Can technology build organizational social capital?
The case of a global IT consulting firm

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Abstract

Knowledge management (KM) and knowledge management systems (KMS) have been positioned as strategies and tools that enable organizations to create and transfer knowledge in order to sustain competitive advantage. While KM as a strategy gained legitimacy, KMS have struggled to show a causal relationship to knowledge creation and knowledge transfer. KMS contribution to the economic performance of organizations has been harder to prove, mainly because of a lack of collection of data and thus analysis of knowledge metrics. This has lead to an unjustifiable move to underplay the role of technology in creating and transferring knowledge. We strived to revive interest in KMS by exploring their ability to accumulate social capital and showing its effect on the creation and transfer of knowledge. We posited that social capital was the mediating factor between KMS and knowledge creation and transfer and hypothesized that: (1) KMS will positively affect an organization’s ability to build social capital, and that (2) social capital will enhance a firm’s ability to create and transfer knowledge. Qualitative data collected from a multinational IT consulting firm was used to validate the framework.

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1. Introduction

For the last decade, knowledge management (KM) and knowledge management systems (KMS) have been positioned as vehicles for the creation and transfer of knowledge within organizations [16], a capacity considered as providing sustained competitive advantage [7,15]. KM considers knowledge to be a critical resource and its integration across the organization as a feature providing success within the market [12]. Knowledge management as a strategy uses people, processes, and technology, to capture and organize knowledge in ways that will enhance organizational capabilities to compete and generate value [26,36]. Technological ways of managing knowledge have focused on providing a medium for storing, retrieving, and exchanging it. However, the technology has not been shown to have positive effects on the creation of new knowledge. As a result, KM has focused on the role of other elements, like culture and processes, and underplayed the role of KMS.
Our study focused on building a theoretical framework that hypothesized a relationship between the use of KMS and its capacity to create and transfer knowledge. We introduced social capital as the mediating factor between them. We surveyed the different types of KMS reported in the literature and explored how they played a role in the accumulation of social capital; thus indirectly affecting the creation and transfer of knowledge.

Social capital has been shown to enhance a firm’s “speed and efficiency in the creation and transfer of knowledge” [22] and this can impact an organization’s ability to improve performance. Our hypothesis was that KMS develop networks of social relationships and provide access to the “collectively owned capital” of knowledge that can create new knowledge, sustain competitive advantage, and improve economic performance. We believe that social capital is the mediating factor that explains the relationship. Our research questions are:

(1) Can KMS accumulate organizational social capital?
(2) Does the accumulation of social capital facilitate the creation and sharing of new knowledge?

To validate our framework, we used data collected from a global IT consulting firm that had successfully implemented a KMS as its main channel for developers to create and transfer knowledge.

2. Knowledge management systems

KMS are defined as “a class of information systems applied to managing organizational knowledge . . . . They are IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer and application.” [3]. The three common uses of IT in KM have been: (1) storage of lessons learned; (2) access to expertise in the organization; and (3) creation of knowledge networks [37]. IT storage and networking capabilities enable KMS to build large electronic communities with huge knowledge resources. Intranets are examples of KMS that build knowledge communities; research on them reported an increase in employee communication and collaboration [9]. It is through active communication and collaborative efforts that employees build common understandings that evolve into strong relationships embodying trust. The social network built on the electronic communication network allows rapid mobilization and assimilation of knowledge assets in the virtual communities [8,33]. The scope of these networks, also, guarantees a level of diversity that provides a rich pool of “collectively owned” knowledge from the virtual space. Such diversity allows organizations to combine and integrate knowledge into innovative solutions because of interactions within the network [21].

3. Social capital

The term social capital first appeared in sociology, highlighting the importance of networks of strong, personal relationships developed over time. The literature suggested that social capital could be defined along three dimensions: structural, relational, and cognitive. The structural dimension refers to the information channels that connect individuals and units. The higher the social interaction, the higher the structural dimension of social capital [5]. The relational dimension refers to resources embedded in relationships, such as trust between its members and the trustworthiness of individual actors. The cognitive dimension refers to the shared meaning and understanding that develops among members of the network as they interact. Through interaction, a common frame of reference develops providing a shared language for communication [28].

4. Knowledge management systems and social capital

We know from prior research that some organizations that adopt KMS appear to be able to create and transfer knowledge better than others [19], but the underlying mechanism that creates this capability is unclear. We proposed that the underlying mechanism is social capital. While studies have argued that social capital explains the creation and transfer of knowledge, we state that KMS help accumulate social capital, which, in turn, contributes to the creation and sharing of knowledge. A conceptual model showing the relationships is shown as in Fig. 1.

Our main thesis is that KMS allow relationships and exchanges to occur and that both have been identified as preconditions for creating new knowledge [4]. To test this, we explore some of the ways in which KM technology influences the three dimensions of social capital, thus aiding the creation and transfer of knowledge (Appendix A provides a survey of KM Technologies features that support social capital). Of course, success in the adoption of any technology needs the support of other factors such as strategies, organizational structure, processes, and change management.
4.1. KMS and the structural dimension

One feature of a KMS is its network capacity. Electronic communities can be created and maintained using a KMS. Our hypothesis is that KMS influences the development of the structural dimension of social capital primarily through the ways in which its network layer enables the formation of virtual communities where members exchange knowledge and build relationships, accumulating higher levels of social capital [1]. Also, members are linked to more people who have a greater capacity to acquire information of high quantity and quality at a lower cost than in a restricted closed network [2]. Communication software, like email, discussion groups, and chat rooms, enables close social interaction between members of the community. Recent research has reported the ability of electronic networks to transfer tacit knowledge as members externalize it in clear and explicit forms—better than in face to face communication [13]. The success of organizations like Microsoft, for example, has been widely attributed to its networking technologies. Virtual teams were formed with customer representation, enabling Microsoft to capture valuable feedback and develop products that customers wanted. When a person, group, or a business unit creates ties with other members in a community; it starts to be central in the community.

Thus:

**Hypothesis 1.** The use of knowledge management systems is positively associated with the ability of members of a community to occupy a central location on the network.

4.2. KMS and the relational dimension

Centrality has been empirically verified to be positively associated with perceived trust and shared understanding [35]. Thus, the development of social capital leads to the development of relational and cognitive dimensions. The *relational dimension* is associated with building trust; developing norms for interaction; setting expectations and obligations of its members; and creating a distinctive identity of the community with which members associate [32].

Though no tests have shown the effect of KMS on the accumulation of social capital, research on electronic networks has reported inconsistent evidence on the ability of these networks to develop relational aspects of social capital. One stream maintained that electronic networks had difficulty developing the relational aspect of social capital as members were unable to acquire knowledge about competencies and reliabilities of others in the network. Weak ties in electronic networks engendered low levels of trust and cooperation [18,29] and an increase threat of opportunistic behavior. Thus, this stream of research reported that the heavy use of electronic networks was negatively associated with outcome quality and efficiency [23]. Other studies report on the ability of electronic networks to evolve moderate levels of trust with the aid of behavioral controls [30] defining behavioral norms for desired outcomes [20]. By capturing behavioral norms and role expectations in an explicit format in electronic networks, new members can quickly conform to the guidelines without “the benefit of time related socializations [34].” While monitoring electronic communication can discourage free-riding [14], it may also discourage members to be open due to a fear of being scrutinized and evaluated. Thus electronic networks should be supplemented by interpersonal relationships, especially in non-routine complex tasks such as knowledge transformation and exploitation due to the tacit nature of knowledge [39]. Future frequent communications using a KMS should improve the accumulation of the relational aspect of social capital [38].

In a study of seven large organizations, electronic communities were found to foster trust and obligations [25]. IBM Global Services [11] reported that use of electronic communities of practice enhanced the development of trust-based relationships, because
members were able to gain detailed knowledge of one another from the use of email, discussion boards, and electronic chat rooms. Issue-based discussion facilities within IBM [17] captured brainstorming sessions, providing members with a decision rationale and a high level of trust in reusing explicit knowledge embedded within the network. In such shared space, individuals began to evaluate who was willing to share and contribute to the community knowledge pool. Automatic tracking tools allowed communities to measure their effectiveness and to identify gaps within knowledge bases by monitoring knowledge activities and identifying reusable intellectual capital. Besides recognizing sources of knowledge, the tool allowed the community and the organization to assign credit for contributions. Recognition and credit assignment have been assumed to build trust and receptiveness and to help in sharing knowledge in organizations [6].

As members work to create and leverage knowledge important to the community, they develop a sense of identity. This makes it possible to distinguish a community from others. A special tool that helps to reinforce this identity is a community portal, which provides a description of the community as well as its social norms, expectations, and obligations.

This leads to:

**Hypothesis 2.** The use of knowledge management systems is positively associated with the ability of members of a community to trust each other.

**Hypothesis 3.** The use of knowledge management systems is positively associated with the ability of members of a community to evolve social norms that govern their interaction.

**Hypothesis 4.** The use of knowledge management systems is positively associated with the ability of members of a community to define expectations and obligations.

**Hypothesis 5.** The use of knowledge management systems is positively associated with the ability of members of a community to develop an identity for the community they identify themselves with.

### 4.3. KMS and the cognitive dimension

As the community establishes its common identity, its members create a shared frame of reference. Members learn to communicate using a common vocabulary. KMS are sold as mechanisms for promoting understanding within organizations. Members draw on knowledge assets to understand and assimilate new knowledge. The tendency of members of electronic communities to express tacit knowledge explicitly supports a hypothesis that electronic networks help the assimilation of new knowledge. In addition, the vocabulary of the KMS taxonomy and knowledge based structure demonstrate important concepts and provide newcomers with a view of the domain. Messages and discussions use the common vocabulary to represent issues and solutions. Repositories capture facts that augment group memory and help new members to understand its culture and individual personalities much faster than in traditional face-to-face teams. An example can be found in a KMS for the Russian Judicial System; it helped members understand disparate pieces of information by linking them to different arguments [27]. However, the size of an electronic network may act against its aid in understanding the knowledge base. Information overloads pose a threat to the development of the cognitive dimension of social capital [10]. One promising technology is information clustering [31] to alleviate the loads on virtual teams.

Thus:

**Hypothesis 6.** The use of knowledge management systems is positively associated with the ability of members of a community to evolve a common language and shared understanding of their domain of focus.

### 5. Research method

To validate our model, a case study was conducted in a multinational IT consulting firm. The research site was identified from the knowledge management literature, where it has been recognized as a pioneer in KM practices and the recipient of several awards for its K-NET knowledge management system. A total of 22 interviews were conducted.

The set of interviewees consisted of: four top managers; three project managers; seven consultants in two sectors: oil and gas and telecommunications. From the KM side, we interviewed the Chief Knowledge Officers (CKO) for the company and for the Americas, three knowledge managers for the telecommunication and the oil and gas sectors, and four librarians who worked at the project level.

**5.1. An overview of the knowledge management program**

The goal of the knowledge management program was to provide content anytime, anyplace and using any type of computing device. The company developed a
portal for all seven sectors as the single point of entry to the repository. The objectives for the portal were to: provide homogeneity for all of the knowledge management systems, allow both passive and interactive communication, and enable users to navigate, search, and retrieve relevant content. An important aspect of the design of the portal was to shield the user from having to know where the information resided or how it was maintained. The portal could route users to internal communities or to third party information service providers, who also were available on a subscription basis (such as the Gartner Group). In addition, the portal could also provide a directory of experts within sectors across the nine regions.

The content of the knowledge repository can be structured in different layers. Though consultants may submit documents once to the repository, the material can be found from different places. Knowledge documents can appear on the community home space created for special interest groups. After being audited, the document may be listed as one of the best practices, or lessons learnt, from actual engagements. Some best practices can be aggregated and further abstracted into a set of methods and techniques.

Communication technologies enable a variety of synchronous and asynchronous communications. Users can communicate asynchronously using email and discussion boards or synchronously using video conferencing, chat rooms, and instant messaging for complex problem solving.

### 5.2. The interview process

During our study, participants were interviewed and asked about their perceptions of and beliefs about K-NET. We worked vertically within the KM and the IT consulting organization, selecting members at different organizational levels. We interviewed consultants and knowledge managers at the top management; middle management; and operational staff levels. The questions were general open-ended questions intended to allow the participants to express their ideas freely without any suggestion of what we considered important. Interviews ranged from 45 to 90 min; all were taped. The study lasted for a period of 6 months.

### 5.3. Data analysis

The data analysis effort involved reading the interviews and categorizing the text into one of the a priori codes used in the social capital literature. These were clustered into one of three major dimensions: structural, relational, and cognitive. The definition of corresponding codes is given in Table 1.

Two researchers coded the data; one was blind to the research hypotheses. We applied the semiotic mode following Krippendorff’s [24] approach to content analysis; in this, words from the interviews were assigned to one of the three high-level categories and then categorized under one of the codes. The focus was not on the meaning of the comment but rather on its type. In an effort to increase inter-rater reliability, the researchers found a set of cues that should improve intercoder consistency. The researchers reviewed their coding to resolve conflicts in understanding and meaning. The inter-rater reliability was close to 100% by the end of the analysis phase.

### 6. Findings and discussion

Analysis of the qualitative data confirmed all six hypotheses. Members of the knowledge management organization and IT consultants strongly believed that the K-NET enabled them to build a well-connected, dense, and highly adaptable network that helped the organization promote its social norms, establish a set of

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<th>Table 1: Dimensions of social capital</th>
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<td><strong>Category</strong></td>
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<td>Cognitive dimension</td>
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responsibilities, and foster trust. Members of the network shared a common language embedded in the knowledge assets and stories hosted within the repository and in threaded discussions captured within their virtual communities.

6.1. Hypothesis 1: The structural dimension of the K-NET

Our data indicate that K-NET helped build a sophisticated well-connected electronic network within the Oil and Gas and the Telecom sectors. K-NET facilitated the flow of knowledge across the organization. As the manager for Telecom explained

“the sectors and the service lines need to be responsive for what’s selling in the marketplace, they need to be talking to the account executives all the time, they need to be going out and talking to their peers in the industry and we try to support them through K-NET. They can get internal and external knowledge about their clients and our competitors . . . .They are able to initiate discussions and find out what they need to focus on.”

Consultants and knowledge workers believed that the K-NET helped them have better relationships with members of the global organization, especially those who worked within the same sector. The communication tools in K-NET helped consultants and knowledge workers seek knowledge from, or contribute knowledge to, members of the organization with whom they had never previously communicated. Knowledge managers working on individual projects had to report on their projects weekly and store the report in K-NET. They also had to select monthly “highlights” that made knowledge visible to the entire organization. K-NET allowed users to contact authors of any knowledge asset to ask for details and this was believed to have promoted a culture that encouraged people to ask for help when they needed it. Consultants’ comments on the communication feature included the following:

“based on the e-mail I am able to help and send them something directly. Sometimes I need to call them and get more understanding of what it is they are looking for and then depending on the specific request I can do as I said before, send them something specific or direct them to somebody else in our practice, but that is our culture.”

“One of the benefits of the K-NET is you get things far outside your local area. Like if I call Paul, I’m probably just going to get a lot of things from Dallas and from the southern region. Where, if I was to type something into our knowledge base it’s processed nationally. And so I think that’s better.”

In several instances, consultants reported on using the tool to communicate with experts on other continents as follows:

“I knew from the repository that there is valuable information on Mobile Commerce in Europe. I contacted them to see what they have done out there because there’s nothing really strong here in the U.S. from my perspective. So the tools are very valuable right now. I think that the contributions from all over the world that are being made to the Mobil Commerce knowledge base system have been outstanding.”

The information channels created strong ties between members that helped them establish a sense of identity to the sector and a level of trust when sharing and reusing material. The following comment illustrates how the K-NET helped:

“The tools within K-NET helped us communicate with our counterparts globally, who work in other offices, in other countries that do similar roles. We share experience about specific accounts. Everyone go into detail of what’s working for them out there. What are you guys doing? Explain to us. It’s a process that we go through so that the people that aren’t actually working on that team or that engagement, have an opportunity to understand what kind of work we are actually doing out there. It’s a learning process for them.”

The tool also helped them to share knowledge with their own clients. Project Gateway is a feature that allows consultants and clients to communicate and thus strengthen their relationships. We thus conclude that the KMS helped members of the organization to occupy a central location within the network developed for each sector.

6.2. Hypotheses 2–5: The relational dimension of the K-NET

6.2.1. Hypothesis 2: Trust

A feature that helped build trust among members of a sector was the automatic tracking feature that keeps track of the assets submitted and the level of reuse for each. The tool enabled managers to award “special recognition for those who contribute heavily to
knowledge bases.” It also built reputation for those who contributed valuable knowledge assets as shown by the comment:

“the Y2K that we prepared was the #1 accessed database. They just went after it and then someone who was looking at the numbers in metrics remarked that to us. They said you guys are getting hit more than anybody else. Not only that, but your volume and hits are equal to everybody else almost combined.”

This tool helped the consultants and knowledge workers get credit for the work they did, and thus they trusted the whole KM concept and agreed that knowledge sharing really paid back.

“I work for so many different people and I may work for someone that I’ve done a great job for and then I may not see them again for a year. It’s important to capture that information. The K-NET helps me keep a log of all the research that I do, all the requests that come in to me. So that I can look back and I can see this is the work I’ve done over the past month, six months, whatever.”

The capture and dissemination of knowledge assets also helped promote trust among members of both a sector and virtual communities. Most consultants reported that they trusted the knowledge stored in the K-NET because “people that are working for the company are delivering to clients and they want to have deliverables that are very sought out and researched.” The executives also played a role in promoting trust. As new knowledge assets are submitted, executives sent emails to “announce these great knowledge initiatives that are going on, announce the launch kit we just launched last week. They sent out this email saying how great it is and how much we need to reuse knowledge.”

6.2.2. Hypothesis 3: Social norms

It was evident that K-NET helped the organization establish several social norms that sustained the KM efforts. Among these are: “knowledge is power;” “leverage knowledge on a daily basis;” “reach out and ask for help,” and “share the best.” The norms created obligations within the virtual community and encouraged members to ask for help and leverage existing knowledge.

The staff consultants with limited experience reported that sharing and reusing was engrained into them through the messages posted on K-NET. The knowledge assets allowed them to learn new facts and meet the expectations of their managers faster.

“It has been engrained in me since we’ve been here to reuse, reuse, don’t reinvent the wheel. It helps out in accelerating our delivery to our clients and it helps people get up to speed on new concepts. We’ve found that typically we can deliver quicker service at better value to our clients and hopefully exceed their expectations. The K-NET is a big part of that. Specifically for areas that I am not as experienced in, it is very important for me to go in and look at our knowledge repository for things that can give me insight. It is also helpful for me as I train new people, to show them the basic framework.”

6.2.3. Hypothesis 4: Expectations and obligations

The postings highlighted the obligation to “reach-out” that emerged from using the KMS. Members who did not comply were reminded of the obligation to share and reuse

“To give you an example, I needed an individual to do a particular job in Telecom, even though he was from the real estate industry. He had to apply his CRM skills from real estate and transfer it over for Telecom. There is specific information about the telecom that he had to understand. He didn’t reach out to the telecom specific type things and it ended up costing him. Because he wasn’t reaching out and using the network, it was a mistake on his part.”

Specific features also helped reinforce expectations and obligations. One of these was an alert function for sector knowledge managers. It alerts the manager when a project starts and provides the name of the project knowledge manager (the person who must encourage the team to submit their deliverables to the K-NET or to reuse relevant knowledge assets). The system also alerts a sector knowledge manager when a deliverable is submitted to a customer, so that the manager can ensure its submission to the K-NET.

6.2.4. Hypothesis 5: Identity

The creation of several communities of practice resulted in new groupings in the organization. The frequent use of discussion boards led members to identify themselves with those communities whose rules they followed and whose norms they respected. Consultants and knowledge managers defended unique processes and methods that emerged within their community as “the best suited to the work we do.” Though unique from standards followed through the rest of the organization, the standards were effortlessly
adopted within the virtual communities because they evolved out of collaborative efforts.

We therefore concluded that the KMS helped members of the organization to promote trust, social norms, expectations and obligations as well as develop an identity that was associated with and loyal to the company.

6.3. Hypothesis 6: The cognitive dimension and the K-NET

Our data indicated that the frequent use of the K-NET led to the emergence of a common language among members of the same sector. The local languages were embedded within the knowledge assets and threaded discussions. The first sign of a common language was the evolution of a taxonomy, which was created to provide a common frame of reference for contributors and reusers of knowledge residing within K-NET:

“You cannot just willie nellie grab content and throw it into a big pot and then hope that it can be reused. Obviously, you’ve got to put tags on that content in a way that its retrievable, in a way that makes sense how we do business for the next person who comes across ... You want to be able to hand this second person a path or a navigational metaphor or structure so that they can find what they are looking for. Of course, on the front end, you have to be able to provide the knowledge contributor with the analog so that they can categorize and catalog their knowledge in a way that makes it meaningful for the person who is now coming in”

Managers contended that consultants and knowledge managers who used the K-NET were more productive than those who do not use it as much.

“She has spent enough time and energy reading and contributing to the discussions within utilities that she knows all the jargon so there is no comparison, I mean, she is three times as productive as somebody who may be more experienced as a business researcher, but doesn’t know anything about the oil industry.”

The K-NET also captured stories within each sector that recounted experiences with important clients. The stories helped new members assimilate the culture and put together pieces of its history. A Telecom manager reported on the effort of a knowledge manager saying “She put together a story of our company at XY Corporation. The stories help us know and understand what we do and give us a history of relationships. They also help us out when we’re trying to sell work to the same client.”

7. Summary and conclusion

We have attempted to show the role that KMS play in the accumulation of social capital and their effect on the creation and transfer of knowledge. We argue that KMS help organizations accumulate all three dimensions of social capital: structural, relational, and cognitive because KMS creates dense and highly connected networks, whose members trust each other and feel obliged to carry out the responsibilities bestowed on them by the network with which they associate. We developed a theoretical framework and three sets of hypotheses that predicted positive relationships between the use of KMS and social capital. Data from a multinational consulting firm was used to validate the framework.

Findings from the current study have several implications. First, the study highlighted the fact that managing knowledge can affect organizational success and that a knowledge management program is one way to preserve and capitalize on corporate knowledge. This position was supported by the Chief Knowledge Officer of the Americas region (i.e., the group interviewed in our study). He stated that the knowledge management program at his company was perceived as:

“Harnessing of the right processes by the right people using the right technology, to help an organization understand what it does well and what is sub-optimal, and to benchmark those processes against other parts of its own organization and the marketplace.”

Additionally, the knowledge management program at his company was believed to save the company millions of dollars and is also credited for creating a global culture of “true give and take.”

Findings also suggest that the development and use of K-NET can enable companies to exploit existing knowledge when preparing for new engagements.

One limitation of our study is that, in spite of using multiple respondents at the research site, we did not exploit the effect of other factors like the KM strategy and KM processes on the accumulation of social capital. A longitudinal study should examine the interaction between strategy, process, and technology in developing social capital.
### Appendix A. Examples of KM Technologies that support the accumulation of social capital

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<th>Type of KMS</th>
<th>KMS feature</th>
<th>Dimension of social capital</th>
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<tr>
<td>Virtual communities</td>
<td>Build connection among members with common interests</td>
<td>Structural dimension</td>
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<td></td>
<td>Online discussions enable the evolution of trust and shared understanding</td>
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<td>among members. The system allows members to evaluate the contribution of</td>
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<td>other team members and to assess their trustworthiness</td>
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<td>Develop &quot;shared understanding among team members, which is essential for</td>
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<td>successful collaboration&quot;</td>
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<td>Knowledge repositories</td>
<td>Link knowledge about the problems and solutions associated with artifacts</td>
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<td></td>
<td>and allows different team members to create distributed annotations on the</td>
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<td>information products developed collaboratively</td>
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<td>Store narratives of individual incidents that bring new organizational</td>
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<td>members up to speed</td>
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<td>Automatically track the creation and reuse of knowledge assets to reward</td>
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<td>knowledge sharing.</td>
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<td>Assigning credit to knowledge creators helps foster trust</td>
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<td>KMS with decision support</td>
<td>Allow organizational members to submit ideas about new product developments</td>
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<td></td>
<td>and let managers evaluate and select ideas that are conceptually developed</td>
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<td></td>
<td>Provide members with a cognitive model on how to solve problems making it</td>
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<td>easier for members with different backgrounds to collaborate together to</td>
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<td>create new knowledge</td>
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<tr>
<td>Knowledge portals</td>
<td>Post organizational mission, group norms and expectations and obligations,</td>
<td>Relational Dimension</td>
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<td>making it more visible to members of the community</td>
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