American Journal of Humanities and Social Sciences Research (AJHSSR)
e-ISSN :2378-703X
Volume-08, Issue-08, pp-201-234
www.ajhssr.com
Research Paper Open Access

Ontological-Epistemological Debate: Human Truth versus Digital Truth

José Rascão
University Polytechnic of SetúbalGraduate School of Business SciencesSetúbal (Portugal)

ABSTRACT : We do not intend to deal with this topic exhaustively, because it is broad and complex for the space of a text, and we do not even know if we can deal with it without incurring in generalities. Our intentions, which are much more modest, refer to documentary research for the understanding and development of the theme of Human Truth versus Digital Truth, in the era of Globalization.The concept of truth was and is undoubtedly one of the great themes of philosophy that was the object of study of great thinkers, such as Plato, (428 - 427, C.) and René Descartes, (1596 - 1650). For Plato, the world was an imperfect reflection of a supersensible world: "the world of ideas", in which truth was an ideal, to be achieved, along with beauty and social and economic well-being. In the seventeenth century, the French thinker René Descartes broke with the Western tradition by introducing "hyperbolic doubt": using doubt as a method to arrive at the truth. After some reflection, he arrived at the argument of the "cogito ergo sum", which translated into Portuguese means, "I think, therefore I am".
The Digital Society poses great challenges to the World (Global) Human Society, among others, the debate on Truth, in the Digital Society, because the human being is part of a whole, which we call the universe, in time and space. About the term truth there are several philosophical theories.Truth is a concept that has always been much discussed in philosophy. Since Socrates, (470 B.C. – 399 B.C.), philosophers have questioned what truth is, and how it can be defended. For some, truth is something absolute, while others believe it is relative.
It is important to understand what truth is in order to better understand the digital world in which we live. Truth is something that gives us security and helps us make conscious decisions. That is why philosophers began to study the concept of truth, and how it relates to other phenomena, such as freedom, rationality and truthfulness.
KEYWORDS: *Truth, true, veracity, rationality, lying, knowing, Digital Society.*

I. INTRODUCTION

There are several relevant philosophical questions that can be asked about truth and more than one answer has been given throughout the history of philosophy, some achieving greater acceptance than others. The main Question are:

- ***Metaphysical question*** - What is truth? What does it consist of? These questions have a more traditional version: What is the *essence*, or *nature*, of truth? The essence or nature of thing Y is traditionally conceived as the set of necessary and sufficient conditions for something to be Y, that is, as the set of characteristics that all Ys possess and only Ys possess. Metaphysics is traditionally conceived as the philosophical discipline that studies the essence of things, and determines what kinds of things exist (ontology).
- ***Epistemological question*** - How can one know the truth? Knowledge is traditionally conceived as a true belief. The epistemological question can be asked: how can one have true beliefs? Epistemology is traditionally conceived as the philosophical discipline that studies the essence of knowledge.
- ***Semantic Question*** - What is the meaning of the word "truth"? The explanation of the meaning of a word is called "definition". The semantic question can be reformulated: What is the definition of the word "truth"? But there is a more general question: what is the function of the word "truth"? Semantics is traditionally known as the part of the philosophy of language that studies meaning, or, as it is sometimes said, the relationship between linguistic expressions and what they mean. But this last formulation can lead to misunderstandings.

There is controversy about what the relationship is between these questions. For example: aren't the metaphysical question and the epistemological question the same question? The answer to this question depends a lot on how one understands the "meaning of", something that is also a matter of controversy.
W. V. Quine, (1908 - 2000), believes that this word, as well as all intentional notions, has no theoretical use. If the meaning of "truth" is determined by the criteria on which people rely to use this word, the essence of truth is independent of these criteria, that is, one can use the word "truth" and at least partially ignore its essence. So an analysis of the meaning of the word "truth" does not provide the knowledge about the essence of truth.
Moreover, some philosophers think that the correct answer to the semantic question implies a dissolution of the metaphysical question (cf. theory of truth, as a redundancy in "Deflationism" below). If the essence of knowledge is constituted partially by truth (knowledge = justified true belief), this shows that truth and knowledge are not the same thing.

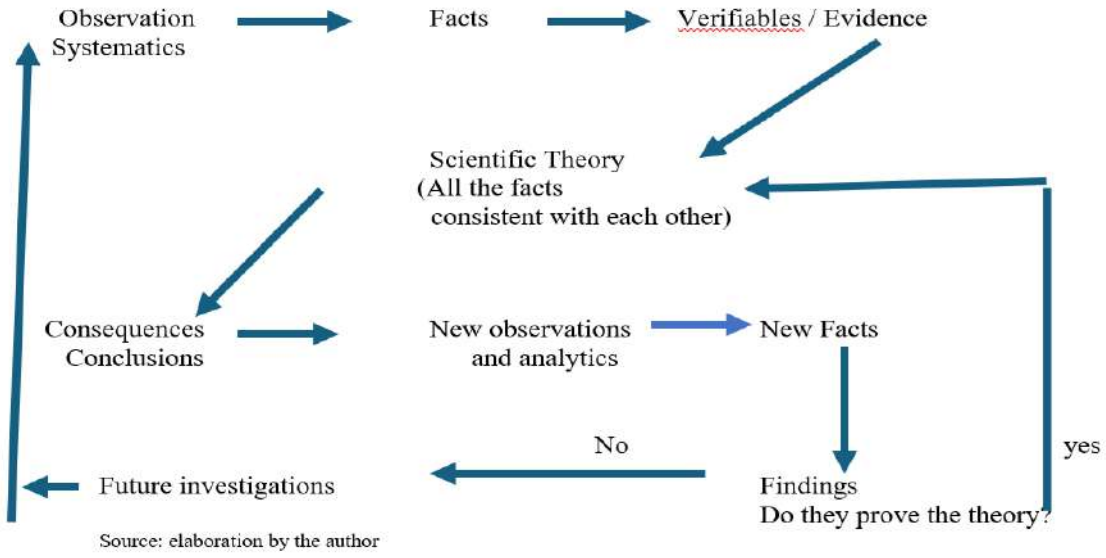
Nevertheless, some philosophers have tried to reduce truth wholly or partially to knowledge, and others have given the same answer to the metaphysical question as to the epistemological question. Be that as it may, an answer to the epistemological question depends on an answer to the metaphysical question. On the other hand, the answers to the semantic question have philosophical relevance, insofar as they determine the answer to the metaphysical question. This is usually how articles about truth are structured and present theories of truth, that is, theories about the essence of truth.

II. Scientific Method

It is an exploratory study that seeks to organize the main challenges, with the truth, that people face in the Digital Society and its meaning presented in the literature of the Humanities, Social Sciences, Information Sciences, Philosophical Sciences, among others. It is not a proposal for new terms and concepts, but rather a universalization of them. that allows the identification of a common denominator among the different concepts already indicated in the literature, in a way that allows their grouping by identity, application / use and pertinence / aggregation of value in the context in which the term and the concept are inserted. The collection of data is characterized by bibliographic research, on the truth and the different concepts existing in the scientific field.

It is a descriptive and analytical approach seeking to know and analyze the existing cultural and/or scientific contributions on this topic, based on the literature review. The research was structured based on the systemic approach to understanding the main challenges that citizens face in the Digital Society, seeking in practical, operational or application terms, the solution of real-life problems of organizations (public and private) and people.

Figure No. 1 – Schematic Representation of the Scientific Method



Source: elaboration by the author

Research Theme and Problem

Oral, written and digital communication allows for active relationships between people, but the problem is that the same word (truth) is used in different contexts with different meanings, and some do not know what it means, or do not want to use it, for personal or collective interests. To understand the way we think, perceive and feel, it is useful to know the concept of truth in different contexts.

With the sophistication of new technologies, man has created forms of artificial intelligence that work in a similar way to himself, improving the ability to interpret and understand the global world. This includes object recognition, motion detection, and pattern identification, in real or non-true images. Automated reasoning refers to the ability of machines to process data (information), reach logical conclusions, and make decisions, based on these reasonings. This involves decision-making based on true principles (norms and rules) and universal values to solve complex problems of society.

Issues:

1 What is truth?
2 Is there such a thing as a universal concept of truth?
3 Does the truth depend on the contexts in which it is inserted?
4 Is truth an "a priori" form of knowledge?

Goals

This article aims to conceptually work on the definitions of human truth and digital truth, from the ontological and epistemological points of view, seeking the solution to the challenges of the Digital Society, that is, to define the concepts of truth that allow guiding citizens in general and especially the owners of economic, political and financial power, in decision-making.

Cognitive Science studies the mental processes of human intelligence, related to the understanding and modeling of cognitive processes, for the development of intelligent systems. Neuroscience seeks to understand the functioning of the human brain and apply these *insights* in the development of concepts of truth, in different contexts, inspired by the human brain. The Philosophy of Mind explores the questions related to the nature of mind, consciousness, and intelligence, offering the important theoretical perspectives for the universal concept of truth.

This article seeks to contribute to the clarification of the main concepts of truth that people face in the (global) Digital Society, taking into account the great complexity and turbulence in which the world lives today, as well as the importance of evaluating the results, the decisions made, by the different powers and their meanings, within the scope of the different sciences, from a theoretical framework. The objective is a debate on the concepts of human truth and digital truth identified by scientific research, developed by the different Sciences, in the Digital Society. The theoretical discussion of the concepts and meanings of empirical research constitute the basis for the outline of its structure, presented at the end, bringing together the universalization of concepts.

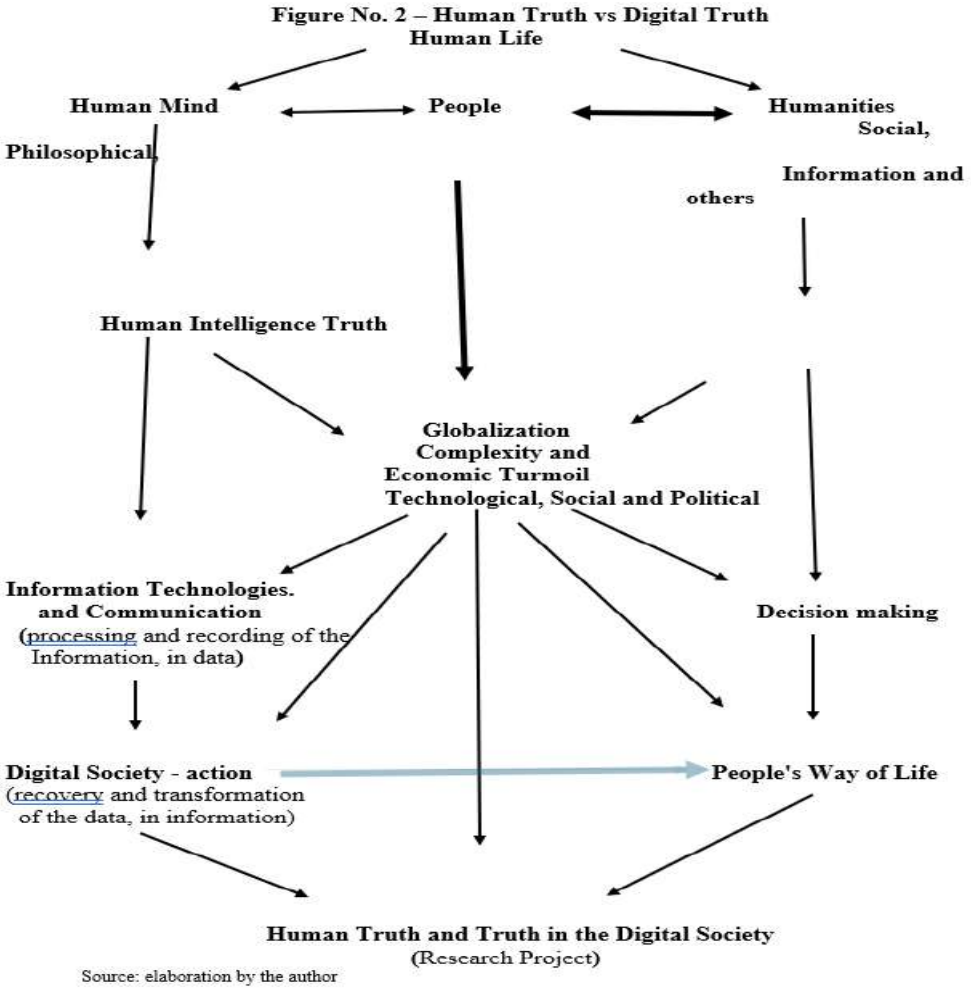
Methodological Approach

As for its nature, the research is qualitative, since it does not privilege statistical study. Its focus is on obtaining descriptive data, that is, the incidence of topics of interest in fields such as Information Science, Humanities, Ethics, Social, Economic, Philosophical and Political Sciences, as well as other Sciences. With regard to the extremities, the research is exploratory and descriptive in nature, as the technique used is categorized, consensually, as a study of direct documentation, which provides for the consultation of sources related to the study, in different *media*, printed or electronic. The complexity and turbulence of the digital society have led to the globalization of research, as essential processes for the development and innovation of sciences and technologies.

The digital society is a complex society of technological innovation and communication, in which new environments are created and changes occur in the dynamics of people, in the way they understand reality, modifying the form, how they relate to each other and how they conceive themselves in the face of reality itself. Both meanings can be understood, as they result from the technological revolution, promoted, mainly, from the attempts to understand human intelligence, via computational bases. As a consequence, the notion of truth. What is truth? This is the most serious and the most frivolous of questions.

The concept of human truth is progressively being replaced by digital truth, which shapes or shapes the human mind, as "data structure", Boland, (1987), representing intangible realities, too large to be experienced directly by people's senses.

The research method is likely to make meanings interact with each other. This interaction can range from the simple communication of ideas, to the mutual integration of concepts, epistemology, terminology, methodology, procedures, data and the organization of research. This is an exploratory study that seeks to clarify and organize the concepts presented in the literature of the different sciences. It is necessary to understand, through a theoretical review of the concepts, through the reference documents; of a psychosocial analysis of the concepts and meanings, applied to the Digital Society, in the context of people's social and economic life. The research was structured based on the systemic approach, to understand people's problems and possible improvements. This conceptual model is represented as follows:



Source: elaboration by the author

The model approach for intervention in information actions, in the academic space, with the purpose of production, sharing of information and knowledge, among participants, in addition to promoting the development of skills of search, retrieval, organization, appropriation, production and dissemination of relevant information for scientific researchers, in the digital society, is presented.

III. THEORETICAL-METHODOLOGICAL FRAMEWORK OF THE RESEARCH

3. 1 Philosophy

Introduction

Philosophy is the basis of all sciences, that is, doing philosophy and doing science are distinct acts. The study of philosophy is complementary to all other areas of knowledge. The difficulty with the concepts ontology and epistemology is due to the fact that they are abstract and confusing, because they are related to each other, especially in the case of scientific research. Ontology is the study/essence of being. It is possible to understand these concepts.

- What is reality? What defines reality? Does reality exist? Is it attainable?
- What is truth? What defines truth? Does the truth exist? Is it objective or subjective?
- What is epistemology and ontology?
- What is digital truth?

These concepts are important to guide and lead the scientific path, and are related to objectives, methods, data analysis, among others. If the ontological assumptions (regarding the essence of the object of study) of the researcher are directed to the following view: "Reality refers to facts that are waiting to be discovered."

So, it is possible that the researcher/scientist will feel more comfortable doing an experiment to investigate facts and perhaps prove them, if you can say so. It is a view that many believe to be more "objective" in science. We would say: positivist. Not to be so critical, we would perhaps say that it is a research model, very present in the exact sciences, although in the human sciences, there is an influence of this model. It is a structuralist, formalist, modern ontological view (as opposed to what Giddens, (2009), calls Late Modernity) ...

However, if the researcher's positioning/ontological view is: "Reality is... ephemeral, liquid and can only be thought of from the point of view of someone/something."

So, the ontological vision of the researcher/scientist is more functionalist, post-structuralist, (as opposed to the concept of modernity) and perhaps his path, towards doing science, is in relation to an object of study, whose meaning is constructed and not ready-made, static and given. On the other hand, due to the challenges faced in research, in the definition of the

object of study, epistemology is for the necessary means, to understand the essence of being, ontology. Epistemology means the study of knowledge. It can be understood by asking the following questions:

- What is truth? (ontology)
- How can I know the truth and interpret it? (epistemology)
- If the truth exists, how can I know it? (epistemology)

Both ontological and epistemological bases of a research must be in tune; they will affect, in some way, the results that will be found. If the epistemological vision of the researcher is: "My senses help me to understand the objective world", this is a vision that will lead him or her to a more empiricist path, which will make him or her use ready-made data for research, perhaps work with evidence...

However, if the scientist shares this epistemological view: "Can I trust my senses?" This means that knowledge is subjective. The scientist is a constructivist, which may direct him to Critical Discourse Analysis (CDA), to the studies of issues related to Social Interactions and the construction of knowledge. In any case, in this view, it is only possible to approach one aspect of reality on a theme/research and the theory(s)/author(s) used. The research, in this case, is a cut of the reality that the researcher has made.

Both these ontological and epistemological assumptions are relative to quantitative research (more traditional, more concerned with reality, objectivity and impersonality in the text) and qualitative research (more critical, discursive, whose vision of "reality" depends on the referential and a process of construction, which understands reality as ephemeral – because everything is constantly changing, subjective, centered on the researcher – who can write in the first person to assume his voice as a researcher, as well as the angle – or the angles, under which the research will be observed).

Considering philosophical practice, as the art of interpreting reality and truth, from the formulation of conceptual schemes about the human being, nature and society, will Philosophy be able to face the problems that arise from the new organizational dynamics of society today? We understand that Philosophy alone, without interdisciplinary tools of analysis, does not seem capable of facing, perhaps even formulating, the problems raised by Information and Communication Technologies (ICTs).

What is Information?

The answer to the question what is information is not unique, Capurro, Hjørland, (2003). There are many possible answers, depending on who answers. In addition, associated with the question what is information? There are others, such as: what is the meaning of informational content? What is Information Science? What is the information for? What is Information Science for? Capurro, (1991). Thus, it should be noted that the discussion of the concept of information, together with the identification of the need to interpret the information – or the informational content – does not lead to a confusion between what information is, what is the meaning of information and what is the role of Information Science (IC).

Answering, or at least analyzing, the aforementioned questions is a recurring theme in the work of Capurro, (1991), who states: "The question: what is information for?' leads to the question: what is IC for?', since IC, conceived as a hermeneutic-rhetorical discipline, studies the contextual pragmatic dimensions, in which knowledge is shared positively, as information and negatively, as misinformation, particularly through information and communication technologies. These are not only instruments, but "ways of being", an expression in English: "*way of being*" (Winograd; Flores 1986 in: Capurro 1991).

Capurro cites a classic definition of IC as a professional and research area made by (Borko, 1968) at a time when the *American Documentation Institute* had recently changed its name to *the American Society for Information Science* (ASIS) (now called *the American Society for Information Science and Technology (ASIS&T)*, which is: "A classic definition of IC says that this science has as its object the production, selection, organization, interpretation, storage, retrieval, dissemination, transformation and use of information. (Borko, 1968, p. 3 in: Griffith, 1980 in: Capurro, 2003).

Despite being a widely cited and accepted definition in the field, there is a problem that there is no consensus on the meaning of the term information. The author cites a work written in the 1980s in which 134 (one hundred and thirty-four) notions of information were identified, only considering the uses in IC (Schrader, 1986, p. 179 in: Capurro, 1991, p. 2). Subsequently, Capurro again cites a work by Schrader, this time mentioning 700 definitions found in the period between 1900 and 1981 (Schrader, 1983, p. 99 in: Capurro; Hjørland, 2003, p. 349).

In short, the term information does not respect the limits of areas of knowledge and does not find consensus on what its definition should be, which varies from one area of knowledge to another, and in relation to different contexts. As a philosopher, Capurro uses to identify the concept of information, the study of the historical roots of the term, going back to the uses in ancient Greece. This appears in at least four of the author's works, published over a period of almost three decades (1978; 1991; 2003; Capurro; Hjørland, 2003).

(Capurro, 1978), investigated the etymological roots of the term information and states that he rediscovered that the key theories of Greek ontology and epistemology, based on the concepts of *typos*, *idéa and morphé*, were at the origin of the Latin term *informatio*. Such connotations were retained through the Middle Ages, but disappeared when scholastic ontology was replaced by modern science. Since the sixteenth century, the term information has been found in the *everyday* languages of French, English, Spanish and Italian, with the meaning we use today: 'to instruct, to provide knowledge', and the ontological meaning of 'to give shape to something' has become more and more obsolete.

A more recent literature review on the term information, Capurro and Hjørland recognize problems in the historical approach to the definition of the term information, more specifically the following: the etymological study of a word can lead to anecdotal conclusions, which only touch on the meaning of the word; the use of the term information became more popular from the year 1950 onwards, which would minimize the importance of previous uses; based on a quote from Charles Sanders Peirce, the authors state that the meaning of a term is defined not only by the past, but also by the future (Peirce in: Capurro; Hjørland, 2003, p. 343; 344; 346).

Despite their own reservations, the authors justify etymological studies by implicitly highlighting the importance of early philosophical texts as fundamental to modern culture: "Examining the history of the uses of a word, one finds some of the

primitive forms or contexts that sustain higher-level scientific practices. This lowers the expectations we have for higher-level univocal concepts, and helps us better manage vagueness and ambiguity. Questioning modern terminology, looking more closely at the relationships between signs, meaning, references, and paying attention to the transformations of historical contexts, helps us to understand how the present and future uses of words are intertwined. [...] Such a critical-historical revision makes possible a better understanding of the concepts of information, of a higher level in the Hellenistic period, as well as in the Middle Ages and in modern times". (Capurro; Hjørland, 2003, p. 351).

Capurro and Hjørland present different concepts associated with the term information, highlighting the following aspects: roots of the term, in Latin and Greek; modern and postmodern uses; the concept of information in the natural sciences, humanities and social sciences; information in CI (2003). The fundamental separation between the various concepts may come from the distinction between information seen as a thing or object (for example, in the case of bits and the mathematical theory of communication, by (Shannon, 1948)) and information understood as a subjective concept, who's meaning, or informational content, depends on interpretation and context (Capurro; Hjørland, 2003, p. 345; 396-397). In this case, the context involves the area of knowledge, interests, training and capacities of the subjects involved.

The very relationship between IC and communication, as areas of knowledge, is a topic of interest to other researchers (Shannon, Weaver, 1949; Le Coadic, 1997, p. 10; Saracevic, 1996, p. 52). The importance of the post-World War II period, when CI emerged (2003, p. 343), in relation to other disciplines, such as cybernetics and modern computing, is also highlighted, since it has an interdisciplinary character that can serve both CI and the other social sciences and humanities, as long as the peculiarities of the release mechanisms are respected.

From a humanist perspective, Capurro and Hjørland comment that such a definition may seem, at first glance, reductionist, mechanistic and unethical. However, they consider that this is not the case, but rather that Karpatshof's definition allows us to take the focus away from the question: What is information? and transfer it to the analysis of the mechanisms of liberation. In the case of social sciences and IC, the mechanisms of liberation are people who interact through signals, and such signals are associated with messages and information. Thus, the study of information would not dispense with the study of semantic meaning for the human being, and of subjectivity, since such characteristics are implicit in the mechanisms of liberation.

From Karpatschof's definition of information, it is also possible to identify elements of the (*angelic*) message theory (Capurro, 2000; 2003). Other mechanisms of liberation would be technological information systems and living organisms in general. In summary, it is possible to state that for Capurro and Hjørland, before defining information, the role and nature of theories in IC should be clarified and substantiated, giving greater attention to concepts, such as signs, texts and knowledge, also considering the use of the term information in the areas of information retrieval research, information systems and information services. for example, without forgetting that information is what is informative for a given person, which is conditioned by the community to which the person belongs, their individual capacities and their interpretative needs (Capurro; Hjørland, 2003, p. 346; 350). In summary, the author does not create or choose an assertive definition of information, but seeks to discuss aspects that should be considered in IC studies, such as the content of information and its social impact. The alternative way he sought to elaborate such a discussion was through message theory.

What is the Message?

Capurro experiences, over time, a passage from hermeneutics to *angelics* (Matheus; Capurro, 2005) – the message theory (Capurro, 2000; 2003B; 2003). With this passage, his argument shifts from the term information to the term message. Capurro's angelics have similarities and differences with the mediumology of (Régis Debray, 1999), as the author himself comments. According to his understanding, there is still an intimate relationship between the message of the *angelic* (sign) and the interpretation of the information (sign).

Capurro himself compares information and message, and states that: "Message and information are correlated concepts, but not identical: - a message dependent on the sender, that is, it is based on a heteronomic and asymmetrical structure. This is not the case with information: we receive a message, but we request information, a message supposedly brings something new and/or relevant to the receiver. This is also the case with information, - a message can be encoded and transmitted through different means or messengers. This is also the case with information, - the message is a speech that triggers selection by the receiver, through a mechanism of release or interpretation". (Capurro, 2003c, p. 3).

Capurro thus points out that the message needs to be interpreted, without commenting on the information. However, the information is remembered indirectly through the citation of the mechanisms of release, which lead to the definition of information of (Karpatschof, 2000, p. 131-132 in: Capurro; Hjørland, 2003, p. 375). The association between the mechanisms of liberation and interpretation, as a selection of semantic meaning, refers again to the proposition of hermeneutics, as an epistemological basis for IC, (Capurro, 1991). In other words, unless the registered representation is considered to be information. This always needs, according to the author, a subjective interpretation. As for the first topic, if information is requested, it must be sent, as a message. Reception and interpretation, as information, is later. Of course, there are differences between a voluntary request and an involuntary reception, but the author's understanding is that this is not an essential difference between message and information. The essential relationship may be that, in any process that involves the communication of information, there is always a message (sign with meaning) that is emitted, whether it has been requested or not, but different possibilities for such a message to be received and interpreted, as information (sign).

Capurro himself mentions this issue when he says, quoting (Luhmann, 1996 in: Capurro, 2003C, p. 3) that: "[...] we differentiate between message ('*Mitteilung*'), i.e., the action of offering something (potentially) meaningful to the social system ('*Sinnangebot*'), and information ('*Information*'), i.e., the process of selecting a meaning from the different possibilities offered by the message, and also comprehension ('Verstehen'), i.e., the integration of the selected meaning with the system, as the three dimensions of communication in a system social." (Capurro, 2003C, p. 3) mentions that the nature of a message can be imperative, indicative or optional.

Regarding the conditions of the process of emission-transmission-reception and the (in)determinism of the *angelic* process of exchanging messages, he states, indicating some principles, which could be called, according to the author's understanding, ethical principles of the *angelic process*, that: "[...] Neither the sender, nor the messenger, nor the receiver have any kind of certainty that their actions will meet the ideal situation that is configured as: - a sender addresses a receiver, sending him a message that is new and relevant to him, that is, he follows the principle of respect, - a messenger brings the message without distortion to the receiver, that is, it follows the principle of trust, - a receiver reserves the right to judge, based on the principle of interpretation, whether the message is true or not, that is, it follows the principle of reservation".

(Capurro, 2003C, p. 4) indicates that *angelics* allows us to study the freedom to name the dimensions of the message, which are the following: form; content; objective; producer(s); receiver(s). Specifically on the objective dimension of the message, it supports the theory of (Vilem Flusser, 1996 in: Capurro, 2003C, p. 4), which supposes two possible objectives in the communication process: dialogical objective – in order to generate new information; Discursive objective – in order to distribute information.

Capurro names the society of the century. as the society of the message. He does not make an explicit opposition to the knowledge society or information society, but such an analogy is one of the consequences. According to Capurro (Matheus; Capurro, 2005), the message society is characterized by the new means of decentralized communication, especially the global digital networks that allow many-to-many interaction (e.g. Internet), as opposed to the centralized and regulated means of mass communication previously available, and also to one-to-one communication (e.g. telephone). Such networks have political, social and economic impacts on the society of the message. Such an analysis brings society closer to the message, to the network society, (Manuel Castells, 2005).

Regarding the society of the message, (Capurro, 2003, p. 4) states that the following "social aspects of the *angelic process" should be considered*: "origin, purpose, and content of the messages, power structures, techniques and means of dissemination, history of the messages and messengers, codification and interpretation of the messages, as well as psychological, political, economic, aesthetic, ethical and religious aspects". In relation to messages in today's society, Capurro refers to the media nihilism (Sloterdijk, 1997 in: Capurro, 2000, p. 2) of Peter Sloterdijk and also to the words of Marshall McLuhan, who say that the medium is the message (Capurro, 2000, p. 2). An interpretation from Capurro, in relation to these comments, it is possible to say that much is said, without saying anything, or even that much is transmitted, but little is received. These questions have a strong impact on the analysis of *angelics* in society, on the role of the *mass media* and on the eventual transformation of this role as a function of the Internet.

Capurro also suggests that *angelics* could be applied to non-human biological processes. It suggests the existence of a postal paradigm, according to which biological structures of a lower level, in terms of biological evolution and DNA, receive the message, but do not have the same degree of freedom, or capacity for selection, that human beings, even babies, have in terms of their epistemological and pragmatic capacity, paraphrasing Heidegger's human hermeneutics (Capurro, 2003C, p. 5-8). In this case, considering the double meaning for the Latin term *informatio*, such as shaping matter and shaping the mind, the simplest biological structures approach the first and the human being the second. When talking about languages and codes, Capurro (2003C, p. 4) states that "[...] In order to select or interpret a message the receiver must have some common kind of pre-understanding, in relation to the sender of the message, for example a common format or a (linguistic) code." (Capurro, 2003C, p. 2; 3).

Curiously, this question is reminiscent of the mathematical theory of communication (Shannon and Weaver, 1949, p. 5), especially the chapter written for the 1949 version, in which Weaver recalls that if the communication system between sender and receiver has only two symbols, such as '0' or '1', for example, it can be agreed that '0' means the content of the King James version of the Bible. while '1' just means YES. Thus, when receiving the sign 0, the receiver will consider the content of the bible. Such elements may offer support for a practice-oriented theory of research in IC, going beyond the philosophical and epistemological analysis of the area. At this point a question arises: Why would Capurro have chosen to elaborate a theory of the (*angelic*) message and not a theory of information? One possible answer is the difficulty of defining the concept associated with the term information in a rigorous way, especially considering the difficulties pointed out by the Capurro Trilemma (Capurro; Fleissner; Hofkirchner, 1999).

In any case, the change in nomenclature has at least two interesting implications. The first is the possible analogy of *angelics*, as a theory of the message, with the mathematical theory of communication (Shannon, 1948). The biggest difference between the theories is that *angelics* seeks to deal broadly with all problems involving human messages, while mathematical communication theory would exclude the semantic and pragmatic aspects of message analysis. In addition, the mathematical theory of communication mentions the transmission of information, which, (Capurro, 2003B, p. 2) ignores the fact that all information, from the perspective of the human being, needs a process of interpretation. According to this conception, only messages could be transmitted, but not information.

However, the semantic and pragmatic aspects are present in the chapter written by Weaver (Shannon; Weaver, 1949), although this approach has not been sufficiently developed to date. The second implication is to question whether the change from the term information to the term message can have the effect of distancing the interest of CI researchers from the Capurro approach, even if the problem and the interests dealt with are the same or similar. In other words, what attracts the CI researcher are the problems related to information, the historical origins of the area, information and communication technologies, the causes and economic consequences of the flow of information in contemporary society, or is it just the word information? Both implications, although speculative, bring *angelics* closer to both IC and other sciences, as indicated by the grouping of several disciplines that have information as an object of study. (Machlup; Mansfield, 1983).

Finally, the approach offered by *angelics* is more independent of direct recourse to philosophical support, which does not occur in the case of the hermeneutic approach, without, however, abandoning it completely. This makes *angelics* simpler and easier to understand in relation to an applied area such as IC, in addition to providing a direct analysis of issues pertinent to society, such as economic implications related to the distribution of information, informational exclusion and the Internet. In other words, *angelics* would approach a theory applicable to research in IC, while hermeneutics would promote a philosophical approach to the area.

What is Knowledge?

Regarding the nature of knowledge, the theories of knowledge stand out, from which it is analyzed through the relationship between the cognitive and the world. According to Dretske (1981, p. 56), the information processors of the sensory systems of organisms are channels for receiving information about the external world

The naturalistic stance in Philosophy consists of disregarding the supernatural, in the explanation of nature and mind, conceiving reality constituted only by natural elements and laws, which are explained through scientific methods. The term "natural" would encompass other terms such as "physical", "biological" or "informational" that express a rejection of transcendent assumptions in the foundation of a priori knowledge (Moraes, 2014), the acquisition of knowledge. (Adams, 2010), in turn, argues that knowledge acquires its properties from its informational base. In such a relationship, knowledge is about the world, about truth, constituting the bridge between the cognitive agent and the world.

In addition to the problems about the ontological and epistemological natures of information, and the nature of knowledge, the following questions are part of IF's research agenda: "what is meaning?", "what is the relationship between mental states and informational states?", "could reality be reduced to informational terms?", "can information support an ethical theory?", among others. Having presented the topics (problems) and theories (hypotheses and explanations) of IF, we highlight two methods specific to this area of investigation: the "synthetic method of analysis" and the "levels of abstraction".

Such methods come from the influence of the works of (Turing, 1950) in Philosophy (marked, in particular, by the informational turn). The "synthetic method of analysis" is the result of the hypothesis of (Turing, 1950), according to which the study of the mind is appropriate when carried out from the use of mechanical functions that could be manipulated by digital computers (Gonzalez, 2005; Floridi, 2012). By means of such functions it would be possible to construct mechanical models of the structure and dynamics of intelligent thought. The understanding that underlies this conception is that the ability to manipulate information in a mechanical way constitutes thinking.

This understanding enabled the development of mechanical models of the mind, which initially generated two strands in Cognitive Science (Teixeira, 1998): strong Artificial Intelligence, which defends the thesis according to which mechanical models of the mind, when successful, not only simulate/emulate mental activities, but explain and instantiate such activities; and weak Artificial Intelligence, according to which the model is only a limited explanatory tool of intelligent mental activity. The common point of such notions is that both accept the thesis that to simulate is to explain, in order to attribute to mechanical models, the value of theories. This is an example of an approach to another question specific to IF: what is the relationship between information and intelligent thinking?

The "levels of abstraction", in turn, derive from the algorithmic approach of (Turing, 1950), which is summarized by (Floridi, 2013b, p. 210) as follows: we have seen that questions and answers never occur in a vacuum, but are always incorporated into a network of other questions and answers. Likewise, they cannot occur in any context, without any purpose, or independent of any perspective. According to this perspective, a philosophical question is analyzed considering its context and purpose, which delimit the field of possibilities for adequate answers.

(Adams & Moraes, 2014), considering the topics, theories and methods of IF, propose the "argument of analogy" to analyze the autonomous aspect of IF. These authors point out that, like the Philosophy of Mathematics and the Philosophy of Biology, the IF has characteristics such as:

- Proximity to the scientific approach, epistemological and metaphysical problems, in addition to the presence of problems of its own not previously dealt with in other areas of Philosophy. Given that IF shares characteristics present in areas already recognized by the philosophical society as legitimate, it would be counterintuitive not to accept IF as an autonomous area of research in Philosophy.

As indicated, the development of information studies in the philosophical-scientific sphere contributed to the constitution of the IF in the academic sphere. This is illustrated with the constitution of IF, as an autonomous and interdisciplinary area of Philosophy: interdisciplinary due to its relationship with Computing, Sociology, Engineering, among other areas, generating methods and theories to deal with its problems; and autonomous, due to its own (and new) problems. With the academic development of IF, the influence in the social sphere is also highlighted.

The understanding of the historical evolution of scientific knowledge from the analysis of research and researchers is an important theme for the history of science and for the philosophy of science. As it is an interdisciplinary area, the history of Information Science (IC) has been and is influenced by the history of other areas of scientific knowledge.

(Capurro, 2003), describes the historical roots as: "CI has two roots: one is classical librarianship or, in more general terms, the study of problems related to the transmission of messages, the other being digital computing". The author also highlights the possibility of tracing a line of evolution from the studies of specialized libraries to documentation and, finally, to IC, both in the United States and in Europe (Williams, 1998; Rayward, 1998 in: Capurro; Hjørland, 2003, p. 378).

The change in nomenclature would have occurred under the influence of new technologies, especially computing and cybernetics, and also as a result of the mathematical theory of communication (Shannon, 1948; Shannon, Weaver, 1949), now known as the theory of information, and the cognitive paradigm of the brain, as the processor of information. (Capurro; Hjørland, 2003, p. 379; Capurro, 1991).

As the historical roots of IC have not limited its scope to studies developed internally in the area, the change in nomenclature has been accompanied by the gradual expansion of the topics of interest, as confirmed by Capurro's analysis of the epistemological paradigms of IC, that is, physical, cognitive and social. (Capurro, 2003).

Information and/or Knowledge?

Although the terms information and knowledge are used very often, they are not the same thing. Information is not the same thing as data, although the two words are often confused, so it is understandable that the subtle distinction between these concepts is essential. Data do not carry the meaning or significance of facts, images or sounds, since they lack relational elements indispensable to the establishment of a complete meaning, lacking an internal relational structure for a cognitive

purpose. This structure is one of the attributes of information. Data is transformed into information when its creator adds meaning to it (Davenport and Prusak, 1998).

Wiliam G. Zikmund (2000, p.19) defines knowledge as "the mixture of information, experience and understanding that provide a structure that can be applied in the evaluation of new information or new situations". Information "feeds" knowledge. Knowledge can thus be defined as a person's ability to relate complex structures of information to a new context. New contexts imply change – action and dynamism. Knowledge can be shared, if the possessor wants to share it. When a person internalizes information to the point of being able to use it, we call it knowledge (Zikmund, 2000). This is a fluid blend of experiences, values, contextual information and expert insight, structured that provides a framework for evaluating and incorporating new experiences and information.

In organizations, it is found not only in documents and reports, but also in organizational routines, processes, practices, and standards. Knowledge originates from and is applied in the minds of connoisseurs (Davenport and Prusak, 1998, William Zikmund, 2000). Knowledge is information as valid and accepted, integrating data, acts, information and sometimes hypotheses. Knowledge requires someone to filter, combine and interpret information. Information can be considered as a "substance" that can be acquired, stored and possessed by a person or a group and transmitted from person to person or from group to group. Information has a certain stability and is perhaps better seen as existing at the level of society (Davenport and Prusak, 1998). Although we can store it using various physical supports, the information itself is not physical, but abstract and not purely mental. Knowledge is stored in people's memory, but information is out there in the world. Whatever it is, it exists somewhere between the physical world around people and the mental world of human thoughts. Knowledge = Internalized information + ability to use it in new situations. Knowledge is fundamentally and intrinsically found within people. These are much more complex and unpredictable at the individual level than an entire society, so it is not surprising that knowledge is much more difficult to obtain than information.

Knowledge exists mainly within people, it is an integral part of human complexity and unpredictability (Davenport and Prusak, 1998). Knowledge has a fundamental duality: it is something that can be stored (at least sometimes we intend to do so) and something that flows (something that is communicated from person to person). It is possibly the duality of knowledge (thing that flows and the process of storage) that makes it difficult to treat and manage. According to Dahlberg (2006), knowledge is organized into units of knowledge (concepts) according to their characteristics (objects/subjects/subjects). The organization of knowledge is related to a process of conceptual analysis of a domain of knowledge and from there it is structured/architected, generating a representation of knowledge about such domain that will be used for the organization of information about that domain of knowledge.

What is the Systemic Approach?

Von Bertalanffy (1968), in *the General Theory of Systems*, says that the word system would appear in one of the first places if one were to make a list of terms in vogue; the idea of system permeates all fields of science, having penetrated popular thought, the mass media, even common jargon. The notion of system encompasses a series of approaches, such as systems philosophy (focused on ethics, history, ontology, epistemology, and systems methodology), systems engineering (artificial systems, such as robots, electronic data processing, etc.), systems analysis (development and planning of system models, including mathematical ones), and empirical research on systems (covering the discovery of laws, adequacy and simulation studies of systems).

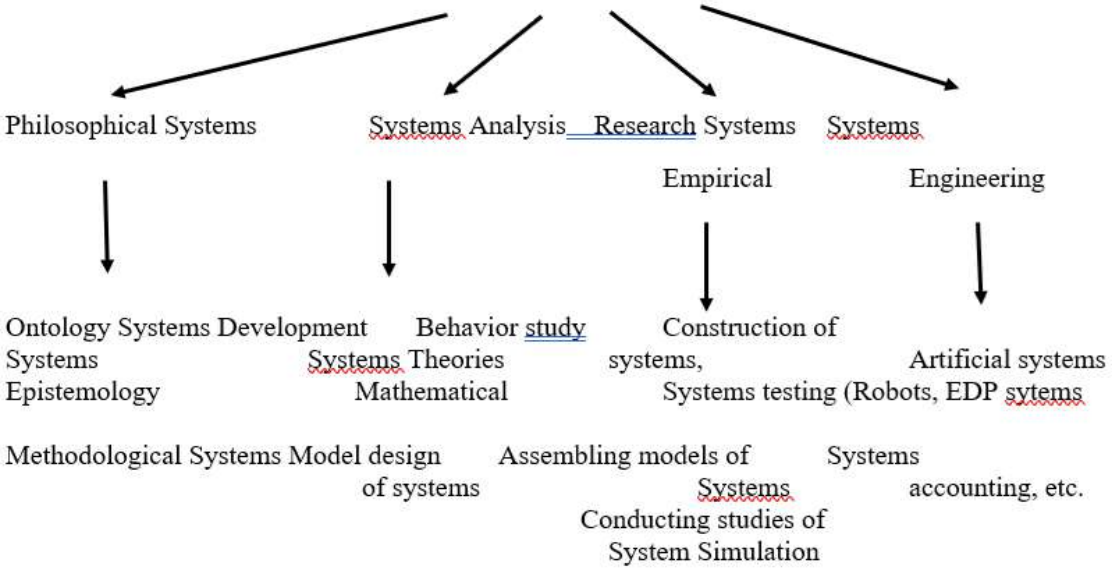
According to (Mattessich, 1982), the strong philosophical flavor presented by *General Systems Theory* stems from the fact that it incorporates many "aspects of holistic paradigms expressed in the philosophies of Lao-Tse, Heraclitus, Leibniz, Vico, Hegel, Marx, Whitehead, Driesch and others." The philosophical view, which has guided the systemic approach since its conception, emerged in the late 60s and early 70s, with the works of (Churchman, 1968, Ackoff, 1971, Laszlo, 1972, Sutherland and Emery, 1969). These authors typify the ethical and introductory phase of systems philosophy.

Churchman's works have a historical, ethical focus, and are oriented towards management and the social sciences. (Ackoff and Emery, 1972), stand out for their conceptual and exploratory contributions. LaSzlo contributes to systems philosophy within the line of thought of (Von Bertalanffy, 1968), and broadens the line with the introduction of systems philosophy (Ervin Laszlo, 1972), applying them to the social sciences. Within the philosophical view, the end of the 70s is marked by a growing pragmatism, characterized by epistemological, methodological and ontological focuses applied to administration, decision methods, social and applied sciences in general. Three names exemplify this phase: (Rescher, 1979), focused on epistemological applications; Bunge, for ontology, and Mattessich for methodology.

The systems analysis approach, he continues (Mattessich, 1982), although much criticized for its restrictive aspects of model building, emerged from visions of cybernetics (Wiener, 1961) and communication theory (Shannon and Weaver, 1948-1949). (Mesarovic, 1974), laid the foundations of a General Mathematical Systems Theory and, together with Takahara, 1975, presented the mathematical foundations for a general systems theory. Still in the mathematical line, control theories of linear and nonlinear systems were developed, and the automaton theory (developed from the works of (Alan Turing, 1936). Empirical research in systems led Herbert Simon to conceive a series of heuristic researches related to games and simulation.

Second, *The International Encyclopedie of Social Sciences*, (1965, v. 15, pp. 452-495), classifies systems analysis into the following categories: General Systems Theory, Social Systems, Political Systems, International Systems, and Psychological Systems. We present our proposal for the classification of the disciplines:

Figure 2 - Systems Approach



Source: Adapted from Richard Mattessich (1982), Distinguished Arthur Andersen & Co. Professor, Faculty of Commerce and Business Administration, University of British Columbia, Vancouver, B.C., Canada, in: V6T 1yjournal of the American Society For Information Science

In short, the systems approach is, in the words of (Churchman, 1968), a perception and an illusion; a continuous revision of the world, of the total system and its components; the essence of the systems approach is on the one hand confusion and on the other hand clarification – both inseparable aspects of human life. Based on this *perception-illusion continuum*, (Churchman, 1968), he summarizes the systems approach in the following aspects:

- The systemic approach begins when, for the first time, one sees the world through the eyes of others;
- The systemic approach continually realizes that the whole view of the world is terribly restricted. In other words, each view of the world sees only one part of a larger system;
- There is no one who is an expert in the systemic approach, that is, the problem with the systemic approach is to capture what everyone knows, something beyond the reach of any specialist's vision;
- The systems approach is not a bad idea at all.

One of the possible definitions of system, according to (Von Bertalanffy, 1968), states that "a system can be defined as a set of elements in the interrelation between itself and the environment". There is broad agreement that a system is a model of a general nature, that is, a conceptual analogue of some fairly universal traits of observed entities. (Angyal, 1939), when dealing with the structure of the whole, points to the concept of system, as being the appropriate entity for the treatment of the all, although he recognizes the difficulties of perceiving and describing the holistic connections through relationships. (Churchman, 1968), says that, although the word system has been defined in various ways, there is widespread agreement that a system is "a set of parts coordinated to achieve a set of objectives".

Second, (Amaral, 1977), "... A system is the whole set of two or more elements that interact. By imagining the universe composed of interacting galaxies, we have a view of the largest perceptible system. By imagining man with all the molecules that constitute and interact with him, we have another vision of the system. Finally, by imagining the atom and the particles that compose and interact with it, we have a vision of a system that, in relation to man, is microscopic. When you visualize everything from the Universe to an atomic particle, you have what is called a systemic view."

In short, systems can be conceptualized as a set of interrelated parts, interacting to achieve certain goal(s). The systems view approaches the world as a set of systems and subsystems with containment/containment implications. One of the most widely used classifications in information science concerns the division into natural systems – those existing in nature – and artificial or social systems, those created by man to improve natural systems.

Among the various possible classifications for systems, (Davis, 1974), it dichotomizes into abstract or physical, deterministic or probabilistic, closed or open. Abstract system is an orderly arrangement of interdependent ideas or constructs. Physical system is a set of elements that operate together to achieve a goal,

Physical systems are tangible, material. A deterministic system is one that works in a predictable way, that is, the state of the system, at a given point, and the description of its operation ideally lead to the prediction of the next state, without errors. A probabilistic system is one that operates within probable conditions of behavior, or rather, there is a margin of error associated with the prediction. Closed system is self-contained. It does not exchange material, information or energy with the environment. Such closed systems will exhaust themselves or become disordered. This movement into disorder is called an increase in entropy. An open system is one that exchanges information, material and energy with the environment, that is, an open system is one that has an environment, which are other systems with which it relates, exchanges and communicates. Open systems tend to adapt to changes in their environments in order to ensure their own existence.

(Wilkerson and Paul, 1985), searched the literature for what would characterize a system, and what properties or characteristics systems should have. (Katz and Kahn, 1977), point out some characteristics common to the so-called open systems:

- **Energy import** – open systems need to import some type of energy from the environment. Therefore, social organizations also need to draw energy, whether from other organizations, people or the material/physical environment that surrounds them – no social structure is self-sufficient and autonomous.
- **Transformation** – to perform some kind of work, open systems transform the energy they have at their disposal. Organizations create new products, produce raw materials, train people, or provide services – all of these activities entail reorganization of inputs.
- **Product** – the product of open systems is exported to the environment either as a mental fat/artifact.
- **Systems such as cycles of events** – the activities generated by the exchange of energy have a cyclical pattern: what is exported to the environment provides energy for the repetition of the cycle of activities.
- **Negative entropy** – according to several authors, in order to try to oppose the entropic process (a necessary condition for survival), systems must acquire negative entropy. Entropy is a universal law of nature that states that all forms of organization tend to disorder or death. The open system, because it imports more energy from the environment than it needs, can, through this mechanism, acquire negative entropy. There is a general tendency in open systems to maximise the ratio of imported energy to exported energy, aiming at survival, even in times of crisis. The process of entropy exists in all biological systems and in closed systems, although social systems are not subject to the rigors of the same physical constants as biological systems, and can be opposed almost indefinitely to the entropic process. However, they state: "... The number of organizations that cease to exist every year is enormous.
- **Information input, negative feedback and coding process** – In addition to the energy inputs that are transformed or altered to perform a job, systems also include information inputs that provide the structure with signals about the environment and its own functioning. Negative feedback is the simplest type of information input found in all systems. Such feedback helps the system correct for deviations in direction. The mechanisms of a machine, for example, send information about the effects of its operations to some central mechanism or subsystem, which, in turn, acts on this information to keep the system in the desired direction. The thermostat is an example of a regulatory mechanism based on negative feedback.
- **Stable state and dynamic homeostasis** – The mechanism of energy importation, in an attempt to oppose entropy, entails an energy exchange, characterizing a stable state in open systems. Such a state does not mean immobility, nor true balance. There is a continuous flow of energy from the external environment to the system and a continuous export of energy from the system to the environment, thus establishing a proportion of exchanges and relations that remains the same, that is, constant and balanced. Although the tendency to stability in its simplest form is homeostatic, such as maintaining a constant body temperature, the basic principle is the preservation of the character of the system. (Miller, 1955) maintains that the growth rate of a system, within certain limits, is exponential, if this system exists in a medium that makes unlimited amounts of energy available for input. Thus, the stable state is that of homeostasis through time. At more complex levels, it becomes a state of preservation of the character of the system, which grows and expands through the importation of more energy than necessary. Open or living systems have a growth dynamic, through which they push their basic nature to the limit. They react to changes or anticipate them through growth by assimilating new energy inputs.
- **Differentiation** – open systems tend to differentiation and elaboration. Fuzzy global standards are replaced by more specialized functions.
- **Equifinality** – (Von Bertallanffy, 1968), suggested this principle as characteristic of open systems and established that "a system can reach the same final state from different initial conditions and by different paths". It should be noted that the level of equifinality may be reduced as open systems develop regulatory mechanisms for the control of their operations.

In a broad, philosophical sense, parts are elements, organs, phenomena, and processes whose interaction constitutes, precisely, the whole and gives rise to the qualities of the system. The component parts can be both material bodies and processes. In society considered as a whole, the parts can be the different social phenomena, processes, and ideas. The nature of the whole and its peculiarities depend mainly on the internal nature of the parts. The change in the composition of the set of components brings about changes in the whole and modifies its characteristics.

Churchman, (1968), defines the environment as everything that is outside the system and over which there is no control. To be outside the system means not to belong to it, to be outside its limits, and that it is difficult to determine. It exemplifies the issue of control with a system operating with a certain budget provided by any agency. If the system cannot change this budget by redistributing it, then the budget is part of the system environment. If, on the contrary, some change is possible, then the budget will be part of the system itself. In this way, the control that the system is or is not able to exert over the various elements determines whether these elements belong to the system or to its environment.

What is the systemic approach to information?

According to (Saracevic, 1996), Information Science (IC), during its development and after the explosion of the informational phenomenon, was initially concerned with investigating issues related to information retrieval, despite its evolution towards the study of other themes, from interdisciplinarity with other areas of knowledge, which are dedicated to the study of information within various contexts, expanded his interest in research on the informational resource, ranging from the scientific to the professional field, as in the case of Information Management (IG).

According to Souza, Dias and Nassif (2011), Information Science is dedicated to the study of the general properties and conditions of information regarding the sources of information, the selection, the processes that enable its treatment and processing, its availability and retrieval, as well as its effective use. Different disciplines, sciences or areas of knowledge are also dedicated, in some way, to the study of information, such as Business Sciences, Economic Sciences, Computer Science, Communication Sciences, Production Engineering, etc.

IC prioritizes the theoretical foundations of the informational phenomenon and, concomitantly, processes and practices that enable the flow of information from its source to the use of information. Information Science reflects this trend and, consequently, and consequently, research intertwines the most varied themes involving information resources. The human being presents specific singularities, of his very differentiated needs, namely: researchers in the traditional basic areas; researchers in the applied sciences; product development personnel; marketing professionals; Engineers; and, more recently, executives and managers.

That is, from the concern with the retrieval of information directed to the scientific field, it is observed, more recently, the emergence of greater care with the flow and use of information in the scope of Management. This means that, in the field of relevant studies in IC, those linked to Information Systems emerge, to IM, in particular, to information systems applied to different sciences and disciplines.

Referring to the concept of information system, (Beatriz Marques, 2017), she states that "in an attempt to clarify this concept, and adopting a holistic view of Information and Knowledge, we seek to contextualize the different existing perspectives from the concepts that are in its genesis: System, Information System (IS) and Technological Information System (ITS). In this context, we highlight that the need for a "unitary vision of various disciplines (such as Archival, Librarianship, Documentation, etc.) or of various sciences (such as Marketing, Management, Neuroscience, Psychology, Information Management, Innovation Management, Management of Technological Information Systems, etc.), contributes significantly to the affirmation, consolidation and enrichment of the core business of Information Science" (Marques, 2017b) and its transdisciplinary character".

According to (Fernández Marcial; Gomes and Marques, 2015, p.3), "information systems are defined by the participation of material, human and informational resources organized in an interrelated way, in order to allow inputs to be transformed into outputs - information products and services"

For Vickery (1973, p.1) "*An information system is an organization of people, materials and machines that serves to facilitate the transfer of information from one person to another. Its functionsis social: to aid human communication*".

(Silva, 2006, p. 162), defines IS as: "a totality formed by the dynamic interaction of the parts, has a lasting structure (producer/receiving entity) with a flow of states in time, being constituted by the different types of information registered or not externally to the subject', and may have a material/technological support". The elements that are part of the IS are: the human, informational, political, economic, social, technological, ecological, legal and cultural elements that interact, directly and indirectly, for the functioning of the system in all its dynamics, from the production / reception, organization and representation, storage, retrieval and dissemination of information. "An information system will be, therefore, one that has information as its central core and its management as its purpose."

Para (Fernández Marcial; Gomes and Marques, 2015, p.5), the generic nature of this definition allows it to encompass all types of information (primary, secondary or tertiary), all types of information support (material or technological) and all types of structures (producing/receiving entities). In this context, and in an attempt to fully clarify the concepts and their applications, we consider that it is very important to make the distinction between Information System, Service or Product.

According to (Machado, 1967), "the etymological origin of the term Service comes from the Latin *servitium*, and can be defined as, servitude, condition of slave, slavery; in a collective sense, the slaves". Second, (Houaiss& Villar, 2005, p. 7318), the Houaiss dictionary provides several definitions for the term Information Service and Public Utility Service: "1 - that which aims to obtain information, especially confidential; intelligence, secret service; 2 - the entity or personnel linked to that activity (...). that useful to society, which is provided by the State upon payment by those who use it"

Second, (Gomes, 2017, p. 54), (Gomes, 2017, p. 54), the Information Services or Information Units are the Archive, the Library, the Documentation Center or the Museum. In other words, the Services and their Information Products will be the natural/artificial consequence of the functioning of the IS, the outputs, the *outputs*. "An Archive or a Library, as services, can be part of a System, while Organizations can constitute a System, but they cannot be confused with the IS (which comprises all the information produced/received and accumulated, regardless of the existence of a service that processes, stores, disseminates and preserves it)."

(Assis, 2006, p. 15), considers that an information product is "one that guarantees and covers the information needs of the members of the organization and contributes, through bulletins/reports and databases, so that users are served with a balanced mix of products".

According to (Carvalho, 2000, p. 260), the Technological or Informatics Information System (ITS) is one of the constituent parts of the whole, that is, of the IS, so there is no polysemy between the two terms. Despite the various misunderstandings and semantic ambiguities that exist at the terminological level and that result from the use of the same term, SI, to designate different realities, we consider that this fact is due to the common characteristics of the object of analysis – information – and the difficulty or impossibility of circumscribing it to the study of a single scientific area: (...)

> *"They all deal with information, they all are somewhat related to organizations or to the work carried out in organizations, and they all are related to information technology, either because they can benefit from its use or because they are made with computers or computer-based devices".*

For (Karwowski, Rizzo and Rodrick, 2003, p. 18), "*Information system (IS) can be defined as technologycal systems that manipulate, store, process, and disseminate information that has or is expected to have an impact on human organized behavior within any real context and use*."

Second, (Pessoa, 2017, v. 12, n. 2, p. 060-076), more than a set of data or processes, the object of study of IC is information understood as a phenomenon, human and social. As the social sciences of a transdisciplinary nature, CI has evolved in order to demonstrate, at the level of its object of study, the "failure" of technological determinism and the "rise" of human and

social determinism. SITS are just one component, among many others, of the IS of Organizations and do not lead to success, they only make the decision-making process easier or more agile, being a valuable aid for the efficiency and effectiveness of organizations

A scientific explanation for the behavior of living organisms, that is, of analyzing the whole (the integral understanding of phenomena and, in the specific case under analysis, of the info communicational phenomenon from the interconnections and interactions that are established between its parts, the General Systems Theory (TGS) has developed a way of conceiving or looking at reality from various prisms or Types of Information Systems:

- **Physical systems** - relationships are physically measurable and derive from a conscious act of man;
- **Abstract systems** – relationships do not derive from a conscious act of man
- **Natural systems** - the relationships are natural and are or are not perceived by man;
- **Closed systems** - with endogenous variables and laws of absolute type, because their behavior is not subject to the influence of external variables
- **Open systems** - when their behavior is strictly determined by internal variables.

3. 2 Philosophical Sciences

Considering philosophical practice, as the art of interpreting reality from the formulation of conceptual schemes about the human being, nature and society, can Philosophy face the problems that arise from the new organizational dynamics of society today? We understand that Philosophy alone, without interdisciplinary tools of analysis, does not seem capable of facing, perhaps even formulating, the problems raised by ICTs.

Floridi, (2011, p. 14), characterizes the Philosophy of Information (IF) as follows: a philosophical area that is related to:

a) The critical investigation of the conceptual nature and basic principles of information, including its dynamics, use and sciences; and refers to IF, as a new area of research in Philosophy, guided by the investigation of the content of information and not only in its form, quantity and probability of occurrence (thus differing from the proposal of Shannon & Weaver, (1949/1998). It is important to emphasize that the IF does not seek to develop a "unified theory of information", but to integrate the different forms of theories that analyze, evaluate and explain the various concepts of information defended.

b) The characterization, in turn, indicates, according to Floridi, (2011, p. 15-16), that the IF has its own methods for analyzing philosophical, traditional and new problems. These methods have information as their central element, are interdisciplinary in nature and maintain the relationship with computational methods, in addition to using concepts, tools and techniques already developed in other areas of Philosophy (e.g., Philosophy of Artificial Intelligence, Cybernetics, Philosophy of Computing, Logic, among others).

Thus, IF will provide a broad conceptual framework for the treatment of the issues that emerge from the "new" dynamics of contemporary society, Floridi, (2011, p. 25). An example of this dynamic is the possibilities of interaction provided by ICTs which, depending on the degree of familiarity of people with such technologies, promote a feeling of dependence on being online. In addition, even if people do not want to be online most of the time, such a feeling remains, due to the dissemination of informational devices in everyday life, such as cameras, credit cards, among others. In this situation, the question arises: what are the implications of the insertion of ICTs in society for people's daily action?

Considering (a) and (b), Floridi, (2002, 2011), argues that IF constitutes a new paradigm and an autonomous area of investigation in Philosophy. It is characterized as a new paradigm, as it would break with previous paradigms of Philosophy, since it is neither anthropocentric nor biocentric, admitting information as the central focus in the analysis of concepts and social dynamics. The autonomy of the IF, on the other hand, would be sustained by the presence of its own topics (problems, phenomena), methods (techniques, approaches) and theories (hypotheses, explanations), according to other areas already recognized, such as legitimately philosophical, Floridi, (2002, 2011); Adams & Moraes, (2014).

Information what is it?

Among the topics of IF, the question "what is information?", referring to the ontological and epistemological natures of information, stands out. It is the answer to this question that directs the paths to be developed by FI and delimits its scope of investigation, Floridi, (2011). The importance of this issue is also due to the fact that there is no consensus among scholars in their proposals.

Since the "informational turn in Philosophy", several conceptions of information have been developed in an attempt to respond to concerns about the ontological and epistemological status of information. Although Adams (2003) indicates the milestone of the informational turn in Philosophy with the publication of Turing's article (1950), there are precursors of information theory in several areas, especially in Semiotics, such as the works of Charles S. Peirce (1865-1895). Some examples can be given with the following proposals:

- **Wiener, (1954, p. 17**): "The commands through which we exercise control over our environment are a type of information that we impose on it." In addition, for this author, information would be a third constituent element of the world, along with matter and energy, and is not reducible to them.
- **Shannon & Weaver, (1949/1998):** the authors establish, the Mathematical Theory of Communication, a technical notion of information conceived in probabilistic terms resulting from the reduction of possibilities of choice of messages, which can be understood objectively.
- **Dretske, (1981):** information is understood as a commodity that exists objectively in the world, independent of a conscious mind of the first person who captures it. The information would constitute an indicator of the regularities of the environment, from which representations, beliefs, meaning, mind, mental states, among others, would be made.
- **Stonier, (1997, p. 21):** information would be on the physical plane, objectively, and the theorists of Physics, in turn, would have to expand their vocabulary and admit *infons* (particles of information) as a constituent element of the world. «(...) information exists. It does not need to be perceived to exist. It does not need to be understood to exist. It does not require intelligence to interpret it."

- **Floridi, (2011, p. 106):** «Information is a well-formed datum, with meaning and truth». Well-formed and meaningful data that refers to the intrinsic relationship that the data would need to have in relation to the choice of system, code, or language in question. These would have their aspect of "true" and "truth" related to the adequate supply of the contents, to which they refer in the world.
- **(Gonzalez, 2014):** conceives of information, as an organizing process of dispositional (counter-factual) relations that bring together properties attributable to material/immaterial objects, structures or forms) in specific contexts.

Information and Truth

Although the concepts of information are different, there is in common the naturalistic stance in relation to the objective aspect of information. In addition, proposals such as those of Dretske and Floridi denote an intrinsic relationship between information and truth. According to Dretske (1981, p. 45), characterizing "false information" as information would be the same as saying that "rubber ducks are types of ducks". Since the information cannot be false, the information would be true, as well as its source. This source can be interpreted as the world itself, making it possible to deal with another problem of IF, that is: what is the nature of knowledge?

The problems of the ontological and epistemological nature of information, and the nature of knowledge, are part of the IF's research agenda the following questions: "what is meaning?", "what is the relationship between mental states and informational states?", "can reality be reduced to informational terms?", "can information support an ethical theory?", among others. Having presented the topics (problems) and theories (hypotheses and explanations) of IF, we highlight two methods specific to this area of investigation: the "synthetic method of analysis" and the "levels of abstraction".

Such methods come from the influence of Turing's works (1950) in Philosophy (marked, in particular, by the informational turn). By means of such functions it would be possible to construct mechanical models of the structure and dynamics of intelligent thought.

This understanding enabled the development of mechanical models of the mind, which initially generated two strands in Cognitive Science, Teixeira, (1998): strong Artificial Intelligence, which defends the thesis according to which mechanical models of the mind, when successful, not only simulate/emulate mental activities, but explain and instantiate such activities; and weak Artificial Intelligence, according to which the model is only a limited explanatory tool of intelligent mental activity. The common point of such notions is that both accept the thesis that to simulate is to explain, in order to attribute to mechanical models, the value of theories.

Relationship between information and intelligent thinking

The "levels of abstraction", in turn, derive from Turing's algorithmic approach, which is summarized by Floridi, (2013b, p. 210), as follows: We have seen that questions and answers never occur in a vacuum, but are always incorporated into a network of other questions and answers. Likewise, they cannot occur in any context, without any purpose, or independent of any perspective. According to this, a philosophical question is analyzed, considering its context and purpose, which delimit the field of possible answers.

Considering the topics, theories and methods of IF, Adams & Moraes, (2014) propose the "argument of analogy" to analyze the autonomous aspect of IF. These authors point out that, like the Philosophy of Mathematics and the Philosophy of Biology, the IF has characteristics such as:

- Proximity to the scientific approach, epistemological and metaphysical problems, in addition to the presence of problems of their own, not previously dealt with in other areas of Philosophy. Given that IF shares characteristics present in areas already recognized by the philosophical society as legitimate, it would be counterintuitive not to accept IF, as an autonomous area of investigation, in Philosophy.

As we have indicated, the development of information studies in the philosophical-scientific sphere contributed to the constitution of the IF in the academic sphere. This is illustrated with the constitution of IF, as an autonomous and interdisciplinary area of Philosophy: due to its relationship with Computing, Sociology, Engineering, among other areas, generating methods and theories to deal with its problems; and autonomous, depending on its own (and new) problems. With the development of the academic scope of IF, the influence in the social sphere is also highlighted, illustrated by the growing presence of ICTs in the daily lives of people and organizations. Such presence is influencing the dynamics of contemporary society, constituting the "Information Society / Digital Society".

3. 3 Information Science

Evolution of Information Concepts

It is difficult to pinpoint the emergence of a new science, even when it is a recent scientific discipline, as is the case of Information Science. However, Foskett (l969) and Ingwersen (l992) point to the date of l958 as one of the milestones in the formalization of the new discipline, when the *Institute of Information Scientists* (IIS) was founded in the United Kingdom. Meadows, (1990), describes the origin of the new discipline, from the specialized libraries (in industries and other organizations). According to Meadows, (l990), the discipline underwent a marked development after the Second World War, due to the emergence of the Mathematical Theory of Information, described by Shanon and Weaver, (1949), in the late 40s. This theory has been adopted by many other areas because it explains the problems of transmitting messages through mechanical communication channels. The industrialization of the commercial press promoted the bibliographic explosion, a phenomenon no less important than the advent of the Gutenberg press, which occurred around 1450, whose effects became more evident after the 2nd world war.

His contribution to the development of Information Science was small, but important for the history of the area, as it attracted attention to two needs. The first to clearly define the nature of the information that people cared about, and the second to define the conceptual framework to be applied in the organization of that type of information. According to Pinheiro & Loureiro, (1995), Norbert Wiener in 1948, in his work "*Cybernetics or control and communication in the animal and machine*", and Claude Shannon and Warren Weaver in 1949, in the book "*The mathematical theory of communication*", marked the beginning of what would become information science. Also according to the authors, it is in the 60s that the first concepts and definitions are elaborated, and the debate on the origin and theoretical foundations of the new area of

knowledge begins", Pinheiro & Loureiro, (1995, p. 42). The authors point out several facts that occurred in the 60s that meant the true milestones of the formation of a new disciplinary field:

- The conference held at *the Georgia Institute of Technology*, (1962),
- The *Weinberg Report (*1963)
- Mikhailov's work Informatics (1966)
- The study by Rees and Saracevic, (1967),
- Borko's definition, *in Information Science: what is it?*, (1968).

Borko (l968) defined information science as a discipline that investigates the properties and behavior of information, the forces that govern its flow, and the means of processing to optimize its accessibility and use. It is related to the body of knowledge related to the production, collection, organization, storage, retrieval, interpretation, transmission, transformation and use of information. This includes the investigation of the representation of information in natural and artificial systems [...]. It has a pure science component that investigates the essence of the subject, without considering its application, and another applied science component that develops services and products [...]. For Goffman, (l970), the goal of Information Science is to establish a unified scientific approach to study the various phenomena that involve the notion of information, whether such phenomena are found in biological processes, in human existence or in machines created by human beings. Consequently, the subject must be related to the establishment of a set of fundamental principles that govern the behavior of the entire communication process and its associated information systems.

Griffith, (1980), proposed a similar definition that establishes Information Science as a discipline that seeks the creation and structuring of a body of scientific, technological and systemic knowledge related to the transfer of information. Saracevic, (l996), studied the evolution of Information Science and defined it as "a field dedicated to scientific issues and professional practice, focused on the problems of effective communication, knowledge and knowledge records, among human beings, in the social, institutional or individual context, of the use and needs of information. In dealing with these issues, the advantages of modern Information and Communication Technologies (ICTs) are considered of particular interest.

Information Science was born after the Second World War, to solve a major problem, which was also the great concern, both of Documentation and of Information Retrieval, which is to gather, organize and make accessible the cultural, scientific and technological knowledge produced throughout the world. Information science is a recent science and was born from the exact sciences, that is, seeking to achieve exact knowledge from the inspiration of mathematical and quantitative models. Bronowski, (1977, p. 47), based on objectivity, sought to formulate universal laws of the "behavior" of information. Strongly influenced by the empirical sciences, it intended to establish universal laws that represented the informational phenomenon and hence the need to resort to mathematical (information theory), physical (entropy) or biological (epidemiological theory) models.

In the seventies, a character enters the scene who redirects the focus of information science: "man (decision-maker) and as such the human and social sciences also begin to contribute with their methods and practices to the composition of this emerging science", Cardoso, (1996: 73-74). Initially very connected to computing and automatic information retrieval. According to González de Gomez, (2000, p. 6), from the 1970s onwards, he effectively inscribed himself in the social sciences, as a "symptom of the ongoing changes that would affect the production and direction of knowledge in the West", González de Gomez, (2000, p. 2). It is from this decade onwards that we can refer to the "social foundations of information". However, some relevant questions, if we are asked right now, what is the branch of science to which information science is most close? What are the theories, concepts and methods that feed information science?

The first studies in information science, as a social science, were to study social reality from a statistical, i.e., quantitative, perspective. Berger &Luckmann (1985) presented reality as something that is socially constructed and not as an existence in itself, and they open the way to the understanding of information not as a given, a thing that would have meaning and importance *per se*, but as a process. That is, something that will be perceived and understood, in various ways by people, which according to Borko's (1968) definition of behavior and information flows, is something that is outside of people and with Buckland's definition (1991), which sees information as a "thing" outside people.

The subjectivity of information becomes fundamental for understanding the different planes of reality and the distinction, between the different forms of knowledge and mechanisms, of their configuration and legitimation. People need to be included in studies on information and in their daily interactions, forms of expression and language, rites and social processes. Several studies can be presented, as an example, of the incorporation of these concepts in the field of information science studies, such as the *sensemaking* approach inaugurated by Dervin, Atwood & Palmour, the studies of MacMullin & Taylor on the values of people, the studies of a cognitive nature inspired by the theory of Maturana & Varela, the hermeneutic approach to information science, the studies of Capurro, (2003), on information networks based on Bourdieu's theoretical framework, (1983. p. 46-81), as well as bibliometric studies and scientific communication and the contributions of Foucault's Archaeology of Knowledge and the Sociology of Science, Latour, (1984), Knorr-Cetina, (1997), among others.

Information Science is a discipline that has a very broad field of practices, but it does not yet have a defined theoretical field as is the case with other areas of knowledge, such as Linguistics, Anthropology and others. He has not yet arrived at a theoretical construction that integrates all his concepts and practices. That is why it operates based on more or less fragmented theoretical constructions, for example, the Representation of Information would be one construct, among another, etc. The most important feature of information science is its interdisciplinary nature in which the magnitude of the problems faced (ecological, ethnic, and demographic) is demanding innovative solutions. Information science has been consolidating itself from elements "borrowed" among others, by mathematics, physics, biology, psychology, sociology, anthropology, semiology and communication theory and other sciences that contributed to its foundation and applicability, Cardoso, (1996, p. 74). *"Information science is not to be looked at as a classical discipline, but as a prototype of the new kind of science" Wersig, (1993, p. 235).*

Information science evolves to new stages of dialogue and insertion in the social sciences. Reflection on the evolution of information science, its relations with the social sciences and as a model of science as a whole, is fundamental for research to

continue and to incorporate all the knowledge accumulated in this process. Since scientific investigation is one of the main ways for the formulation of theories in an area, what can be seen is that research in Information Science has been consolidating itself over the last decades and opening new horizons of discussions. Great contribution has been made by professors and researchers in the various international universities.

It can be seen that some important steps have been taken in order to theoretically strengthen the area of Information Science and that research is expanding and has a Scientific Community that over the years has been consolidating internationally. There are many and different challenges that are presented today for Information Science. As an applied science, it needs to respond to society's demand for information and, as an object of research, to the fundamental conceptual needs of the area. The realization and sociability of research are the safest ways to create and share new paradigms. Thus, it becomes increasingly important to seek the theoretical, philosophical and social foundation in the field of Information Science and, above all, to further strengthen its scientific community.

(i)i Concept of Perception versus Information

Information perception not only influences our view of information, but also our perception of the information system (Klein &Hirschleim, 1987), our perception of communication (Mokros, 1993, Schement, 1993) and the conduct of research (Newman, 2001, Schement, 1993). This means that the perception of information, which we prefer to call information concepts, has a profound influence on the field of information science. The concept of information fascinates many scientists from different areas, such as biology, psychology, computer science, sociology, economics, management, political science, statistics, philosophy, communication and information studies, (Mokros, 1993, Newman, 2001, Ruben 1993, Schement, 1993).

In all these domains, information is an important concept, but at the same time, none of them can claim that the information is relevant only to them. Information must be seen as an interdisciplinary concept. This means that information concepts must be studied in different disciplines. It also means that the concepts of information are not only relevant in the field of information science. The concept of interdisciplinary information has not emerged, and no unifying theory is presented as imminent (Schement, 1993). When information is defined "abundance and diversity confuse us" (Braman, 1989, p. 233). One tantalizing conclusion we have come to is that the meaning of information depends on the context. While many argue that we need an information-theoretic perspective (Devlin, 1999, Aefiner, 1999, Newman, 2001).

We do not intend to define a theoretical perspective, but only to present the different concepts in different disciplines, as well as a critical analysis of the different concepts. (Newman, 2001) describes a variety of concepts in different sciences that can be grouped as follows:

- Probabilistic concept. • Concept of information processing; • Ecological concept of information.
- Social and organizational concept of information.

The probabilistic concept of information is that low-probability events represent a high level of information. An important application of this concept is information theory (Shannon and Weaver, 1949, in Newman, 2001). In this theory, the mathematical representation of the transmission of a message is presented, as if the information were a measure of predictability. Logic, cybernetics, and philosophy also correlate information with probability (Fisher, 1934, Carnap & Bar-Hillel, 1952, Popper, 1965, Mackay, 1969 in: Newman, 2001). But these concepts differ in important ways, such as in the interpretation of probability and the semantics of information. With regard to information semantics, many concepts see information as a reduction of uncertainty.

The concept of information processing (or cognitive concept) focuses on the thinking of cognitive psychology. However, this concept, thinking, and information processing are analogous. Information is the product of thought and this increases knowledge about anything. The model of the cognitive process and the internal representation are the first concern of this approach.

The concept of ecological information is not created, but is present in the world, in the environment, in a given situation. Organizations actively gather this information from the outside world. An important extension of the ecological approach is situation theory. This is reconstructed on a mathematical basis and makes a clear distinction between information (content or information) and its representation.

The social and organizational concept of information is part of the sphere of work: work associated with the concept of information economy. In this category, information concerns the processing of the same and the information pyramid model is often used. In this model, it is necessary to analyze data for the production of information and the information must be processed to produce knowledge. An important ingredient of information economics is the quantification of "working information" and the "information product", used, among other things, to show the importance of knowledge in modern economies (Wallerstein 2000, Murteira, 2001, Brandt, 1995, Nicholas, 2000, Handy, 1990, Hauknes, 1999).

In the well-known effort of (Porat, 1997, in Newman, 2001), information is associated with the reduction of uncertainty. Information science research focuses on the information process in the Organization and the information needs of managers to support decision-making. Meeting this requirement can result in a reduction in uncertainty, which contributes to better decision-making (Schement, 1993).

(i) ii Philosophical Concept of Information

(Belkin, 1978) has contributed with many studies to an important problem in information science: the question of defining an adequate concept of information for information science. Although Belkin discusses the concepts of information used only in information science, many of these concepts have originated in other fields and/or are used in a wide variety of them (Belkin, 1978, p. 82):

- **Information as a Fundamental Category**: Information is seen as something essential to the existence of the universe, as a basis, but a different category of matter;

- **Information as a Property of Matter and Consciousness**: Information is not considered, as a special category, but as a property of matter (i.e., objective information) and/or a property of consciousness or reflection of an individual (i.e., subjective information);
- **Information as social-scientific information**: it is based on the classification of (Mikhailov, Chernyi and Giliarevskii, 1975, in Belkin, 1978). This classification divides the intuitive idea of social and non-social information, social semantic information and not semantic and scientific and non-scientific and non-scientific information. According to (Mikhailov, Chernyi and Giliarevskii, 1975), information is limited by the social sciences;
- **Information as Event**: Information is seen as the expression of the mental image that occurs when we receive a message; • Information Board: Information is not seen as an event, but as the structure resulting from that event. For example, information is the resulting structure in the mind of a sensory datum or some experience;
- **Information as a probability of an event occurring**: comes from the information theory of (Shannon and Weaver, 1949); • Information as Message: A vague concept in which information is confused with the content of a communication.

(i)iii Concept of information in the context of decision-making

(Cleveland, 1982) characterizes information as follows: • Information is "human" - there is only information through human observation;

- **Information is multiplyable** – the more we use it, the more useful it becomes; the basic limit is the biological age of people and groups;
- **Information is replaceable** – it can replace other resources such as money, people, raw materials, etc. For example, the accumulation of information in the area of automation replaces several million workers annually.
- **Information is transferable** - the speed and ease with which information is transferred is a considerable factor for the development of all areas of knowledge;
- **Information is diffuse** - it tends to become public, even if our efforts are to the contrary;
- **Information is shareable** – goods can be exchanged, but in the exchange of information, the seller continues to own what he has sold. (Braman, 1989) suggests a hierarchy of definitions of information that are used in the context of decision-making. The hierarchy is based on three dimensions: the level of opportunity, the level of complexity, and the associated power (which is guaranteed for information, streams, and usage). These dimensions group the definitions of information into four groups:
    - Information as a resource.
    - Information as something useful.
    - Information as a standard perception;
    - Information as an essential characteristic of society.

Information as a resource is associated with the lowest level of opportunity, complexity, and power, while information, as an essential characteristic of society, is associated with the highest level in these three dimensions.

- Information as a resource treats information as an isolated and distinct entity without energy. Information is divided into the parts that make up the body of knowledge or information flows in which it can be organized (Braman, 1989, p. 236).
- Information as something useful focuses on the process of exchanging information between people. This concept requires chain production, through which information gains economic value (Porter, 1980). The chain includes steps such as creation, processing, and distribution. This implies a greater complexity of the social structure "including suppliers, customers and the Organization to maintain the market" (Braman, 1989, p. 238).
- Information as a standard perception requires both information and context. Information "has a past and a future, it is affected by the stimulus of chance factors and the environment" (Braman, 1989, p. 238).

Compared to information as useful, the scope of the phenomenon covered by this concept is broadened. Information can be used to articulate social structures. This definition sees information as an element of uncertainty reduction.

- Information as an essential characteristic of the information-oriented society as "an active function constructed in context" (Braman, 1989, p. 239). Information becomes an actress that affects the environment and creates a social structure. This definition treats information as an essential characteristic of society. It applies to all phenomena and processes in which information is involved and can be applied to the social structure with some degree of articulation and complexity (Braman, 1989, p. 241).

(i)iv Concept of Information Process, as Knowledge and as a Thing

(Buckland, 1991) identifies three "primary uses" of the term information:

- Information as a process.
- Information as knowledge.
- Information as such.

The information process refers to the act of informing/being informed. When something is reported, what is known is changing. "Information as knowledge" refers to what is seen, as process information. It is knowledge that is communicated. (Buckland, 1991) sees information, as a reduction of uncertainty, as a special case of "information as knowledge". Some information increases uncertainty. Information as something that refers to things that are seen as informative, things become informed. Buckland also examines different things (data, text, subject material, events) and concludes that everything is or should be informative. He argues that the virtue of being information as a thing is situational and depends on subjective judgments. (Buckland, 1991) summarizes the main concepts of the information tree in terms of two distinctions:

- Between entities and processes;
- • Between intangible and tangible asst.

(Buckland, 1991) distinguishes four aspects of information, but only three with regard to the use of information.

- The fourth aspect of information is information processing. This refers to the execution, manipulation, and deduction of new forms or versions of information, such as a thing.

(i)v Concept of Interdisciplinary Information

(Ruben, 1992, 1993) has different proposals to "provide interdisciplinary communication in the information-communication relationship" (Ruben, 1992, p. 22). Ruben does not justify this classification and does not refer to any example of these concepts in the literature. However, he sees information as an interdisciplinary concept focused on the relationship between information and communication. Here it explicitly describes a wide variety of fields, such as biology, economics and cybernauts, mathematics, sociology, and communication studies:

- The information has a potential meaning for a living system, but this potential is not yet updated;
- Information is that which has been transformed and configured for use by an individual;
- Information includes the sharing of information/knowledge base from society and other social systems.

(i)vi Concept of Information in Communication

(Schement, 1993) reviews 22 definitions of information from different areas, such as economics, physics, information and communication science. Although his focus is on the study of information and communication, he analyzes their interdisciplinary aspects, because the definitions of the different fields are compared. Based on these definitions, he distinguishes "fundamental terms whose outline of current thought is the nature of information" (Schement, 1993, p. 7). Information as something treats information as a thought, being a (non-material) thing.

According to Schement, this concept is the most widely used of the three concepts. Two examples of this concept are:

- Information is an entity; a thing that has neither mass nor energy" (Diener, 1989 in: Schement, 1993);
- Information is a consistent collection of organized data or messages that have meaning or can be used by the human system (Ruben, 1988 in: Schement, 1993).

(i)vii Concept of information as a process.

This concept of information processing sees information as the phenomenon to inform or change a given situation. An important subtheme of this concept is the view of information as the reduction of uncertainty, a common view among economists, managers, and computer scientists. The last concept, information as a product of manipulation is seen as a thought is something that must be manipulated in order to exist. Example: Information is produced as a result of a process on the data. (Hayes, 1969, in: Schement, 1993)

According to Schement, these perceptions of information are related to different perceptions of communication. He argues that these two concepts are inextricably linked to each other.

(i)viii Concept of information in the real world

According to (Gelepithis, 1999) information is the central concept for the information science community. A considerable number of information-related disciplines have been involved in the development of other closed, information-related concepts (e.g., sign, symbol, and meaning (Shannon and Weaver.1949, in Newman, 2001). (Gelepithis, 1999) is concerned with the clarification of these concepts and their consequences in the fields of information science. However, its proposal is not present in the table of contents of the various concepts of information in different disciplines. (Gelepithis, 1999) presents seven concepts of information:

- The information in terms of the probability of a signal;
- Information as a state;
- Information in terms of knowledge and meaning of the mental level and as a mental and non-material entity;
- Information in terms of the concept of the sign as primitive;
- Information conceived in terms of the world tree;
- Information in terms of true condition;
- Information as a basic property of the universe.

The problem with these concepts is that they are very brief. Information in terms of sign as primitive is referred to by (Stamper, 1985) insofar as he proposes semiotics (sign theory) as an appropriation of information theory (Shannon and Weaver, 1949). He argues that the idea of a signal is "the very primitive one on which information science is based" (Gelepithis, 1999, p. 195). Signals can be described as physical objects, events or properties of objects, and events that are available to represent a function in human behavior. Information is actually a measure of some property of a signal. Measures differ from each other (e.g., entropy measure and subjective measure), and in addition, information has different meanings.

The information conceived in terms of Popperian tree design is the basis of (Popper & Eccles, 1977) they argue that we only accept things as real if they can interact with material things. It distinguishes three realities or three worlds:

- **World 1**: The world of physical objects and states.
- **World 2**: The world of states of consciousness (e.g., subjective knowledge, creative imagination experience);
- **World 3:** The world of knowledge for purpose (e.g., products of the human mind, theoretical systems, scientific problems).

According to Popper, these worlds interact with each other. However, it is still unclear what (Gelepithis, 1999) is bad through information conceived in terms of these three worlds.

Knowledge and Wisdom

Information is not the same thing as data, although the two words are often confused, so it is understandable that the subtle distinction between these concepts is essential. Data do not carry the meaning or significance of facts, images or sounds, since they lack relational elements indispensable to the establishment of a complete meaning, lacking an internal relational structure for a cognitive purpose.

This structure is one of the attributes of information. Data is transformed into information when its creator adds meaning to it (Davenport and Prusak, 1998). (William G. Zikmund, 2000, p.19) defines knowledge as "the mixture of information,

experience and understanding that provide a framework that can be applied in the evaluation of new information or new situations". Information "feeds" knowledge. Knowledge can thus be defined as a person's ability to relate complex structures of information to a new context. New contexts imply change, action and dynamism. Knowledge cannot be shared, although technique and information components can be shared. When a person internalizes information to the point of being able to use it, we call it knowledge (Zikmund, 2000).

This is a fluid blend of experiences, values, contextual information and expert insight, structured that provides a framework for evaluating and incorporating new experiences and information. In organizations, it is found not only in documents and reports, but also in organizational routines, processes, practices, and standards. Knowledge originates from and is applied in the minds of connoisseurs (Davenport and Prusak, 1998), (William Zikmund, 2000). Knowledge is information as valid and accepted, integrating data, acts, information and sometimes hypotheses. Knowledge requires someone to filter, combine and interpret information.

Information can be considered as a "substance" that can be acquired, stored and possessed by a person or a group and transmitted from person to person or from group to group. Information has a certain stability and is perhaps better seen as existing at the level of society (Davenport and Prusak, 1998). Although we can store it using various physical supports, the information itself is not physical, but abstract and not purely mental. Knowledge is stored in people's memory, but information is out there in the world. Whatever it is exists somewhere between the physical world around people and the mental world of human thought.

Knowledge = Internalized information + ability to use it in new situations.

Knowledge is fundamentally and intrinsically found within people. These are more complex and unpredictable at the individual level than an entire society, so it is not surprising that knowledge is much more difficult to obtain than information. Knowledge exists mainly within people, it is an integral part of human complexity and unpredictability. Knowledge has a fundamental duality: it is something that can be stored (at least sometimes we intend to do so) and something that flows (something that is communicated from person to person). It is possibly the duality of knowledge (thing that flows and the process of storage) that makes it difficult to treat and manage.

According to (Dahlberg, 2006) knowledge is organized into units of knowledge (concepts) according to their characteristics (objects / subjects / subjects). The organization of knowledge is related to a process of conceptual analysis of a domain of knowledge and from there, it is structured/architected, generating a representation of knowledge about such a domain that will be used for the organization of information about that domain of knowledge. Knowledge has a fundamental duality: it is something that can be stored (at least sometimes we intend to do so) and something that flows (something that is communicated from person to person). It is possibly the duality of knowledge (thing that flows and the process of storage) that makes it difficult to treat and manage.

According to (Dahlberg, 2006) knowledge is organized into units of knowledge (concepts) according to their characteristics (objects / subjects / subjects). The organization of knowledge is related to a process of conceptual analysis of a domain of knowledge and from there, it is structured/architected, generating a representation of knowledge about such a domain that will be used for the organization of information about that domain of knowledge. Matrix – 1 Data Information Knowledge. Given Information Knowledge Simple observations on the state of the world:

- easily structured;
- easily obtained by machines;
- often quantified;
- Easily transferable Data endowed with relevance and purpose:
- requires unity of analysis;
- it requires consensus regarding meaning;
- it necessarily requires human mediation. Valuable information of the human mind. It includes reflection, synthesis, context.
- difficult to structure;
- difficult to capture in machines; • often tacit;
- difficult to transfer. Source: (Davenport, 1998).

Data, information and knowledge must be seen and analyzed from the continuous perspective of values and fundamentally marked by the growing human contribution – processing, management, action, result, learning and feedback, that is, human empowerment for actions that generate the desired results at the organizational level

Matrix – 1 Data Information Knowledge.

Datum	Information	Knowledge
Simple observations on the state of the world: • easily structured; • easily obtained by machines; • often quantified; • Easily transferable	Data endowed with relevance and purpose: • requires unity of analysis; • it requires consensus regarding meaning; • it necessarily requires human mediation.	Valuable information of the human mind. Includes • reflection, synthesis, context. • difficult to structure; • difficult to capture in machines; • often tacit; • difficult to transfer

Source: Adapted from (Choo, 2002, p.258).

Data, information and knowledge must be seen and analysed from the continuous perspective of values and fundamentally marked by the growing human contribution – processing, management, action, result, learning and feedback, that is, human empowerment for actions that generate the desired results at the organisational level.

Matrix – 2 – Data, Information, Knowledge, Actions / Results

	Data Processing	Information Management	Knowledge Management	Actions/Results
Activities	• Data Capture • Data Definition • Data Storage • Data Modeling	• Information Needs • Acquisition of information • Organization of Information • Distribution of Information	• Knowledge Creation • Knowledge Sharing • Use of Knowledge	• Strategies, alliances and initiatives • Products and Services • Processes • Systems • Structures • Values
Values	• Precision • Efficiency	• Access • Relevance	• Enables action • Value generation	• Innovation • Apprenticeship

Source: Adapted from (Choo, 2002, p.258).

Today we know how people learn, but we also know that learning and teaching are not the same thing, that is, that they are two different processes. What has to be taught must be taught and cannot be learned in any other way, but what can be learned must be learned and cannot be taught. For several years, schools and universities have had the education system as their model of education, but more and more emphasis is placed on learning. Today's "masters" teach in much the same way that the old masters did.

Today we know that different people learn differently and that learning is personal. Each student has a different speed and a different pace of learning. If a learning pace, a speed, or a degree of attention is imposed on the students, there will be little or no learning. There will only be fatigue and resistance. Different people learn different subjects differently and at a different rate. You learn a subject and teach a person.

Information and communication technologies are an extremely important tool in learning and not in teaching, that is, the teacher teaches students the functionalities of technologies and students learn how they can use technologies (means of support) to support them in solving some of the problems of their day-to-day life and of the organization where they work. Information and communication technologies can be seen as a means or as an end. If they are seen as an end, what can be taught to students are functionalities.

If they are seen as a means of support for decision-making, it means that they can be used in learning how to solve problems. For example, when we go to the doctor and take a CT scan of a part of the body, it means that information and communication technologies are used as a support/support for the diagnosis of the disease so that the doctor can make the best decision about the medication to take, what is the dosage of the medication, etc., that is, we are using information technologies, as an instrument/tool to support the resolution of the problem, of the person's disease.

Information and communication technologies are a medium that determines which messages can be sent and received. At the same time, technologies determine which messages cannot be sent and received, that is, we are in a phase of rapid transformation of the "media". It is enough to remember that in the fifteenth century high technology was the printed book on paper and that in the twenty-first century information and communication technologies are bound to have a profound impact on schools and on the way in which one learns. Before writing, the only way to learn was through manuscripts, listening to lectures and recitations. With the printed book, people started to learn by reading.

Information and communication technologies are more "friendly" than printed books, especially for children, since their patience is unlimited. It doesn't matter how many mistakes the student may make, because the computer is always available for another attempt, no matter how many mistakes the student may make and whether the student is fast, slow or normal to learn, it doesn't matter, whether the student thinks the subject is easy or difficult and does not care if the student intends to learn new things or review something he has already learned. There is also the media and with them a whole world of visual pedagogy. There are more hours of pedagogy compressed into an advertising spot than teachers can fit into a given long period of teaching.

The content of the advertising spot is secondary, what matters is the skill, professionalism and power of persuasion that exists in it. Therefore, students arrive at schools and universities today with high expectations that can easily be frustrated. Schools and universities resort to the use of information and communication technologies, so that teachers are increasingly "supervisors" and "mentors" of student learning. The work of teachers is increasingly to help, guide, serve as an example and encourage students, that is, their work is no longer primarily to transmit the subject itself.

Interdisciplinarity with other sciences

Interdisciplinary can be understood as "dialogue between the fields of knowledge", in the words of Japiassu (1976), or "mutual appropriation of methodologies, principles, theories, concepts and constructions between two or more areas of knowledge", Pinho, (2004). For Klein (2004), the concept of interdisciplinarity is linked to complexity. The convergence between these two ideas has significant implications for understanding the nature of knowledge, for solving scientific problems, and for the dialogue between science and humanity. According to Klein (2004), the nature of complex systems provides a comprehensive rationality for interdisciplinary studies, unifies apparently divergent approaches, and serves as a criterion to direct the integration process.

The ultimate goal of interdisciplinary research comprises the portion of the world shaped by a complex system. Interdisciplinarity is characterized by the exchange of knowledge, the transformation of areas of knowledge and the sharing of objectives. Interdisciplinary is not a simple appropriation of concepts, theories and methods from one area of knowledge to another, it only materializes from the concrete dialogue between different areas of knowledge. Effective interdisciplinarity

is that which is updated in the field of theoretical abstractions, establishing methodologies, but also interventions that promote different areas of knowledge in the social, Gomes, (2001). According to Klein, (2004), the interdisciplinary approach stems from the need to understand complex objects, which constitute a single area of specialization and would be unable to deal with adequate coverage. Among these, the phenomena of the explosion of information and cultural diversity, social and technological problems, multifaceted concepts such as "body", "mind" and "life" are mentioned. A significant number of areas of multi or interdisciplinary knowledge have been developed since the mid-twentieth century, and among them is information science.

Information Science and Ethics

The concern with ethical principles and moral values spreads with globalization and makes us reflect on a society with social responsibilities. According to Sá (2007), the word ethics is sometimes understood in the sense of morality, but not always in an adequate way. It has also been understood as a science of human conduct towards the being and its fellow human beings, to study the action of men and their considerations of value. For Du Mont (1991), ethics aims to establish the principles of behavior that help people to choose alternative forms of action. These considerations lead us to the definitions of ethics and morals, instigating us to refer to deontology, such as the study of codes or ethics of professions.

Targino (2006, p. 135) tells us that the definitions of ethics originate from the "Greek term *ethos*, as the etymology suggests, that is, it is the part of philosophy that deals with reflection on customs and actions". As a moral "term from the Latin *mores* refers to acts and customs *per se*, that is, to the set of objective norms of conduct, changeable, in time and space". According to Targino (2006, p.135), ethics "comes from the Greek *deontos*, it is duty; *logos*, discourse or treatise, etymologically equivalent to a treatise or science of duty, and designating the doctrinal precepts related to the various professions", highlighting ethical action in the context of society and, mainly, with regard to its social responsibility.

The confirmation of right or wrong is usually determined by legislation, although not all situations can be included in such codes, since laws are designed for the well-being of society and change over time, in the social groups and locations in which these groups live. Therefore, the social being establishes ethical or unethical actions. From birth, human beings begin to live in social groups, which get involved and go through a process of exchange of knowledge, habits and customs, allowing their moral growth. Thus, Du Mont (1991) says that the basic components of an ethical system are the values accumulated by the individual, the group or society.

Ethical or unethical procedures start from human coexistence and raise ethical questions and discussions, bring paradigm shifts and make us rethink the actions of our daily lives. People, regardless of social origins or groups, live according to the ethical aspects disseminated in society. Among the groups that disseminate these concepts, we mention the family, the school, the church, the favorite club, the university, friends, the political party, among others. Living with these institutions is important, because it is through them that individuals accumulate unique experiences, enriching their knowledge, Targino, (2006).

Ethics is related to the incorporation of moral standards in the conduct of people involved in the dissemination of information, aiming to guide their actions. According to Camargo (1999, p. 31), "professional ethics is the application of general ethics in the field of professional activities", since the professional incorporates his own principles and values to experience them in his professional activities. It is through the profession that people are able to fully realize themselves, exercising theirs: capacities, skills, wisdom and intelligence, affirming their personality, raising their morale, being able to be useful to the community and to elevate and stand out in it.

The concern with ethics and social values leads us to reflect on social responsibilities in institutions, companies and social groups. For Du Mont (1991), social responsibility is an ethical concept that involves notions of change, of how human needs should be satisfied. In addition, the author emphasizes the interest in the social dimensions of the information service, which has to do with improving the quality of life. Social responsibility gained greater prominence from the 90s onwards, with a greater influence of society, the media, in the organizational world. According to Cajazeiras, (2006, p. 13) social responsibility was often confused with "welfare" (donations) and for this reason he proposed "another conception of social responsibility" that stems from industrial advances, globalization and the intense flow of information and technology with immediate prestige, causing degradation of the quality of life, intensification of environmental problems and precariousness of labor relations.

According to Pedro Anunciação, (2012), "The relationship between ethics and information is closely associated with its usefulness, value and respective enjoyment. Information is only economically and socially relevant if it is useful, that is, if there is the ability to interpret, understand and use it. This means that whenever conditions are created for the change in the patterns of interpretation or valuation, one is or may be influencing the conduct or behavior of the receiver and, consequently, entering the ethical domain of information". According to the same author, "Information, when transmitting to people something they do not know, involves the reception and communication of intelligence and knowledge. It is the information recognized as valid, accepted and related to certain contexts that should serve as support for the generation of knowledge, decision and consequent action. The ability to screen, combine and interpret allows the development of skills related to use, responsibility in use and innovation".

Information Science and Human Cognition

According to Saracevic, (1996, p. 16), in the 60s information science was concerned with the properties of information and with the "forces" that managed its flows and the means to facilitate its use, that is, it tried to formalize "...the properties of information by applying information theory, decision theory, and other constructs of cognitive science, logic, and/or philosophy." According to Lima, (2008, p. 78) information science studies have focused on the processes of information communication. From the years management was included and in the 90s studies focused on the use/needs of information by people and organizations.80 a

In understanding the informational phenomenon there are multiple perspectives in understanding it and it operates with language. According to Saracevic, (1996), information science is "a field dedicated to scientific issues and professional practices focused on the problems of the effective communication of knowledge and its records among human beings, in the

social, institutional or individual context, of the use and needs of information. Among the various functions is that of intellectually describing information."

Capurro, (1991, p. 3-4), states that "human beings are biological processors of information. Information is a doubly encoded reality... Information science aims to study information itself, that is, to contribute to its analysis and construction and that it proposes to establish a consistent scientific approach to the study of the various phenomena that surround the notion of information, whether they are found in biological processes, in human existence, or in machines".

Understanding the Human Mind

Cognitive science is an area of interdisciplinary studies that, among others, is related to cognitive psychology, computer science, neurosciences and Linguistics, Lima, (2003). According to the same author, the research developed on human cognition has sought to apprehend the way people think, interpret and perceive the world. Studies on the nature and cognitive development of human beings are focused on four main theories of cognitive development:

- ✓ Piaget's - "human cognition is a form of biological adaptation in which knowledge is built little by little from the development of cognitive structures that are organized according to the stages of development of intelligence. Thus, cognitive development is linked to the processes of assimilation and accommodation that promote balance that varies according to age" Flavell; Miller, P.H.; Miller, S.A., (1999); Sternberg, (2000).
- ✓ The neopiagetians - "emphasize cognitive skills, such as processing and coordinating elements that enable the differentiation of information in the determination of subjective to achieve a goal. In addition, they include the concept of mediation and interaction in problem solving".
- ✓ Vygotsky's (1998) - "knowledge is built during interactions between individuals in society, triggering learning. Thus, the mediation process is established when two or more people cooperate in an activity". Flavell, (1979; Miller, P.H; Miller, S.A. (1999).

Information processing research encompasses text comprehension, i.e., cognitive activity that involves perception, memory, inference, and deduction. The comprehension of the text occurs from the knowledge of the world and of various types of text, requiring semantic awareness. According to Sternberg (2000), the processing of text in memory occurs in the following way and sequence: 1st there is the perception of graphic representation; then the translation of letters into sounds and the chaining of these sounds into a word, being necessary to master the lexical processes that are used to identify letters and words and activate the relevant information in memory about these words.

According to Sternberg, (2000); Koch; Travaglia, (2001), the process of comprehension involves semantic coding, the acquisition of new vocabulary, the creation of mental models and the comprehension of the ideas of the text. Semantic coding is the process by which sensory information is translated into words. Vocabulary acquisition adds to the existing vocabulary of new meaningful terms. Mental models are a set of propositions that can lead to more than one mental model and simulate the reality that surrounds us, Johnson-Laird, (1983).

According to Eysenck and Keane, (1994) and Seternberg, (2000), among others, the most used mental models are the following:

- Schemas – are cognitive structures related to a set of knowledge stored in temporal or causal sequence, in which the sets of characteristics of the objects and beings that surround us are maintained. For example: procedures to make a piece of equipment, mobile phone, etc., work;
- Plans – are a set of knowledge on how to act to achieve certain goals. For example: how to win a chess game;
- Scripts – are stereotyped and predetermined actions applied to defined situations. For example, the script applied, when we go to the cinema or a restaurant;
- Superstructures or textual schemes – a set of knowledge acquired as we read different types of texts and correlate them.

When we read a text, we try to keep as much information as possible in our memory for the comprehension of the text. We do not seek to store the exact words, but rather to try to extract the ideas from a group of words, to store them in order to try to retrieve them later.

Authors such as Kintsch and Van Dijl, (1983), in the information processing model, also included the model of production through analysis and synthesis, called situational model, that is, a model common to all readers. They affirm that essential thematic propositions last longer in the memory of those that are considered less important. According to Jacob and Shaw (1998), from the cognitive point of view of information science it implies that each act (preceptive or symbolic) of information processing is mediated by a system of categories and concepts which, for the information processing mechanism, constitute a model of the world, that is, all actions performed involve cognitive activities.

Information and Knowledge Science

Although the terms information and knowledge are used very often, they are not the same thing. Information is not the same thing as data, although the two words are often confused, so it is understood that the subtle distinction between these concepts is essential. Data do not carry the meaning or significance of facts, images or sounds, since they lack relational elements indispensable to the establishment of a complete meaning, lacking an internal relational structure for a cognitive purpose. This structure is one of the attributes of information. Data is transformed into information when its creator adds meaning to them, Davenport and Prusak, (1998).

William G. Zikmund, (2000, p.19), defines knowledge as "the mixture of information, experience and understanding that provide a structure that can be applied in the evaluation of new information or new situations". Information "feeds" knowledge. Knowledge can thus be defined as a person's ability to relate complex structures of information to a new context. New contexts imply change - action, dynamism. Knowledge cannot be shared, although technique and information components can be shared. When a person internalizes information to the point of being able to use it, we call it knowledge Zikmund, (2000). This is a fluid blend of experiences, values, contextual information and expert insight, structured that provides a framework for evaluating and incorporating new experiences and information. In organizations, it is found not

only in documents and reports, but also in organizational routines, processes, practices, and standards. Knowledge originates from and is applied, in the minds of connoisseurs, Davenport and Prusak, (1998), William Zikmund, (2000).

Knowledge is information as valid and accepted, integrating data, acts, information and sometimes hypotheses. Knowledge requires someone to filter, combine and interpret information. Information can be considered as a "*substance*" that can be acquired, stored and possessed by a person or a group and transmitted from person to person or from group to group. Information has a certain stability and is perhaps better seen, as it exists at the level of society, Davenport and Prusak, (1998). Although we can store it using various physical supports, the information itself is not physical, but abstract and not purely mental. Knowledge is stored in people's memory, but information is out there in the world. Whatever it is, it exists somewhere between the physical world around people and the mental world of human thoughts. Knowledge = Internalized information + ability to use it in new situations.

Knowledge is fundamentally and intrinsically found within people. These are much more complex and unpredictable at the individual level than an entire society, so it is not surprising that knowledge is much more difficult to obtain than information. Knowledge exists mainly within people, it is an integral part of human complexity and unpredictability, Davenport and Prusak, (1998). Knowledge has a fundamental duality: it is something that can be stored (at least sometimes we intend to do so) and something that flows (something that is communicated from person to person). It is possibly the duality of knowledge (thing that flows and the process of storage) that makes it difficult to treat and manage. According to Dahlberg, (2006), knowledge is organized into units of knowledge (concepts) according to their characteristics (objects/subjects/subjects). The organization of knowledge is related to a process of conceptual analysis of a domain of knowledge and from there, it is structured / architected generating a representation of knowledge about such domain that will be used for the organization of information about that domain of knowledge.

3. 4 Data Science

Multidisciplinary approach

Data Science is the study of data to extract meaningful insights for organizations. It is a multidisciplinary approach that combines principles and practices from the fields of mathematics, statistics, artificial intelligence, and computer engineering to analyze large amounts of data. This analysis helps data scientists ask and answer questions such as what happened, why it happened, what will happen, and what can be done with the results.

Data Science is important because it combines tools, methods, and technology to generate meaning based on data. Modern organizations are inundated with data; There is a proliferation of devices that can automatically collect and store information. *Online*systems and payment portals capture more data in the areas of e-commerce, medicine, finance, and all other aspects of human life. We have text, audio, video and image data, available in large quantities.

While the term Data Science is not new, the meanings and connotations have changed over time. The word first appeared in the 1960s, as an alternative name for statistics. In the late 1990s, computer science professionals formalized the term. A proposed definition for Data Science saw it as a separate field with three aspects: data design, collection, and analysis. It still took another decade for the term to be used outside of academia.

Artificial intelligence and *machine learning*innovations have made data processing faster and more efficient. The demand from the sector has created an ecosystem of courses, diplomas and positions in the area of Data Science. Due to the cross-functional skill set and experience required, Data Science shows strong projected growth in the coming decades.

Data Science is used to study data in four ways:

1. **Descriptive analytics -** Descriptive analytics analyzes data to gain insights into what has happened or what is happening in the data environment. It is characterized by data visualizations, such as pie charts, bar charts, line charts, tables, or generated narratives. For example, a flight booking service may record data such as the number of tickets booked per day. The descriptive analysis will reveal booking spikes, booking dips, and high-performing months for this service.
2. **Diagnostic analysis -** Diagnostic analysis is an in-depth or detailed analysis of data to understand why something happened. It is characterized by techniques such as *drill-down*, data discovery, data mining, and correlations. Various operations and data transformations can be performed on a given dataset to discover unique patterns in each of these techniques. For example, the flight service can *drill down* into a particularly high-performance month to better understand peak bookings. This can lead to the discovery that many customers visit a particular city to attend an event.
3. **Predictive analytics -** Predictive analytics uses historical data to make accurate predictions about data patterns that may occur in the future. It is characterized by techniques such as machine learning, prediction, pattern matching, and predictive modeling. In each of these techniques, computers are trained to reverse-engineer causal connections in the data. For example, the flight service team can use Data Science to predict flight booking patterns for the next year at the beginning of each year. The computer program or algorithm can analyze past data and predict booking spikes for certain destinations in May. Having anticipated the future travel needs of its customers, the company could start targeted advertising for these cities from February.
4. **Prescriptive analytics –** Prescriptive analytics takes predictive data to the next level. It not only predicts what is likely to happen, but also suggests an optimal response to that outcome. She can analyze the potential implications of different choices and recommend the best plan of action. Prescriptive analytics uses graph analysis, simulation, complex event processing, neural networks, and machine learning recommendation engines.
5. Going back to the flight booking example, prescriptive analytics can analyze historical marketing campaigns to maximize the upside of the next booking spike. A data scientist can project booking outcomes for different levels of marketing spend across multiple marketing channels. These data predictions would give the flight booking company more confidence to make its marketing decisions.

Data Science is revolutionizing the way businesses operate. Many companies, regardless of size, need a robust data science strategy to drive growth and maintain a competitive edge. Some of the key benefits include:

Uncover unknown transformative patterns – Data science enables businesses to uncover new patterns and relationships that have the potential to transform the organization. It can reveal low-cost changes in resource management to achieve maximum impact on profit margins. For example, an e-commerce company uses Data Science to discover that many customer inquiries are being generated after business hours. Research reveals that customers are more likely to buy if they receive an immediate response rather than a response on the next business day. By implementing 24/7 customer service, the company increases its revenue.

Innovate new products and solutions – Data science can reveal flaws and problems that would otherwise go unnoticed. More insights into purchasing decisions, customer feedback, and business processes can drive innovation in internal operations and external solutions. For example, an online payment solution uses data science to collect and analyze customer feedback about the company on social*media*. The analysis reveals that customers forget their passwords during peak purchase periods and are dissatisfied with the current password recovery system. The company can innovate a better solution and see a significant increase in customer satisfaction.

Real-time optimization – It is very challenging for companies, especially large ones, to respond to changing conditions in real time. This can cause significant losses or disruptions to business activity. Data Science can help businesses anticipate changes and react optimally to different circumstances. For example, a trucking company uses Data Science to reduce downtime when trucks break down. They identify the routes and change patterns that lead to faster breakdowns and adjust truck schedules. They also set up an inventory of common spare parts that need to be replaced frequently so that trucks can be repaired faster.

A business problem typically starts the data science process. A data scientist will work with stakeholders in organizations to understand what the needs are. Once the problem is defined, the data scientist can solve it using the OSEMN Data Science process:

O: Get Data – Data can be pre-existing, newly acquired, or a data repository that can be downloaded from the Internet. Data scientists can pull data from internal or external databases, the organization's CRM software, web server logs, social media, or purchase it from trusted third-party sources.

S: Suppress data - Data suppression, or data cleansing, is the process of standardizing data according to a predetermined format. It includes, dealing with missing data, correcting data errors, and removing any atypical data. Some examples of data suppression are: ·

- Change all date values to a common standard format. ·
- Correct spelling errors or additional spaces. ·
- Correct mathematical inaccuracies or remove commas from large numbers.

E: Explore data – Data exploration is a preliminary data analysis that is used to plan other data modeling stratagems. Data scientists gain an initial understanding of data using descriptive statistics and data visualization tools. They then explore the data to identify interesting patterns that can be studied or acted upon.

M: Model data – Software and machine learning algorithms are used to gain deeper insights, predict outcomes, and prescribe the best plan of action. Machine learning techniques such as association, classification, and clustering are applied to the training dataset. The model can be tested against predetermined test data to assess the accuracy of the results. The data model can be adjusted multiple times to improve results.

N: Interpret results – Data scientists work together with analysts and organizations to convert data insights into action. They make diagrams, graphs, and charts to represent trends and forecasts. Data summarization helps stakeholders understand and implement the results effectively.

Data Science professionals use computer systems to keep track of the Data Science process. The main techniques used by data scientists are:

Sorting - Sorting is the sorting of data into specific groups or categories. Computers are trained to identify and classify data. Known datasets are used to create decision algorithms on a computer that quickly processes and categorizes the data. For example: ·

- Classify products as popular or not popular·
- Classifying insurance applications as high risk or low risk·
- Classify social*media*comments as positive, negative, or neutral.

Data Science professionals use computer systems to keep track of the Data Science process.

Regression – Regression is the method of finding a relationship between two seemingly unrelated data points. The connection is usually modeled around a mathematical formula and represented as a graph or curves. When the value of one data point is known, regression is used to predict the other data point. For example: ·

- The rate of spread of airborne diseases.·
- The relationship between customer satisfaction and the number of employees. ·
- The ratio between the number of fire stations and the number of people injured as a result of a fire in a given location.

Clustering – *Clustering* is the method of grouping closely related data together to look for patterns and anomalies. Clustering is different from classification because data cannot be accurately classified into fixed categories. Therefore, the data is grouped into most likely relationships. New patterns and relationships can be discovered with *clustering.*For instance:

- Group customers with similar buying behavior to improve customer service.
- Group network traffic to identify patterns of daily usage and identify a network attack faster.
- Group articles into several different news categories and use that information to find fake news content.

Basic principles of Data Science techniques

While the details vary, the underlying principles behind these techniques are:

- Teach a machine to classify data based on a known data set. For example, sample keywords are provided to the computer with their respective ranking values. "Happy" is positive, while "Hate" is negative.

- Provide unknown data to the machine and allow the device to classify the dataset independently.
- Allow inaccuracies of results and deal with the probability factor of the outcome.

Data Science professionals work with complex technologies, such as:

- Artificial intelligence: Machine *learning models* and related software are used for predictive and prescriptive analytics.
- Cloud computing: Cloud technologies have given data scientists the flexibility and processing power needed for advanced data analytics.
- Internet of Things: IoT refers to various devices that can automatically connect to the internet. These devices collect data for Data Science initiatives. They generate large amounts of data that can be used for data mining and data extraction.
- Quantum computing: Quantum computers can do complex calculations at high speed. Skilled data scientists use them to create complex quantitative algorithms.

Data Science is an umbrella term for other data-related functions and fields. Let's look at some of them here:

- **Difference Between Data Science and Data Analytics –** While the terms can be used interchangeably, data analytics is a subset of Data Science. Data Science is an umbrella term for all aspects of data processing, from collection to modeling and insights. On the other hand, data analysis mainly involves statistics, mathematics, and statistical analysis. It focuses solely on data analysis, while Data Science is related to the big picture around organizational data. In most workplaces, data scientists and data analysts work together to achieve common organizational goals. A data analyst can spend more time on routine analysis by providing regular reports. A data scientist can design the way data is stored, manipulated, and analyzed. Simply put, a data analyst makes sense of existing data, while a data scientist creates new methods and tools for processing data to be used by analysts.
- **Difference Between Data Science and Business Analytics -** While there is an overlap between Data Science and business analytics, the main difference is the use of technology in each area. Data scientists work more closely with data technology than business analysts. Business analysts reconcile business and IT. They define business cases, gather input from stakeholders, or validate solutions. Data scientists, on the other hand, use technology to work with business data. They can write programs, apply *machine learning*techniques to create models, and develop new algorithms. Data scientists not only understand the problem, but they can also create a tool that provides solutions to the problem. It's not uncommon to find business analysts and data scientists working on the same team. Business analysts take the output of data scientists and use it to tell a story that the organization as a whole can understand.
- **Difference Between Data Science and Data Engineering –** Data engineers build and maintain the systems that allow data scientists to access and interpret data. They work more closely with the underlying technology than a data scientist. The role typically involves building data models, building data pipelines, and overseeing extract, transform, and load (ETL). Depending on the layout and size of the organization, the data engineer may also manage related infrastructure, such as **big data** storage, streaming, and processing platforms, such as Amazon S3. Data scientists use the data that data engineers have processed to create and train predictive models. Data scientists can then hand over the results to analysts for later decision-making.
- **Difference Between Data Science and *Machine Learning* –** *Machine learning* is the science of training machines to analyze and learn from data in the same way that humans do. It is one of the methods used in Data Science projects to obtain automated data insights. Machine *learning*engineers specialize in computation, algorithms, and coding skills specific to *machine learning* methods. Data scientists can use *machine learning*methods as a tool or work closely with other *machine learning*engineers to process data.
- **Difference Between Data Science and Statistics -** Statistics is a mathematical base area that seeks to collect and interpret quantitative data. On the other hand, Data Science is a multidisciplinary scope that uses scientific methods, processes, and systems to extract knowledge from data in various ways. Data scientists use methods from many disciplines, including statistics. However, the scopes differ in their processes and in the problems they study.

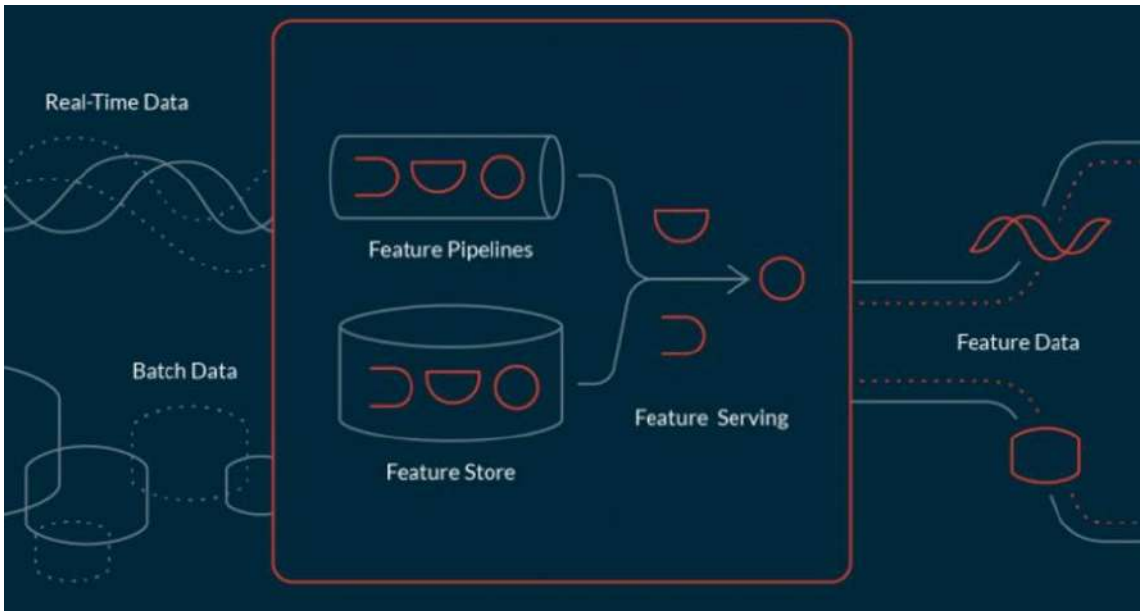
AWS has a number of tools to support data scientists around the world:

- **Physical data warehousing -** For *data warehousing*, Amazon Redshift can run complex queries on structured or unstructured data. Analysts and data scientists can use AWS Glue to manage and search data. AWS Glue automatically creates a unified catalog of all data in the Data Lake, with Meta data attached to make it discoverable.
- **Machine learning -** Amazon SageMaker is a fully managed machine learning service running on Amazon Elastic Compute Cloud (EC2). It enables users to organize data, build, train, and deploy machine learning models, and scale operations.

Analysis:

- OrAmazon Athenais an interactive query service that facilitates data analysis in theAmazon S3or in theGlacier. It's fast, serverless, and works using standard SQL queries.
- Amazon Elastic MapReduce (EMR) processes big data using servers such as Spark and Hadoop.
- Amazon Kinesis enables real-time aggregation and processing of streaming data. It uses website clickstreams, application logs, and telemetry data from IoT devices.
- Amazon OpenSearch enables searching, analyzing, and visualizing Petabytes of data.

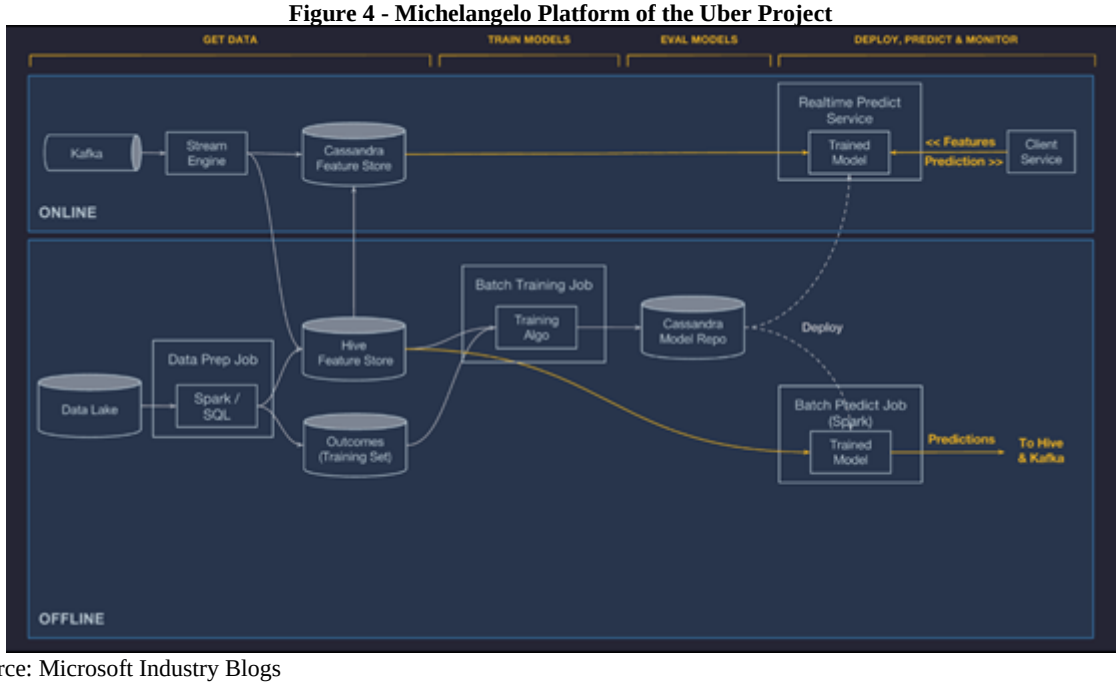
Figure 3 - Feature Store



Source: Microsoft Industry Blogs

The data can be stored in memory or in a very fast key-value database. The process itself can be carried out on multiple cloud services or on one platform. Here's an example of an online and offline pipeline using data store (Feature Store). It was designed by Uber, as part of its Michelangelo platform:

Figure 4 - Michelangelo Platform of the Uber Project



Source: Microsoft Industry Blogs

Challenges for Data Scientists

A data scientist can use a number of distinct techniques, tools, and technologies as part of the Data Science process. Based on the problem, it chooses the best combinations to get faster and more accurate results. The role and day-to-day work of a data scientist varies depending on the size and requirements of the organization. While they typically follow the Data Science process, the details may vary. In larger data science teams, a data scientist may work with other analysts, engineers, *machine learning*specialists, and statisticians to ensure that the data science process is followed end-to-end and that business goals are met.

However, in smaller teams, a data scientist may have more than one role. Based on experience, skills, and academic background, he may perform multiple roles or have overlapping roles. In that case, your day-to-day responsibilities may include engineering, analytics, and *machine learning*, along with key data science methodologies.

Data sources - Different types of applications and tools generate data in various formats. Data scientists need to clean and prepare data to make it consistent. This can be tedious and time-consuming.

Understand the problem of organizations - Data scientists need to work with various stakeholders and managers of organizations to define the problem to be solved. This can be challenging, especially in large organizations with multiple teams with varying requirements.

Eliminate drift – machine learning*tools* are not entirely accurate, and as a result, there may be uncertainties or deviations. Deviations are disparities in the model's test data or prediction behavior across different groups, such as age or income bracket. For example, if the tool is trained primarily on data from middle-aged people, it may be less accurate when making predictions involving both younger and older people. The field of *machine learning* offers an opportunity to address deviations by detecting and measuring them in the data and model.

Online and offline data have different characteristics. Behind the scenes, offline data is mostly built on frameworks such as Spark or SQL, where the actual data is stored in a database or as files. While online data may require data access using APIs for *streaming* engines such as Kafka, Kinesis, or in-memory key-value databases such as Redis or Cassandra.

Working with a data store abstracts this layer, so that when a Data Scientist is looking for data, instead of writing engineering code, they can use a simple API to retrieve the data they need.

One of the main challenges in implementing machine (computer) learning in production arises from the fact that the data being used to test a model in the software development environment (programs) is not the same as the data in the production service layer. Therefore, enabling a consistent feature set (machine and software) between the test and service layer allows for a smoother deployment process, ensuring that the tested model truly reflects the way, how things will work in production.

In addition to the actual data, the data store maintains **additional meta data** for each feature. For example, a metric that shows the impact of the resource on the model it's associated with. This information can help Data Scientists tremendously select the features for a new model, allowing them to focus on those that have achieved better impact on similar existing models.

The reality today is that almost all businesses are based on *Machine Learning*, so the number of projects and resources is growing exponentially. This reduces our ability to have a good comprehensive overview of the resources available, since there are so many. Instead of developing in silos, data warehousing allows us to share our resources with our colleagues' Meta data. It's becoming a common problem in large organizations that different teams end up developing similar solutions, simply because they're not aware of each other's tasks. Data stores bridge this gap and allow everyone to share their work and avoid duplication.

To meet guidelines and regulations, especially in cases where the generated Artificial Intelligence (AI) models serve industries such as healthcare, financial services, and security, it is important to track the lineage of the algorithms under development. Achieving this requires visibility into the end-to-end data flow to better understand how the model is generating its results. As the data is being generated, as part of the process, it is necessary to track the flow of the data generation process. In the data store, you can maintain the lineage of data and a resource. This provides the necessary tracking information, how the data was generated, and provides the insight and reporting needed for regulatory compliance.

MLOps is an extension of DevOps where the idea is to apply DevOps principles in machine learning pipelines. Developing a machine learning (computer) pipeline is different from developing software (programs), mainly because of the look and feel of the data. Model quality is not based solely on code quality. It is also based on the quality of the data and resources that are used to run the model. According to Airbnb, about 60%-80% of Data Scientists' time is spent creating, training, and testing.

Data stores allow Data Scientists to reuse resources instead of rebuilding them over and over again for different models, saving valuable time and effort. Data stores automate this process, and resources can be triggered by code changes that are pushed to Git or by the arrival of new data. This automated feature engineering is an important part of the MLOps concept.

Some of the largest information and communication technology companies that deal extensively with AI have created their own Feature Stores (Uber, Twitter, Google, Netflix, Facebook, Airbnb, etc.). This is a good indication to the rest of the industry of how important it is to use data warehousing as part of an effective machine learning pipeline. Given the growing number of AI projects and the complexities associated with putting these projects into production, the industry needs a way to standardize and automate the core of feature engineering. Therefore, it is fair to assume that data warehousing is positioned to be a basic component of any machine learning pipeline (computer and software).

IV. Ontological-Epistemological Debate: Human Truth versus Digital Truth

4.1 Theories of Truth

There are theories developed by thinkers throughout history that determine criteria to be taken into account to distinguish what is true from what is not, so some of the existing theories at the documentary level can be presented, such as:

- **Corresponding truth theory –** a theory that is based on the criterion of adequacy and that holds that an ancient postulate of the Greeks says that something is true when there is a correspondence between the statement and the real.
- **Theory of Truth as Evidence –** Descartes, (1596 - 1650), maintains that a postulate is true when it is presented to the human mind, in a clear and evident way.
- **Theory of coherence of truth –** rationalist thinkers say that truth is based on the criterion of coherence, that is, a postulate is true when it does not contradict another, which is not part of the same system of truths and beliefs.
- **Consensus theory –** is based on the criterion of consensus, that is, when the truth is accepted, by the community.
- **Theory of objective and subjective truth** – truth is objective when it does not depend on the experiences and observations of each person, but exists regardless of whether it is known or accepted. A truth is subjective when it is grounded in people's minds. Some thinkers consider that all truths are subjective, and as such, are based on the experience and knowledge of each person, (examples, opinions, feelings and emotions).
- **Theory of absolute truth –** refers to any belief or experience, considered true, regardless of historical context or culture, that is, it refers to God and nature, from the point of view of each human person. However, the ideas considered true are relative, since relativism is the doctrine that holds that no idea has universal validity, but varies according to the context.
- **Theory of Truth and Lies –** lying is something that a person uses to deceive others or to obtain some advantage, since it is through lying that the total or partial truth about some subject is hidden. Lying uses oral, written, or

digital words to communicate misinformation to others. There are different types of lies that vary according to the degree of importance or consequences that may arise from the fact. The lie used to the detriment of terrier's is condemned in moral and ethical terms that govern societies/organizations, even though lies are resorted to to avoid greater evils (examples: slander, fallacy, defamation and deception).

Examples of truths:

- **Objective/factual – Covid vaccine**
- **Subjective – I'm more beautiful than you, my house is the most beautiful in the neighborhood.**
- **Absolute – All human beings are born and die.**
- **Relative – human development is constant.**

4.2 Truth and Justice

Veracity is a fundamental principle in Law, since it seeks the truth of the facts to ensure justice, that is, the search for the truth of the facts is essential for making fair and impartial judicial decisions. Truth is important for the parties involved in legal proceedings, as well as for society as a whole.

The lack of truth can lead to unfair decision-making and undermines the credibility of the legal system. On the other hand, the truth is essential to ensure equal treatment between the parties and to avoid the manipulation of the facts. By seeking the truth, the Law contributes to the constitution of a just and balanced society. Truth underpins the evidence and arguments presented in judicial decision-making, promotes trust in judicial institutions and strengthens the rule of law.

Truth in Law contributes to the constitution of a more ethical and responsible society - From now on, a question arises: what would a legal system be without the search for truth?

Truth is the foundation of the Rule of Law and of all legal relations, since it is through the search for truth that justice is done and the rights of all those involved in judicial proceedings are guaranteed.

The role of honesty in justice, as well as the search for truth, contribute to making the legal system more efficient and equitable, since when all parties involved are honest and seek the truth of the facts, it is possible to ensure that judicial decision-making is fair and equitable. One question: does anyone want to be deceived?

Lying is an obstacle to justice, since false information in legal processes causes irreparable damage to legal processes, such as the credibility of the people involved in the judicial decision-making process and the entire judicial system. On the other hand, truth is the basis of credibility, when information is reliable, decision-making by judges and lawyers gains strength and respect. Question: Who wants to be judged with false information?

Ethics and truth are intrinsically linked in the exercise of Law. Justice professionals must have a commitment to a Code of Ethics and professional Deontology for Justice, in the search for truth in an ethical way, respecting the fundamental values of human justice.

In courts, judges, lawyers and witnesses play a crucial role in promoting justice through accurate, objective, factual and reliable statements. They have the responsibility to make accurate and reliable statements, always seeking the truth of the facts, since they are the ones who help to build the legal process and make fair judicial decisions.

Currently, people face several challenges to the truth in Law, especially in the Digital Society. Fake news and the manipulation of evidence compromise the search for the truth in the judicial system, so it is important to always question the veracity of the information received. This is personal, since the veracity of information is essential for justice and for an efficient and equitable legal system, so it is important to always seek the truth of the facts for legal decision-making and to value honesty in legal relationships.

In Criminal Law, the veracity of the evidence is decisive for the conviction or acquittal of the accused. In Civil Law, the veracity of documents and testimonies is crucial for the resolution of conflicts and reparation of damages. The lack of truth leads to injustice, causing irreparable damage to the parties involved in judicial proceedings.

The veracity of factual information is essential to ensure legal certainty and the quality of judicial decision-making and to avoid decision-making based on falsehoods.

Law is a set of norms and rules that govern the legal system and coexistence in a society and which are summarized as follows:

- **Justice** – an ethical principle that seeks the truth of the facts with responsibility, in the search for equality and equity in social relations.
- **Importance –** value or relevance attributed to something.
- **Authenticity –** characteristic of being genuine and original.
- **Trust** – feeling of security and credibility placed in someone or something.
- **Norms –** rules established to guide human behavior.
- **Rules –** guidelines established to regulate a certain activity or situation**.**
- **Coexistence -** interaction and relationship between people in society.
- **Ethics** – set of principles and moral values that guide human behavior.
- **Equality** – a principle that defends equity and social justice.
- **Fairness** – fair and impartial treatment for all persons involved.

4.3 TruthandPhilosophy

One of the greatest concerns of the human being is about the truth of things. What is actually true? What can be as absolute truth? After all, what is truth? The search for truth can generate conflicts between people. After all, for each person, the truth is only one: the one in which each person believes. The search for the truth about certain subjects often leads to questioning people, defending our point of view, that is, our perception, (the way we look at / interpret information), on that subject.

Over time, it has led humanity to conflicts between different human groups, such as the Hundred Years' War and the Second World War.

In looking at truth, philosophers deal with truth by distinct historical periods:

- It cannot be said that everything that seems to be true, so it must be recognized that there is no false sensation of the sensible as such, since imagination is not to be confused with sensation (Aristotle, 384 B.C. – 322 B.C.).
- To examine the truth, it is necessary to put all things in doubt as much as possible, (Descartes, 1596-1650).
- Truths are illusions that are forgotten that they are illusions, (Nietzsche, 1844-1900).

Philosophy since the Greek thinkers, even with metaphysics, has not been able to arrive at an acceptable definition of truth. For them, the search for truth took place through philosophy that sought to answer the ontological question: where does being come from? From there, the other questions arise naturally. What is the truth that lies behind all that men live and see?

For the Greeks, truth is not only what exists, but what can be stated with certainty. This position is not shared by other disciplines of the Human Sciences, such as History.

History looks at historical truth. After all, history looks at the truth as a herculean service, which depends on the historian's gaze, since each one has a different idea or vision about what has happened throughout human history, so the perspective in this aspect must be changed, since the truth must be treated in a different way, not as something certain and exact, which cannot be doubted, but as a possibility in the face of the clues left by the ancestors.

For History, truth is presented in the form of hypotheses, theories that seek to give meaning to certain historical events before the historian's gaze, (Mora, José Ferrater, Dicionário de Filosofia).

4.4 Truth and Knowledge

The topic of truth has been studied over time by thinkers and philosophers, trying to make its definition, how to reach truth, and its distinction with falsehood. Talking about the construction of the concept of truth is certainly not an easy task, due to its complexity and scope. To this end, we will address scientific truth, the belief that scientific discourse is neutral and true, and what is intended is the purest and most efficient way to approach its rigorous methods, the truth.

Scientific discourse has increasingly valued the use of reason as a safe, infallible and unique way to achieve true knowledge about the physical and social world. According to René Descartes, (1637), in his work Discourse on Method, he considers that few rational precepts are considered sufficient to reach true conclusions. Despite numerous precepts, he states that the following would be sufficient:

1 Never to accept anything as true without knowing with evidence that it is true, that is, to carefully avoid haste and prevention, and to include nothing else in judgments, other than that which is so clear and distinct in the minds of people and that they never doubt them.
2 Divide each difficulty into as many parts, as necessary, to better solve them.
3 To conduct thoughts through order, beginning with the simplest and easiest objects to know, to ascend gradually, like the rungs of a ladder, to the knowledge of the most compound, and supposing that there is a certain order between those that are and naturally precede each other.
4 To make everywhere enumerations so complete and revisions so general that nothing is omitted.

Foucault, (2006), presents scientific truth as truth-knowledge or truth-demonstration. For science, truth cannot remain hidden, because it is always present. If the truth does not present itself, it is because some limitations need to be overcome. In this way, if the right tools exist to discover it, the categories to think about it, and the right language to formulate it, the truth can be reached.

Epistemology is the area of philosophy that studies human knowledge and its relationship with truth. Philosophers in antiquity, such as Plato and Aristotle, were already concerned with epistemological issues. Descartes was one of the main thinkers of modern epistemology, when he questioned the validity of knowledge, based on tradition and authority.

Second, Locke (1632 – 1704) and David Hume (1711 – 1776) (empiricism) argue that human knowledge is based on sensory experience. René Descartes, (1569-1650), and Baruch Spinoza, (1632-1677), (rationalism), argue that human knowledge is based on reason and human intuition. He built the study based on doubt, justified by three arguments:

- The illusion of the senses, which declares distrust in perception, which would be limited and deceptive.
- The lack of distinction between what is correct and what is a fanciful product.
- The existence of an evil genius, whose idea is that there is a powerful and malevolent being who devoted his energies to deceiving people.

For Kant, (1724 - 1804), (transcendental idealism), knowledge is a synthesis between empiricism and rationalism, by stating that human knowledge is built from the interaction between experience and innate mental structures.

Contemporary epistemology is concerned with the questions of the nature of truth, the validity of scientific knowledge, and the limitations of human knowledge.

4.5 The Truth and the Bible

There are many reasons to believe that God exists HE gives us proof of his existence and his power, in many different ways that help us to keep the faith. Three proofs are presented:

1 **Nature** – the universe is astonishing, since, when everything seems chaotic, all matter acts and interacts, according to complex rules. In nature, everything has its place. There are millions of people alive. The world is too complex and works too well to be just the work of chance.
2 **The Bible** – there is no other book like the Bible, there are 66 books, written over 1500 years, in various styles, written by different people who lived through different situations, but all with the same message.
3 **Jesus Christ** – God did not limit Himself to speaking through nature and written texts. HE came into the world and walked among us, being the greatest reason to believe in the existence of God. Jesus Christ in all that he said and did, showed the Power and Wisdom of God.

We live in an age where truth is belittled. People do not believe in absolute truth, each one builds their own version of the truth, which fits their way of life, (**example: the glass is half full or half empty), depending on each one's perception of the same phenomenon.**

The Bible does not say that Jesus Christ is just a truth, it says that HE is THE TRUTH. This means that HE is the embodiment of truth and there is no truth outside of HIM.

God wants to change our lives with His truth and only Jesus Christ can remove the "blindfolds and bonds" of lies that prevent us from living happily and worthily.

According to the Bible, Jesus Christ, when questioned, replied "I am the way, the truth, and the life. No one comes to the FATHER except to me (John 14:6). And you will know the truth, and the truth will set you free" (John 8:32). Truth is the essence of thy word, and all thy righteous ordinances shall be eternal, Psalms, 119:160. Sanctify them in the truth; your word is truth, (John 17:17).

Guide me with your truth and teach me, for you are God my Savior, and my hope is in you at all times (Psalm 25:5). Send me your light and your truth; they will guide me and lead me to your holy mountain where you dwell, (Psalms 43:3). For the Law was given through Moses; grace and truth came through Jesus Christ (John 1:17). By His decision, He begot us by the word of truth, that we might be as the first fruits of all that He created (James 1:18).

He who is the Word, became flesh and lived among us. We have seen his glory, glory as of the Only Begotten from the FATHER, full of grace and truth, (John 1:14). So stand firm, girding yourselves with the girdle of truth, putting on the breastplate of righteousness, (Ephesians 6:14)."

4.6 Truth and Wisdom

Wisdom, wisdom or sagacity (from the Latin ***sapere*** – which has flavor, is the condition of those who have knowledge, (Aurélio Dictionary). The Greek equivalent "sofia" is the term that is equivalent to knowledge – present in the formation of words, such as theosophy, also meaning manual skill, science and wisdom.

The term finds different definitions according to the philosophical, theological or psychological perspective. In the ordinary sense, wisdom is the quality that gives wisdom, prudence, moderation to the human person, while for religion it is "knowledge inspired by divine and human things."

Wisdom is associated with attributes, such as judgment, without bias, compassion, experiential self-knowledge, self-transcendence and non-attachment, and virtues, such as ethics and benevolence.

Humanity has been interested in the understanding of wisdom since its beginnings; in Ancient Egypt wisdom is cited in records dating back to 3,000 B.C. The Greeks believed that wisdom would be a gift that the gods granted to philosophers, so that they could contemplate truth, being the object of philosophical knowledge, and virtue, which lead humans in search of the good, the truth and the beautiful, (Santos, Seille Cristine Garciab et al, Human Excellence: The Contribution of Personality, Paideia, vol. 22, no. 52, pp. 251259) consulted on 2024-08-12).

4.7 Truth and Human Happiness

According to the Encyclopedia of Meanings, human happiness is the state of being happy, a feeling of well-being and contentment, which can occur for several reasons. Happiness is a lasting moment or period of satisfaction, in which people feel happy, where there is no suffering. Happiness is formed by emotions and feelings, which can be for a specific reason, such as a dream come true, or a wish fulfilled, good mood in which it is not necessary, no special reason for people to feel happy.

Happiness in Philosophy

Happiness is addressed by several sciences, including Philosophical Sciences, Sciences of the Human Mind, Religions. According to Aristotle, (384 B.C. – 322 B.C.). Philosophers associate happiness with pleasure, since it is to define happiness, since it is the product of feelings and emotions, that is, happiness concerns balance and harmony, in the practice of social well-being. For the Greek Epicurus, (341 B.C. – 270 B.C.), happiness occurs through the satisfaction of desires; Pyrrhus of Elis, (360 BC – 270 BC), believed that human happiness happened through tranquility. For Lao Tzu, (sixth century B.C. – fifth century B.C.), happiness could be achieved with nature as a model. Confucius, on the other hand, (552 B.C. – 489 B.C.), believed in happiness. due to the harmony between people.

Happiness in Psychology

Happiness in Psychology, according to Sigmund Freud, (1856 - 1939), happiness is driven by the search for happiness, but this search would be a utopian thing, since for it to exist, it could not depend on the real world, where people can have experiences, such as failure, so it could not depend on the real world. What can be said is that the human being could achieve partial happiness.

Happiness in Religion

The relationship between religion and happiness is a complex and multifaceted topic. Religion can bring happiness for many reasons, as it offers a common sense of purpose and meaning in human life, providing a moral and ethical framework to guide the actions of believers. Additionally, participation in the religious community offers a sense of belonging and social support, which can contribute to emotional well-being.

Faith plays an important role in the pursuit of happiness, as believing in something beyond the human person can bring comfort, hope, and a sense of security in difficult times. In addition, faith can provide the moral and ethical guidelines that help people make ethical decisions and live a dignified life.

There are differences in the relationship between different religions. Some religions are more associated with happiness than others, but it should be noted that the relationship between religion and happiness is individual and can vary from person to person.

V. CONCLUSIONS AND LEADS FOR FURTHER INVESTIGATION

According to the encyclopedia of meanings (consulted on 2024-08-10), truth is related to what is sincere, true and in which there is the absence of lies. What is certain and what is reality, that is, which can in many situations be proven by facts and which is of great importance in judging human actions.

Truth is the property of being in accordance with the real fact or reality, (everything that exists). Truth is the opposite of falsehood. Truth is the conformity between a statement or belief and reality. A proposition is considered true when it corresponds to the facts or when it can be proven in a coherent and consistent way

Myth	Truth
Absolute truth exists	Truth is relative and depends on individual context and perspectives
Science is the only path to truth	Science is a way of seeking truth, but there are other philosophical and epistemological approaches
The truth is objective and can be proven definitively	Truth can be subjective and is subject to constant interpretation and revision
Truth is static and unchanging	Truth can be dynamic and evolve over time as new information and perspectives emerge

Source: Author

In fact, scientific truth starts from the philosophical concept and whose scientific realism, of all sciences, whose objective is to discover the truth about the world. Realists, philosophers and scientists, defend and use the Scientific Method with the aim of reaching the truth. In this sense, there are strong reasons to resort to the use of scientific methods as conduits of reaching the truth. Scientific progress is measured by progress in the search for truth.

When we talk about the truth, we are talking about the truth sought by all human beings, who want to position themselves in the world, whether they are scientists or not. It is a truth in which the human mind knows reality, or that the reality of the external world, corresponds to the language about it.

There is a factual (objective truth of reality) that can be scientifically proven by facts, and a subjective reality constructed in the minds of human persons. These truths can be theorized and about which one can know, always using the approximation of the total and universal truth. Interdisciplinary truth is a conception that regulates the relationship between scientific theories that formulate through language, and the reality of the world external to the human mind, that is, a statement is true when the argument about something is proven by the fact(s).

The information and knowledge society is in the transition phase to the Digital Society, which is not only a technological change, but also a socio-cultural one, so it becomes necessary to manage this change, communicate and guarantee the digital truth, since the processes of acquisition and use of technological tools, automation and data analysis, such as process automation technologies, Internet of Things connectivity, Artificial Intelligence and Big Data become a major challenge for people and organizations.

The issue of the veracity of digital information, the importance of cybersecurity, the protection of data (information transformed into data and these transformed into information), as well as the guarantee of privacy, become critical components of digital transformation. This socio-cultural change requires the permanent search for truth (credible and accessible information), it obliges scientific research and human beings to promote innovation, the sharing of true information and the mental change of prioritizing the digital.

Clues for Future Investigations

The debate on human truth versus digital truth can contribute to enlightening people about paradigm shifts, in economic, political and social terms, and to the creation of a universal culture, about truth versus truth, in their attitudes and behaviors, as opposed to falsehood (lies), in all situations, whether in public or private organizations, both in personal life (social and family), as well as in decision-making, in the different areas of activity.

The following questions are already posed to us:

- What is the relationship between Information Science and truth?
- In the Digital Society, what will be the truth: the truth of the facts or another type of communication?

REFERENCES

[1]. Ackoff, R. L., (1971), "Towards a system of systems concepts." Management Science. 17:661-671; July.

[2]. Ackoff, R. L.; Emery, F. E., (1972), On Purposeful Systems. Chicago: Aldine-Atherton.

[3]. Ackoff, R. L.; Gupta, S. R.; Minas, J. S., (1962), Collaborators. Scientific Method—Optimizing Applied Research Decisions. New York: Wiley.

[4]. Adams, Frederick, (2010, v. 41, n. 3, pp. 331-344), «Information and knowledge à la Floridi», Metaphilosophy, editor Patrick Allo, Porto Alegre: Edipucrs.

[5]. Adams, Frederick; Moraes, João Antonio de, (2014), «Is There a Philosophy of Information? » Topoi (Dordrecht), pp.1-11. <http://link.springer.com/article/10.1007%2Fs11245-014-9252-9>.

[6]. Adams, Frederick; Moraes, João Antonio de, (2014), «Is There a Philosophy of Information? » Topoi (Dordrecht), pp.1-11. <http://link.springer.com/article/10.1007%2Fs11245-014-9252-9>.

[7]. Adams, William C., (2015), Conducting Semi-Structured Interviews, Handbook of Practical Program Evaluation, John Wiley & Sons, Inc, pp, 492-505, ISBN 978-1-119-17138-6

[8]. Aristotle. (1969). *Metaphysics*. Porto Alegre: Editora Globo.

[9]. Austin, J.L. (1950) "Truth", *Proceedings of the Aristotelian Society*, sup. vol. n. 24, pp. 111-28.

[10]. Bertalanffy, (1968), General System Theory: Foundations, Development, Applications, New York: George Braziller, revised edition, 1976: ISBN 0-8076-0453-4.

[11]. Bohr, Niels, (1957), Atomic Physics and Human Knowledge, essays 1932-1957. Translated by Vera Ribeiro. Rio de Janeiro. Counterpoint, 1995.

[12]. Boland, R. J. (1987). «The In-Formation of Information Systems». In: Critical Issues in Information Systems Research. Boland, R. J. &Hirschheim, R. A. (Ed.), Wiley, New York.

[13]. Cabral, João Francisco Pereira, "René Descartes e a duvida hiperbólica": Brasil.

[14]. Capurro, R, Eldred, Michael; Nagel, Daniel, (2012), It and privacy from an ethical perspective digital whoness: identity, privacy and freedom in the cyberworld. In: BUCHMANN, Johannes (Ed.). Internet Privacy: multidisciplinary analysis. München. Available from: <http://www.acatech.de/fileadmin/user_ upload/ aumstruktur_nach_Website/Acatech/ root/de/Publikationen/Projektberichte/ acatech_STUDIE_Internet_Privacy_WEB.pdf>. Accessed: 11 Oct. 2016.

[15]. Capurro, R., (2010), Foundations of information science: review and perspectives. In: international Conference on Conceptions of Library and Information Science, Finland, 1991. Proceedings... Tampere: University of Tampere, 1991. Available: . Accessed: 14 Apr. 2004.

[16]. Capurro, R., (1978), Information. Munich: Saur http://www.capurro.de/info.html

[17]. Capurro, R., (2009), Past, present, and future of the concept of information. tripleC , 7, 125-141. Available at: <http://www. capurro.de/infoconcept.pdf>.

[18]. Capurro, R.; (2014), apud Arabes. Notes on the Greek, Latin, Arabic, Persian, and Hebrew Roots of the Concept of Information. Available at: <http://www.capurro.de/iran. html>.

[19]. Capurro, R.; Hjørland, B., (2003), The Concept of Information. In Annual Review of Information Science Technology (ARIST), B. Cronin Ed.; Information Today: Medford, New Jersey, 2003, pp. 343-411. Available at: <http://www.capurro.de/ infoconcept.html>.

[20]. Capurro, R; Fleissner, P.; Hhofkirchner, W, (1999, v.2),. Is a Unified Theory of Information feasible? the trilogue. In: second international conference on the foundations of information science. The quest for a Unified Theory of Information. [S.l.]: Gordon and Breach, p. 9-30, 1999. Available: . Accessed: 17 May 2004.

[21]. Capurro, Rafael (2003): EthikimNetz. Stuttgart: Franz Steiner Verlag.

[22]. Capurro, Rafael (2003a): *Operarisequitur esse*. Zurexistenzial-ontologischenBegründung der Netzethik. En: Thomas Hausmanninger, Rafael Capurro (Eds.): Netzethik. Grundlegungsfragen der Internetethik. Schriftenreihe des ICIE, Bd.1, Munich: Fink, 61-77.

[23]. Capurro, Rafael (2003b): Angeletics - A MessageTheory. En: Hans H. Diebner, Lehan Ramsay (Eds.): Hierarchies of Communication. Karlsruhe: ZKM - Center for Art and Media, 58-71.

[24]. Capurro, Rafael, (2006), «Towards an ontological foundation of Information Ethics», Ethics and Information Technology, v.8, n. 4, pp. 175-186.

[25]. Capurro, Rafael, (2010), «Theoretical and practical challenges of Capurro, Rafael, 2010, «Theoretical and practical challenges of intercultural information ethics», E-Book of the I Brazilian Symposium on Information Ethics, João Pessoa: Idea, pp. 11-51.

[26]. Capurro, Rafael, (2014), Personal correspondence, Demir, Hilmi, 2012, Luciano Floridi's philosophy of technology. New York: Springer.

[27]. Capurro, Rafael; Højrland, Birger (2003): The Concept of Information. En: Blaise Cronin (Ed.): Annual Review of Information Science and Technology, Vol. 37, Medford, NJ: Information Today Inc., 343-411.

[28]. Choo, C. W. et al., (2006, p. 491-510), Working with information: information management and culture in a professional service organization. Journal of Information Science, 32(6). Available at: https://journals.sagepub.com/doi/10.1177/0165551506068159. Accessed on: 06 ago. 2015.

[29]. Choo, C. W., (2002), Information, management for the intelligent organization: the art of scanning the environment.3rd. ed. New Jersey: ASIST.

[30]. Churchman, (1968), An Appreciation of C. West Churchman, International Society for the Systems Sciences. (Retrieved 14 August 2024).

[31]. Davenport, T. H. ,(1988), Ecology of Information: why technology alone is not enough for success in the information age. São Paulo: Futura.

[32]. Descartes, René, (1628), Rules for the Guidance of the Spirit, trans. Paulo Neves and introduction by Denis Lerrer Rosenfield. Porto Alegre: L&PM Editores.

[33]. Descartes, René, (1637), Discourse on Method, trans. Paulo Neves and introduction by Denis Lerrer Rosenfield. Porto Alegre: L&PM Editores, 2010, p. 37.

[34]. Descartes, René, (1644), Principles of Philosophy, trans. Paulo Neves and introduction by Denis Lerrer Rosenfield. Porto Alegre: L&PM Editores.

[35]. Descartes, René, (1649), The Passions of the Soul, trans. Paulo Neves and introduction by Denis Lerrer Rosenfield. Porto Alegre: L&PM Editores.

[36]. Dummett, Michael. (1990). *La Verdad y Otros Enigmas*. Trad. A.H. Patiño. Mexico: Fondo de Cultura Económica.

[37]. Floridi, L. (2008). Trends in the Philosophy of Information. In P. Adriaans, & J. v. Benthem, Handbook of Philosophy of Information (pp. 113-132). Amsterdam: Elsevier.

[38]. Floridi, Luciano, (2002), What is the philosophy of information. <http://www.philosophyofinformation.net/publications/pdf/wipi.pdf>.

[39]. Floridi, Luciano, (2005), «The ontological interpretation of informational privacy», Ethics and information technology, v.7, pp. 185-200.

[40]. Floridi, Luciano, (2008), Information ethics, its nature and scope. <http://www.philosophyofinformation.net/publications/pdf/ieinas.pdf>.

[41]. Floridi, Luciano, (2009), The information society and its philosophy: Introduction to the special issue on "the philosophy of information, its nature and future developments. <http://www.philosophyofinformation.net/publications/pdf/tisip.pdf>.

[42]. Floridi, Luciano, (2011), The Philosophy of Information. Oxford: Oxford University Press.

[43]. Floridi, Luciano, (2012, v. A, nº. 370, pp. 3536-3542), «Turing's three philosophical lesson and the philosophy of information», Philosophical Transactions.

[44]. Floridi, Luciano, (2013a), The Ethics of Information. Oxford: Oxford University Press.

[45]. Floridi, Luciano, (2013b), «What is a philosophical question?», Metaphilosophy, v. 44, n. 3, pp.195–221.
[46]. Floridi, Luciano, (2014), The fourth revolution: how the infosphere is reshaping human reality, Oxford: Oxford University Press.
[47]. Foucault, Michel, (1999), In defense of society. São Paulo: Editora Martins Fontes.
[48]. Giddens, Anthony, Duneier, Mitchell, Appelbaum, Richard P. Carr, Deborah, (2009), Introduction to Sociology (Eighth Edition), New York: W. W. Norton & Company.
[49]. Hjorland, B., (2002), Domain analysis in information science: Eleven approaches traditional as well as innovative. Journal of Documentation, v. 58, n. 4, p. 422–462, ago. 2002.
[50]. Hjorland, b., (2009), Concept Theory. Journal of the American Society for Information Science and Technology, 60(8), 1519-1536.
[51]. Horwich, Paul. (1990). *Truth*. Oxford: Basil Blackwell.
[52]. https://rabiscodahistoria.com/a-importancia-da-veracidade-no law-discover-why-the-truth-is-essential-for-justice/ (consulted on 2024-09-12)
[53]. James, W. (1909) *The Meaning of Truth*, New York, Longman Green.
[54]. João Branquinho, Desidério Murcho and Nelson Gonçalves Gomes – Encyclopedia of Logical-Philosophical Terms, São Paulo: Martins Fontes, 2006
[55]. Kant, Emanuel, (1781/1787), Aufklarung: revsta de filosofia (1): p. 117-128, ISSN 2318-9428. DOI: 10.18012/arf.v7i1.47324. Retrieved 14 August 2024. Trad. António Djalma Btaga, (June 2020).
[56]. Kirkham, Richard. (2003) *Theories of Truth*. Trad. Alessandro Zir. São Leopoldo: Unisinos.
[57]. Laszlo, Ervin, (1972), Introduction to Systems Philosophy Toward a New Paradigm of Contemporarary Thought, Gordon & Breach Science Publishers, ISBN 0-677-03850-X.
[58]. Laudan. Larry, (1996), Beyond positivism and relativism. Boulder. Westview.
[59]. Le Coadic (1994), La Science de l'Information, Presses Universitaires de France, Paris
[60]. Le Coadic, Yves F., (1998), Le besoind'information. Paris: ADBS Editions, 191 p.
[61]. Le Coadic, Yves-François., (1996), The science of information. 5. ed. Braslia: Briquet de Lemos, 119 p.
[62]. Le Coadic, Yvez-François (1997), La science de l'information. 2 current ed. Paris : Universitaires de France.
[63]. Locke, John, (1698), Na Essay Concerning Human Understanding, ABW, CAPES, Google(N.L.A), 2011.
[64]. Locke, John, (1830), Libery, Equality, Fraternity – France in the United States / Embasay of France in Washington, DC.
[65]. Locke, John, (2013), Second treaty on civil government. São Paulo: Edipro.
[66]. Luhmann, Niklas, (1975), EinfacheSozialsysteme. In: LUHMANN, Niklas (Ed.). Soziologische Aufklärung 2, p. 21-38. Opladen: Westdeutscher Verlag, 1975.
[67]. Magalhães, I., Martins, A.R. Resende, V. de M., (2017), RhetoricAnalysis: a qualitative research method. Brasília: Ed. da UnB, p. 259.
[68]. Matheus, R. F.; Capurro, R., (2004, v. 5, n. 5) Contact about philosophy of information, by Rafael Capurro [personal message]. Messages exchanged between the author and rafael@capurro.de, 2005.
[69]. Mautner, T. The Penguin Dictionary of Philosophy. Penguin Books Ltd, 1997. Ed. Portuguesa – Edições 70, 2010.
[70]. Moraes, C. R. B. De; Fadel, B. (2008). Methodological triangulation for the study of information and knowledge management in organizations. In: Information and knowledge management. São Paulo: Polis: Cultura Acadêmica.
[71]. Moraes, C. R. B. De; Fadel, B. (2010). The interface between organizational and informational behavior. In Valentim, Marta (Org.) Environments and information flows. São Paulo: Cultura Acadêmica.
[72]. Moraes, J. A, (2015a), Philosophy of Information: a Philosophy for the present day? In: Santos, L. R., Marques, U. R. A., Afonso, F. (eds.). Lisbon International Philosophical Days. Philosophy & Current Affairs. Lisbon: eCFULeditions.
[73]. Moraes, J. A., (2014), Ethical implications of the "informational turn in Philosophy". Uberlândia: EDUFU.
[74]. Moraes, J. P. et al., (2018, v. 7, n. 1, p. 39-51), information ecology, management information systems and knowledge management with a view to creating competitive advantages: literature review. Visão Magazine: Organizational Management.
[75]. Moraes, J.A.; Andrade, E. B., (2015b, v. 23, n. 11, p. 4-19), Who are the citizens of the digital citizenship? International Review of Information Ethics.
[76]. Moraes, J.A.; Gonzalez, M. E. Q., (2013, v. 25, n. 36, p. 305-322), Dretske and the problem of qualia. In: Rev. Filos., Aurora, Curitiba.
[77]. Moraes, J.A.; Rodrigues, F. A., (2017), Lecture: Privacy, Public Transparency and Complexity. In: VIII International Meeting on Information, Knowledge and Action and VII International Colloquium on Philosophy of Mind, Marília.
[78]. Moraes, João Antonio de, (2014), Ethical implications of the "informational turn in Philosophy", Uberlândia: EDUFU.
[79]. Musgrave, Alan, (1999, pp. 490-496), The T-scheme plus epistemic thru equals idealism, In: Australian Journal of Philosophy, 75 (1997).
[80]. Plato. (1987). *Sophist*. Trad. J. Peleikat and J.C. Costa. São Paulo: Abril Cultural.
[81]. Popper, Karl, (2002, p. 197), The Logic of Scientific Research, São Paulo. Cultrix.
[82]. Popper, Karl, (2006), In search of a better world. São Paulo, Martins Fontes.
[83]. Quine, W. V., (1934), Ontological Remarks on the Propositional Calcus in Mind (October 1934), 43–(172): 472–476, reprinted in W. V. Quine's Ways of Paradox).
[84]. Quine, W. V., (1936), Set-Theoric Foundations for Logic. In Journal of Symbolic Logic (June 1936), 1(2): 45-57, reprinted in W. V. Quine's Selected Logic Papers.
[85]. Ramsey, F.P. (1927) "Facts and Propositions", *Proceedings of the Aristotelian Society*, sup. vol. n. 7, pp. 153-70.
[86]. Rees, Alan; Saracevic, Tefko, (1967), Education for information science and its relation to librarianship.

[87]. Richard Mattessich (1982), Distinguished Arthur Andersen & Co. Professor, Faculty of Commerce and Business Administration, University of British Columbia, Vancouver, B.C., Canada, in: V6T 1yjournal of the American Society For Information Science
[88]. Robredo (2003), the "Journal of the American Society for Information Science and Technology"
[89]. Santos, Boaventura de Sousa (1996), *Um discurso sobre as ciências*. 8. ed. Afrontamento, Porto
[90]. Santos, Seille Cristine Garciab et al, Human Excellence: The Contribution of Personality, Paideia, vol. 22, no. 52, pp. 251259) consulted on 2024-08-12).
[91]. Saracevic, T., (1992. p. 5-27), Information Science: origin, evolution and relations. In: Vakkari, P.; Cronin, B. (eds.). Conceptions of Library and Information Science: historical, empirical and theoretical perspectives. In: Conference for the Celebration of 20TH Anniversary of the Department of Information Studies, 1991, University of Tampere, Finland. Proceedings... Los Angeles: Taylor Graham,.
[92]. Saracevic, Tefko, (1996, p. 41-62), Information Science: origins, evolution and relations. Spec. Ci. Inf., Belo Horizonte, v. 1, n. 1, jan./ jun. Available at: http://www.scribd.com/doc/6837453/ Tefko-Saracevic-Information-Science-Origin-Evolution-and-Relations.
[93]. Saracevic, Tefko, (1999, p.1051-1063), Information Science. Journal of the American Society for Information Science, v, 50, n.12.
[94]. Shannon C. E., Weaver W., (1948), *The Mathematical Theory of Communication*, University of Illinois Press, Chicago
[95]. Shannon C. E., Weaver W., (1948), *The Mathematical Theory of Communication*, University of Illinois Press, Chicago
[96]. Shannon C. E., Weaver W., (1972), *The Mathematical Theory of Communication*, University of Illinois Press, Urbana
[97]. Shannon, Claude; Weaver, Warren, (1998), A mathematical theory of communication, Urbana: University of Illinois Press, (first edition: 1949).
[98]. Sighele, Scipio, (2018), The Criminal Crowd and other Writings on Mass Society, University of Toronto Press, ISBN 978-1-4875-1735-9.
[99]. Simmel, Georg, (1890), (1892), Introduction to the Science of Ethics, Berlin: Hertz.
[100]. Simon Blackburn – Dictionary of Philosophy, 1997. Portuguese translation Ed. by Gradiva, 1997
[101]. Smith et al., (2008), Brief Resillence Scale, APA PsycNet.
[102]. Smith et al., (2018), Understanding rapid adjustments to Brief Resillence Scale, APA PsycNet.
[103]. Spinoza, Baruch, (1677), Ethics, OrdineGeometricoDemonftrata,
[104]. Stonier, Tom, (1997), Information and meaning: an evolutionary perspective, London: Springer-Verlag.
[105]. Strawson, P.F. (1950) "Truth", *Proceedings of the Aristotelian Society*, sup. vol. n. 24, pp. 125-56.
[106]. Sudnow, David, (2001), Ways of the Hand, MIT Press.
[107]. Tarski, A. (1943) "The Semantic Conception of Truth", *Philosophy and Phenomenological Research*, IV, pp. 341-75.
[108]. Tarski, Alfred, (2009, pp. 196-222), The semantic conception of truth. Translated by Celso Reni Braida, Cezar Augusto Mortart, Jesus de Paula Assis and Luiz Henrique de Araújo Dutra. São Paulo. UNESP, 2007.
[109]. Turing, (1936), On Computable Numbers, with an Application to the Entscheidungsproblem, Proceedings of the London Mathematical Society journal in two parts, the first on 30 November and the second on 23 December.
[110]. Turing, (1990), The experiment that shaped artificial intelligence, New York, Business Hugh Loebner.
[111]. Turing, Alan, (1950), «Computing machinery and intelligence», Mind, n. 59, pp.433-460.
[112]. Turing, Alan, (1950), Computing Machine and Intelligence, Mind, Oxford University Press on behalf of the Mind Association.
[113]. Zikmund, William G., (2000), Business Research Methods sixth Edition,Dryden Press Harcourt College Publishers.