

A Typology of Knowledge Management System Use by Teams

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Abstract

This essay sketches out a typology of knowledge management system use by teams. It is proposed that how a knowledge management system is framed and enacted by a team depends on (a) psychological safety (the shared beliefs held by members of a team that the team is safe for interpersonal risk taking – Edmondson, 1999) and (b) the rate of episodic change experienced by the team. Four distinct patterns of use are identified: candid, ambivalent, conservative, and reluctant. Each of these usage patterns has implications for the learning opportunities teams may face and the perceived usefulness of a knowledge management system.

1. Introduction

Teams and organizations learn from experience. To increase the odds of doing so, they rely on a mix of managerial initiatives aimed at fostering a culture of sharing, at designing an innovative organizational structure, and at implementing appropriate incentives [48]. Among other initiatives, they adopt knowledge management systems (KMS). Broadly defined, KMS are information systems that aim to support and facilitate the codification, collection, integration, and dissemination of organizational knowledge [2]. Because of these features, KMS are perceived as key devices for expediting learning and the re-use of knowledge gained from past experiences within a team or a workgroup. KMS have also been labelled electronic knowledge repositories, organizational memory systems, or organizational memory information systems [35, 41]. An increasing number of large organizations are currently adopting KMS to support their teams; Kodak [26], Raytheon, Royal Dutch/Shell, BP [27], Hallmark, Sears [10], and General Motors [56] are all recent adopters.

While much research in knowledge management has focused on the behaviour of knowledge sharing and transfer [4], little attention has been given to the actual use of KMS by teams [3, 49]. According to certain empirical studies, it was found that people enacted collaborative information technologies in ways that

failed to foster knowledge sharing and transfer [40, 53]. Thus, despite the growing attention devoted to KMS in the academic literature, we still do not know much about why contradictory patterns of KMS use emerge [16].

Recently, the conventional definition of the construct of “use” in MIS has been criticized [6, 7, 33]. Traditionally, either at the individual or at the group level, “use” has been defined as a quantity (i.e., less or more use). Because of the implications of the social roles associated with the use of a KMS, “quantity of use” may not be the most sophisticated way of thinking about KMS use. Instead, it may be more insightful to think about the “quality” of use, as evidenced by the pattern of interaction that people enact with a given KMS. A new vocabulary appears to be needed to capture such a conceptualization of use. Such a vocabulary is proposed in the typology developed in this essay.

This essay addresses this gap by providing a typology that accounts for why patterns of use occur when a new KMS is adopted by a team. The main argument of this essay is that the pattern of KMS use adopted by a team depends on (a) psychological safety – the shared beliefs held by members of a team that the team is safe for interpersonal risk taking [13] and (b) the rate of episodic change experienced by a team [17, 34]. Candid use is predicted to occur when psychological safety is high and the rate of episodic change is low. Ambivalent use is predicted to occur when psychological safety is high and the rate of episodic change is high. Conservative use is predicted to occur when psychological safety is low and the rate of episodic change is low. Finally, team members are likely to be reluctant to use a KMS when psychological safety is low and the rate of episodic change is high. Each of these usage patterns has specific implications for the learning opportunities a team may face, and, therefore, for the success of a KMS.

This essay provides a novel contribution to the literature on KMS use by amending the idea of what is meant by “use” of a KMS from an analytical perspective, thus responding to calls for richer conceptualizations [6, 7, 33]. The proposed typology is also grounded in the idea that users of a KMS are social actors [28] by

acknowledging accountability as a universal feature of social and organizational life [29].

This essay is organized as follows. First, the meaning of what is understood by “team,” by “KMS,” and by “use” is bracketed and frozen for the purpose of this essay. Then, drawing upon prior research, we discuss the importance of considering both the shared beliefs held by members of a team and the nature of work they accomplish. Afterwards, the typology of KMS use outlined above is presented in fuller detail. The last section of the paper discusses the implications of the typology for researchers and managers.

2. Some definitions

In this section, the meanings of “team,” “knowledge management system,” and “use” are clarified in order to state the assumptions upon which this essay has been based.

2.1. Team

The purpose of a KMS is to support team-based collaborative work [39]. A team is an entity made up of individuals who see themselves and who are seen by others as a social entity, who are interdependent in their work, who are embedded in one or more larger social systems (e.g. a business unit or an organization), and who perform tasks that affect others (e.g. colleagues, customers, suppliers) [8, 21, 50]. Team members have usually been recruited for their qualifications, experience, and skills with the objective of accomplishing a common team goal. Teams have a boundary, which is more or less permeable. Depending on the context, members can move in and out of a team over time. The word “group” has also been used to describe teams. For this essay, the words “group” and “team” will be used interchangeably.

2.2. Knowledge management system

Broadly defined, knowledge management systems (KMS) are a class of information systems aimed at supporting and facilitating the codification, collection, integration, and dissemination of organizational knowledge [2]. KMS differ from transactional and decision support information systems. They are usually not process-based, as enterprise systems (ERP) are, and they do not support decision making in the same way as data mining and data warehousing systems. In KMS, knowledge is usually stored in an unstructured way, as in documents, as opposed to the structured electronic records of transactional and decision-support information systems.

It has been suggested that “there is no single role of IT in knowledge management as there is no single technology comprising KMS” [2, p.114]. Hence, a useful way to think about KMS is to consider them from the perspective of levels, in which basic tools are used to build generators, which are then used to build specific applications and features [16]. Three types of KMS generators can be identified:

- *Knowledge repositories*, which provide document and information databases, search engines, and intelligent agents [22, 25, 39];
- *Expert directories*, such as yellow pages and knowledge maps [22, 35];
- *Collaborative tools*, such as groupware, email, listserv, newsgroups, chat, and conferencing [25, 39].

This essay focuses on the class of specific KMS for which the *most salient feature* is an ability to provide a knowledge base of “lessons learned,” “best practices,” or “case analyses.” Such systems may be built from a combination of any of the above generators. These systems can also be built according to a variety of structural configurations. For instance, they can consist of one, unique, centralized knowledge base that supports the common needs of one or more teams simultaneously. They can also be designed as loosely coupled systems, which are principally used to support local team needs. In that case, there is little interaction within the distributed knowledge base. A discussion of the benefits and detriments of such a configuration is, however, beyond the scope of this essay (e.g., Markus [35] provides such a discussion of KMS design requirements). Whether the design of a KMS is centralized or distributed should not, in principle, affect the validity of the typology proposed in this essay. This claim is nevertheless conditional to empirical validation.

The justification for the emphasis on “lessons learned” KMS is two-fold. First, if we consider KMS users as social actors [28], the spirit of the features embedded by lessons learned KMS sets these systems apart from other classes of KMS. While the spirit of many KMS [12] is to facilitate communication and address problems of poorly-structured problem solving, the spirit of lessons learned KMS is to collect, analyze, synthesize, and diffuse team members’ narratives about best practices, failures, and near-misses. Hence, instead of acting as a conduit or a connecting device, lessons learned KMS act as a repository of “what works and what doesn’t.” The implications of such a nuance might get overlooked if all these classes of KMS were to be considered jointly.

Second, a number of real-world initiatives suggest that organizations face important and distinct challenges when implementing lessons learned KMS as opposed to other classes of KMS. While some implementations have

been successful, most notably in the aviation [37] and military industries [52], getting teams to embrace KMS in their work practices is very difficult. For instance, a report to the United States General Accounting Office in 2002 revealed that NASA's lessons learned KMS was little used and a source of dissatisfaction among managers [31]. This dissatisfaction stemmed mainly from the lack of relevance of the lessons extracted from the system. An explanation of these outcomes needs to go beyond factors such as perceived usefulness and perceived ease of use [11]. It appears crucial to take into account the distinctive features of "lessons learned" KMS that might influence their use and their usefulness.

2.3. Use of a knowledge management system

Because the purpose of KMS is to support team-based collaborative work, knowledge sharing and knowledge re-use behaviours are intrinsic to their use [22, 35]. When people interact with a KMS, they can fulfill one of three roles: the knowledge provider, the knowledge seeker, and the knowledge intermediary. In a team, people can potentially play any of these roles at any given time. As knowledge providers, people have to provide the system with knowledge about their experience or the case at hand [22, 35]. As knowledge seekers, people need to filter, find, extract, and actually use the knowledge contained in the system [22, 35]. As knowledge intermediaries, people prepare, index, transform, and disseminate knowledge in order to make it usable [35].

Variations in how people fulfill these roles will cause variations in the exhibited pattern of KMS use by the team as a whole. The interaction order that emerges from these variations is what distinguishes individual use from team use. Furthermore, while use has been associated with system success in voluntary settings, use of a KMS cannot be taken as a proxy for system success. In the context of a KMS, system success is ultimately assessed by the amount of team learning, or changes in team behaviour, that can be attributed to the KMS. Hence, variations in the exhibited pattern of KMS use by a team as a whole should influence the kind of learning opportunities encountered by a team.

3. Prior research

This section briefly reviews prior research about the role of shared beliefs and the nature of a team's work in the use of a KMS. These two domains provide the underpinnings of the typology proposed below.

3.1. The role of shared beliefs

In past studies, shared beliefs about what is deemed legitimate conduct have been found to influence how a KMS gets enacted by a team. For instance, Orlikowski [40] found that the institutional conditions in which teams are embedded have an influence on how a collaborative technology (i.e., Lotus Notes) gets framed and enacted in practice. Hierarchical, individualistic, and competitive cultures tended to be in conflict with the use of Lotus Notes. On the other hand, participative, team-focused, cooperative, and learning-oriented cultures reinforce an interest in using the technology. In another study, it was found that the implementation of the same type of system did not affect the degree of collaboration among people [53]. People who already collaborated continued to do so, but those who did not, did not collaborate more.

These studies underscore the idea that users of KMS are also social actors embedded in an institutional context [28]. They live in an institutional context which provides rules, norms, and *beliefs* about what type of conduct is perceived to be legitimate [47]. More generally, shared beliefs refer to what is taken for granted by individuals affiliated with a team and thus fit under the broad conceptual umbrella of "culture." Culture is usually referred to as "a pattern of basic assumptions, invented, discovered or developed by a given group, as it learns to cope with its problems of external adaptation and internal integration, that has worked well enough to be considered valid, and therefore is to be taught to new members as the *correct way* to perceive, think, and feel in relation to those problems" [43, p.111, emphasis added]. This definition of culture implies that members of a team will be concerned with aligning their actions with what is considered legitimate in order to preserve their projected image of self [18].

To entertain such an idea is also to entertain the idea that the use of a KMS is also an action that projects a given image of the self to others. This was convincingly shown by Schultze [46] in an ethnography of knowledge workers. Information provided to a KMS acts as a representation and implies a certain representation of the self by its author. In turn, it implies that people may not necessarily infer the intended meaning from the information, distorting the image of the self that had been projected. Thus, because people put in play their identity when they use a KMS, shared beliefs about what kind of image of self is legitimate within a team should influence the pattern of KMS use that teams enact.

3.2. The nature of a team's work

The literature also suggests a second important influence on KMS use by a team: the nature of a team's work. It has been suggested that the nature of work and its fit with the technology supporting this work influences whether an information technology will be both used and effective, at the individual level [19] and at the group level [57]. The degree of task-technology fit influences the usefulness that team members perceive about the use of an information technology.

In the context of KMS, it has been shown that the use of a KMS is more appropriate and effective when the task domain is broad rather than focused, and the task orientation is content- rather than process-oriented [5]. It has also been said that a KMS is more appropriate for tasks which have a high degree of interdependence [23, 24]. Furthermore, a KMS also seems more appropriate for tasks that are structured rather than unstructured [38]. It has been suggested as well that the KMS that are fully adopted are those that are part of a workflow; that is, they are seamlessly embedded within organizational processes [20]. To make their use less cumbersome and less obtrusive [20], it has been proposed that KMS should be incorporated into the information systems that support user workflows [9].

The work accomplished by a team also has a temporal aspect. Over time, the knowledge contained in the KMS loses part of its value, if not all of it. Contextual information about the knowledge contained in the KMS could be forgotten as the nature and context of work change [35]. Furthermore, each episode could have different knowledge needs, and it has been argued and found that a KMS is most useful when the activities of a team are stable over time [1]. The implicit burden of using a KMS could be influenced by the speed at which a team experiences major shifts in the nature of its work during its life span.

4. Explaining patterns of KMS use

This section sketches out a typology that accounts for *why* distinct patterns of KMS use by teams might emerge, based on the discussion of the previous section. For the sake of clarity, it is important to recognize that this typology does not address *how* distinct patterns of KMS use might emerge. Such accounts are provided, for instance, by the lenses of structuration theory [40] and adaptive structuration theory [32]. Instead, this investigation aims to provide suggestions as to what may be the outcomes of such adaptive processes of use, based on a consideration of the shared beliefs of team members and the nature of the work accomplished by a team. More precisely, it is proposed that the pattern of use enacted by the people constituting a team depends on the

team's *psychological safety* and on the *rate of episodic change* in a team's work.

These particular contingencies have been chosen to explain variations in KMS use because of the theoretical and empirical support they enjoy in their respective streams of literature. In the field of organizational behaviour, the construct of psychological safety has been found to be a significant influence on the learning performance of teams [13, 14, 15]. In the field of information systems, task-technology fit has been found to be a significant predictor of the success of information systems [19]. Furthermore, these contingencies focus on the context in which team members interact with a KMS. Such a focus complements the existing research on KMS use.

For instance, Markus [35] outlined design requirements for successful KMS, based on the attributes of the knowledge re-user (i.e., seeker) and the purpose of the re-use. After presenting four situations of knowledge re-use, she argued that appropriate incentives, sufficient resources, and the presence of intermediaries were necessary conditions for successful knowledge re-use.

In comparison to Markus [35], this essay focuses (*a*) on the nature of the relationships that exist between knowledge providers, intermediaries, and seekers when they interact with a KMS (i.e., psychological safety); and (*b*) on the nature of the work accomplished by a team (i.e., the rate of episodic change). As will be explained in the following section, psychological safety and the rate of episodic change affect each of the usage roles differently. The effects of psychological safety are expected to be stronger for knowledge providers. While the rate of episodic change also impacts knowledge providers, its effects should be stronger for knowledge intermediaries and knowledge seekers.

4.1. Team psychological safety

Team psychological safety refers to the "shared belief that the team is safe for interpersonal risk taking" [13, p.354]. It is a tacit belief, which people take for granted. People feel safe when they believe that it is legitimate to make errors following well-intentioned actions. More precisely, psychological safety means "neither a careless sense of permissiveness, nor an unrelentingly positive affect but, rather, a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up. This confidence stems from mutual respect and trust among team members" [13, p.354].

Team psychological safety and trust share part of the same domain. However, as Edmondson [13] suggested, psychological safety emerges from the patterns of trust that exist in a team. Trust means the "willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a

particular action important to the trustor, irrespective of the ability to monitor or control that other party” [36, p.712]. Interpersonal trust has been found to play an important role in knowledge sharing [30, 51]. However, trust does not exist outside a dyad, since it necessarily involves a trustor and a trustee. To understand why distinct patterns of KMS use emerge, it is necessary to understand the taken-for-granted beliefs that are shared homogeneously by members of a team. Trust may be a necessary condition to achieve psychological safety, but it may not in itself be sufficient [13].

The idea of psychological safety goes beyond the idea of trust because psychological safety is grounded in the assumption that accountability is a universal feature of social life [29]. Accountability refers to “the implicit or explicit expectation that one may be called on to justify one’s beliefs, feelings, and actions to others” [29, p.255]. Accountability is a universal feature of social life because when things go wrong, people look for someone to blame. When called upon to justify their beliefs, feelings and actions to others, people will seek approval by putting in play their social identities and their internalized image of self that they constructed and strive to protect [44].

Accountability pressures arise when people are in the mere presence of another; when people expect their actions to be identifiable; when people expect that their actions will be evaluated by another according to some normative ground rules and with some implied consequences; and when people are expected to give reasons for what they say or do [29, 45]. Accountability potentially restricts the repertoire of discretionary behaviours associated with a given role.

As outlined above, the use of a KMS entails people fulfilling the role of knowledge provider, knowledge intermediary, or knowledge seeker. Psychological safety should primarily affect the role of knowledge provider. In most KMS, the contributions of people can be identified by other members of the team. One way that people contribute to KMS is to document cases that they have experienced in their work (e.g. “lessons learned”). These cases feed the knowledge base of the KMS. In such situations, people will put in play their image of themselves to others [28]. If people feel that it is legitimate to commit errors for actions that were well-intentioned, they are more likely to provide complex, self-directed contributions, which could lead to greater learning for the team as a whole. However, if they feel that to provide a frank and self-directed account might put at risk their image of competence, commitment, and integrity, they might be more conservative in their contributions to the KMS. In order to understand how people use a KMS, one needs to look for the accountability relationships they live with.

For instance, in a study of the use of a KMS by aviation pilots to report near accidents, it was found that pilots did not learn as much from their experience when they were accountable to superiors [37]. These accountability pressures led the pilots to simplify the accounts that they put in reports fed into the knowledge base. When pilots were not under the accountability pressures of a known superior, they more frequently engaged in upward and self-directed accounts of what they might have done differently. In other words, pilots were more conservative in their use of the KMS when they felt threatened by the disclosure, while pilots were more candid in their use of the KMS when they felt that their image of self was not at stake. Thus, the accounts that people provide through the “lessons learned” features of many KMS might not be as rich as they could be if they feel that the information they provide might be held against them in the future. A similar finding was reported by Schultze [46]. She observed that the knowledge workers she shadowed were conscious of the nature of the information, especially since they knew that this information represented how they were going to be perceived by others.

Psychological safety alleviates accountability pressures that exist in a team. It allows people to be confident that they are not putting their image of self in play when taking well-intentioned risks. When people feel safe within a team (i.e., psychological safety is *high*), they are more likely to experiment in order to find ways to improve the work of their team. When people feel uncomfortable about taking risks, experimenting, and admitting errors (i.e., psychological safety is *low*), they are more likely to act in ways that will inhibit learning [13].

4.2. Rate of episodic change

The nature of a team’s work also needs to be considered if we are to better understand why distinct patterns of KMS use emerge. In the present case, the attribute of a team’s work that is going to be glossed over is the temporal aspect.

It has been argued that a team progresses in a pattern of punctuated equilibrium [17]. Throughout its life span, a team goes through episodes of stability that are punctuated by periods of quick and intense transition.

During the episodes of stability, a team concentrates on goal-directed activity, its main purpose [34]. These are the times when a team is engaged in acts that contribute directly to goal accomplishment. People may engage in coordination, task monitoring, and carrying out work in order to produce the team’s output. During these periods of “stasis,” a team accomplishes work without any major reorientations. Instead, it executes plans that are created during the transition periods.

These episodes of stability are rather long in comparison to the periods of transition.

During periods of transition, however, a team undergoes major changes in how work is accomplished in a relatively short length of time. The main activities of these periods consist primarily of evaluation and/or planning activities [34]. Processes in transition phases include mission analysis, goal specification, and task planning. Members reflect on their past performance, mistakes, lessons learned, and successes. Transition phases are also periods in which teams adopt new perspectives on their work. Thus, major reorientations in the purpose of the team might emerge.

As mentioned earlier, the value of the knowledge contained in a KMS appears to be highly dependent on the stability of the team's activities [1, 35]. The compatibility of a KMS with a team's work depends on the team's rate of episodic change. In the context of the use of a KMS, it could be argued that the quicker the cycle time in episodic change, the less compatible a KMS is for the work of a team. Remember that a KMS entails three roles for users: knowledge seeker, knowledge provider, and knowledge intermediary. The rate of episodic change is most likely to influence the perceived usefulness of a KMS as seen through each of these roles. For the knowledge provider, it decreases the incentive to provide information to the knowledge base, since the relevance of the information may get washed away by a changed context that demands new assumptions. For the knowledge intermediary, it increases the burden of tinkering with the knowledge base to keep it current. For the knowledge seeker, the knowledge may not prove to be useful any more, as assumptions about the past may no longer hold in the present.

Thus, when team members feel that there is a high degree of permanency in the nature of a team's work, they will be more willing to invest time and effort in contributing to the knowledge base. However, if team members feel that what they feed into the knowledge base may be devalued by inevitable changes in the nature of a team's activities, context, and goals, they may be less inclined to interact with the system.

4.3. A typology of KMS use by teams

The constructs of psychological safety and of rate of episodic change provide two contingencies for why a given pattern of use might get enacted. By juxtaposing these contingencies, we obtain a typology of KMS use. This typology is shown in Table 1.

This typology suggests four distinct ways that a KMS might be framed and enacted by the members of a team, depending on team members' shared belief that the team is safe for interpersonal risk taking [13] and the rate of

episodic change experienced by team members [17, 34]. If the typology is valid, a team's use of a KMS (of the type "lessons learned") should align with the one predicted by the typology. Each of these distinct patterns of use is described in fuller detail below.

Table 1. Typology of KMS use by teams

Psychological safety	<i>High</i>	Candid use	Ambivalent use
	<i>Low</i>	Conservative use	Reluctant use
		<i>Low</i>	<i>High</i>
		Rate of episodic change	

Conservative use. (Low psychological safety/low rate of episodic change). When people believe that it is risky to admit errors or to speak up and when they perceive that the team's activities are stable, their interaction with a KMS is most likely to be conservative. In such circumstances, while the KMS may actually be used from a quantitative perspective, people will have poor interactions with the KMS. For knowledge providers, the KMS is likely to be framed as a monitoring device instead of as a learning device. Hence, people will strive to protect their image of self in front of others and engage in defensive bolstering [29, 37]. Because the contributions that knowledge providers make in such a situation are volitional, irrevocable, and visible to others [42], the knowledge base will end up containing more justifications for past actions than reflections on past actions. As a result, the quality of the knowledge available for re-use suffers and learning opportunities are scarce.

Reluctant use. (Low psychological safety/high rate of episodic change). When people believe that it is risky to reveal oneself and when they believe that the nature of the team's activities are likely to change in the near future, they are likely to frame the KMS as a nuisance. In such a situation, team members will be disinclined to use the KMS. Not only do knowledge providers feel that using the system is a threat to their identity, knowledge seekers perceive that the knowledge base is of little value, since it is likely to be perceived as obsolete. Members of the team are thus unlikely to engage in upward and self-directed counterfactual thinking, thus

missing opportunities for learning [37]. From a quantitative perspective, the system is likely to receive little use, and from a qualitative perspective, the knowledge contributed is likely to be poor. Team learning from the KMS is highly unlikely to occur in such a situation.

Candid use. (High psychological safety/low rate of episodic change). When people know that their image of self is not put in play and that the knowledge base will provide support for the team's activities in the long term, they are more likely to embrace the KMS. Knowledge providers will engage the system directly, in a frank, straightforward fashion, without reserve. They are also more likely to think in more complex ways by engaging in pre-emptive self-criticism, leading them to reflect on their actions instead of trying to justify them [29, 37]. Furthermore, because people believe that the team's activities are unlikely to change, the usefulness of the system should be more salient for both knowledge providers and knowledge seekers. Knowledge providers will perceive their contribution as useful in the long run, and knowledge seekers will perceive the knowledge base as somewhat current. Interactions with the system, by both knowledge providers and knowledge seekers, should be frequent and of high quality. When members of a team enact a candid pattern of use, learning opportunities due to the KMS are more likely to materialize.

Ambivalent use. (High psychological safety/high rate of episodic change). The fourth pattern of use is fascinating because it puts team members in an awkward position. While people believe that it is safe to admit errors and speak up, they also believe that the knowledge base is impermanent. This means that as knowledge providers, they may engage in complex thoughts and provide reflections on their experience. But at the same time, as knowledge seekers, they know that what is contained in the system may no longer ring true.

In such a context, a burden is also put on knowledge providers [20]. While they may have an intrinsic motivation to produce complex and rich narratives for the knowledge base, they may also be constrained in their ability to do so. A high rate of episodic change means that tasks are less routine, time pressures are felt more strongly, and the projected usefulness of the knowledge produced for potential knowledge seekers by knowledge providers may be low (i.e., "why should I contribute if what I write quickly becomes obsolete?"). In this context, psychological safety might not be sufficient to get team members to contribute experiences. The particular conditions under which a high degree of psychological safety takes precedence over a high rate of episodic change, and vice-versa, remains an empirical issue to be resolved. What is certain, however, is that knowledge producers should contribute knowledge of

high quality, because the interpersonal risk of disclosing near-misses and problematic situations is perceived to be low.

The high rate of episodic change also puts a burden on knowledge intermediaries. Because the conditions under which they interpret, analyze, and synthesize the content of the knowledge base are quickly changing, they need to keep up-to-date with the work practices of both the knowledge providers and the potential knowledge seekers. They need to understand changes in the knowledge providers' work practices in order to be able to adequately interpret narratives and experiences that may be in flux. Knowledge intermediaries also need to understand the changes in the work practices of knowledge seekers in order to appropriately target and package the knowledge that is captured by the system. Failure to do so may increase the knowledge seekers' perception that the knowledge contained in the system lacks relevance.

In the case where knowledge providers contribute to the KMS in spite of rapid changes in the nature of work and knowledge intermediaries keep abreast of these changes, knowledge seekers need to adopt the attitude of wisdom for learning opportunities to materialize. In Weick's [55] vocabulary, having the attitude of wisdom means considering ambivalence as the optimal compromise. Wisdom is "defined conceptually as a balance between knowing and doubting, or behaviourally as a balance between too much confidence and too much caution" [55, p.366]. When people doubt too much, they are not able to fix meaning and carry on with their projects. When people believe too strongly in their interpretations, the actions subsequently enacted could prove inadequate for the situation. Knowledge seekers thus need to adopt the attitude that it is alright to renegotiate the meaning of what is contained in the system, without apology. However, they also need to entertain the idea that the knowledge base may still be valuable, because knowledge providers are assumed to have been frank and straightforward about their experience when feeding it into the system. To manage this ambivalence between knowing and doubting, team members need to be attentive to their guessing and validating processes. They need to complement these processes with face-to-face interactions in which effectuating, triangulating, affiliating, deliberating, and consolidating is achieved [54].

In short, an ambivalent pattern of use means (a) that contextual constraints are put on knowledge providers and knowledge intermediaries; and (b) that in order to maximize learning opportunities from a KMS, knowledge seekers' interactions with a KMS need to be enhanced by heedful social interactions external to the KMS. Given the right mindset and sufficient resources,

learning opportunities should occur, even if the nature of work is not routine and is constantly changing.

The next section will discuss some of the implications of the proposed typology for team leaders and for MIS and KM scholars.

5. Conclusion

Unlike other classes of information systems such as enterprise systems and decision support systems, the spirit of KMS is quite unique. Indeed, the behaviour of knowledge sharing is omnipresent in the use of a KMS. Knowledge sharing is perceived as a sine qua non condition to the success of a KMS [22]. Team members must overcome their reluctance and inability to share, which has been said to be the result of various psychological, social, and organizational factors [22]. The typology proposed in this essay attempts to clarify the role of these factors by being attentive to the influence of shared beliefs held by a team's members and the nature of the work accomplished by the team. The typology provides hints as to the conditions under which a KMS is likely to foster learning opportunities (i.e., when psychological safety is high), and under which the knowledge base is likely to be judged irrelevant by a team (i.e., when the rate of episodic change in a team's work is high).

From a research perspective, a certain number of theoretical issues remain unresolved. First, the relative weights of the contingencies remain to be defined. The circumstances in which psychological safety is more powerful than the rate of episodic change, and vice-versa, need to be clarified. It is quite possible that in some circumstances, psychological safety drives out any impact that the rate of episodic change could have. The particularities of the interaction between these contingencies are both theoretical and empirical issues that need to be addressed in further research. Second, the impact of each contingency on the roles of users needs to be considered in fuller detail. For instance, recent findings [51] suggest that too much trust may lead knowledge seekers to overlook the complexity of the knowledge they seek. This means that in a context characterized by high psychological safety, knowledge seekers may have the temptation to forgo doubt, leading them to drop the attitude of wisdom. These findings may mean that the attitude of wisdom may be even more important in settings conducive to candid use, since it is so easy to trust in these settings. Third, while it is assumed that the implications of the typology are oblivious to differences in KMS configurations, this assumption needs to be empirically validated. The usage patterns of local, distributed KMS and of global, centralized KMS may be quite different. Additionally, it is acknowledged that the enactment of a KMS usage

pattern conducive to learning is a necessary but insufficient condition for learning opportunities to occur. Other factors to consider are the existence of a critical mass of users and the degree of disruption that the KMS causes in a team's social processes [20]. Future research efforts should also consider the conditions under which the lessons learned and extracted from the knowledge base actually get implemented. Even if the quality of the knowledge contained in the knowledge base is quite high, no learning will take place if these ideas do not get put into action.

From a practical perspective, the typology should prove a useful aid to team leaders trying to understand why their KMS is not being used as expected. When their team members believe that they may be punished or lose face for reflecting publicly on their experience, knowledge providers will engage in retrospective rationalization instead of counterfactual thinking. Simply using a KMS is not sufficient as a condition of success. Or, put differently, not every kind of knowledge leads to learning. To foster learning opportunities, what is important is not to focus on what is captured by the KMS, but on what is not captured by the KMS: the "near-misses" that are hard to identify and disclose. The greater the "façade" work undertaken by a team, the scarcer the learning opportunities for a team as a whole. Defensive bolstering is the worst enemy of learning. What provides the initial "kick" is the conditions under which contributions to the KMS are made. To establish these conditions, managers may engage in coaching and perspective taking, which alleviate accountability pressures. Making unequivocal, irrevocable, and visible statements that the system is meant to be used as a learning tool and not a monitoring tool is also likely to help foster a feeling of psychological safety among team members. However, if they make such statements team leaders should make sure that they walk the talk, because if they do not, psychological safety could deteriorate.

The typology also suggests that team leaders should be conscious of the nature of their team's work. In other words, if activities change periodically and reorientations are common, informal mechanisms for complementing the use of a KMS might be necessary. These might take the form of frequent meetings aimed at building relationships among their team members. If people are better able to determine the validity of the knowledge contained in the system, they will be more apt to make sense of it and adapt it to changing circumstances. In addition, resources to help people contribute to, interpret, index, analyze, and synthesize the knowledge base should be carefully provided when activities change quickly.

Overall, this typology contributes to the literature in MIS and KM several ways. It provides a rich typology of KMS use by a team, in a way similar to

other efforts made at the individual level of analysis [6, 7, 33]. Its richness comes from its consideration of users as social actors embedded in a web of accountability relationships [28, 29]. The ideas of psychological safety and rate of episodic change proposed in this essay also provide opportunities for hindsight into why a distinct pattern of use – candid, ambivalent, conservative, reluctant – might become enacted over time. The next logical steps are to empirically validate the typology and investigate its proposed relationship with the quality of team learning. While complex, this refined conceptualization of KMS use has the advantage of not glossing over nuances that might otherwise be forgotten.

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7. References

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