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Corporate Wikis: The Effects of Owners' Motivation and Behavior on Group Members' Engagement

ABSTRACT

Originally designed as a tool to alleviate bottlenecks associated with knowledge management, the suitability of wikis for corporate settings has been questioned given the inherent tensions between wiki affordances and the realities of organizational life. Drawing on regulatory focus theory and social cognitive theory we developed and tested a model of the motivational dynamics underlying corporate wikis. We examined leaders (owners) and users of 187 wiki-based projects within a large multi-national firm. Our findings revealed two countervailing motivational forces, one oriented toward accomplishment and achievement (promotion-focus) and one oriented toward safety and security (prevention-focus), that not only predicted owners' participation, but the overall level of engagement within the wiki groups. Our primary contribution is in showing that, notwithstanding the potential benefits to users, wikis can trigger risk-avoidance motives that potentially impedes engagement. Practically, our findings call for an alignment between organizational procedures surrounding wiki deployment and the technology's affordances.

Keywords: knowledge management (KM), knowledge management systems (KMS), knowledge sharing, wiki, owner, motivation, regulatory focus theory, social cognitive theory.

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Introduction

In the information age, companies increasingly derive value from intellectual rather than physical assets and employee knowledge is believed to be a company's most profitable resource. Knowledge Management (KM) refers to identifying and leveraging the collective knowledge in an organization to help the organization compete [3], and knowledge management systems (KMS) are designed to allow firms to manage their knowledge resources. Initially, KM approaches focused on knowledge as objects that could be organized to support decision making, and KMS were seen as tools to manage codified knowledge, such that most KM projects were initiated top-down and driven by management. However, the rigid structure of such centrally-controlled KM initiatives often exhibited poor incentives to sharing and reuse of knowledge [8, 48, 70, 71]. Co-creation and peer-based production over the Internet, as exemplified by open-source software development [28] and later Wikipedia [5, 63], has offered an alternative model of KM that emphasized principles such as open access and community governance [68, 79]. Beginning in the mid 1990s, with the growing emphasis on knowledge workers and tacit knowledge, organizations began exploring this form of 'open KM' [8, 48, 76]. Rather than centralized control of KM initiatives and the codification of all organizational knowledge, firms increasingly recognize that distributed collaboration is a more effective way of sharing knowledge. In open KM conversations are seen as central, as the process of expressing knowledge aids its creation and information exchanges help refine knowledge [41]. 'Conversational KM' [69, 70] is an approach that emphasizes the sharing of

tacit knowledge through ongoing exchanges within work groups. Conversational KMS, such as discussion forums, instant messaging, Weblogs, podcasts, and wikis, are collaborative in nature and assist in the creation and sharing of knowledge through conversations [5, 27, 70].

Wiki (when used within organizational settings) is a conversational KMS [70] designed for open KM [4, 46, 76]. It is a web-based application that allows users to collectively author documents, such that the most recent version reflects the cumulative contributions of all authors [42]. Although wikis have the potential to alleviate the knowledge acquisition bottlenecks associated with traditional KMS [69], for wikis to succeed it is essential that users share their knowledge and participate in the collaborative authoring process. It follows, then, that we need to understand the motivational dynamics that drive user participation within open KM, and particularly within the context of conversational KMS and wikis. Although there is much to be learned from open-source software development and Wikipedia [5, 48], corporate settings introduce constraints that pose challenges for adopting Internet-based procedures [4, 77]. For example, firms may restrict wiki access privileges, and corporate users of KMS may be more concerned about career advancement and more likely to hoard knowledge. Thus, it is not clear the extent to which theoretical models of knowledge sharing over the Internet [5, 55, 63, 68] are applicable to open KM [44, 46].

To date a number of studies have looked at the motivational processes that underlie user participation within traditional (non-open) organizational knowledge-sharing processes [11, 36, 59, 66]. Naturally, the questions driving research in this area have revolved around the various conditions that elicit knowledge sharing within and between groups. However, an implicit assumption that runs through this work is that knowledge-sharing activities are inherently benign. Recently, it has been suggested that KMS [34, 73], and particularly wikis [44] could inadvertently

introduce risks and that would negatively affect engagement. In this article we follows up on these prior works and argue that within open KM in corporate settings knowledge sharing can be "dangerous," in the sense that it potentially exposes deficiencies and differences with respect to a user's abilities, knowledge, and experience, which, in turn, might affect reputation and status within the group. Prior studies that have neglected these adverse realities, leave us with motivational explanations that might tell us only half the story.

The objective of the present research is to develop an integrative theoretical framework that explains the motivational dynamics within the organizational wiki-based open KM context, which incorporates the notions regulatory focus and social learning. By adapting regulatory focus theory [29] and social cognitive theory [9] to this particular problem domain, we are able to model the tension between two coexisting regulatory (motivational) states within the wiki leader (or 'owner') - one that is oriented toward satisfying nurturance needs and concerned with growth, accomplishment, and advancement, and one that is oriented towards satisfying security needs and focused on personal safety, and meeting obligations and responsibilities. We then examine the implications of these motivational states on wiki owners' behavior and for group engagement. Specifically we wanted to model how the motivations of prominent individuals within the wikis affect others, both directly (i.e. signalling) and indirectly (i.e. affecting owners' actions, which in turn influence group members' actions). Our work contributes to the understanding of the behavioral processes underlying wiki work, and more broadly to the understanding of how leaders influence groups' knowledge work. If we are able to show that these countervailing motivational forces affect individual and group engagement differently, then our work will confirm that open KMS designed to foster collaboration and knowledge sharing, may, in some contexts, impede rather than facilitate engagement in IT-mediated knowledge management initiatives.

Before proceeding, it is important to clarify the role of "leader" within the corporate wiki context. It is well known that e-leaders play a critical role in managing knowledge work and in driving the adoption of KMS. E-leadership has been described as a social-influence process mediated by IT with the power to produce attitude and behavior change within individuals or groups [7]. In virtual knowledge networks, leadership is often emergent, rapidly shifting from one person to another depending on who has the knowledge-advantage for a given task [33]. Wiki owners have responsibilities for both social management and technical administration [12], playing a central role in encouraging the engagement of others [52]. Thus, owners fit our understanding of e-leaders. Our model focuses on the motivational tensions within wiki owners, and the social mechanisms by which these e-leaders affect the engagement of wiki group members[1].

The paper proceeds as follows: the next section reviews relevant work on KM, corporate wikis, and wiki owners; we then proceed to describe the broader theoretical context and develop the study's hypotheses; next, we continue to describe the research method; present the results of our empirical evaluation; and discuss the implications of our findings and review its limitations.

Corporate Wikis and Their Owners

Wiki-Based Knowledge Management

Wiki, derived from the Hawaiian-language word for fast, is a collaborative authoring tool that allows users to overwrite others' contributions. In additional to supporting conversations, wikis help to explicate tacit knowledge and create knowledge bases [4, 38]. The primary affordances of wikis are: open access, transparency, automatic release of changes, peer-based governance [42, 69, 70], thus wikis naturally lend themselves to open KM [44, 46, 71, 76, 77]. Wiki is a highly flexible

[1] In line with prior studies of open source projects [28], Wikipedia [63], and corporate wikis [76], we define engagement to include all interactions in the wiki: reading of content, posting new content, and editing others' postings.

technology and wikis have been used for a variety of KM applications, including personal information management, document repositories, collaboration and project management, maps of experts and organizational knowledge, idea generation, and e-learning [4, 30, 45, 70]. To date, most research on wikis has focused on their use in the public sphere, and specifically on Wikipedia [5, 50], while our interest is in corporate wikis. There seems to be an inherent tension between wiki affordances and traditional corporate knowledge management practices [6, 25, 77]. While the wiki system used in both Internet and corporate settings might be very similar, wiki-based conversational KM practices may differ substantially from Internet systems such as Wikipedia. For example, over the Internet, wiki editing is open ended, while a corporation may put restriction on access privileges, provide template formats, or calculate users' relative contribution to be used in performance evaluation [6, 76].

Wiki Owners

The term "owner" is commonly used in the context of peer-production communities to describe a specific type of leader [48]. Fundamentally, the role of an owner within a wiki context is informal and emergent, potentially available to any user. That said, owners often assume the responsibility for a variety of technology-infrastructure and social-management tasks [12]. On the technology side, owners' responsibility may involve installing and setting up the wiki, system configuration, and establishing access privileges. On the social management side, wiki owners will often assume responsibility to control detrimental activity (e.g., managing disputes, channelling the discussions, and chastising inappropriate behavior) and to encourage appropriate participation (e.g., by recognizing informative and supportive contributions) [12, 48, 58]. Wiki owners also tend to be active contributors, synthesizers of others' contributions, and good communicators [32]. The critical point is that, because of their role(s), wiki owners are highly visible and characterized by

distinctive rights and responsibilities (e.g. special access privileges, rights to add or remove members, and the ability to reject members' postings). Within a corporate setting, wiki owners play similar roles and are pivotal in influencing others and driving engagement and participation[2].

Theoretical Context

Our aim in this section is to develop a theoretical understanding of the motivational forces that drive the participation of wiki-group members. To provide a referent for this discussion we focus on the e-leader (i.e., wiki owner), and then provide an explanation of how his or her behavior affects the engagement of other individuals within the wiki. As mentioned earlier, our theoretical frame integrates aspects of regulatory focus theory and social cognitive theory, which is expressed as a series of testable hypotheses.

Motivation for Wiki Engagement and Regulatory Focus Theory

Theoretical frameworks on knowledge sharing over the Internet are largely rooted in theories of volunteering and participation in social movements [51, 53, 55, 63, 68, 79]. Within organizational settings, the motivational dynamics believed to underlie knowledge sharing behavior have been viewed through a number of different theoretical lenses, including: the traditional model of intrinsic versus extrinsic motivation [16, 78]; the theory of reasoned action [11]; social exchange theory [36, 73, 76]; and organismic integration theory [47]. These studies identified a large number of reasons why people would be motivated (intend) to share knowledge, including: need satisfaction [16]; attitudes toward knowledge sharing, permissive knowledge-sharing norms, and

[2] The term 'owner' has also been used in the context of corporate wikis [15, 25]. In many respects, corporate wiki owners are similar to the owners of online communities: they are curators of knowledge [14], often initiate the wiki are active contributors of content [25], and they have additional privileges. Thus, corporate wiki owners play a leadership role in driving participation [54] and in directing others to properly use the wikis [14]. A unique challenge that the owners of corporate wikis have to face is in mobilizing semi-autonomous knowledge workers that are attuned to directions coming from managers. Another difference is that in corporate settings, technology management tasks are often shared between wiki owners and the IT unit.

organizational climate [11]; contingent rewards, self-set goals or intentions, self-efficacy, and knowledge sharing norms [59]; and attitudes and feelings towards knowledge sharing [47].

Most of the theoretical perspectives employed in earlier studies in both the Internet and organizational contexts have assumed, either implicitly or explicitly, that knowledge sharing is inherently desirable with the potential to enhance both the individuals involved and the group to which the individuals belong. Indeed, engagement with wikis and other knowledge sharing technology do provide opportunities for personal growth, achievement, and, in some cases, advancement. What seems missing, however, in most of the motivational explanations to date is that knowledge sharing activity, in and of itself, can incur risk – especially in conversational KMS that are used within corporate settings [44, 73]. Although the very public nature of wikis offer great opportunities for collaborative work, wiki work could also expose participants to risk, because users may fear that their contributions will not be appreciated, reverted, or even attacked [19] and because users may be reluctant to modify what they perceive to be others' content [44]. Thus, we expect wiki members to have simultaneously conflicting goals: the goal to fully engage and participate freely and the goal to engage but do so in a cautious and guarded (safe) manner to prevent negative outcomes.

Regulatory focus theory is rooted in the basic idea that virtually all human behavior is motivated by two coexisting regulatory systems that service different survival needs [29, 62], and thus is particularly suitable for explaining the countervailing motivational forces believed to drive wiki engagement. One system, promotion-oriented regulation, is concerned with satisfying nurturance needs where the emphasis is on growth, accomplishment, and advancement. Individuals in a promotion focus strive to achieve personal ideals, and are particularly sensitive to the presence and absence of positive outcomes (e.g., gains) [62]. Prevention-oriented regulation, in contrast, is

concerned with satisfying security needs. Individuals in a prevention focus are concerned with personal safety and security, and with meeting one's obligations, duties and responsibilities [62]. Moreover, individuals in a prevention focus show particular sensitivity to presence or absence of negative outcomes (e.g., losses) [62][3].

Research studies have found that promotion and prevention regulatory foci are related yet distinct motivational states [72], such that it is possible for an individual to experience high levels in one focus, simultaneously in both foci, or in neither focus [29]. Interestingly, there has been a hint in the literature that corporate wikis have the potential to both facilitate and forestall user participation. Findings from studies on wikis suggest that people approach knowledge-sharing activities to achieve personal growth and accomplishment [45]. The distinct wiki affordances and the nature of wiki-mediated processes allow users substantial discretion in performing their wiki tasks, they provide an opportunity for users to collaborate and learn from each other, and they provide a form to gain mastery and develop new competencies. We contend, however, that the very properties of wiki-based work that evoke promotion focus might also introduce risk, especially in corporate settings where inferences of one's contributions to the wiki can have serious consequences. In particular, the open, transparent, and public nature of wikis may increase the

[3] It may be helpful to explain how regulatory focus relates to intrinsic-extrinsic motivation; a conceptualization of motivation that is commonly used to explain knowledge sharing in organizational contexts [11, 45, 59]. Intrinsic motivation refers to motivation where individuals freely and spontaneously engage in a task, out of pure interest or enjoyment and in the absence of any external controlling contingencies; in stark contrast, extrinsic motivation refers to motivation that is fundamentally compliance-based, whereby individuals engage a task in order to achieve a desired outcome (i.e., attainment of external rewards or avoidance of punishments) [17]. Given the control and reward contingencies that characterize corporate life, extrinsic motivation tends to be predominant in work settings. Extrinsically motivated behavior can take different forms depending on the perceived source of regulation, ranging from external regulation where the source of regulation is perceived to be external to the individual (i.e., contingent rewards or punishments) to integrated regulation where external contingencies are internalized as personal goals that are integrated with one's self concept [17]. As the salience of external control increases in strength, regulatory focus will be increasingly prevention oriented as individuals attempt to maximize gains while protecting against losses. However, as the salience of external control gradually gives way to internal control, the choices that people make and the goals they strive for should be increasingly brought into coherence with other aspects of the individuals' self-identity. Thus, as the salience of internal control increases in strength, the regulatory focus should be increasingly promotion-focused. However, because of the contingencies associated with promotion focused regulation, the concept of *promotion focused regulation* is not synonymous with intrinsic motivation.

salience of safety and security needs, especially in a corporate environment [34]. Having the quantity and quality of contributions known, could potentially expose performance differences, which, in turn, may evoke a strong prevention focus to protect reputation and self-esteem. Majchrzak [44], for instance, has observed in users a "tendency not to edit others' work on a corporate wiki in part because they feel they would be publicly criticizing the other person, thereby harming the acceptance in the community (pp. 18)."

Wiki Owner: Regulatory Focus and Engagement

In this section we consider the relation between the motivational state of the wiki owner and his or her behavior. As outlined earlier, regulatory focus can be viewed as a psychological state that affects the choices people make, the way they think about their goals, the strategies they use to achieve desired states, and how they evaluate and respond to outcomes. Moreover, regulatory focus has been linked to information processing style, which has important implications for creative thought and innovative behavior [22, 29]. At a deeper level, the differential effects of promotion and prevention focus might reflect their respective links to the bio-behavioral systems that drive approach and avoidance behaviors [29, 40, 62]. Drawing on theory and relevant findings reported in the IT literature, we now examine the effects of promotion and prevention focus, in turn, and propose hypotheses for each.

We propose that promotion focus will be positively associated with engagement. At a very rudimentary level, our rationale is supported by research that links promotion-oriented regulation with the behavioral activation system (BAS) [29, 40, 62]; a bio-behavioral system that fostering behavioral approach or action towards desired end states [24, 40, 62]. To the extent that an open KMS context evokes a strong promotion focus (and by implication the BAS), the behaviour of users to be vigorous, energized, and excited, as they engage in activities that lead to positive

outcomes – leading to *higher* rather than lower levels of engagement. In addition to overall activation levels, we can understand the relation between promotion focus and engagement from an information-processing perspective. Wiki-based knowledge work, whether sharing ones knowledge, editing others' contributions, or simply reading wiki content, require intensive information processing. According to Friedman and Forster [22], promotion-oriented regulation involves a riskier information-processing style that results in a higher frequency of creative and innovative behaviors because novel alternatives are eagerly and actively sought [49]. We surmise, then that the information-processing style elicited by a promotion focus should enhance rather than detract from creative expression [22, 29].

There appears to be some evidence in the literature that is consistent with our predictions. In the context of corporate wikis, it would seem that promotion-focus motives might play an important role in affecting users' willingness to participate and contribute knowledge. Majchrzak et al. [45] surveyed wiki users from a variety of organizations and identified use-value and enhancing the contributor's reputation as salient motivations. Danis and Singer [15] mention career advancement as a primary driver of wiki participation. Yates et al., [76] found that users who either add content to the wiki or who synthesize others' postings are driven by the benefits this offers to their personal work and to organizational processes. Thus, based on theory and several consistent findings reported in the literature, we advance the following hypothesis:

> *Hypothesis 1. Wiki owners with a strong promotion focus will exhibit higher personal engagement levels than those with a weak promotion focus.*

In contrast, we propose that prevention focus will be negatively associated with engagement. Again, our rationale is supported by research that links prevention-oriented regulation with the behavioral inhibition system (BIS) [29, 40, 62]. The BIS promotes survival by fostering

avoidance-related behaviors when the individual encounters potentially threatening or aversive conditions that evoke feelings of fear and anxiety [24, 40, 62]. To the extent that an open KMS context evokes a strong prevention focus (and by implication the BIS), users should be sensitive to aversive stimuli and motivated to inhibit their behavior to minimize or avoid negative outcomes. It is reasonable, in these situations, to expect that the behavior of wiki owners and users will be measured and guarded, leading to lower rather than higher engagement levels. In addition to its relation to the BIS, prevention-oriented regulation has implications for information processing style. It has been suggested that prevention focus is associated with a more conservative, risk–averse, and vigilant processing style that is *less* open to creativity and innovation; a style where repetition is favored over novelty and where alternatives are carefully eliminated rather than explored [22, 29].

As alluded to earlier, with corporate-based wikis, risk is potentially introduced in several ways. First, users may fear that their contributions will not be accepted, reverted, attacked unfairly, exploited, or used against them [19]. This might occur because wikis allow any group member to see the complete history of revisions, and because content modifications are automatically published. Thus, concerns about errors, and how these will be interpreted by others, are likely heighted in the wiki context. In addition, on corporate Intranets wiki users' identities are revealed [6], thus increasing the risks associated with ineffective performance [34]. Second, the notion of shared ownership of content might be foreign to many corporate users, who are sometimes reluctant to modify what they perceive to be others' content, especially for those users who are more sensitive to peer pressure [77] and in cases when the contributions were made by authoritative figures (whether managers or domain experts) [15, 25, 30, 44]. It is reasonable to assume that because owners are familiar with wiki affordances they would feel more comfortable editing

others' work; however, owners may also have the most to lose (e.g., exposing their own incompetence) and may be especially concerned with the expectations of others. In short, the inherent personal risks for users should evoke prevention focus regulatory, which, in turn, should lead to lower, and more cautious participation. Thus, based on theory and several consistent findings reported in the literature, we advance the following hypothesis:

> *Hypothesis 2. Wiki owners with a strong prevention focus will exhibit lower personal engagement levels than those with a weak prevention focus.*

The Effects of Wiki Owner on Group Engagement

We accept, as have others, that "there are no coherent, integrated, and theoretical frameworks of the motivational factors that explain how knowledge is transferred between knowledge providers and recipients" [59] (pp. 71). Knowledge sharing represents complex (individual and social) human behavior that is not likely to be fully explained by any single theoretical perspective. The direction in the literature seems to be one where relevant and appropriate concepts and ideas from different motivation theories are integrated to provide greater explanation or the specific phenomenon under investigation. Although regulatory focus theory allows us to consider the tensions between two co-existing regulatory systems, and how these systems are potentially evoked in an open KMS context, it isn't clear how the behaviour of a focal individual (e.g., wiki owner) impacts the engagement of other users. To address this gap in the explanatory logic we have brought forward concepts drawn from social cognitive theory, and its roots in social learning [9].

According to this social cognitive theory [9], most, if not all, human behavior is determined by a reciprocal interaction of social (situation) and cognitive (person) determinants. Our capacity to learn through observation and inference enables people to expand their knowledge and skills capabilities by simply attending to the actual performance of others and the consequences for them.

Bandura [9] argues that modeling has always been one of the most powerful means of transmitting values, attitudes, and patterns of thought and behavior to others – and that innovation and creative development can emerge through the modeling process. Innovative or creative work involves synthesizing experiences into novel ways of thinking and doing things. According to Bandura [9], models shape the behavior of observers in a variety of ways, including (a) exposing observers to novel patterns of thought or behaviors, and the "generative rules" that determine when behavior should be initiated and the strategies for dealing with different situations, (b) providing observers with a social prompt or cue to perform a previously learned behavior, and (c) directing the attention of observers to particular information, objects, events, or contingencies.

In this study we assert that wiki owners act as models for others in the wiki group. We base this assertion on the fact that individuals who occupy the role of wiki owners are unique in the sense that they command the attention of the group. It is true that all members within a wiki group (i.e., employees who are actively using the wiki) who perform creative and highly interdependent knowledge management tasks could potentially influence each other by modeling values, attitudes, thoughts and behaviors. However, wiki owners, because of their role within the wiki are most likely to be viewed as the primary and salient source of behavioral information, if for no other reason that the responsibility they have establishing and maintaining the wiki. How owners behave, and the inferences others makes about their motivational state, should matter. Drawing on social cognitive theory our model asserts that, despite the fact that owners do not have full control over wiki content (i.e. their contributions could be overwritten), owners hold the capacity to influence others by demonstrating values, attitudes, thoughts and behavior, by cuing appropriate responses, and by directing effort and attention to salient contingencies.

There is precedent for this view in the literature. First, the literature on champions of technological innovation [31] describes the role of champions in driving the adoption of specific new technologies across an organization. Second, studies exploring the interaction between KM and leadership discuss the role of the 'knowledge leader' in driving knowledge management processes by communicating a vision, motivating employees, encouraging an organizational culture that promotes teamwork and knowledge sharing, and by providing a set of systems and structures that support knowledge processes [23, 57]. A third relevant strand of research – e-leadership, helps explain how leadership emerges even in organic organizations and in fluid and dynamic work settings. E-leadership has been defined as a social influence process mediated by advanced information technology to produce a change in attitudes, feelings, thinking, behavior, and performance with individuals, groups and/or organizations [7]. It is important to understand that within organic wiki context, where membership, roles, and goals are constantly changing, e-leadership may be associated with one individual (e.g. the wiki owner), or it may be shared by several individuals. Moreover, in an environment where knowledge flow is not restricted to hierarchical chain of command and knowledge is openly shared, ownership may rapidly shift from one person to another depending on who has the knowledge-advantage for a given task [33].

In the specific context of wikis, the literature provides little, if any, discussion of modelling. However, studies from related areas do provide some relevant insights. A common characteristic of online leaders is that they lead by example and they are typically the most active contributors [32]. These leaders are often effective communicators; they usually enjoy the challenge and chance to lead others, and, in exchange, seek power and prestige [58]. The results from a survey of 284 Internet groups (including both work-related and non-work groups) demonstrate that salient individuals within these groups, such as owners, have a substantial influence over group members'

participation levels [12]. Thus, based on theory and reported findings in the literature, we advance the following hypothesis:

Hypothesis 3. The personal engagement of the wiki owners will exert a positive effect on the engagement of group members.

In addition to tracking the behavior of the owner, wiki group members may also be affected by inferences regarding the owner's regulatory focus. Drawing on social cognitive theory [9], we expect that salient individuals within the wiki group, who model a strong promotion focus through their contributions and related attitudes, thoughts, or acts, effectively signal to members their desire to achieve an ideal state. The effect of modeled promotion focus should be to increase in members their level promotion self-regulation, and, in turn, goal-relevant behavior. We see support for this idea in the literature. Although studied in a different context, Neubert et al. [49] demonstrated that the level of promotion and prevention focus experienced by employees, and the resulting behaviors, reflected the employees' inferences regarding the motives of their leader (e.g., employees who perceived their leader to have a strong promotion focus were more likely to internalize this motive). To the extent that observers align their motives and behavior with a social referent, then the level of promotion focus demonstrated by the wiki owner should be reflected in elevated group engagement (cf. [37]). In Internet wikis, community leaders typically use multiple discourse channels to broadcast themselves and their messages, and they often make the effort to welcome newcomers and educate them on community norms [21]. In corporate settings, wiki owners can use additional channels to broadcast their values and motivation, including face-to-face and through a variety of organizational communication tools. We, thus, hypothesize:

Hypothesis 4. An owner's promotion focus will be positively related to his group members' engagement.

An implication of regulatory focus theory is that individuals who have a strong prevention focus are sensitive and responsive to external contingencies, such as social pressures, obligations, and responsibilities [1]. Again, in a general sense, a trade-off with prevention focus is that prudent and "safe" responses can lead to lower overall engagement in wiki context – perhaps greater accuracy in what is actually produced, but less in the way of riskier or innovative contributions (e.g., [22]). Salient individuals within the wiki who demonstrate or model risk-averse values, attitudes, thoughts and behaviors should increase, in observers, the likelihood of more careful and guarded responding. So, rather than optimal performance, group members are cued by the owner to maintain (and guard) the status quo by fulfilling their basic transactional responsibilities and obligations (cf. [37]). For these reasons, wiki owners who model prevention self-regulation, all else equal, should decrease rather than increase group members' engagement (cf. [49]).

Hypothesis 5. An owner's prevention focus will be negatively related to his group members' engagement.

The Proposed Model

Our proposed model includes a set of five hypotheses. First, causal paths were specified between the owner's regulatory foci and his or her engagement (Hypothesis 1 and 2). Second, Hypothesis 3 reflected the causal path between the owner's engagement and the group members' engagement. Finally, causal paths were specified between the owner's regulatory foci and group members' engagement (Hypotheses 4 and 5).

Method

The methodology used in our study involved a web survey and an archival analysis of wiki usage logs. Before describing our measures and procedures, it would helpful to provide some important contextual information with respect to the host organization.

The Organizational Context

IBM Corporation is a global organization with over 350,000 employees that designs hardware, develops software, and engages in professional services. This corporation was a particularly appropriate research site given that IBM has a very large and growing group of wiki users. Wikis are managed as a 'wiki farm', where administration is central and each employee can instantaneously create his own wiki. An internal analysis conducted by IBM revealed that the two most popular applications of wikis are as a document management system and as a collaboration tool. When the wiki serves an IBM project group, access is commonly restricted to those employees working on the specific project; and when the wiki serves a community of practice, the wiki is open to all employees interested in the topic. At IBM, anonymous postings are not possible, and each wiki edit is associated with a specific employee.

As outlined previously, we focused our analysis on wiki owners. Similar to other settings, the term 'owner' is used at IBM to refer to the individual who takes charge of the wiki and drives participation. There are four primary mechanisms by which IBM wiki owners influence group members' engagement. First, they act as role models and lead by example; they contribute content to the wiki, integrate the groups' various postings, and play an important role in the administration tasks. Second, owners play an active role in driving wiki adoption within their groups, relying on the wiki and other communication tools to correspond with others. In the cases where the owner is a manager, she may dictate that the wiki is used for the specific project, and may assign employees

to specific wiki tasks. Third, by nature of their technical responsibilities, owners can set access privileges, restricting participation to a selected group. Lastly, owners are often responsible for determining the overall look and feel of the wiki (e.g. by selecting templates that determine how information is presented), and usability is an important factor in driving adoption.

Sample, Design, and Procedure

Data was collected from two primary sources. With the exception of the group members' engagement measure that was estimated based on wiki usage logs, all of our measures were assessed using a web survey of wiki owners. At the time of our study, IBM ran roughly 13,000 distinct wiki applications. An announcement regarding the survey appeared in the homepage of IBM wikis that all active wiki owners could have seen, but the exact number of people who read the announcement is not known. This mass announcement would be similar to an advertisement in an industry magazine inviting survey participation. Our web survey was administered internally and was open for eight weeks, where participants self-identified themselves as owners. Although an 'owner' is not a formal position within IBM and it is possible that in a fluid and dynamic wiki context the ownership role may change hands over time, the fact that owners hold special access privileges within the wiki system entails that there is no ambiguity regarding who serves in the owner role[4] and at the specific point in time when the survey was conducted wiki owners had no problem self identifying. To address concern for non-response bias, we compared early versus late respondents of the survey, and found no significant differences.

In order to measure group members' engagement, we extracted wiki usage data for the three months *after* the web-survey was closed for all the active wikis within four organizational units: Global Business Services, Information Technology Services, Sales and Distribution, and the

[4] IBM's central wiki page (http://www-01.ibm.com/software/lotus/products/connections/wikis.html) describes that "the wiki owner can control access to the wiki and assign read access, write access, or manager access privileges"

Software Group[5]. In total, our respondent sample consisted of 187 wiki projects for which we had both survey data and system usage logs. Each of these wiki projects had a unique wiki owner. In addition to the survey and system logs, our knowledge of the IBM wiki context was also informed by ongoing conversations (face-to-face, phone, e-mail) with IBM's central wiki administration unit.

Our intention in this study was not to focus on a specific wiki usage but rather to try and capture the breadth of wiki usage at IBM, and the wikis in our sample represent a broad spectrum of wiki applications in terms of the business unit (as described above), organizational functions (including engineers, project managers, marketing and sales people, IT specialists, and consultants), group size (from a handful of group members to wikis with over sixty active contributors), and overall group activity (from dormant wikis to those with hundreds of edits per month).

Study Measures

Owners provided data on their regulatory focus and wiki engagement. Measures (indicators) of these concepts were developed for this study based on literature-based definitions, and on input from subject matter experts at IBM. Subjects rated each item on a 5-point Likert scale. See Table 1 for a complete listing of the survey items.

Two contextualized items were used to sample the concept domain of *promotion focus*: "My participation in the wiki is very relevant to my personal goals," and "Wiki participation has benefited me in my job." Both of these items reflect a motivational state characterized by a concern for growth, advancement and accomplishment [29]. Likewise, two contextualized items were used to sample the concept of *prevention focus*: "When I use the wiki I'm aware that I might let others down if I don't perform well," and "When using the wiki, I'm very aware of the consequences of not performing effectively." Both items reflect a motivational state where

[5] These 4 organization units represent 76% of all IBM wiki users.

attention, effort, and goal-directed activity is directed towards meeting one's contractual responsibilities and duties, meeting other's expectations, and complying with external reward contingencies [29]. To our knowledge, a consensus has yet to emerge concerning the measurement of situationally-induced regulatory focus. However, the nature of the items used to assess both regulatory foci in this study mirror what has typically been reported in the literature (e.g., [43, 49, 72]). Finally, *owner's engagement* was measured in line with prior studies in a similar context [28, 63], and we employed two self-reported items regarding the weekly amount of time the owners spent reading and contributing content to the wiki.

To assess the degree of *group member engagement* we collected data from usage logs provided by IBM. We employed four metrics of wiki usage: the number of (a) 'edits', (b) unique visitors, (c) and web page 'hits', as well as (d) the amount of content downloaded (i.e. bandwidth). While the first metric captures active participation (i.e. changing the wiki contents), the latter three metrics capture overall participation: both active and passive (i.e. reading wiki contents). Together, these metrics represent a comprehensive picture of wiki users' engagement. Our interest here is in the engagement of the average group member, thus we divided wiki usage metrics by the number of group members. This measure controls for the size of the wiki group, which is essential given that larger groups are expected to collectively generate more activity. We used the metrics' average over these three months as our indicator, and members' engagement was modeled as a reflective variable of the four metrics (number of edits, visitors, page hits, and bandwidth). Due to the power distribution of the data, the usage metrics were natural log-transformed.

Control variables. To control for exogenous effects in our model, we included four control variables: owner's job scope perceptions, perceived ease of use, wiki maturity, and the number of active contributors. First, by measuring owner's perceptions of the wiki job, we control for

differences in wiki applications. To control for the psychological properties of different wikis, we assessed perceptions of skill variety, task identity, task significance, autonomy, and feedback [26]. For each owner, a motivating potential score was computed by following the recommendations of Hackman and Oldham [26] (i.e., averaging the first three, then multiplying that score by the autonomy and feedback scores). Second, *ease of use* has been shown to impact technology adoption decision in a variety of settings [67], suggesting that ease of use is an important factor in wiki adoption. We thus included *ease of use* as a control variable. Third, since users are more engaged in certain phases of the project life cycle than in others, we controlled for *wiki maturity*, measured through the number of months since the wiki was instantiated. Lastly, we controlled for the *number of active wiki group members*, since it is possible that in order for wikis to grab traction, a number of users must first become active, and thus it is possible that wikis with low number of members would yield relatively low engagement levels. We have included paths from the four control variables to both dependent variables (*owner engagement* and *members' engagement*).

Results

Descriptive statistics are reported in Table 1 below.

Insert Table 1 here

Proposed Measurement Model: Convergent and Discriminant Validity

The convergent validity of our measurement model was assessed in several ways. First, we examined several competing measurement models to see if they provided a better explanation for our data. This is particularly relevant for the set of self-reported measures, where the possibility of common-method variance introduces an alternate measurement model [56]. Confirmatory factor

analyses were then performed using *LISREL* 8.80 [35]. We compared three different measurement models: (a) the null model (all indicator variables are independent), (b) a one-factor model (all indicator variables load on a single factor), and (c) a five-factor model: two indicators of promotion focus, two indicators of prevention focus, two indicators of owners' behavior, two indicators of ease of use, and a single indicator of job scope. Of the three measurement models tested, the proposed five factor model provided the best explanation for the observed variance and covariance among the set of self-reported indicator variables: null model (χ^2 = 505.94, *df*= 36); one-factor model (χ^2 = 193.43, *df*= 27; *RMSEA*= .182; *CFI*= .615); and the five-factor model (χ^2 = 33.99, *df*= 18; *RMSEA*= .069; *CFI*= .966)[6], thus suggesting that the risk of common method bias is low.

In addition, we employed *Partial Least Squares* (PLS) path-modeling algorithm [2] to assess the reliability of our measures (as well as the structural model, as reported below). The PLS algorithm estimates path models using composite variables, sometimes called latent variables, from a number of indicator items, sometimes referred to as manifest variables. In this respect, the variance-based Partial Least Squares (PLS) path modeling is similar to covariance-based structural equation modeling (SEM), such as LISREL [35], because both algorithms estimate complex relations between several latent variables simultaneously. Nevertheless, a number of conceptual and formal differences make PLS path modeling especially suited for this study. Although both PLS and SEM may suffer when sample size is very small and with non-normally distributed data [60], the PLS algorithm performs better in these conditions and is more robust when assumptions of normality are violated [13]. This was an important consideration for choosing to use PLS in our study, given that some of the variables are not normally distributed.

[6] In addition to the chi-square statistic, we report an index of absolute and relative fit. The root mean square error of approximation (RMSEA; [65]) is an absolute fit index that assesses how well an a priori model reproduces the sample data. RMSEA values below 0.08 indicate a reasonable fit and those below 0.05 indicate a good fit. The comparative fit index (CFI) [10] is a relative or incremental fit index that reflects the improvement in fit by comparing the target model with a more restricted baseline model, such as the null model. Values of CFI greater than 0.90 indicate a good fit.

Using PLS, an index of internal consistency was computed for each multi-item scale (please refer to Table 2 for details). Composite reliability values of 0.78, 0.86, 0.90, 0.97, and 0.86 were found for: promotion focus, prevention focus, owner's engagement, members' engagement, and the control variable ease of use, respectively. In addition, we analyzed the individual loadings of an item on its corresponding underlying factor, as well as by the Average Variance Extracted (AVE). All item loadings on their relevant construct were greater than 0.70, with the exception of one promotion-focus item (loading was 0.61). The AVE for each construct was greater than the suggested minimum of 0.50 [20] (0.65, 0.75, 0.82, 0.90, and 0.75, for promotion focus, prevention focus, owner's engagement, members' engagement, and ease of use, respectively). Taken as a whole, the evidence supports the convergent validity of the proposed measurement model. Please see Table 2 for details of composite reliability and AVE and Table 3 for item loadings.

We assessed discriminant validity by comparing the square root of the AVE (RAVE) of a particular construct (presented in Table 2 on the diagonal, in bold) and the correlation between that construct and other latent constructs (presented by the off-diagonal position). We found that the constructs' RAVE ranges from 0.80 to 0.95, while correlations between constructs did not exceed the recommended threshold of 0.5. Moreover, RAVE for every construct is substantially higher than the correlation between that construct and all other constructs. In addition, in all cases, items loaded on their relevant construct substantially higher than any cross-loadings. Having established reliable and valid measures, we tested the study hypotheses by assessing the extent to which the proposed model fit the observed pattern of variance and covariance among the study's measures.

Insert Table 2 here

Insert Table 3 here

Hypothesis Testing: Assessing the Fit of the Structural Model

The specified paths in the structural model corresponded to the hypothesized relationships. The significance of structural path estimates was computed using the bootstrapping re-sampling method with 800 re-samples. The structural model was evaluated on the basis of the statistical significance of structural paths and the R^2 for each composite latent variable. Figure 1 shows the results.

Insert Figure 1 here

The resultant model in Figure 1 explains 18% of the variance of owner's engagement[7] and 32% of the variance for members' engagement. The results of the PLS analysis provide support for all of the proposed hypotheses, confirming that regulatory focus motivations yield two countervailing effects on wiki engagement levels: promotion focus affects engagement (for both owner and members) positively, whereas prevention focus exerts a negative effect on engagement (for both owner and members). The outcome variable, members' engagement, was impacted significantly by owner's engagement (Hypothesis 3; effect = 0.16; $p < 0.001$), as well as by both motives: a positive impact by promotion focus (Hypothesis 4; effect = 0.19; $p < 0.001$) and a

[7] It is possible that the measure of members' engagement includes also the owner's engagement. Since wiki logs did not contain data regarding individual contributors, there is no straightforward way for teasing out members' only activity from the total activity figures. In order to validate that this does not impact our results, we worked to estimate members' only activity by utilizing data regarding wikis' total number of distinct editors. We made a series of approximations, and for each we adjusted the data set and re-ran the model. First, we assumed that the owner is actively editing the wiki at least once every month, thus in the cases where the total number of editors for that month was 1, we associated all edit activity with the owner and assumed that other group members' activity was zero. Second, based on the assumption that the owner is actively editing the wiki at least once a month, we calculated the number of member non-owner editors to be the total number of editors minus one (i.e. the owner). We then calculated the average wiki edit activity as the total activity divided by the revised number of members. Third, by relying on (a) an internal IBM report showing that on average owners are active 1.5 times as non-owners and (b) the data regarding the number of distinct editors, we were able to approximate how much of the total activity is associated with the owner and how much of it is members' activity (for example, looking at the averages across all wiki groups, the average group activity is 12 monthly edits and the number of active contributors is 5; the owner's average activity is 3.3 edits/month and the average for the four non-owner member is 2.2 edits/month). We then calculated the average number of edits as (approximated) members' only activity divided by the number of members (excluding owner). For each of these three approximations, we separately re-ran our data analysis, and the results for the three modified data sets were essentially the same as our original data set (i.e. all the paths that are significant using the original data set are still significant), This demonstrates that our results are not sensitive to the 'purity' of members' engagement measurement (i.e. whether it includes owners' engagement or not).

negative impact by prevention focus (Hypothesis 5; effect = -0.14; $p<0.001$). Owner's engagement was similarly significantly impacted by both motives: a positive impact by promotion focus (Hypothesis 1; effect = 0.22; $p< 0.001$) and a negative impact by prevention focus (Hypothesis 2; effect = -0.06; $p<0.05$). The control variables have contributed substantially to explaining the variance in the outcome variable, increasing R^2 from17% to 32%. Three of these controls – motivating potential score, wiki maturity, and the number of contributors - exerted significant impacts on both owner's and members' engagement (all effects were positive, with the exception for the effect of wiki maturity on members' activity), while the effects of 'ease of use' were significant only on members' engagement.

Discussion

Wiki is a conversational KMS that has the potential to alleviate the bottlenecks associated with traditional KMS [46, 69]. In addition to being conversational, wikis allow users to explicate knowledge and create document repositories, where codifying knowledge from other conversational KMS (e.g. discussion forums) would have been extremely difficult and costly [4, 27]. Users' willingness to share information is paramount to the success of wiki-enabled KM projects. While people voluntarily share information online, organizations often fail to stimulate the sharing of knowledge and convince employees to contribute knowledge to KMS, even when monetary incentives are used [74]. Without a more comprehensive understanding of the underlying motivational processes that drive individual and group knowledge-sharing behavior, it would be difficult to explain engagement in wiki-enabled KM [44]. Moreover, we recognize that e-leaders, such as wiki owners, are influential characters within this context, yet little is known about how owners influence the engagement of other wiki group members.

The need for a more complete explanation of how e-leaders (and particularly, wiki owners) shape the knowledge sharing process and user participation required us to draw upon two prominent psychological theories of motivation, regulatory focus theory [29] and social cognitive theory [9]. Our approach was necessary because "there are no coherent, integrated, and theoretical frameworks of the motivational factors that explain how knowledge is transferred between knowledge providers and recipients" [59] (pp. 71). Consistent with the "middle range" approach to theory development (cf. [39]), we integrate the concepts of regulatory focus theory and social cognitive theory to offer a more complete explanation of how e-leaders (and particularly, wiki owners) shape the group's knowledge sharing processes. Overall the pattern of findings provided empirical support for our model, and our study explains how wiki owners' orientation affects others, both directly (i.e. signaling) and indirectly (i.e. directing owner's actions, which in turn affect group members' behavior). We now review the major findings and discuss their implications for theory and practice.

Our findings confirmed the predictions of regulatory focus theory [29] that the motivation experienced by wiki owners reflected a resolution of two distinct self-regulating motives – one directed toward growth and achievement (promotion focus) and one directed toward personal safety, loss prevention, and security (prevention focus). As predicted from regulatory focus theory [29], the level of promotion and prevention focused regulation experienced by owners were found to exert a positive and negative effect, respectively, on the owners' own behavior (wiki engagement). This finding is in line with the results from a recent study in the context of self-service technologies [75]. Moreover, our findings are also consistent with the predictions of social cognitive theory [9], inasmuch as members of a wiki group attend to and model the values, attitudes, orientations and behaviors of wiki owners. This result confirms the essential role of

owners in evoking participation and engagement within wikis. Other members of the wiki group interpret the owner's engagement, as well as inferences about underlying motives, as social cues that shape their own behavior.

We observed that the same wiki-based KM work context evokes a promotion focused motive *concurrently* evokes a degree of prevention-oriented regulation. This is interesting, and counterintuitive, because open KMS (and particularly wiki-based systems) are intended to foster collaboration and knowledge sharing, might inadvertently bring about a motivational state that impedes or inhibits engagement in IT-mediated KM initiatives. Even wiki owners, who are likely strong advocates of the technology itself, were found to be sensitive to the negative outcomes associated with wiki-mediated task experiences, at least in the context of our study. We argued that wikis' openness and transparency would produce a cautious, more guarded, response within owners, and hypothesized that this prevention-orientation would result in lower engagement levels. This hypothesis was supported.

To date, the literature on wikis emphasized the positive aspects of the technology [4, 69-71]. Recent evidence, however, suggests that wiki affordances may give rise to risk-avoiding behavior [34, 44]. For example, interviews of corporate wiki users [15, 30] revealed concerns that sharing of information would later be used against the contributor, as well as unease in making information accessible to the rest of the corporation when it was not "finished"; in addition, the interviews revealed that wiki users were reluctant to change what they perceived to be "someone else's content" and often they would provide feedback to the contributor outside the wiki. Our integrative model provides a lens to understand these evidence and shed light on how the experiences associated with wiki work can lead to risk avoidance and impede engagement, especially in a corporate setting where perceptions of competence can significantly affect one's career. This

finding makes a contribution beyond the investigation of corporate wikis to the broader study of motivation for KM. While a range of promotion-focus motives have been shown to affect knowledge sharing in organizational and Internet settings [11, 36, 50, 51, 63, 73, 74], the concerns and personal risks inhibiting sharing within KMS help to complete the story. Our findings regarding the effects of prevention-focus orientation are, thus, of particular, significance.

It would seem, however, that engagement within the wiki group is not just affected by members' first-hand experiences of wiki-mediated work and the resulting motivational states (as was found for owners in our study), but also affected by the key individuals within the wiki group. Based on theory and the pattern of effects in our study, evidently the wiki owners in our context served as behavioral models. This finding confirms the notion that innovation and creative development can emerge through the modeling of values, attitudes, and patterns of thought and behavior to others [9]. One explanation for this effect is that group members, especially in dynamic, uncertain, and highly interactive contexts, will rely on mutual adjustment to coordinate their activities. In these situations, all eyes will be on each other and on significant individuals for cues that signal what to do. We see that the stronger the owner's orientation toward personal growth and achievement, the more likely it was that group members became engaged in the knowledge-creation process. Interestingly, we also saw that the stronger the owner's orientation towards safety and security exerted a countervailing influence on the engagement of the group.

Our integrative model asserts that the variance in the engagement of group members is, in part, a direct function of the owner's behavior. We based this assertion directly on the tenets of social cognitive theory [9]. Our findings confirm the logic of social and observational learning inasmuch as owners provide salient behavioral cues for users. This makes sense especially within the confines of social system where members frequently interact and have ample opportunities to

influence each other through their on-task and off-task activities. While we acknowledge that the concepts in Figure 1, to some extent, are bound together within a non-recursive causal system, in the present study, the temporal relation between the owner-based measures and the group measure allowed us to assess the effect of the owner on the wiki group. Thus, while alternative causal specifications exit, these explanations do not discount the logic or interpretation of our findings.

Finally, theoretical framework has implications for the role of e-leaders, and in particular wiki owners. A natural extension of our work would be, then, to explore the motivational and behavioral influence of alternative referent individuals within the wiki context, and to study the extent to which our theoretical framework holds for these alternative referents.

Implications for Knowledge Management

Industries are seeing the breakup of large traditional organizations and the emergence of new, networked organizational forms, in which work is conducted by temporary teams that cross organizational lines [48]. It has been suggested that answers to questions regarding the motivation for contributing to open source projects and Wikipedia can reveal important lessons for organizations regarding ways for motivating knowledge workers, as well as for the process of managing various types of virtual organizations, such as ad hoc project teams, virtual teams, and communities of practice [8, 44, 48, 78]. Markus et al [48] argue that "traditional organizations should consider ways to shift from the management of knowledge workers …to the self-governance of knowledge work" (p. 15). Our study suggests that when IT is employed to support open KM, special attention should be given to the affordances of that technology.

Wiki is conversational system that is intended for open KM. Wikis' design philosophy (i.e. 'The Wiki Way' [42]) stresses egalitarianism, openness, and peer governance; it is possible that when wikis are implemented in an environment that is hierarchical in nature, promotes competition,

and is not tolerant towards errors, employees would apply wikis in ways that disagree with wikis' affordances (e.g. an over-careful editing mode that limits the number of contributions). This tension has led some to challenge the extent to which wikis could success in corporate settings [4, 15, 25], suggesting that either wikis would need to be modified to more effectively support organizational knowledge management initiatives [6, 77] or that organization implementing wikis would adopt more collaborative and open work practices [27, 34, 45].

The implications of our findings for the management of wikis in corporate environments would be, essentially, to align the organizational procedures surrounding wiki deployment with the technology's affordances, namely to accentuate aspects of the technology and the social context that evoke promotion focus and attempt to minimize those that foster prevention-focused regulation. This is not easy, as inducements that reduce employees' risks can at the same time curb the positive effects of promotion focus. One example is making wiki postings anonymous, which reduces the risk of exposing incompetency, but at the same time prevents promotion-oriented users from claiming credit for their wiki work. A possible solution would be to *allow* (but not mandate) anonymous postings, addressing the needs of both prevention and promotion oriented employees. Another example of a managerial intervention that would enhance promotion focus without directly affecting prevention focus is incentivizing knowledge sharing by recognizing top contributors or alternatively by providing group-based incentives. Firms adopting wikis often experiment with different deployment strategies, and in some cases managers may decide to formally assign employees to the wiki editing task [38]. Such a deployment strategy does not align well with wikis' affordances, and we suspect that it could have undesirable implications for contributors' motivation. Another important managerial implication is to actively monitor social interaction within the wikis, with the understanding that group members will look to salient others. Drucker's

[18] view that leaders must direct people as if they were unpaid volunteers is particularly relevant to open KM and to e-leaders' roles. In particular, owners within a corporate wiki context can have a very powerful effect on shaping the values, attitudes, motives and behaviors of others. Paying attention to these processes is certainly a first step in understanding why some open KM initiatives produce less-than-satisfactory outcomes.

The pattern of relations in our proposed model was hypothesized for the specific context of wikis used in organizational settings, and the strengths of the paths we observed represent this unique context. However, it is reasonable to expect that this pattern of relations would apply to other types of open KMS. The causal paths in our model are directly related to wikis affordances, for example wikis' openness and transparency are likely to have contributed to the links between regulation focus and wiki engagement constructs. The extent that the pattern of relations applies to other technologies depends on the affordances of these tools, and we expect to see similar patterns for technologies whose affordances resemble wiki affordances. The natural candidates are other conversational KMS. While there are some apparent similarities between these tools and wikis, we should note important differences [5, 70]. For instance, in discussion forums contributors' postings are appended in an ongoing conversation style, while in wikis a new contribution overwrites the older version. Accordingly, the risk associated with challenging the opinions of others is larger in wikis, and we expect prevention focus to play a more salient role in the wiki context.

Study Limitations

Any conclusions drawn from this study should be considered in light of several limitations. First, although using a convenience sample for testing basic psychological mechanisms is a common practice (cf. [64]) and is often used in the information systems field (e.g. [61]), it does limit the generalizability of the study's findings. Nonetheless, there are no plausible reasons to

suggest that owners in our sample should differ from the larger population of wiki owners at IBM in respect to the psychological and social processes studied, especially given the broad range of wikis (in terms of group size and activity) and diversity of owners (in terms of business unit and organizational function) in our sample. Another concern associated with the use of two items to sample regulatory focus, and the risk of lower reliabilities. We note, however, that measures with lower reliability make it *harder*, not easier, to find support for the theoretical predictions. Thus, in all likelihood, our results reflect lower-bound estimates of the true relations between constructs. The third limitation concerns our measure of group engagement. Based on IBM's data, owners account for 15%-20% of wiki group activity, on average. There was no straightforward way for teasing out members' only activity from the total activity figures. However, in order to test whether this limitation affected our calculations, we estimated members' only activity by utilizing data regarding wikis' total number of distinct editors and by making a series of approximations (please see details in Results section). This analysis demonstrated that our findings were not sensitive to these approximations, suggesting that that the inclusion of the owner makes insignificant difference to the overall group activity. Fourth, our model included relatively few explaining variable and it is possible that exogenous factors affected the model's constructs. In future research we plan to explore additional possible explanation for the relationship between owners' regulatory focus and group performance. In particular, in the future we plan to investigate the relationships between wiki affordances, job characteristics, motivation, and wiki engagement. Another interesting line of investigation we would like to pursue is the relation between organizational procedures surrounding wiki deployment and the motivational dynamics underlying wiki engagement. Finally, we acknowledge that there are some features unique to the IBM environment, and thus we should be cautious in generalizing our findings to other settings. Specifically, wikis were deployed at IBM in

hybrid fashion, where technology administration was largely centralized, but social management was grass-root fashion: top management did not mandate that IBMers use wikis for specific KM tasks; rather, management opted to make the technology available and allow employees to decide on wiki adoption themselves. It is not clear how well our results would transfer to corporate settings with different wiki deployment policies, and we propose that future research on wikis would consider the impact of governance.

Conclusion

We make contributions to the study of information systems, as well as to the broader study of organizational behavior and management. We have observed that most of the theoretical perspectives applied to KMS implicitly assume that knowledge-sharing activities are inherently benign. Naturally, the questions driving research in this area have tended to center on identifying the conditions that elicit knowledge sharing within and between groups. However, what seems missing in all of these discussions is the proverbial "elephant in the room." In corporate settings open KMS can create conditions that expose deficiencies and differences with respect to a group member's criterion-relevant abilities, knowledge, and experience – which, in turn, could damage status and reputation. In short, most of the motivational explanations of IT-enabled knowledge sharing activity fail to recognize that participation this activity, in and of itself, can incur risk. Failure to capture these realities leaves us with conceptual models that tell us, at best, half the story. By adapting regulatory focus theory [29] to this particular problem domain, we are able to model these two fundamental conflicting motivational mindsets – one that is oriented toward personal growth and achievement, and one that is oriented towards personal safety and security – and test the implications of these motivational states on behavior. Thus, the value for the information

systems literature, and knowledge management in particular, is to offer a more complete picture of the motivational dynamics that underlie IT-enabled knowledge-sharing activities within corporate environments. Specifically, our contribution is in showing that open KMS (and particularly wiki-based systems) that are designed to foster collaboration and knowledge sharing might inadvertently evoke a motivational state that impedes or inhibits engagement.

We also make a contribution to the broader management literature by explaining how the motivational states of focal individuals within an open KM context are contagious, affecting others. The literature on knowledge leadership [23, 57] and e-leadership [7] document how individuals within fluid, dynamic knowledge-based work settings take on important leadership roles; however, what seems missing is an explanation of how the behavior of a salient individual affects others within computer-mediated interactions. Our study extends earlier work by Kark and Van Dijk [37], who explain how followers use cues provided by leaders to impact their motivation. We demonstrate that inferences regarding an e-leader's motivational states have direct effects on the knowledge-sharing activity of followers, thus supporting the view that followers, within these knowledge-sharing contexts, respond to the social and informational cues of leaders.

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Tables

Table 1: Item details and descriptive statistics

Construct	Legend	Item	Mean	STD
Promotion Focus Regulation	Prom1	My participation in the wiki is very relevant to my personal goals.	4.35	0.76
	Prom2	Wiki participation has benefited me in my job.	4.30	0.72
Prevention Focus Regulation	Prev1	When I use the wiki I'm aware that I might let others down if I don't perform well.	3.82	1.02
	Prev2	When using the wiki, I'm very aware of the consequences of not performing effectively.	3.55	1.08
Owner's Engagement	OE1	What is the weekly amount of time you regularly spend contributing content to the wiki? (in hours [<1, 1-3, 4-6, 7-9, >10])	2.24	1.11
	OE2	What is the weekly amount of time you regularly spend reading the wiki you previously mentioned? (in hours [<1, 1-3, 4-6, 7-9, >10])	2.02	1.06
Members' Engagement	ME1	Average number of monthly edits	11.87	12.81
	ME2	Average number of monthly web site visits	79.96	135.66
	ME3	Average number of monthly web page hits	117.65	189.19
	ME4	Average number of monthly web site bandwidth (MB)	3.41	6.83
Ease of Use	EoU1	The wiki is easy to use	4.13	0.87
	EoU2	How satisfied are you with the wiki's overall ease of use?	3.97	0.99
Motivating Potential Score (MPS); an index MPS = Autonomy * Feedback * average (Skill Variety, Task Identity, Task Significance)	MPS1	[Skill Variety] The wiki requires me to use a number of complex or high-level skills.	53.11	27.78
	MPS2	[Task Identity] The wiki gives me a sense that I am performing a whole piece of work from start to finish.		
	MPS3	[Task Significance] A lot of people are affected by the quality of my wiki contribution.		
	MPS4	[Autonomy] I have considerable opportunity for independence and freedom in how I do my wiki work.		
	MPS5	[Feedback] I regularly get feedback about my wiki contributions.		
Wiki Maturity	WM	Number of months since wiki inception	7.91	4.60
Active Contributors	AC	Number of distinct editors per month	5.18	9.11

Note: statistics for items ME1-4 prior to log transformation.

Table 2: square-root of AVE and correlation between the latent constructs.

Constructs	*AVE*	*Composite Reliability*	*Prom FM*	*Prev FM*	*OE*	*ME*	*EoU*	*MPS*	*WM*	*NAC*
Promotion-Focus (PromFM)	0.65	0.78	**0.80**							
Prevention -Focus (PrevFM)	0.75	0.86	0.30	**0.86**						
Owner's Engagement (OE)	0.82	0.90	0.30	0.10	**0.91**					
Members' Engagement (ME)	0.90	0.97	0.33	-0.02	0.27	**0.95**				
[Control] Ease of Use (EoU)	0.75	0.86	0.31	0.20	0.10	0.19	**0.87**			
[Control] Motivating Potential Score (MPS) index	1.00	1.00	0.44	0.40	0.30	0.24	0.29	**1.00**		
[Control] Wiki Maturity (WM)	1.00	1.00	0.05	-0.11	-0.15	0.24	0.05	-0.08	**1.00**	
[Control] Number of Active Contributors (NAC)	1.00	1.00	0.20	0.02	0.20	0.42	0.12	0.12	0.26	**1.00**

Table 3: item loadings; loadings on relevant constructs are in bold.

Item	**Owner Promotion Focus**	**Owner Prevention Focus**	**Owner Engage.**	**Members Engage.**	**Ease of Use**	**MPS**	**Wiki Maturity**	**# Contributors**
Prom1	**0.61**	0.29	0.13	0.10	0.17	0.34	-0.05	0.03
Prom2	**0.96**	0.26	0.31	0.36	0.31	0.40	0.07	0.22
Prev1	0.27	**0.81**	0.07	-0.01	0.07	0.33	-0.10	-0.01
Prev2	0.27	**0.92**	0.10	-0.02	0.25	0.36	-0.10	0.04
OE1	0.25	0.09	**0.90**	0.20	-0.01	0.28	-0.21	0.14
OE2	0.30	0.10	**0.91**	0.30	0.19	0.27	-0.07	0.21
ME1	0.31	-0.05	0.24	**0.98**	0.16	0.24	0.26	0.42
ME2	0.30	-0.05	0.24	**0.99**	0.16	0.22	0.27	0.41
ME3	0.30	-0.06	0.23	**0.98**	0.17	0.22	0.29	0.41
ME4	0.37	0.10	0.35	**0.85**	0.25	0.26	0.09	0.37
EoU1	0.32	0.18	0.13	0.21	**0.97**	0.31	0.02	0.12
EoU2	0.18	0.22	0.00	0.09	**0.74**	0.15	0.12	0.07
MPS	0.44	0.40	0.30	0.24	0.29	**1.00**	-0.08	0.12
WM	0.05	-0.11	-0.15	0.24	0.05	-0.08	**1.00**	0.26
AC	0.20	0.02	0.20	0.42	0.12	0.12	0.26	**1.00**

Figures

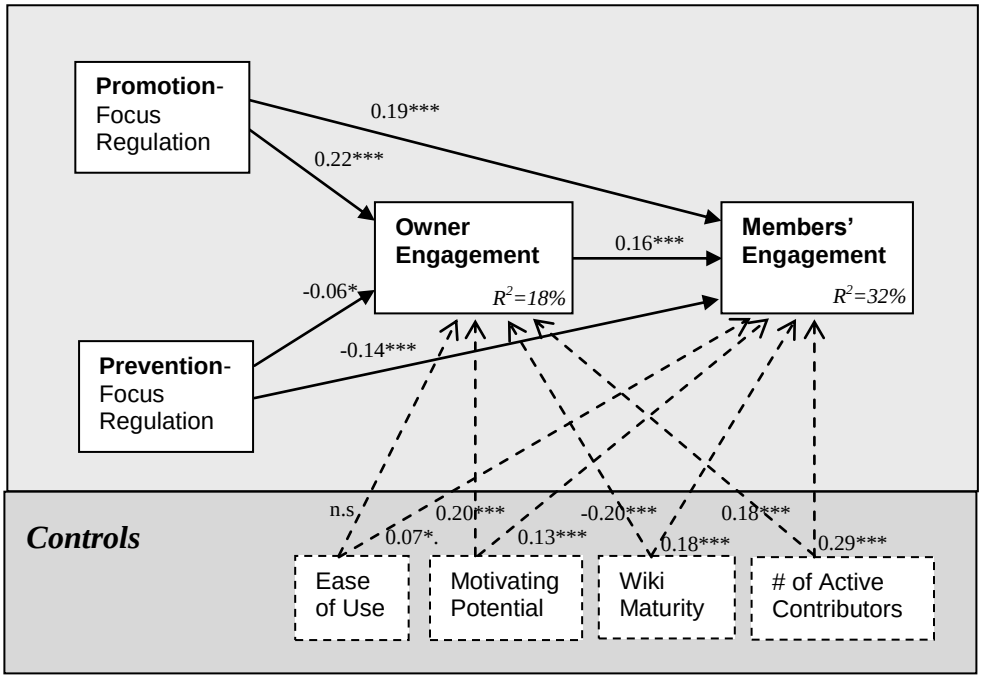

Figure 1: Results of PLS analysis; '*' signifies p<0.05; '**' p<0.01; and '***' p<0.001; values on arrow represent effect size and direction**;** R^2 values (*italicized*) in bottom-right corner of boxes show variance explained for construct.