to be considered.

Their own characteristics and the broad concept of "information" mean that thay exert a mutual and reciprocal influence. If, foe example, the subject background increases in the –IC- system it affects the knowledge content –KN- which in turn influences the degree of culture, -CU-, and semantic content, -MA-. If the degree of culture, -CI-, of a village in a given space, -e-, of the –IN- system is modified, this can change, among others, the ethics, -ET-, and history, -HI, of the system, as well as the subject background, -SB-, information retrieval, -IR-, software system used –SS-, and others of the –IC- system. One can easily imagine all and each variation in the parameters, vectors and transformables and any change that these can produce. We therefore have two systems in dialectic interaction. Diagram 3.

Any detail study of the two systems would require the construction of suitable models. Inventic and systemographic techniques would be used. By giving the vectors and parameters values, and formulating the opportune mathematical correlations, it would be possible to learn the behaviour of the –IN- and –IC- systems, their evolution in time and their influence on any other human activity.

These are matters for systems science specialist, a science I very much admire, as I do another area of research as yet unknown: systemometry. This would enable measurement of systems in various aspects. The result would be a better cosmic and terrestrial knowledge of the world in which we live.

SYSTEMIC APPROACH OF INFORMATION SCIENCE

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SB = Subject
DS = Data collection
IR = Information retrieval
IN = Information needs

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IM = Indexing methods
SW = Software

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t = time
s = space

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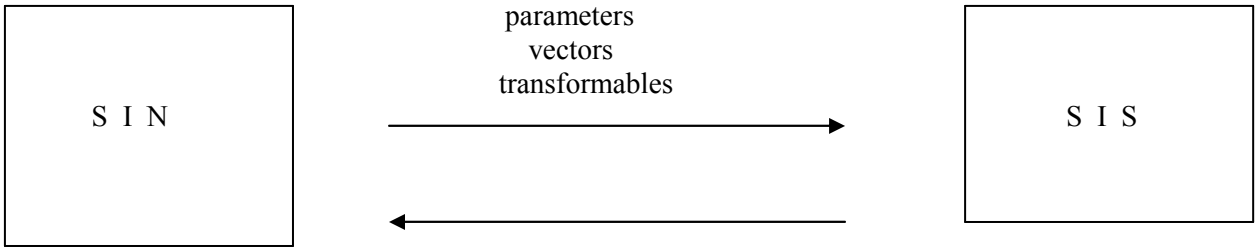
| INFORMATION SCIENCE---INFORMATION AS A DIALECTIC INTERACTIVE SYSTEM | DIAG. 2 |

DIALECTIC INTERACTIONS BETWEEN
INFORMATION AND INFORMATION SCIENCE




dialectic
interactions

s ⟷

t →

LEGEND

SIN = System: Information
(as a discipline
within the branches
belong to the science
as unit)

SIS = System: Information Science
(as a discipline, with its
theoretical and practical
components dealing with
the elaboration of useful
information)

s = space
t = time

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| INFORMATION SCIENCE---INFORMATION AS A DIALECTIC INTERACTIVE SYSTEM | DIAG. 3 |

## 7. Conclusion

Given the importance that information has in the life of a person, as a living being or as a scholar, and the unknown factor that it still remains, the present paper has attempted to provide another opinion on its nature and peculiarities. True, this is yet another idea to add to many others. This is a view with a systemic approach, systems thinking, or way of thinking along systemic criteria. It attempts to provide new subjects for reflection an to define information, considered as a whole, a system and as another subject in the group of learning that form science as a unit. It is therefore on the same conceptual level, although comparison many vary, as chemistry, history, medicine or aesthetics. Information is supposed to be an intra-and transdisciplinary science, serving all other sciences and yet the cause of all. It would not be too far-fetched to consider it one of the sciences of science.

Likewise, an opinion is attempted as to what is understood by “information science”, a science as such with its theory and practical side aimed at preparing and providing “informative data”, “useful information”, where necessary, for the proposed goal, eventually benefiting mankind and its future on this planet.

A difference, and yet a correlation, is established between “information” and “information science”, by means of the holistic approach of systems science regarding relationships between the parts forming a whole. The correlation is extremely complex, but perhaps study by systems specialist could clarify concepts and behaviour. If we were sensible, we could profit from such study and research. Once again, there is room for optimism.

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