

The Structure and Essential Characteristics of Information-Literate Knowledge Workers in Information Systems

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Abstract: - There appear many inconsistent and often conflicting views and terms for information, data and meaning in the field of information systems. This confusion might be a result of the lack of adequate understanding of meaning. We argue that meaning is created through interpretation by a subject (a human agent). We outline a conceptual framework for looking at information flow, which consists of an information source, information bears (carriers), and information receivers. This constitutes a backdrop of our main investigation on how what a piece of information means to a person takes place. We draw on Heidegger's work on the notion of 'being' to investigate the structure and essential characteristics of information-literate knowledge worker in the realization of possible impact of information whereby to understand the essence of inter-subjective and subjective meaning. We observe that meaning is the link between information and data. To be able to drawing meaning from information embodies the ability of an interpreter in understanding or interpret information, viz. her/his horizon of interpret. What is revealed here would seem highly desirable for both theoretic research and practice.

Key-Words: - information-literate knowledge workers, information systems, information, meaning, Heidegger

1 Introduction

Information is a core notion for the field of information systems, and the realization of the value and impact of a piece of information depends on the interpreter of the information. It appears that little has been done in understanding such an interpreter. Understanding notions of *data*, *information* and *meaning* and understanding that of the *information interpreter* are intertwined. Currently they cause confusion to each other due to neither being adequate.

The information interpreter is also known as *information-literate knowledge worker*, which was defined by Stephen Hang and his co-authors in terms of the five responsibilities the knowledge worker should take ([1], p.17). An *information-literate knowledge worker* defines what information

is needed, knows how and where to obtain that information, understands the meaning of the information once received and acts appropriately, and based on the information helps the organization achieve the greatest advantages possible. In all instances, an information-literate knowledge worker always uses information according to ethical and legal constructs ([1], p.17). Under many other circumstances, we simply take an information interpreter as a user or end-user, around whom we study user general competence, user linguistic production competence, end-user competence and end-user computing and so forth ([2], [3], [4]). Reference [2] constructs and analyzes *user competence* in terms of the level of technological knowledge that the user possesses. Reference [3] looks at the impact of individual user tasks and motivations to the success of end-user computing.

Reference [4] analyzes how experiences affect the accuracy of self-assessed user competence. All these works seem to take the user or end-user for granted without studying them, and discuss user competence or end-user computing from some experience. Thus, there is a lack of systematic consideration of what it means to be an information interpreter, and why an information interpreter must possess certain user competence or end-user computing, and what the essence of user competence or end-user computing is actually.

This paper begins with a conceptual framework for looking at information flow. This framework consists of seven components, the source of information (the S), the bearer (carrier) of information (the B) and the receiver of information (the R), and we call it the S-B-R framework for convenience. This would constitute the backdrop of our main investigation with this paper, namely the discussion of the relationship between data, information and meaning, especially from the point of view of interpreting information to obtain meaning, to understand the *information interpreter*, or in synonymous terms, *information-literate knowledge worker*, or *end-user and user*.

The rest of the paper is organised as follows. The second section presents the S-B-R framework. The third section analyzes the relationship between the information interpreter and the internal relations of data, information and meaning. The fourth section draws on Heidegger's work on 'being' and uses some cases to investigate the structure and essential characteristics of the information-literate knowledge worker. The fifth section analyzes the implementation procedure of obtaining meaning from information and describes a semi-structured model of the knowledge worker followed by conclusions in the final section.

2 The S-B-R Framework

To facilitate further studies of information within the context of information systems, that is, to gain insight and to be able to explain various phenomena in human communication, information creation and transformation, and the development of information systems, an overarching framework seems highly desirable and we believe it is actually necessary. Aforementioned various theories and semiotics can be seen, among other things, address the issue of information and information flow in different ways and emphasize different aspects

of it. We find that all these may be incorporated within a framework, which would help make sense of them, and make good use of them in understanding information and information flow. We believe that such a framework should be formulated from the point of view of how information is created, carried and finally received. Therefore we have created a framework consisting of Information Sources, Information Bearers and Information Receivers, and the links between them. We call such a conceptual model the 'S-B-R Framework', which is illustrated in Figure 1.

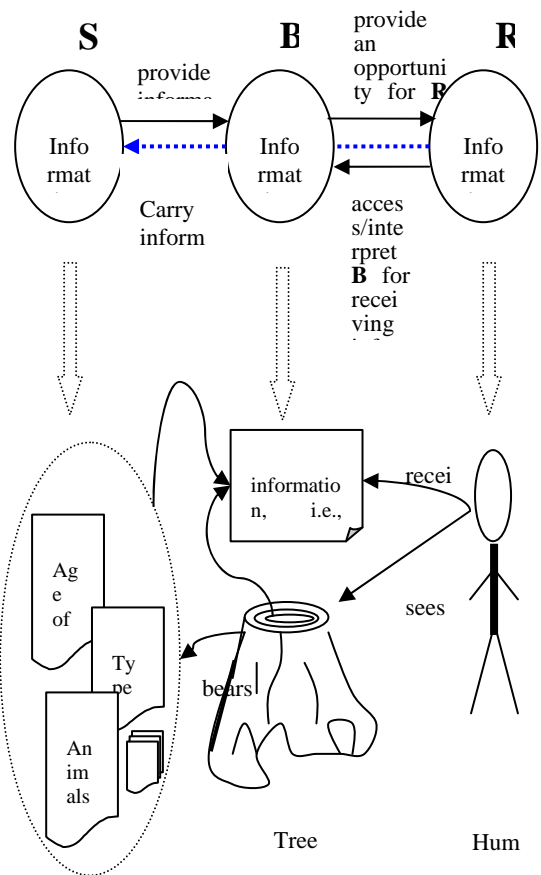


Figure 1. S-B-R Framework

We use a simple example to show how this framework might work in helping understand information flow. As illustrated in Figure 1, some information is created due to 'reduction in uncertainty' ([5], Dretske 1981 reprinted in 1999[6], p.5), for example, the tree was 80 years old, rather than it is possible therefore uncertain that the tree was 40 years old or 80 years old among many other possibilities. The states of affairs of the tree in terms of its age involve uncertainty, i.e., the tree could

have grown for many possible and different years. When it was cut down or for wherever reason it stopped growing, reduction in uncertainty takes place, and therefore a piece of information regarding the age of the tree is created among many others.

This piece of information is high likely to be carried by something other than that particular 'reduction uncertainty' in question per se. Whatever else that can potentially tell us, tell us truly, the age of the tree is such a carrier (bearer) for this piece of information. This is possible only because between the 'reduction in uncertainty' and the 'whatever else' there is a certain relationship, which in turn is governed by some underlying regularity (Barwise and Seligman 1997[7], p.8), one type of which is 'nomic dependencies' (Dretske 1981 reprinted in 1999[6], p.75). Such a relationship enables the states of affairs of one thing to tell us truly about the states of affairs of another, and therefore is called an informational relationship (Dretske, 1981 reprinted in 1999[6], p.35). An information bearer provides an opportunity for an information receiver, for example a human agent, to receive information, in terms of the states of affairs, about the information source. By consulting an information bearer, an information receiver can acquire information (illustrated by dotted line in Figure 1) if the receiver is aware of and attuned to some *constraints* (Devlin 1991[8], p.12). A constraint is a formulation of some informational relationship, a kind of dependency between the information bearer and the information source.

2.1 Information Source

Information must be created in the first place, no matter whether it is by nature or by humans with or without a purpose or intention. Following Dretske (1981 reprinted in 1999[6] pp.3-12), any situation may be regarded as a source of information as long as reduction in uncertainty takes place. It could be a 'universe of discourse', a particular situation (Devlin 1991[8], pp.49-65), a relation, an event with uncertain outcomes, and so on. For example, the situation 'choosing one from eight employees to do an unpleasant job' can be an information source S.

From the point of view of semiotics ([9]), an information source S can be seen as the 'sign object' ([10]) that conforms to the definition of 'sign' given by Charles Sanders Peirce. It is a thing that the sign alludes or refers to.

2.2 Information Bearer

Information flow requires, as a necessity, some representation of information, which we call the bearer or carrier. Jerry Fodor even says 'No information without representation' (cited by Barwise and Seligman ([7], p.235)). An information bearer can be a traffic light or signal, a physical sign or an information system. Following Stamper (1997[9]), anything, say x, can function as a sign if it can stand for something else, say y, for the people in some community. Here, x is an information bearer for y. With our S-B-R framework, our ontological assumptions are that information may or may not be carried by a bearer; information can be conveyed only through a bearer; and information is independent of whether one receives it or can receive it or not. For example, if a book were written in ancient Chinese, we would consider that it carries certain information no matter whether we can read it or not.

In addition, we maintain that the literal meaning i.e., the propositional content (Devlin 1991[8], p.88), if any, of a bearer is independent of the information that it bears. For example (Dretske 1981 reprinted in 1999[6], p.44), my utterance 'I have a toothache' bears no information that I had a toothache if my teeth were absolutely alright when I uttered that sentence, even though the literal meaning of the sentence is obvious. If I did have a toothache at that time, then the literal meaning of the utterance is part of the information that the utterance carries/bears. Thus, it is only accidental that the literal meaning (if any) of a sign is (part) of the information that the sign bears.

Considering the structure of a sign given by Peirce, we agree that the 'representamen', which is a thing serving as the 'carrier' of the sign, is independent of its meaning ([10]). For example, an entity in an Entity Relationship data diagram might refer to something that has no semantic correspondence with the meaning of the name given to that entity.

2.3 Information Receiver

To be able to receive information carried by a bearer, following Devlin (1991[6], pp.99-101), we maintain that an information receiver must be aware of and actually invokes some relevant 'constraints' (i.e., attunement to the constraint (ibid.)) in order to receive information that is carried by a bearer. Different receivers may receive different information from the same bearer. The users of an information system are information receivers. In a system integration environment, an agent or a

mediator can be an information receiver, which may process information further.

A crucial problem for an information receiver is what a piece of information means to him/her. And we observe that such problem has not been investigated adequately in the literature of information systems. In the sections that follow, we concentrate on the topic of how what a piece of information means (we call it ‘meaning’ – note that it is not just the literal meaning of a sign or sentence in some language, even though it may make contributions to the former) to a human being takes place.

3 Data Information Meaning and Information Interpreter

Data, information and meaning are fundamental concepts for the field of information systems, but these concepts seem to be in a state of confusion, which bring about a mixture of isolated and often contradictory knowledge in the study of information systems ([9],[11], [12], [13]). We believe that one of the causes of such a state is the lack of a convincing account of meaning obtained from information, or more precisely, what a piece of information means to a person. The realization of the value of a piece of information depends on the interpreter. But there seems no adequate study of the information interpreter.

Floridi considers that information is meaningful data that happens to be true [13]. Dretske believes that meaning of a message is different from data (i.e., the message *per se*) and the information content of the message [6]. Stamper seeks the meaning of signs by using organizational semiotics [6]. Checkland takes the view that ‘information equals data plus meaning’ ([14], [15]). Mingers thinks that data, information and meaning are different, information is untouchable, and the relationship between information and meaning is the same as that between analogue and digital. That is, meaning is a subset of information and meaning is of different levels. Mingers suggests that people is surrounded by their respective ‘meaning systems’ [16]. All the notions above point out that meaning is different from data or information, but none gives an accurate form of meaning. Thus it is not clear how to express meaning or how to study the meaning systems.

Meaning is achieved through an explaining process or an explaining activity ([17]). But who explains? People! People explain the activities. It is people with which meaning exists and is valuable.

The explaining process of meaning is also that of receiving information relevant to the interpreter in terms of how to use information and the process of how information provides people with services. Thus we take the view that it is only through analyzing the people that are involved in a process of obtaining meaning from information, namely, the knowledge workers who are proficient in handling information, can the nature of meaning obtained from information and the form of meaning be comprehended, and then can the relationship between data, information and meaning be comprehended also.

In contemporary studies on the meaning and the content of information, two concepts are used repeatedly (e.g., in Mingers’ and Stamper’s work, aforementioned), namely subjective meaning and inter-subjective meaning. But the studies seem to stop short of exploring these two concepts in depth. We observe that this is because present studies do not centre their investigation on people – the information interpreter.

Our approach goes like this. Based on Heiderger’s work on ‘being’ and his technological view ([18], [19]), we firstly analyze the *being-structure* (a structure of being) and the essential characters of the information-literate knowledge worker (hereafter simply *knowledge worker*) by means of a case study. Then based on the ‘being structure’ of the knowledge worker we comprehend the form of meaning and the relationship between data, information and meaning. Furthermore, based on the essential characters of the knowledge worker we explore the nature of subjective meaning and inter-subjective meaning obtain from information. We then identify a realizing mechanism for obtaining meaning from information through extracting a semi-structured model of the knowledge worker. Our study extends the works of Mingers and Stamper on information—meaning conversion, therefore should provide further insight on this problem.

4 The Information-Literate Knowledge Workers

In the field of information systems, information flow involves a variety of people, such as managers, operators of information systems, customers as well as suppliers. They all need information in order to make decisions, to control and to manage during which further information is generated, which is then used by other people in a variety of ways. Such people are knowledge workers who are proficient in

dealing with information, who are called information-literate knowledge workers.

Data and information have meaning (i.e., being meaningful, relevant or significant) only when they are used by us. What kind of structure and essential characters do we, as knowledge workers, have? To find an answer, we drawing on Heidegger's work on the notion of 'being' through a case study.

4.1 The Being-Structure of the Knowledge Worker

Case 1: A cable assembly company founded in September 1999 is an international joint venture. It was certified as a 'high-tech enterprise' in Shanghai in 2001. The company's essential tenet is 'Quality is Everything' and it is certified by the ISO9002 quality assurance system, and received the ISO9001-2000 certification by the Chinese Saibao Certification Committee and the ISO14001-1996 environmental management system certification, which was then upgraded to ISO14001-2004. Persistent high quality and competitive prices enable the company to have good business relations with many well-known domestic communication enterprises, such as North-Electric Networks (China) Company Ltd, JiepuTechnology (Shanghai) Company Ltd (Long Xin), Siemens (Shanghai) Mobile Communications Equipments and Zhongxin Communications Shenzhen.

The company's highest decision-making body is the Board of Directors, under which a General Manager is in charge of the day to day operation of the company. There are 9 managerial departments: sales, supply, production, finance, supplier management, equipments, general office, inspection and technology. In addition, there are independent representatives of managers.

The general manager sets up the remit of each department according to the structure of the company. We take the remits of the inspection manager, the production manager and the purchasing manager illustrated in Table 1 to analyze the 'being' structure' of the knowledge workers.

If Tom is now the inspection manager, the duties and authorities of an inspection manager have already existed, and Tom's existence as an inspection manager is to execute the duties and work within his authorities.

Table1 Remits of positions in xx cable assemblies company

Position	Remits
inspection manager	<ul style="list-style-type: none"> ♦ Responsible for the inspection and testing of the requisitions, check and management of the instruments ♦ Responsible for inspection and testing of the products, and have the veto power on quality. And organize the work of quality review and quality statistics, and take measures to prevent the disqualifications about products, process and the quality management system. ♦ Responsible for controlling the substandard products, and organize the assessment and correction of substandard products, and the analysis, development and supervision of the prevention measures ♦ Responsible for the control of quality records, set up and keep the marking, collecting, cataloguing, filing, storing and processing of quality records. ♦ Responsible for drawing up and carrying out of the internal quality audit program.
production manager	<ul style="list-style-type: none"> ♦ Responsible for carrying out and accomplishing of the production plan, control the production process and ensuring the product quality. ♦ To cooperate with the general office to make on-the-job training, quality training and annual appraisal of the operators. ♦ To make batch control of the products, take notes of the quality for process control, ensure the traceability of the product quality. ♦ Continually increase the labour productivity and product quality, decrease waste products and product costs. ♦ The Product Department consists of 2 groups, namely the Assemble group and the Integration group.
purchasing manager	<ul style="list-style-type: none"> ♦ Make procurement plan, purchase raw material and appurtenant material according to the plan and Purchase Order. ♦ Responsible for the management of the Procurement contract, build channels and mutually beneficial relations with suppliers, make effort to reduce the material cost. ♦ Responsible for sending raw and appurtenant materials for check, deal with unqualified materials.

Based on the operation of human, financial and material resources of the company, the inspection manager executes his duties and works within his authorities, which have existed since the opening of the business. The Inspection Department exists as a separated part of the company, and the manager's duties and authorities are published officially, which makes the originally implicit duties and authorities open and institutionalized. That is to say, Tom, the inspection manager's duties and authorities are fixed. The business exists on the one hand as a physical entity and on the other hand as an information world, which reflects the way it operates. So being the inspection manager, Tom's duties and authorities exist in the information world of the company. When he/she is working, the related information world is opened up and the meaning (effects and impact) of information is materialized.

When Tom is in charge of the inspection and testing of the products, and exercises the veto power of quality, organizes the work of quality review and quality statistics, and takes measures to prevent the disqualifications about products, process and quality management system, the information about production and the quality of materials are needed. He has to communicate with the production manager and the purchasing manager, which is realized by sharing the information world, including messages about human, financial and material resources of the company.

Therefore, based on Heidegger's work on 'being' and the technological viewpoint ([9], [10]), in the process of realizing the effects of information, the being-structure of the information-literate knowledge worker consists of three factors, namely being-before-oneself, being-in-oneself and being-by-oneself.

➤ being-before-oneself:

The role that an information-literate knowledge worker plays exists before the worker does. The existence of the role makes it possible for the knowledge worker to exist in different ways. Different roles reflect possible ways human beings survive and accounts for different requirements for information including what information is needed, why people need information and how to use it. People often are aware of such roles but cannot define them clearly. If we played no role at all in the human society, we would not be seen as a normal human being. This is what the notion 'Before' means. It is the existence of such 'pre-defined' roles that enable people to survive in different ways possible.

➤ being-in-oneself

The ways people live are manifested by different roles, and these roles exist in the *information world*. When people play these roles, the information world is revealed. The information world is exhibited through the *data world*. 'Being-in-oneself' shows that the assignment and realization of the roles are not random or subjective. They are assigned in an already-existing information world. The so-called role's assignment can be seen as the confirmation of information requirements and their possible implications. Information exists objectively, but understanding and using information is subjective. This subjectivity means that information, as a series of possibilities to serve people, needs the knowledge worker to design and to 'make' it as something. This means that information has an aspect that is uncertain and changeable, and it provides infinite possibilities to serve people. Only through our making it as something, can it be that thing. Once we have understood the 'being-structure' of information that is based on data, we find the purposes and usability of information and gain what a piece of information means to us.

➤ being-by-oneself

In playing their roles, the knowledge worker always communicates with others. Such communication is realized through the co-existence of people in the information world. This is manifested by realizing what a piece of information means to them, and the links that such communication is based upon is data in the information world.

The analysis of the three factors of the knowledge worker's being-structure suggests that what a piece of information means to the knowledge worker is generated only because of the need of his/her own existence in an organization. What a piece of information means is rooted in the objective information world, but how to obtain it is subjective. Information provides people with a series of possibilities of serving them, and what a piece of information means to a person is a specific one of the possibilities. The realization of this specific possibility starts from data through which a knowledge worker gets connected with information. It can be seen that therefore what a piece of information means for a person links data and information, which involves both objectivity and subjectivity.

4.2 The essential characteristics of the information-literate knowledge worker

In the process just described, the basis for the existence of people, i.e., roles, exists in the

information world in the form of co-existence of people in the information world. But, what are the essential characters of the three factors of the 'being-structure'?

Case 1 (continued) The essential characteristics of the information-literate knowledge worker

Tom appears in the company firstly as the inspection manager and not as himself as a specific individual. Only when his behavior conforms to the inspection manager's duties and authorities, can he be recognized and accepted as such by his colleagues and by the organization. What he does and what he says should match with his post. His understanding about the products' information sent from the Production Department is based on his identity as an inspection manager. We can say that Tom loses his distinctive personality as a specific individual in the normal sense in the information world. This kind of meaning is inter-subjective.

However, we may say that someone is excellent or someone is just average, which indicates that different people may perform differently in the same role. We now explore why this is so by using the case of a retail store manager ([1], p.23).

Case 2: A retail store manager receives some interesting data. That is, the sales of diapers (nappies) in Friday evenings account for a high percentage of that in the whole week. It is found that in Friday evenings most of the diapers are bought by young male customers with babies. Facing such information, managers may react differently. That is, the same information may mean differently to them. An adequate manager may realize that Friday evenings are hot hours for selling diapers. But an outstanding one would realize that it is good time to sell beer as well.

In addition to one's ordinary identity, everybody has an instinct to transcend the ordinary. This transcend, just like the outstanding manager in the case above, is not a break away from himself/herself, but a break away from the normal state or average state of an ordinary manager, thus highlights his distinctive personal traits, makes him/her different from the other members of the group. The meaning (i.e., intent and import [12]) of information corresponding to the highlight of personal traits during the transcending progress is subjective. The demonstration of personal traits, i.e., transcending the ordinary, is realized through understanding the subjective meaning of information, and the subjective meaning is arrived at through inter-subjective meaning. For example, in the above case, the outstanding manager is specifically sensitive to the customers' feature, i.e., 'sex' being 'male'. So in addition to the inter-subjective meaning, i.e.,

'diapers sell best in Friday evenings', he/she also obtains the subjective meaning 'male customer' and 'men love bees', and this is possible only because of his unique sensitivity. Finally, he/she dispatches the subjective meaning by an inter-subjective meaning, that is, 'Friday evenings are peak times to launch beer promotion'.

Therefore, in the process of falling and transcending, information-literate knowledge worker realizes his/her self-survival, and it is demonstrated through the information world.

Thus, we arrive at two essential characters of the knowledge worker whose 'being-structure' is made up of the three factors whereby to understand the inter-subjective meaning and the subjective meaning concerning a piece of information.

The first character is that the information-literate knowledge worker loses, in the information world, the aspect of being a normal individual. This is geared with the inter-subjective meaning of a piece of information.

People co-exist in the world, and they communicate with one another in various ways. Each person's role is manifested in a form of his/her information world in which he/she meets with others who are also in certain roles. To co-exist is essential for the information-literate knowledge worker. In the information world, people are always in the scope that some other's role covers. People are always in a society, and their roles must be accepted by the society or some organization. So people represent an organization, a society, a stratum, and not themselves. Also, the information world in which he/she is has the nature of being of an organization, a society or a stratum. This is therefore concerned with inter-subjective meaning.

The second character is that the information-literate knowledge worker obtains his/her self-understanding and finds himself/herself through 'transcending'. This character is concerned with obtaining and understanding of subjective meaning.

In the process of realizing the effects of a piece of information and information flow, people understand themselves from the 'information world' and others' roles. Also they can understand themselves by looking at the most fundamental roles of their own. The roles are essential as they define and enable the very existence of people. The information-literate knowledge worker has a profound ability of transcending themselves with free will. But this 'transcending' does not divorce from the worker himself/herself and becomes some others' action. It divorces only from the common and average level state of an individual so that to make one different from others who belong to the

same organization, society or stratum. This is manifested through obtaining subjective meaning.

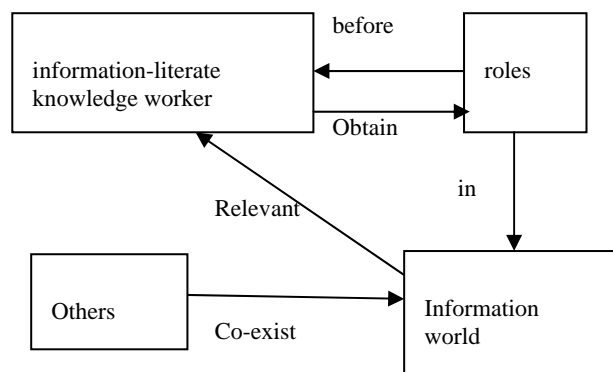


Fig. 2 A Semi-structured model of information-literate knowledge worker

5 The structure of realizing of the meaning of information

Based on of the being-structure and essential characters of the information-literate knowledge worker, we develop a semi-structured model shown in Fig 2, which visualizes what has been discussed thus far. The main points that are captured by the model are as follows. The knowledge worker exists by playing a certain role. The roles exist, independent of a particular worker. The roles are in the information world, and such a world is concerned with the worker and how he/she co-exists with other people. Through performing the roles and revealing the information world in which they are, people understand the information world. This enables the information world to manifest as it is. In such a manifestation, other people's roles are involved and one's role may be part of another's. This is role exchange, which is accomplished through data exchange in the information world. In revealing the information world and in playing one's roles, the knowledge worker acts as a member of an organization to discharge one's responsibilities. That is, through playing roles like others would, one obtains inter-subjective meaning, and through making oneself distinct from all others by playing the roles in a specific way other could not or would not, one obtains subjective meaning. Both subjective meaning and inter-subjective meaning are part of the meaning one may obtain from information, which, we observe, is possible only because of the being-structure of the knowledge worker.

The realization of the meaning of information can be seen through the semi-structured model of the knowledge worker. To be able to obtain the

meaning of information reflects the ability of the knowledge worker in understanding and explanation as well as his/her horizon as an interpreter. Moreover, this process involves both inter-subjective meaning and subjective meaning. Therefore, the semi-structured model is also a model that captures the mechanism for the creation of meaning.

6 Conclusions

We have argued that to understand the being-structure and the fundamental characteristics of information interpreter is a key to understand user competence and end-user computing. This is closely related with the notion of 'information' in the field of information systems. We observe that studies reported in the literature on the form of the meaning (i.e., semantic content, annotations, intent and import [11]) of information do not seem adequate.

We believe that meaning can only be formed through certain explanation activities or explanation processes. The subject who does the explanation and explanation is human being. Even if we use machine to carry out explanation, it would just be some form of simulation of humans. Humans have high orders of intentionality [9], which machines do not have. Therefore, the problem of meaning of information belongs to humans exclusively.

The most influential and classic work concerning the problem of 'how people understand and explain' is Heidegger's work on 'being'. In this paper, drawing on Heidegger, we have developed a semi-structured model of the subject, namely the information-literate knowledge worker in the realization process of the meaning of information, which helps understand the form and the essence of inter-subjective meaning and subjective meaning. We have come to the following conclusions:

- 1) As the subject of the meaning of information realization process, the 'being-structure' of the information-literate knowledge worker consists of three factors, i.e., being-before-oneself, being-in-oneself and being-by-oneself. Our analysis about the three factors shows that the nature of the meaning of information lies in the needs of the knowledge worker to survive. Meaning of information comes from the objective information world, but it is a subjective process to acquire it. Information provides a series of possibilities to serve mankind, and the subjectivity of acquiring the meaning of information results in a specific one of them. This is accomplished through connecting

data and information. Therefore, the meaning of a piece of information is not part of it (the information), but the connection between data and information. To create/obtain meaning from a piece of information is dependent on not only the ability of the interpreter, but also his/her horizon if the latter is not taken as part of the former.

- 2) The 'being-structure' has two essential characters through which the nature of subjective and inter-subjective meaning of information can be revealed. Firstly, to survive together with others is paramount, thus the knowledge worker has to above all exist in the information world as a member of a group, a society or a class, and hence this part of meaning he/she obtains is inter-subjective. The acquisition and formation of inter-subjective meaning requires therefore that the knowledge worker lose his/her identity as a specific but normal individual. Secondly, the human nature makes him/her to acquire self-understanding and self-discovery in the process of 'transcending'. But this 'transcending' do not mean to depart from himself/herself and become some others' activity. Rather it means a break away from the normal state or average state of himself/herself, and thus highlights his/her distinctive personal traits making him/her different from other members of a group, a society or a class, and therefore realizing his/her value. The process of transcending manifests the acquisition of the subjective meaning of information.

In summary, the present investigation makes two fundamental contributions.

- 1) By revealing that meaning of information is the link between data and information, we reinforce research about meaning in the field of information systems, and enrich research on concrete forms of hermeneutics' *horizon* in the field of information systems.
- 2) By observing and analyzing two essential characters of the *being-structure* of the information-literate knowledge, we have found the origins of inter-subjective meaning and subjective meaning.

References:

- [1] Stephen Hang, Maeve Cummings, James Dawkins, *Management Information Systems for*

the Information Age, McGraw-Hill. Companies, Inc.,1998.

- [2] Munro, MC., Huff, SL., Marcolin, BL. and Compeau, DR, Understanding and measuring user competence, *Information & Management*, 1997, 33,1 45-57.
- [3] Blili, S., Raymond, L. and Rivard, S. Impact of task uncertainty, end-user involvement, and competence on the success of end-user computing. *Information & Management*, 1998, 33,3, 137-153.
- [4] Gravill, JI., Compeau, DR. and Marcolin, BL. Experience effects on the accuracy of self-assessed user competence. *Information & Management*, 2006, 43,3, 378-394.
- [5] Shannon, C. E. and Weaver, W. The mathematical theory of communication. *Urbana: University of Illinois*, 1949.
- [6] Dretske, Fred I. *Knowledge and the Flow of Information[M]*. MIT Press, 1981, reprinted in 1999:41-52.
- [7] Barwise.J. and Seligman.J. *Information Flow—the logic of distributed systems*. Cambridge University Press, 1997.
- [8] Devlin.K. *Logic and Information*. Cambridge University Press,1995.
- [9] Stamper, R. Organisation Semiotics, *In Information Systems: an Emerging Discipline?[M]*, ed. Mingers,J. and Stowell F. McGraw-Hill Publishing Co., 1997, p.267-283.
- [10] Falkenberg, D. E., Hesse, W., Stamper, R., et al., A Framework of Information Systems Concepts – *The FRISCO Report (web edition)*, IFIP, 1998.
- [11] Boland, R.J, Jr., The In-formation of Information Systems, *in Critical Issues in InformationSystems Research*, Edited by R.J.Boland Jr. and R.A.Hirschheim, John Wiley & Sons LTD, 1987, chapter 14, pp.363-379.
- [12] Hirschheim, R., Klein, H.K., and Lyytinen, K., Information systems development and data modeling, *Cambridge University Press*, 1995.
- [13] Floridi, L. Is Information Meaningful Data?. *Philosophy and Phenomenological Research*, 2005, 70.2, 351-370.
- [14] Checkland, P. and Holwell, S., Information, Systems and Information Systems---Making Sense of the field. *John Wiley & Sons Ltd.*, 1998, p.88
- [15] Checkland, P. and Scholes, J, Soft Systems Methodology in Action. *Wiley, Chichester.*,1990, p.303

- [16] Mingers, J. 1995, Information and meaning: foundations for an intersubjective account, *Info Systems J*, 5, 285-306.
- [17] Sufen Wang, Junkang Feng, Chunmei Lin, A Hermeneutic Approach to the Process of Information Realizing in the Context of IS. *WSEAS TRANSACTIONS ON BUSINESS AND ECONOMICS*, 2008, Issue 3, Volume 5:94-102.
- [18] Heidegger, M., *Being and Time*, Basil Blackwell, Oxford, 1962.
- [19] Heidegger, M., The Question Concerning Technology and Other Essays, *Harper Torchbooks*, New York, 1977.