Analyzing Knowledge Management Systems: A Veritistic Approach

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Abstract. Knowledge management systems (KMS) are increasingly becoming popular and important in managing organizational knowledge. This motivates a closer inspection of the degree of usability of various types of KMS. This paper is an analysis of KMS from a philosophical angle: with the help of veritistic social epistemology we analyze which KMS are likely to be used *more* in comparison to others. Veritistic social epistemology is oriented towards truth determination; it seeks to evaluate actual and prospective multi-person practices in terms of their tendency to produce true beliefs (versus false beliefs or no belief) in their users. We distinguish between KMS that manage structured knowledge and those that manage unstructured knowledge. It is argued that structured knowledge is more credible to the users than unstructured knowledge and that, because of this, KMS that manage structured knowledge bring more veritistic gains than those that manage unstructured knowledge.

1   Introduction

The aim of this paper is to explore the question, "Which knowledge management systems (KMS) bring more veritistic gains to users in comparison to others?" Veritistic social epistemology seeks to evaluate actual and prospective practices in terms of how well they tend to promote the acquisition of true beliefs (versus false beliefs or no belief) on the part of their users. The practice of Knowledge Management (KM) is realized by using IT products or information systems (IS) called KMS. This paper analyzes two types of KMS and finds which type is veritistically superior. The paper is organized as follows. The background of the paper is set out in the next two sections, on knowledge in organizations and veritistic social epistemology, respectively. Veritistic analyses of KMS, with the interpretation of the findings are done next followed by the conclusion.

2 Knowledge in Organizations

A commonly held view among IS researchers is that *data* is raw numbers and facts, *information* is processed data, and *knowledge* is authenticated information [1]. Another common, perhaps complimentary, way of thinking about knowledge in an organizational context, is as "information in action" [cf.2]. Nonaka [2] discusses two types of knowledge in organizations: *tacit* and *explicit*. Tacit knowledge is rooted in action, experience and involvement in specific context. An example of tacit knowledge is the artful oral skills of an experienced sales-person selling a not so useful product. Explicit knowledge is articulated, codified, and communicated in symbolic form and/or natural language. An example is a product manual that accompanies a product, describing what it does and how it works. (The distinction between explicit and tacit knowledge corresponds to the distinction between "propositional" and "procedural" knowledge, respectively.) The tacit form of organizational knowledge is related to the production of knowledge by social means. According to Stahl [3], individuals generate personal beliefs from their own perspectives, but they do so on the basis of socio-cultural knowledge, shared language and external representations. Thus beliefs come to be accepted as knowledge through social interaction, communication, discussion, clarification, and negotiation. So understood, knowledge is considered as the product of social processes.

2.1 Knowledge Management Systems

Organizations are collections of humans, their skills and resources. The resources consist of human skills (e.g. expertise, experience), physical resources (e.g. building, machinery) and vast collections of information and knowledge. "Knowledge" in this context includes both the experience and understanding of the people in the organization and the information artifacts, such as documents and reports, available within the organization and in the world outside [4]. Organizational knowledge is difficult to manage, as the volume of knowledge (both tacit and explicit) increases day by day and tacit knowledge embedded in human minds disappears from the organization when employees leave. In order to capitalize on organizational knowledge, organizations must create an environment where knowledge is captured, shared and transferred effectively and efficiently. KM helps to capture, share, and transfer knowledge and thus manage organizational knowledge. The practice of effective KM typically requires an appropriate combination of organizational, social, and managerial initiatives, along with the deployment of appropriate technology. Technology can help to capture explicit knowledge (e.g. in databases), identify sources of tacit knowledge (e.g. using extranet applications), share tacit and explicit knowledge among users (e.g. using groupware) and transfer knowledge (e.g. preparing best practices documents). A KM system is a specific type of IS or IT product, applied to managing organizational knowledge [1].

2.2 Categories of KMS: Structured and Unstructured Knowledge

Hahn and Subramani [5] propose a framework for classifying KMS, based on where the knowledge (to be managed) resides and the extent to which it is structured. They distinguish between KMS in which knowledge is *structured*, and those in which it is *unstructured*. "Structured knowledge" either has an inherent structure (as does, e.g., an electronic database) or the structure is imposed upon it (as, for example, when documents are tagged with keywords) [5]. Structured knowledge is generally stored in the organization such as in the corporate websites. Unstructured knowledge has no prior structure and is generally dynamic in nature for example information in an electronic discussion forum. It is difficult to impose structure on unstructured knowledge. For example, tagging text obtained from an electronic discussion forum is difficult as the content is highly context dependent. Organizational knowledge that is structured can essentially be coded and thus classified as explicit knowledge. Tacit knowledge, which is generally unstructured (such as expertise or experience), is created over a period of time in organizations.

KMS have been developed that manage both structured and unstructured knowledge. Some KMS use classification mechanisms, tags or meta tags to structure knowledge and then manage them. An example of a KM system managing unstructured knowledge is the collaborative filtering systems. These systems predict browse and search behaviors by analyzing past behavior of other users when they performed a similar activity [5].

3 Veritistic Social Epistemology

Epistemology is the branch of philosophy that deals with the study of knowledge. Traditional or classical epistemology is concerned with the pursuit of truth, typically on the part of individuals considered in isolation from other agents or any broader social setting. Social epistemology focuses on the social dimensions of knowledge and/or knowledge-production; it acknowledges, where traditional epistemology largely ignores, the important role that social factors play in the knowledge-forming process. This is not to say, however, that social epistemology must jettison the traditional epistemological concern with truth (true belief): *veritistic social epistemology* (VSE). VSE is concerned with the role of social factors in 'the production of knowledge, where knowledge is understood in the ''weak'' sense of *true belief* ' [6] (p. 5). VSE is intended to be evaluative or normative rather than purely descriptive or explanatory: the task of the theorist is to identify and evaluate actual and potential social processes/activities/institutions in terms of their tendency to promote the acquisition of true belief (versus false belief or no belief) in their users [7].

The motivation for adopting a veritistic approach is straightforward: both for practical reasons and because they are spontaneously curious, humans across cultures and throughout history commonly seek the truth. Moreover, epistemic notions such as *knowledge* are properly conceived in terms of truth: when we discover that a belief is false, we cease to consider it to be a candidate for knowledge -- something one might "know" -- in any non-figurative sense. From this perspective, when "knowledge" is

used to refer to *what is accepted* within an organization, this must be taken with a grain of salt: if what is accepted turns out not to be true, then it is not knowledge, properly so-called, even though users within the organization might continue to consider it to be such. Hence, understanding and evaluating the role of inter-personal, *social* factors in knowledge acquisition/production requires that we look at their tendency to promote true belief. In a word, institutions and practices that foster *true* belief are epistemically good and should be promoted; institutions and practices that result in false belief (error) or the absence of true belief (ignorance) are epistemically bad, and should be avoided or corrected. (This is assuming that there are not overriding, non-epistemic reasons which speak against a given veritistically good practice or institution, or in favor of some practice/institution which, while less good epistemically, is judged to be better overall.)

The main question for VSE is thus, "which practices have a comparatively favorable impact on knowledge as contrasted with error and ignorance?" [6] (p.5). Once again, the rationale for taking up a veritistic perspective is that in everyday life a certain value is placed on having true beliefs rather than false beliefs or no opinion. This type of value is *veritistic value* (or "V-value"). In order to understand the concept of V-value we cite an example from Goldman [6]. Suppose that a person S has an interest in a yes/no question as: "Is it the case that P has occurred?" V-values can be assigned for three possible states. If S believes that the proposition is true then the V-value is 1.0, if he rejects the true proposition P then the V-value is 0, and if he withholds the judgment then the V-value is 0.5. The first case constitutes *knowledge*, the second *error* and the third *ignorance* respectively. Veritistic analysis focuses on change of V-value over time. Over a period of time if a person changes his state of belief from no-opinion to rejecting P, then the V-value either improves or worsens depending on whether P is true or false.

A high V-value of beliefs indicates an increase in the level of knowledge of the user. If the V-value increases of an entire community then the knowledge of the entire community increases. *The increase in V-value can yield veritistic profit to the users whose beliefs have been modified.* If a user moves from false belief to true belief by receiving correct information, and the receiver is able to draw true conclusions from the information, then there is an increase in veritistic profit of the user. Finally, it is important to note that veritistic analysis is always to be assessed relative to the questions of interests. Though they may be true, answers to questions that are of *absolutely no interest* to the user do not qualify as properly having V-value.

Knowledge in organizations is formed, shared and practiced by processes that are essentially social. The practice of managing knowledge in organizations is done by KM, and this practice is realized by KMS. KMS help to bring changes to individual beliefs by allowing individuals to use KMS. Any tool such as a KM system will have an impact on modifying the beliefs of users, resulting in change of V-value. However, we predict that not all KMS will have an equal impact on modifying users' belief. This is because different KMS manage different types of knowledge (structured and unstructured). Users might be influenced by the credibility of these knowledge and modify their beliefs accordingly. In the next section we analyze the credibility of these different types of knowledge, and their consequent impact on change in V-value.

4 Veritistic Analysis of KMS

4.1 Credibility of Knowledge Sources

We make a claim that: "*structured knowledge is more credible to the users than unstructured knowledge*". This claim is based on analyzing a similar proposition of credibility between structured and unstructured information. Information is normally seen as that which has meaning, in that it reduces uncertainty for the seeker [8]. Information can, however, increase uncertainty and create more dissonance [9]. Information can also be viewed as something that describes fact. Hicks et al. [10] mention that individuals exposed to structured information may infer the same knowledge from it and majority of unstructured information is either personal or developed through interaction between two or more individuals. For example, "an engineering drawing" is a structured piece of information containing text, numbers and symbols and drawn for a specific context. This information can also be evaluated for its accuracy (thus measurable). Different engineers will infer similar knowledge by studying the drawing. The primary differences between structured and unstructured information are outlined in Table 1.

Table 1. Information category [10]

Category	Characteristics
Structured	• Textual (e.g. numeric, alphabetic) and pictorial (visual image) • Generally context dependent • Consistent by producing similar knowledge from structured information
Unstructured	• Textual (e.g. personal note), verbal (conversation) and memory • Generally context independent • Inconsistent as individuals infer different knowledge from unstructured information

Trust is an important factor in belief formation. McDowell [11] points out that trust can have a crucial epistemic impact on social epistemology, which assesses the epistemic value of social practices. Foley [12] points out that our most fundamental assumptions from where opinions are "formed" and not "self-generated". They are passed to us as part of our intellectual inheritance. For example, we do not verify the assumptions mentioned in the elementary science text books, as (we think) the assumptions are already verified by some experts and these assumptions often become the basis of our or others beliefs. Thus, formation of our fundamental beliefs depends on the trust we place in their sources. Hardwig [13] (p. 694) mentions that "trust is often epistemologically even more basic than empirical data or logical arguments: the data and the arguments are available only through trust".

Trust and credibility are closely related. Credibility is defined as "believability" and trust is regarded as "a positive belief about the perceived reliability of, dependability of, and confidence in a person, object, or process" and in this sense trustworthiness of information is a synonym for credibility [14]. "Credible" sources are described as "trustworthy" and having "expertise" [15]. McDowell [11] points out that an epistemic effect of social trust is that people can be less willing or likely either to

speak or to listen to socially untrustworthy sources of information, and more willing or likely either to speak or to listen to socially trustworthy ones. Self presents a summary of early Socratic and Aristotelian ideas about credibility [15]: "First, sources are credible because their message's rightness is perceived by the audience. Second, sources are credible because they rightly read how to reveal themselves to particular audiences. And, third, sources are perceived to be credible because of audience characteristics." (p.423) In most cases a message's rightness is more easily perceived by the users using structured information. Users are able to rightly deduce the meaning of the structured information more consistently than unstructured information. For example, studying an engineering drawing of an engine (structured information) versus listening to the functioning of an engine (unstructured information), different users would be able to interpret the drawing correctly by studying it, but listening to the functioning may result in different interpretations of the message as the message is unstructured and it's context is unknown to the users. Unstructured information is dynamic (changes whenever new content is added) and therefore more prone to misinterpretation and error. Thus, structured information is more credible than unstructured information.

We extend the same logic to argue that structured *knowledge* is more credible to the users than unstructured knowledge. The differences in structured and unstructured information (Table 1) are applicable to the structured and unstructured knowledge as well. We make an assumption in this claim that the sources of knowledge in both structured and unstructured are equally credible, as long as their sources are within the organization. We do not consider sources of knowledge that are not produced or managed within the organization, such as documents obtained from the internet. In other words, we are treating the credibility of various knowledge sources as the same when that source is an individual or artifact within the organization.

Other than the differences mentioned in Table 1, we argue that the credibility of unstructured knowledge is less than that of structured knowledge for two reasons. First, unstructured knowledge is often possessed by single individuals in the organizations such as experts. For unstructured knowledge the users have to first *find the sources of the unstructured knowledge* before accessing it; second, the *transfer process of unstructured knowledge is often difficult* because of its tacit nature. Unlike accessing structured knowledge by search and retrieval mechanisms, there are no formal methods established to access unstructured knowledge. The structured knowledge can be categorized and stored in the organization and therefore easily accessible to the users. But once the unstructured knowledge is converted to the structured knowledge, the credibility of the structured knowledge increases to the users as they can now access and share the knowledge. For example, experience of an expert can be converted to explicit knowledge such as "best practices", case studies or stories. This knowledge becomes more credible to the users as it is now available in explicit form and could be easily accessible. The task of KMS that manage unstructured knowledge resources is more difficult as the knowledge cannot be accessed easily. From the above arguments we therefore claim that in most of the cases structured knowledge is *more credible* than unstructured knowledge. **(**It is to be noted that the present discussion is on degree of credibility – that some piece/source of knowledge is less credible than another does not mean that it will not be believed, much less that it will be as false; rather, it will be less likely to lead to belief on the part of the user.)

4.2 Veritistic gains of KMS

We claim that KMS that manage structured knowledge bring more veritistic gains to users than those that manage unstructured knowledge. KMS make available knowledge to the users, which otherwise might have been difficult to obtain. While accessing this knowledge, an individual increases his/her knowledge. Goldman (1999) suggests that the higher an individual's degree of belief in a true proposition, the more knowledge this individual possesses. In other words, an individual acquires knowledge if this individual increases his or her degree of belief in true proposition. When a user uses a KM system, he/she uses the acquired knowledge to do certain tasks that can be stated as propositions. For example, a task could be 'how to evaluate salesmen to distribute incentives?' A KM system can help in defining evaluation criteria for incentive distribution based on the past information. Users' belief for doing the task will change when he/she obtains the evaluation criteria from the KM system. We therefore view KMS as tools that modify users' belief in doing tasks. If using KMS can increase the state of belief of users from (a) false belief to true belief, (b) false belief to partially-true belief, or (c) partially-true belief to true belief then we can claim that KMS bring veritistic profits to the users.

Goldman mentions two cases where communication can yield veritistic profits. First, "when a communicated message contains a direct answer to some question that interests the receiver". And second, "when a communicated message does not contain a direct answer to a question but contains a report of some evidence that the receiver uses to answer her question" [6] (p. 164). The second case applies more for KMS usage. The users use the knowledge that the KMS manage as evidence in doing tasks.

We previously analyzed that structured knowledge is more credible than unstructured knowledge, therefore beliefs of users would be changed more positively (false to true, false to partially true or partially-true to true) using structured knowledge than using unstructured knowledge. When KMS manage structured knowledge, the change in users' belief from false to true, false to partially true or partially-true to true would likely be *high* and therefore users will be able to draw accurate conclusions using this type of KMS. Likelihood of the veritistic gains of the users will be high in this case. The situation will be reversed when users use KMS that manage unstructured knowledge where likelihood of veritistic gain is *low*. This finding can also be generalized to the practice of KM in organization. If on average (average value of individual V-value) the practice of KM increases the V-value of the user's belief status, then the over all practice of KM in the organization will bring veritistic profits to the users.

The above analysis is based on 'likelihood of veritistic gain' instead of simply 'veritistic gain' because there may be some beliefs that are irrelevant or unimportant to the users. These beliefs, though few in numbers would be viewed as uninteresting and therefore would not bring veritistic gains to the users.

We made two assumptions in this analysis. First, users need to have genuine interests on propositions or artifacts to be fit for veritistic analysis. KMS that are used in organizations help the users to take decisions in the organizations and therefore perceived to be useful. Therefore knowledge managed by KMS is of interest to the users. Second, it is assumed that the technologies used in the KMS are most appropriate and correctly chosen. The degree of trust users place in the KMS also depends on the technologies used in the KMS and we assume that users trust the technologies.

5 Conclusion

The change in beliefs of the users to make certain decisions will depend on the KMS that they use. KMS manage knowledge, and users use this knowledge to perform certain tasks within the organizations. We have argued that KMS that manage structured organizational knowledge bring more veritistic gains to their users than KMS that manage unstructured knowledge. This veritistic analysis of KMS can help users to identify KMS that they are most likely to use. *Users would like to use KMS that bring more veritistic gains to them than others*. In other words, users tend to use KMS that are seen as increasing their stock of true belief, and they tend not to use KMS which they regard as not having such veritistic benefits. Our veritistic analysis of KMS usage is consistent with the current design of KMS used in organizations as Marwick [4] (p. 814) points out, "the strongest contribution to current knowledge management solutions is made by technologies that deal largely with explicit knowledge, such as search and classification. Contributions to the formation and communication of tacit knowledge, and support for making it explicit, are currently weaker".

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