present embodiment in reality (explicate order) including mediating memory processes (i.e., historically dependent processes) releasing the meaning. **Knowledge** is tacitly or consciously grasped and interiorized content of information related and meaningfully integrated into a unifying frame of experience among other information contents interiorized in the same way, the complex of which reflects subjective understanding of environment. Mistakes arise from integration of misinformation or from integration of contradictory information into a unifying frame of experience (the second leads to cognitive dissonance and motivates to seek another information). [29] (Michal Lorenz)

Data are perceptible or perceived—if and when the signal can be interpreted by the 'user'—attributes of physical, biological, social or conceptual entities. **Information** is recorded and organized data that can be communicated (Porat & Rubin, 1977). However, it is advisable to distinguish between the various states or conditions of information (e.g. information-as an object (Buckland, 1991b), or semantic, syntactic and paradigmatic states (Menou, 1995). **Knowledge** is information that is understood, further to its utilization, stored, retrievable and reusable under appropriate circumstances or conditions. [30] (Michel Menou)

Data are sets of characters, symbols, numbers, and audio/visual bits that are represented and/or encountered in raw forms. Inherently, knowledge is needed to decipher data and turn them into information. **Information** is facts, figures, and other forms of meaningful representations that when encountered by or presented to a human being are used to enhance his/her understanding of a subject or related topics. *Knowledge* is a reservoir of information that is stored in the human mind. It essentially constitutes the information that can be "retrieved" from the human mind without the need to consult external information sources. [31] (Haidar Moukdad)

Data are raw material of information, typically numeric. **Information** is data which is collected together with commentary, context and analysis so as to be meaningful to others. **Knowledge** is a combination of information and a person's experience, intuition and expertise. [32] (Charles Oppenheim)

Datum is an object or crude fact perceived by the subject, non-constructed nor elaborated in the consciousness, without passing through neither analysis processes nor evaluation for its transfer as information. **Information** is a phenomenon generated from knowledge and integrated therein, analyzed and interpreted to achieve the transfer process of message (i.e., meaningful content) and the cognitive transformations of people and communities, in a historical, cultural and social context. **Knowledge** is a social and cognitive process formed by the passing or assimilated information to thought and to action. **Message** is the meaningful content of information. [33] (Lena Vania Pinheiro)

Data are primitive symbolic entities, whose meaning depend on it integration within a context that allow their understanding by an interpreter. **Information** is the intentional composition of data by a sender with the goal of modifying the knowledge state of an interpreter or receiver. **Knowledge** is the intelligent information processing by the receiver and it consequent incorporation to the individual or social memory (Belkin & Robertson, 1976; Blair, 2002) [34] (Maria Pinto)

Signs. The distinctive feature of signs is that they denote something, regardless of whether that something exists or does not exist, is concrete or abstract, possible or impossible, a thing or an event, a substance or a determination, an individual or a collective. Analysis even of one single sign leads to a multiplicity of signs and their denoted items. For this reason, we may say that the sign contains a reference to both the denoted item considered per se, in isolation, and the contexts or situations in which the denoted item appears. And of these of especial importance are those that, for lack of better terminology, we can call the proximal context and the distal context. The proximal context is the net of relations that hold among the items denoted by signs. On the other hand, the distal context is the outcome of a categorization procedure. Its most usual form is that constituted by the reply to questions like 'what is this?', where acceptable replies are of the type 'this is an animate being', 'this is an artifact', 'this is a property', etc. This codification of the two types of context enables me to propose the following distinction between data and information.

Datum. Def. 1. x is a datum = x is a sign that denotes entities or attributes in a proximal context. In the light of this definition one understands why conventional analyses of consistency and integrity, or procedures of normalization, are effective techniques for the organization and rationalization of data. From a technological point of view, relational databases are the currently most advanced products available for the efficient handling of data.

Information. Def. 2. x is an item of information = x is a datum in a distal context. Definition 2 tells us that information is made up of more structured items. That is to say, information is the embedding of signs-in-a-proximal-context (i.e., data) in a distal context. Information, thus, adds greater structure to data. These definitions provide a first explanation for the scant interest aroused by proposals to draw more exact distinctions between data and information. In effect, in concrete cases of application, it is often difficult to distinguish precisely between distal and proximal contexts.

Conditions of knowledge. Knowledge is apparently not reducible solely to information and data. The problem is to understand 'what is lacking', what must be added to information and data in order to achieve true knowledge. My claim is that the meaning of a sign is given by the position of the sign in a field of signs (in a space). On the other hand, the content of a sign is given by the position of the item (denoted by the sign) in a field of items. Data, information, meanings and contents cover the field of knowledge. This amounts to saying that we have knowledge when we know (1) which item is denoted by which sign, (2) the item's proximal context, (3) the item's distal contexts, (4) the sign's position in the field of signs, (5) the item's position in the field of items (Poli, 2001).

Data, information, knowledge, message. I am unable to understand why data, information, knowledge and message are placed on the same level of analysis. I would suggest considering message as the "vehicle" carrying either data or information (which can be taken as synonymous). Knowledge hints to either a systematic framework (e.g., laws, rules or regularities, that is higher-order "abstractions" from data) or what somebody or some community knows ("I know that you are married"). In this latter sense knowledge presents a "subjective" side. [35] (Roberto Poli)

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