



Research Article

Are business users social? A design experiment exploring information sharing in enterprise social systems

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Abstract

In recent years, social technology has changed the ways people collaborate and communicate. With the blurring boundaries between work and personal life, business software vendors have begun to deliberate on the possibilities for enhancing the rather rigid and impersonal structures in enterprise systems (ES) by integrating social features. In doing so, they frequently assume that business users share the same interaction patterns as private users. In this paper, we challenge this belief and explore the factors that stimulate business users to share information in ES environments. By means of a design experiment, we show different use scenarios and explore business users' attitudes toward open and unconditional information sharing in ES. Our results demonstrate that business users are less 'social' and that applying social features in ES is highly context dependent. Based on these findings, we offer recommendations for software vendors and researchers who are interested in the social enhancements of ES.

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Introduction

Since the emergence of the Internet, and particularly with the rise of social technologies, users have drastically changed the ways they interact with and appropriate value from technology (Allen, 2005; Benkler, 2006; Bonabeau, 2009). Inspired by platforms such as Facebook, Flickr, and Wikipedia, which have permeated nearly every aspect of our lives, the next wave of enterprise systems (ES) – commonly referred to as enterprise social systems (ESS) – promise a totally new user experience and value to enterprises (Chui *et al.*, 2012). Building a bridge to the Internet and relying heavily on web technology, ESS are frequently less formal, less structured, and less hierarchical than traditional ES and allow for a greater freedom of interaction (Cook, 2010).

The applications of ESS range from the business-related use of social networks (Trier and Richter, 2015), blogs/microblogs (Zhao and Rosson, 2009; Zhang *et al.*, 2010), and wikis for communicating and interaction with internal and external stakeholders of the company (Arazy *et al.*, 2009; McAfee, 2009), to more specialized applications that attempt to

leverage the newly available information from social technologies within traditional ES environments in order to improve service delivery efficiency, reputation, credibility, and consumer trust (Wang *et al.*, 2007).

In contrast to ES, which are rather *organization-wide* software packages (Strong and Volkoff, 2010) focused on streamlining and automating existing organizational work routines toward best practice business processes (Davenport, 1998; Huang *et al.*, 2009), and enabling access to company information in a more or less real-time environment (Nah *et al.*, 2001; Dorantes *et al.*, 2013), ESS therefore rather represent *globally interconnected, interpersonal* software packages that allows business users more spontaneous and flexible ways of knowledge-based operations (McAfee, 2009) and usually require a certain degree of open, unconditional information-sharing behavior in order to work appropriately (Tapscott and Williams, 2008).

Although prior literature has largely focused on explaining the nearly unbound potential of ESS for today's companies,

little is known about the actual compatibility of the underlying principles of enterprise and social software – respectively organization-wide *vs* inter-organizational and interpersonal ways of sharing information. Is it really possible to unite both world views? Are users in business contexts ready for a change of mind? In fact, evidence exists that the implementation and adaptation of both paradigms into a common system is not a trivial task (Li *et al.*, 2009). Wang *et al.* (2011) note that ‘the two systems [ES and ESS] have rather different natures [...] ERP and enterprise 2.0 systems are incompatible.’

Following this thread, it is the aim of this paper to enhance our understanding of the compatibility of the ‘social paradigm,’ which appears to be nearly uncontested by the extant literature on ESS. More precisely, we want to investigate the key phenomenon of *information sharing* in the ESS context by addressing the following research questions: (1) Are business users willing to openly and unconditionally share valuable business information in ESS? (2) Which factors positively or negatively influence business users to share their information in ESS?

In what follows, the next section reviews prior studies on the affordances of and tensions between social technologies and traditional ES. Recognizing the importance of information sharing for ESS to function properly, we then develop and test a set of hypotheses about business users’ motivations and doubts for voluntarily and openly sharing information with others on interconnected and interpersonal ESS. Based on the evidence we obtained from our design experiments, we then discuss the practical and theoretical implications of information sharing in ESS settings. We end with the description of limitations of the study and some considerations of possible future research directions.

Affordances and tensions between social technologies and traditional enterprise systems

In order to examine how a technology merges with an existing organizational setting for unfolding its potential, prior research has suggested to focus on the investigation of the affordances of an artifact as opposed to a consideration of pure technological features (Leonardi, 2011; Volkoff and Strong, 2013; Fayard and Weeks, 2014). In this view, the term ‘affordance’ can be understood as a relational concept that connects the materiality of a technological artifact with the subjective goals and perceptions of its users, such that the same technology may provide different affordances to different users albeit materiality exists independent from them (Treem and Leonardi, 2013). Accordingly, such an approach offers a way of theorizing about ESS, which acknowledges human behavior and the materiality of the IT artifact without being either socially or technologically deterministic (Ellison *et al.*, 2015).

In the following sections we therefore compare the affordances of ES and social technologies to get a better understanding of the possible tensions that may emerge when combining both perspectives in an ESS setting.

An affordance perspective on traditional ES

Enterprise systems were developed and implemented under the assumption that organizations have objectives and that individuals working in organizations are purposeful and goal

seeking, although their goals may differ from the ideal state (Kayas *et al.*, 2008). To engage workers in instrumental rational action so that the company’s objectives are accomplished, a major affordance of ES is to provide greater *control* over employee’s work behavior and a company’s operations (Lowe and Locke, 2008; Maas *et al.*, 2014). Many scholars have noted that the ES structuredness and formality are key enablers for increasing organizational control. For instance, Sia *et al.* (2002) found that ES afford managers a greater ability to verify procedural adherence of internal processes by gathering, tracking, reporting, and analyzing structured information. Clark (2012) extended this view by describing the potentials of leveraging the information in ES for additionally improving external processes control (e.g. outsourcing partners).

Together with greater control, ES also afford an increase in *efficiency* of operations and productivity, as well as information sharing between distinct departments and divisions. Prior research has highlighted this particular affordance of ES in several studies (Lau, 2004; Hendricks *et al.*, 2007; Park and Park, 2015). Whether through process, functional, or layout standards, regulated and normalized information collection, exchange, and presentation has been of utmost importance for attaining superior efficiency (Gattiker and Goodhue, 2004; Rachuri *et al.*, 2008).

Standardized information collection and exchange has also largely improved *interoperability* within and partially also across firms (Vernadat, 2007; Bharadwaj *et al.*, 2013). ES built upon rule-based systems, agent architectures, inference engines, and other technologies have helped to overcome semantic heterogeneities such that information sharing – to some extent – could be automatized.

Lastly, ES has allowed companies to align strategic, informational, and operational needs (Bendoly and Jacobs, 2004; Velcu, 2010; Mamoghli *et al.*, 2015). Because institutional structures develop cumulatively over time as organizations interact with their environment, ES have supported this constant *alignment* by vertically, horizontally, and technically integrating – to a large extent – structured information for ultimately improving decision support capability as well as control over recipients and timing of information exchange (Seethamraju and Seethamraju, 2009; Trinh *et al.*, 2012).

An affordance perspective on social technologies

With the proliferation of the social paradigm and the fact that the Web 2.0 has permeated almost every part of our private and business life, more recent studies have also started to explore the organizational affordances of social technologies (Majchrzak *et al.*, 2013; Treem and Leonardi, 2013; Ellison *et al.*, 2015).

The reviewed literature revealed that a key affordance of social technologies is to make behaviors, preferences, relationships, and knowledge unrestrictedly perceptible to others (Cross *et al.*, 2003; Leonardi, 2014). According to Treem and Leonardi (2013), this increased *visibility* has the potential to present information communally, which means contributions can be easily located and viewed by other co-workers, as well as even generate meta-knowledge that is not available in any traditional ES knowledge repository or elsewhere. In addition, posts, comments, status updates, votes, revisions, and other forms of information sharing frequently afford improved

transparency of ongoing organizational activities (Zhao and Rosson, 2009).

An additional affordance of social technologies is the ability to make information accessible to co-workers without restrictions or expiration date. Many scholars have noted that *persistence* is a major characteristic of social technologies since they afford a robust way of communicating, which is hard to destroy or compromise (Treem and Leonardi, 2013), and in most instances also permit new ways of content creation and storage beyond structured forms as used predominantly in ES (Ellison *et al.*, 2015).

Since persistence and visibility enable information-sharing practices that persist over time, and as such can cause consequences long after the initial point of sharing, social technologies frequently allow users to modify or revise content they have already communicated, including straightforward acts such as editing a spelling error or deleting content (Treem and Leonardi, 2013). The affordance of *editability*, such as implemented in open-editing and consensus-seeking structures in social technologies, thereby not only facilitates employees to edit, revise, and alter organizational content, but also considerably enhance the quality of shared information (Arazy *et al.*, 2009).

By definition, social technologies enable the creation and disclosure of social connections. In doing so, *associations* are established between individuals or between individuals and content. In its original form, social technologies afford users to articulate person-to-person relationships as well as the belonging to a group (Ellison *et al.*, 2015). In addition, research revealed that social technologies could also be used for making a claim on or establishing an explicit association with shared information. Following Treem and Leonardi (2013), these explicit associations regarding the source, quality, and usefulness of information may foster novel participatory and collaborative forms of working and improve content use in organizations.

Tensions between ES and social technology: The ESS melting pot dilemma

Merging the two systems and worldviews creates tensions, which in one way or another influences information-sharing behavior of business users (Allen, 2005). Conversely, information sharing is a crucial prerequisite for ESS to function properly (Carbone *et al.*, 2012). Before we have a closer look at the determinants of information sharing, we will now examine the tensions between ES and social technologies in more detail (cf. Figure 1).

Prior research has shown that increased information sharing generally has the potential to improve a company's productivity, flexibility, innovation, and learning (Lee *et al.*, 2000; Fu-Ren *et al.*, 2002; Wu, 2008). Consequently, the belief that information sharing is a standard, correct, and socially expected behavior at work has long been an underlying assumption of many research studies and a sufficient reason not to question otherwise (Wittenbaum *et al.*, 2004). It is not surprising, therefore, that research in the area of social software also frequently follows this belief. For instance, Bruno *et al.* (2011) argue that social software is built according to the ideas of egalitarianism, weak ties, co-production, and collaboration with the intention of 'encouraging a maximum of contributors and of getting the best solution by fusing a

high number of contributions.' More enthusiastically, Cyphers (2008) states that social software will empower business users to become 'fearless and willing to engage with co-workers, customers, vendors, and executives to find solutions and create systems that are for the good of the whole.' This is in contrast to the rather conditional information exchange practices in ES.

As we have demonstrated in the previous section, a motivation to use social technologies is the increased visibility, persistence, and externalization of existing or emergent associations. However, this contrasts the urge for organizational control. ES comprise many governance mechanisms, which not only restrict how information is generated and presented, but also how users may access and distribute information. Accordingly, the use of social technologies may create a tension in that ES formal socialization efforts, based on strict control of information doled out to employees, may become undermined by widespread informal communication (Zhao and Rosson, 2009).

According to Wang *et al.* (2011), this informality will enhance harmonious, social interaction. But the possibilities to persistently edit, revise, and alter organizational information may diminish efficiency and possibly also interoperability, since information will be rather weakly structured, semantically loaded, continuously changing, and therefore difficult to integrate in well-structured ES environments (Bruno *et al.*, 2011). These spontaneous, informal social interactions between individuals and content additionally create a tension related to the rather well-planned and centralized efforts to align organizational functions and processes within and across a firm (Bendoly and Jacobs, 2004; Mamoghli *et al.*, 2015).

Determinants of information sharing in ess settings

Without doubt, ESS open up many new opportunities for companies to share and make use of information within and across their own boundaries. As we will describe in the next sections, the application of social features by Internet-enabled ESS, such as social bookmarking and rating of suppliers, establishes many improvements compared with traditional, not socially enhanced ES. However, the previously discussed tensions may influence a business user's willingness of information sharing, the kind of information that is shared, and expectancy of the returns from information sharing.

Relatively little research has explored the concept of *information sharing* in the context of ESS. Although a number of studies suggest that information sharing in business contexts follows different rules from those in private life, the reasons for differing behaviors are still unclear (Du *et al.*, 2012; von Krogh, 2012).

In this section we therefore describe the major determinants of information sharing in ESS settings. A better understanding of this phenomenon is important because it may allow software vendors and ESS companies to establish more effective incentive mechanisms that are specifically designed to encourage the sharing of highly business-relevant information (Manatsa and McLaren, 2008).

Organizational ownership of information

Constant *et al.* (1994) have shown that information sharing in business contexts is significantly affected by organizational

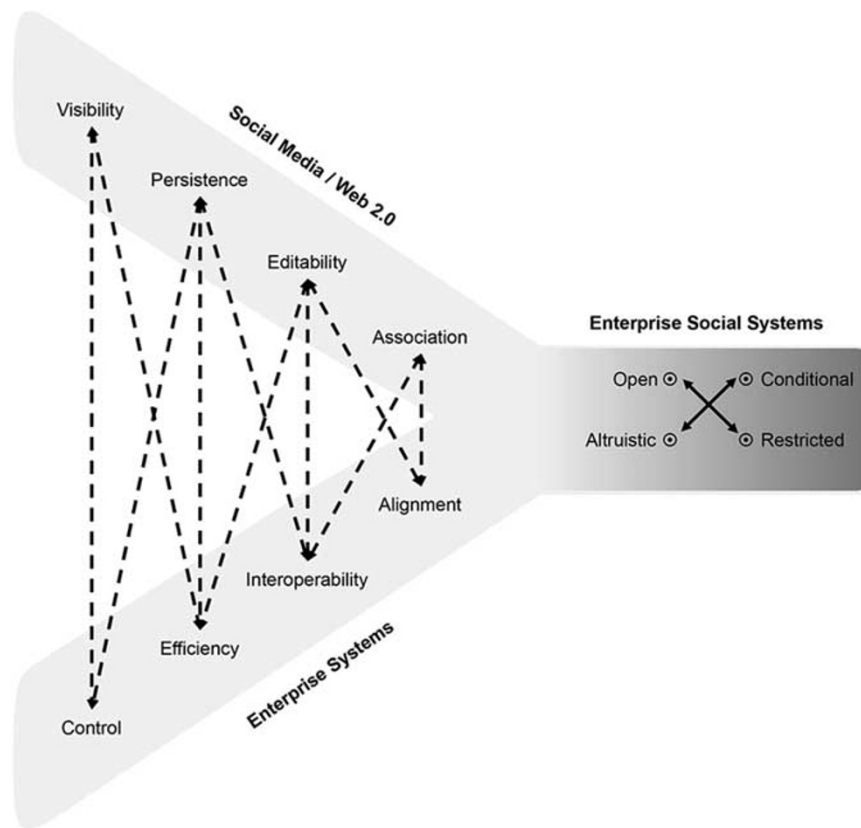


Figure 1 Affordances and tensions between social technologies and enterprise systems.

norms, intellectual property rights, and other forms of organizational control. Whereas in private life, the information that is shared typically belongs to oneself, organizational norms emphasize the idea that information, even if produced by an employee on his or her own, still remains the property of the company and as such must be used and protected for the greater good of the organization. As Constant *et al.* (1994) state: "This norm implies that an information outcome of work such as an idea, process, invention, document, or computer program that an employee creates or acquires at work or using organizational resources actually belongs to the employer rather than to the employee."

Empirical evaluation of their model attested that employees have different attitudes about different types of information sharing. The study results implied that expertise is perceived less as an organizational possession than is information as a product. However, more recent research has shown that perceptions of self-ownership and organizational ownership frequently coexist (Kwan and Cheung, 2006). Regardless of the type of information that is shared, Jarvenpaa and Staples (2001) found that employers are more likely to assign organizational ownership to their work when they have a propensity to share.

Although it remains controversial how employees form their beliefs on information ownership, it seems reasonable to posit that organizational norms and intellectual property rights may negatively influence information-sharing behavior in ESS. In other words, the stronger an employee feels that the information he or she is supposed to share belongs to the company, the greater are his or her concerns about actually

disclosing the information in ESS. The negative impact of restrictive organizational ownership norms on information sharing is also supported by empirical findings from Constant *et al.* (1994) and Jarvenpaa and Staples (2001). This reasoning leads to the first hypothesis:

Hypothesis 1(a): *Organizational ownership norms are negatively related to information sharing in ESS.*

In contrast, however, organizational norms could also unleash positive effects. Findings in the area of data governance suggest that the production, retention, and retirement of user-generated content are heavily influenced by the existence of and the company's ability to assert organizational standards (Khatri and Brown, 2010). Furthermore, when organizational norms are reinforced by monetary and nonmonetary incentives, it was found that the quality of information sharing significantly increased with both individualistic and collectivistic employees (Wolfe and Loraas, 2008). Following this rationale, organizational ownership norms may motivate users to improve the quality of the information they share in ESS. We therefore hypothesize:

Hypothesis 1(b): *Organizational ownership norms are positively related to the quality of user-generated information in ESS.*

Reciprocity and social cohesion

Information sharing takes both time and effort. Whereas in the social software context, information sharing is frequently

assumed to be self-motivational, hedonic, or altruistic (Hsu and Lin, 2008; Chai *et al.*, 2011), evidence from the ES context instead suggests economically motivated or egoistic behavior, which often leads to collective irrationality (Chen and Hung, 2010). A popular example that is often discussed in this stream of research is the public goods dilemma, referring to a situation in which certain individuals consume a shared resource without contributing to its provision. According to Wasko and Faraj (2000), organizational information can also be considered a public good, and as such, a temptation for individuals to free-ride exists. The lack of sufficient extrinsic or intrinsic rewards to compensate self-interested individuals for the costs of information sharing thus becomes a common barrier to that sharing (Huber, 2001).

However, research on organizational knowledge exchange has shown that reciprocity and social cohesion have opposite effects on self-interested information-sharing behavior. Contrary to altruistic behavior, which internalizes unconditional kindness, reciprocity can be understood as the tendency to be more cooperative in response to a previous or a future condition. Positive reciprocity emerges in response to a friendly action, negative reciprocity in fear of a retaliatory action. In both cases, empirical evidence exists that reciprocity may serve as a strong motivational mechanism to expedite information sharing (Kankanhalli *et al.*, 2005). Furthermore, multiple research studies have observed that although information sharing in online networks typically occurs through weak ties, users who regularly help others – hence build strong associations with others (see previous section) – appear to receive support more quickly when they ask for it. By reason of regular interaction, these weak social ties become more substantial and may attract or attach a person to a peer group. These ties can even lead to what is called social cohesion or contagion, referring to a phenomenon in which individuals' preferences and actions are influenced by interpersonal contact, impacting the aggregate diffusion and spread of behaviors, ideas, or epidemics (Carless and De Paola, 2000).

A number of studies on social cohesion have shown that there is an important link between positive interpersonal experiences – for example, those induced by reciprocal actions – and individual levels of involvement in the network (Friedkin, 2004).

In line with Chui *et al.* (2012), we thus expect the influences of reciprocal and socially cohesive behavior to positively affect information sharing in ESS. This leads to the second hypothesis:

Hypothesis 2(a): *Reciprocity and social cohesion are positively related to information sharing in ESS.*

Moreover, peer pressure and exposure – due to increased visibility and persistence – may also motivate individuals to share and generate high-value information (Ghosh and McAfee, 2011), especially in non-anonymous professional service networks in which information can be traced back to the person who shared it. In this sense, we expect that reciprocity and social cohesion may also enhance the quality of information shared within an ESS. This is captured by the following hypothesis:

Hypothesis 2(b): *Reciprocity and social cohesion are positively related to the quality of user-generated information in ESS.*

Quality of shared information

As discussed earlier, voluntarily contributing data, information, or media is one of the key ideas of social software. Compared with ES, in which the exchanged information is rather structured and transactional or analytical in nature (Kelle and Akbulut, 2005), the shared information in ESS can take many forms such as product or service reviews, comments on news articles or blog posts, and responses on discussion boards or question-answer forums, and it can have extremely varying levels of quality. Particularly, the quality issue is more pertinent in the context of unstructured, business-critical reviews and ratings because these influence trust and future congenial collaboration with others.

A large body of research in the domain of supply chain management has therefore addressed the question of if and how information sharing is connected to information quality (Li and Lin, 2006). A number of studies suppose a strong interrelation between information sharing and information quality. Hartono *et al.* (2010), for instance, found that sharing high-quality information among supply chain partners was positively related to both the supply chain's operational performance and the firm's overall performance. Nicolaou *et al.* (2013) note that sharing information within an enterprise network can enhance collaboration – as long as the information is accurate and timely. Because firms generally perceive information disclosure as a loss of power and control (Zhao and Rosson, 2009), it is therefore important to improve the quality of the information being shared so that it is as accurate as possible and presents a value-add to a rather protectionist information-sharing behavior (Li and Lin, 2006). In other words, the better the quality of the information shared within an ESS, the more likely it is that users will also adopt a positive sharing attitude. Hence, these arguments suggest that the quality of user-generated information is a critical determinant of information sharing in ESS. We therefore hypothesize:

Hypothesis 3: *The quality of user-generated information is positively related to information sharing in ESS.*

Privacy concerns

The influence of privacy concerns on information-sharing behavior has largely been explored in social software and e-commerce (Smith *et al.*, 2011; Conger *et al.*, 2013). In particular, it has been shown that the vast majority of private users have limited-to-reasonable trust in online networks (Conti and Sobiesk, 2007) and that privacy risks negatively affect users' attitudes toward self-disclosure (Krasnova *et al.*, 2010). As shown by Malhotra *et al.* (2004), risk and trusting beliefs critically determine information sharing in private settings.

Although the type of information that is exchanged is different in business contexts, multiple studies have found that lack of trust and concerns about disclosing business-sensitive information hinder voluntary and open inter-organizational interchange (Li *et al.*, 2006). Studies have shown that privacy concerns are higher when the business relationship is more casual and short term (Du *et al.*, 2012). Moreover, additional studies have found evidence that business users are also more worried about security breaches (Morris *et al.*, 2014) or the sharing and use of information by unauthorized employees (Morabito, 2014), possibly jeopardizing the

reputation of the firm. Accordingly, privacy concerns could constitute a major inhibiting factor for information sharing in ESS. The above arguments therefore lead to our last hypothesis:

Hypothesis 4: *Privacy concerns are negatively related to information sharing in ESS.*

Research approach

In order to answer our research questions and test our hypotheses, this study primarily uses a design experiment methodology, as suggested by Mettler *et al.* (2014), to collect user perceptions based on practical, real-life scenarios. Our design experiment consists of two parts: The first part of our design experiments gives business users the opportunity to gather how social design features can be integrated naturally into an ESS scenario. This is important because traditional ES users may not be familiar with the use of social software in an organizational setting. Moreover, it provides this research with the necessary contextual anchoring as it helps to recognize under which conditions a business user is more or less disposed to share information.

The second part of the experiment aims at obtaining a more general understanding of business users' attitudes toward sharing in ESS and, in doing so, serves us to test the previously formulated hypotheses (cf. Figure 2).

Experimental setting

For our design experiment, we created multiple clickable and navigable mockups based on the user interface of *SAP Business ByDesign* (BBD). We used BBD because it is an example of a fully integrated, on-demand ES that relies heavily on web technology and as such is extensible by web services and

accessible by a simple web browser. Having said this, it is imaginable that traditional processes could be easily redesigned toward using socially and Internet-enabled features. Figure 3 illustrates a possible use scenario ('supplier recommendations') in the context of supplier base management.

More specifically, this example shows the integration of two design features that are widely used in social media and e-commerce websites: Instead of relying on the company's own experiences with a supplier, the implementation of a social reputation score, as used, for example, on *eBay*, *Klout*, *PeerIndex* and the like, allows a purchasing manager to rate and see how other companies perceive a supplier's performance. By means of an additional social bookmarking or tagging feature, the purchasing manager may add, annotate, and share additional information about a supplier, which can be helpful for other companies to better comprehend why a particular rating decision was made.

Similar mockups were designed for other functional areas of traditional ES, such as campaign management, human resources, logistics, and travel management. In addition, much emphasis was placed on selecting and describing diverse use scenarios that addressed both structured (III+IV) and unstructured (I+II) and both operational (I+III) and strategic (II+IV) forms of information sharing (cf. Figure 4). Each mockup was also accompanied by a detailed description of the purpose, scope, and possible functioning. The intention was to give users of traditional ES a better understanding of (a) the type of information that is shared within ESS and (b) the possible benefits and risks that come with the implementation of Internet-enabled design features in ESS.

Data collection and procedure

The design experiment ran for 6 months (November 2009 to April 2010), during which time 166 users were asked to click

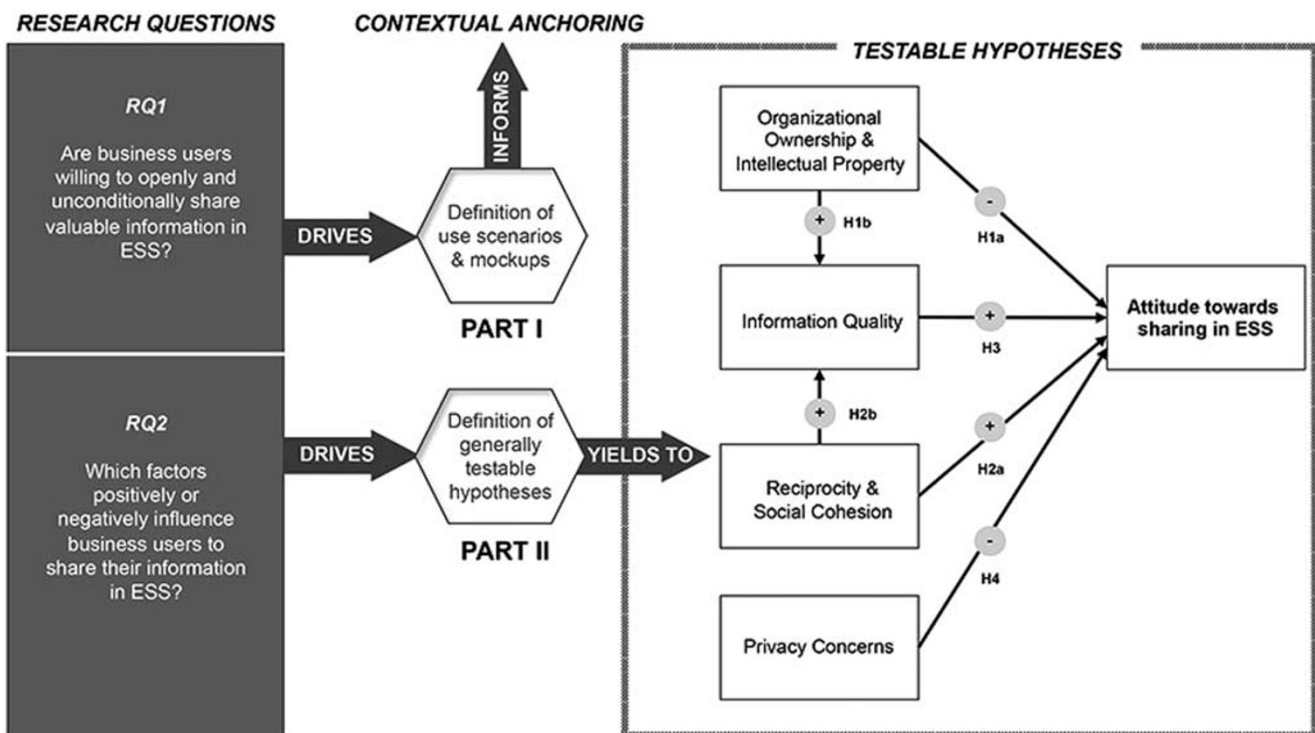


Figure 2 Overall research model of this study.

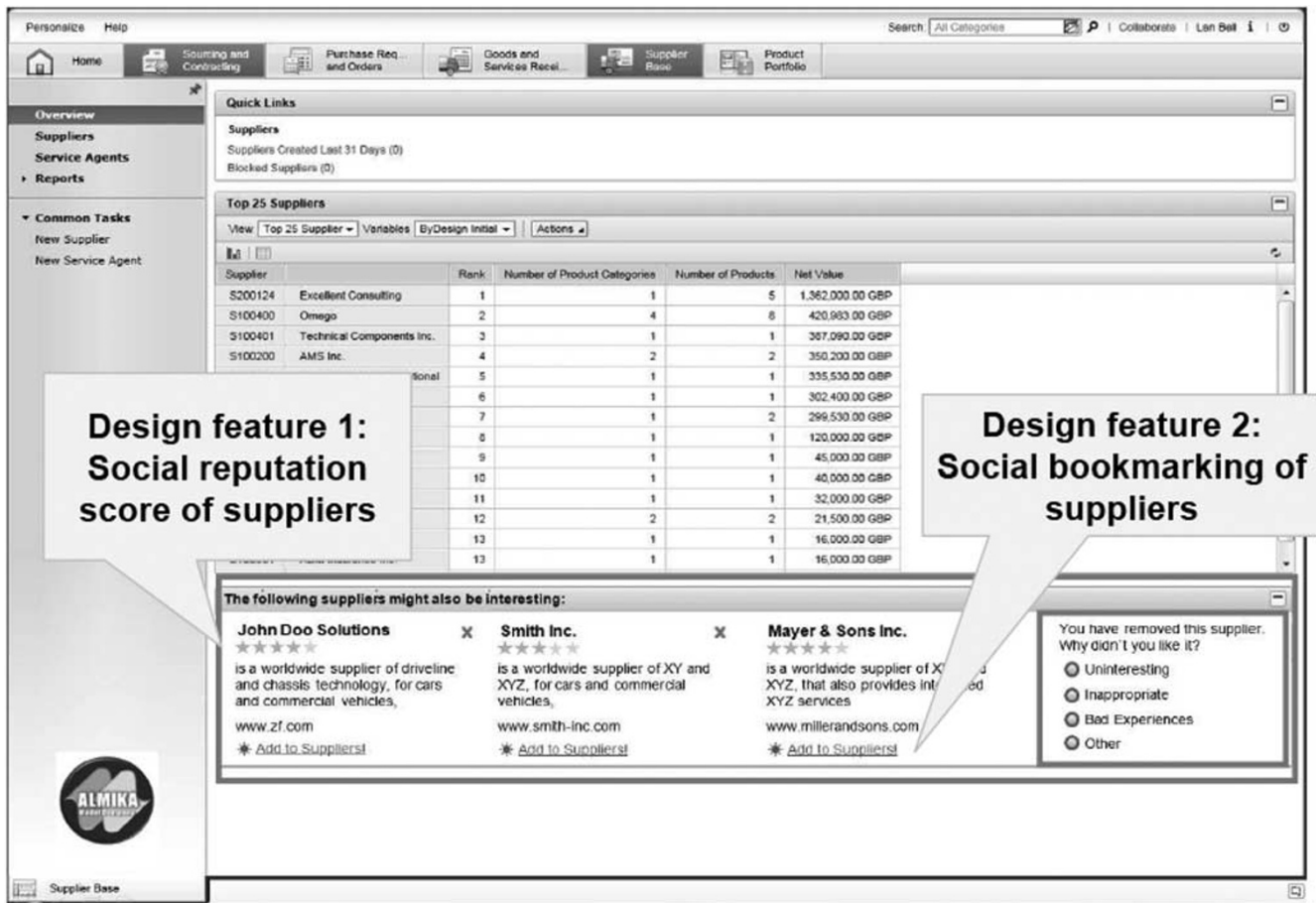


Figure 3 Possible realization of Internet-enabled supplier recommendations with SAP Business ByDesign.

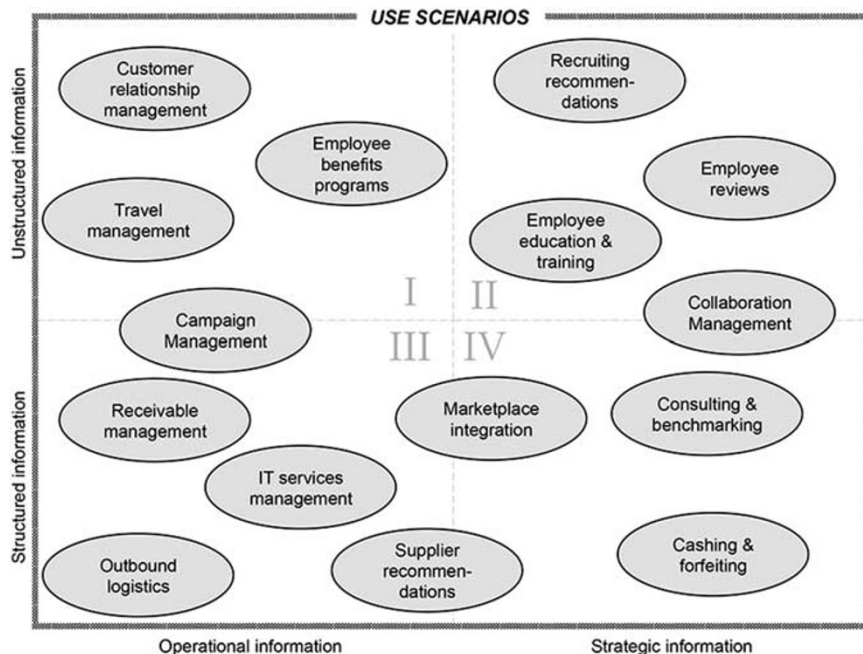


Figure 4 Selection of possible ESS use scenarios covered in this study.

through the design mockups and to subsequently answer the online questionnaire. Participants were recruited through thematic promotional releases in magazines (15.0%), a link

on the researchers' website (19.9%), and mailed letters (65.1%). Approximately 50.6% of the users had accumulated over 25 years of practical experience, working mainly in

mechanical engineering (23.8%) or manufacturing (23.4%) companies. Most participants were executives (33.1%) or mid-level managers working in procurement (22.3%), production (13.9%), or logistics (12.7%). All demographic characteristics of the sample are summarized in Table 1.

In order to explore as many use scenarios as possible and to test for significant differences regarding formal (i.e. more likely restricted and conditional) or rather social implementations of information sharing (i.e. more likely open and altruistic), we decided to define two experimental groups.

Based on random assignment, one group of users (47.6%) was provided with design mockups and descriptions that implied a self-motivational, hedonic, or altruistic realization of the use scenarios – that is, a setting in which information is openly shared without any rewards. The second group of users (52.4%) received the same design mockups, but the use scenario descriptions differed in that any information sharing was strictly anonymous and, to some extent, rewarded with monetary or nonmonetary incentives. After each mockup, the participants were asked via pop-up window whether they wanted to adopt such a use scenario or not. We used a 5-point Likert scale anchored with ‘1 = very likely’ and ‘5 = very unlikely’ for this rating.

In the second part of the experiment, all participants had to answer the same set of questions so that we could determine which factors positively or negatively influence users to share their information in ESS. To operationalize the constructs, we derived measurement items that either had been applied and validated in prior research or the wording for which was modified in order to fit the context

of this study. By means of a structured sorting exercise as suggested by Moore and Benbasat (1991) with 15 volunteers, a number of items with low inter-item correlations within a construct were eliminated. The final list of items is presented in Table 2. A 5-point Likert scale anchored with ‘1 = strongly agree’ and ‘5 = strongly disagree’ was used for ordinal items, with all constructs in the study modeled as being reflective.

Data analysis

We used descriptive statistics along with box plots to analyze the first part of the experiment. For the second part, we applied partial least squares (PLS) analysis using SmartPLS software, version 2.0 for modeling construct dependencies and estimating quality criteria and effect sizes. A major advantage of using PLS, compared with other statistical techniques, is the fact that it does not depend on having multivariate normally distributed data and can be used with relatively small sample sizes (Chin, 1998). We chose PLS in order to overcome problematic model identification issues since it is a powerful method for analyzing complex models using smaller samples with few distributional assumptions (Ringle *et al.*, 2012). Applying PLS, however, means specifying two distinct models, a *structural model* that describes the relationships or paths among structural dimensions and a *measurement model* that links the constructs with a set of operational measures. It is common to first examine the reliability and validity of the measurement model and second to test the significance of the structural model.

Table 1 Sample characteristics ($n = 166$)

Characteristic	N	%	Characteristic	N	%
<i>Line of business^a</i>			<i>Job type</i>		
Automotive	25	11.7	Executive	55	33.1
Construction	18	8.4	IT	7	4.2
Electrical engineering	12	5.6	Logistics	21	12.7
Manufacturing	50	23.4	Procurement	37	22.3
Mechanical engineering	51	23.8	Production	23	13.9
Metal processing	20	9.3	R&D	10	6.0
Plastics	10	4.7	Sales	13	7.8
Other	28	13.1			
<i>Experience in business</i>			<i>Experience in position</i>		
25 years or less	82	49.4	5 years or less	49	29.5
Over 25 years	84	50.6	Over 5 years	117	70.5
<i>Country of origin</i>			<i>Supplier base</i>		
Germany	107	64.5	<100	46	27.7
Italy	20	12.0	100–200	44	26.5
Spain	37	22.3	201–500	38	22.9
Switzerland	2	1.2	>500	38	22.9
<i>Company size</i>			<i>Monthly transactions</i>		
<15	14	8.5	<100	63	38.0
15–50	15	9.1	100–200	24	14.5
51–250	54	32.7	201–500	31	18.7
251–1000	45	27.3	500–5000	35	21.1
>1000	38	23	>5000	13	7.8

^aNote: Multiple selections were possible.

For the former, a number of quality criteria were considered. The coefficient Cronbach's alpha (α) was applied to determine the reliability of the operationalized constructs. According to Cortina (1993), the values for α should be greater than or equal to 0.8 for a good scale, 0.7 for an acceptable scale, and 0.6 for a scale that will be used for exploratory purposes. As can be observed from Table 3, all constructs met these requirements.

Because α is biased against short scales of two or three items, which typically leads to an underestimation of reliability, we also examined the internal consistency of the constructs using the composite reliability measure. Following Chin (1998), values should be greater than 0.6 for exploratory purposes and greater than 0.7 for an adequate confirmatory model. All of the measured constructs did comply with this criterion as well.

Convergent validity can be examined in terms of item loadings and average variance extracted (AVE). AVE captures

the amount of explained variance relative to the total amount of variance and is considered sufficient if it is equal to 0.5 or more (Fornell and Larcker, 1981), which was the case with our measurement model. With regard to the item loadings, values greater than 0.7 are considered acceptable (Hulland, 1999). As shown in Table 4, our item loadings are admissible.

Lastly, discriminant validity is given when the square root of the AVE for each construct is larger than its corresponding inter-construct correlation coefficients and the individual item loadings are above 0.5 for their associated constructs (Chin, 1998). From Table 3, it can be observed that the inter-construct correlations were very low. Although the extracted variance per construct was at the lower acceptable end, discriminant validity is still assured.

Having established measurement validity and reliability, we estimated each path coefficient's significance in accordance with Bollen and Stine (1992) by applying the bootstrapping

Table 2 Construct operationalization

Construct	Item	Item text
Attitude toward information sharing (self-developed)	AIS1	I'm open to sharing information on ESS
	AIS2	I find it useful to share information on ESS
	AIS3	Overall, sharing information on ESS will generally improve my decision-making
Privacy concerns (partly based on Malhotra <i>et al.</i> , 2004)	PC1	I feel uneasy sharing my work experiences and company-owned information on ESS
	PC2	I don't find it secure enough to share my information on ESS
	PC3	Overall, I find it risky to share information on ESS
Organizational ownership norms (partly based on Constant <i>et al.</i> , 1994; Jarvenpaa and Staples, 2001)	OON1	I feel that organizational ownership norms hinder my sharing information on ESS
	OON2	I would share information on ESS more openly if the information belonged to me
	OON3	Organizational ownership norms force me to adhere to a certain standard of information quality
Reciprocity and social cohesion (partly based on Carless and de Paola, 2000)	RSC1	Sharing information on ESS will not only be helpful to others but also help me in reaching my performance goals
	RSC2	For me, sharing work experiences is important for relating with peers of other companies
	RSC3	In my profession, everybody looks out for each other; sharing information is normal
Quality of shared information (self-developed)	IQ1	I feel that the quality of information in an ESS is superior to that in closed systems
	IQ2	Overall, I feel more motivated to share when the quality of shared information on the ESS is good
	IQ3	I feel reluctant to share my experiences when the quality of shared information on the ESS is low (<i>Reversed</i>)

Table 3 Reliability and inter-construct correlations

Construct	AIS	LR	OON	PC	IQ	Cronbach's alpha	Composite reliability	AVE
Attitude toward information sharing (AIS)	1.00					0.75	0.81	0.59
Privacy concerns (PC)	0.33	1.00				0.74	0.80	0.58
Organizational ownership norms (OON)	0.31	0.26	1.00			0.75	0.81	0.58
Reciprocity and social cohesion(RSC)	0.33	0.35	0.15	1.00		0.78	0.81	0.59
Quality of shared information (IQ)	0.27	0.27	0.21	0.31	1.00	0.74	0.76	0.52

sampling method with 500 resamples. PLS does not generate an overall goodness-of-fit index for the proposed research model because it does not attempt to minimize residual item covariance or make any distributional assumptions. Consequently, the R -squared (R^2) values and structural paths' t -values were examined instead (Chin, 1998). Effect sizes were calculated by means of the SmartPLS path weighting scheme. The results are discussed in detail in the next section.

Table 4 Item loadings and cross-loadings

Item	Mean	SD	AIS	LR	OON	PC	IQ
AIS1	2.33	0.73	0.76	0.51	0.09	0.41	0.31
AIS2	2.20	0.50	0.74	0.53	0.21	0.47	0.32
AIS3	2.70	0.86	0.80	0.50	0.38	0.39	0.65
PC1	2.02	0.50	0.58	0.78	0.19	0.37	0.32
PC2	2.65	0.96	0.51	0.77	0.24	0.33	0.54
PC3	2.38	1.01	0.41	0.73	0.15	0.37	0.48
OON1	2.16	0.72	0.19	0.13	0.75	0.07	0.38
OON2	1.97	0.66	0.23	0.19	0.79	0.05	0.39
OON3	2.11	0.84	0.27	0.25	0.75	0.19	0.39
RSC1	2.89	0.83	0.57	0.46	0.08	0.87	0.28
RSC2	2.86	0.96	0.30	0.23	0.13	0.70	0.10
RSC3	3.04	0.96	0.33	0.32	0.17	0.74	0.30
IQ1	2.49	0.85	0.43	0.44	0.44	0.23	0.72
IQ2	2.30	0.79	0.48	0.46	0.34	0.22	0.80
IQ3	2.06	0.92	0.31	0.33	0.32	0.22	0.70

Note: Bold values are loadings of items on their own construct, while others are cross-loadings.

Results

The results of the first part of our design experiment are illustrated in Figure 5. The box-plot diagram shows the differences in information-sharing willingness across test groups and use scenarios.

Overall, no clear preference for using social design features in structured (III and IV) or unstructured (I and II) use scenarios was found. However, it does appear that there was a tendency to prefer using social design features in operational (I and III) rather than in strategic (II and IV) use scenarios. Interestingly, use scenarios that incorporated social design features for ratings and reviews were rated less positively than were scenarios that contained more self-expressional features such as blogs/micro-blogs or wikis.

Distinctive differences in information-sharing willingness were, however, identified between the two test groups. It was found that the users who were given the design mockups and descriptions that implied a completely self-motivational, altruistic, and open realization of the use scenarios (group 2) were generally less inclined to share information. On the contrary, the users who received the use scenario descriptions that suggested strictly anonymous information exchange (group 1) tended to be more positive about disclosing information.

In general, the responses of the first group indicated that the participants were less willing to share information compared with the group that was promised a reward as compensation for their time and effort in sharing information. Only in a few cases, such as the use scenarios 'employee benefits programs', 'recruiting recommendations' or 'employee reviews,' participants, who were assigned to the group with the rather

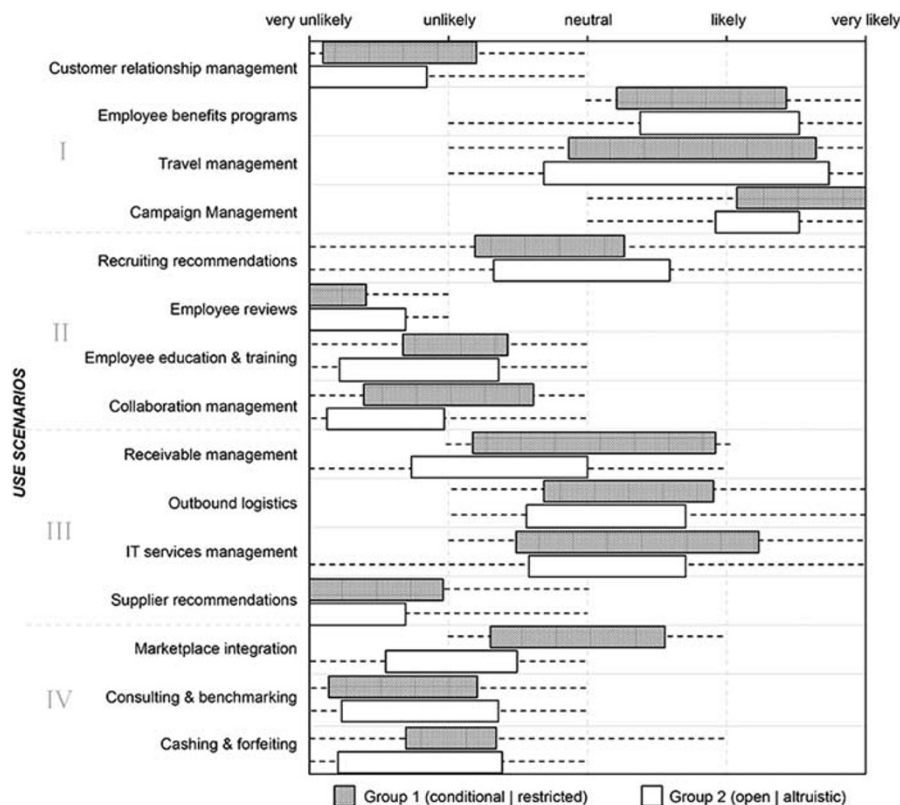


Figure 5 Contextual anchoring: Differences in information-sharing willingness across test groups and use scenarios.

Table 5 Standardized path coefficients, *t*-values and hypothesis evaluation

Hypothesis	Path description	Path coefficient (<i>P</i>)	<i>t</i> -value	Result
H1a	Organizational ownership→Attitude toward information sharing	0.05	0.52	Not significant
H1b	Organizational ownership→Quality of shared information	0.48	5.78	Significant***
H2a	Reciprocity and social cohesion→Attitude toward information sharing	0.29	3.40	Significant**
H2b	Reciprocity and social cohesion→Quality of shared information	0.25	3.37	Significant**
H3	Quality of shared information→Attitude toward information sharing	0.23	2.17	Significant*
H4	Privacy concerns→Attitude toward information sharing	0.39	5.90	Significant***

Note: Significance at * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

altruistic and open suggestions of the use scenarios, were slightly more positive.

Table 5 presents the results of the second part of our design experiment – that is, hypothesis evaluation concerning the determinants that positively or negatively influence business users to share their information in ESS. As can be seen, the *t*-values obtained for the tested relationships ranged from 0.52 to 5.78, indicating that not all paths were significant. Notably, our design experiment revealed that the relationship between organizational ownership and attitude toward information sharing in ESS was not significant. This is interesting because it could mean that today's organizational ownership norms either do not overly restrict sharing behavior or that business users simply care less than has been previously reported (e.g. Constant *et al.*, 1994; Jarvenpaa and Staples, 2001). Nevertheless, organizational ownership norms have an extremely high impact on the quality of shared information ($P = 0.48$, $t = 5.78$, $P < 0.001$), which in turn directly influences information-sharing attitudes ($P = 0.23$, $t = 2.17$, $P < 0.05$). In addition, reciprocity and social cohesion also had reasonable positive effects on the quality of the shared information ($P = 0.25$, $t = 3.37$, $P < 0.01$) and on information-sharing attitudes ($P = 0.29$, $t = 3.40$, $P < 0.01$). Despite these positive influences, our research model also showed a strong impact of privacy concerns on attitudes toward sharing information in ESS ($P = 0.39$, $t = 5.90$, $P < 0.001$). Figure 6 graphically summarizes the results of our structural model estimation. The implications of the obtained results are more thoroughly discussed in the following section.

Discussion

The results of our experiment revealed that business users in an enterprise environment are more self-interested and calculating than are private users in regard to sharing information. This contrasts with the general idea of social software, which frequently follows the concept that information is voluntarily and openly shared for the sake of self-expression and social engagement (McAfee, 2009). Consequently, we believe that the notion of being 'social' within the concept of ESS needs to be revisited or at least be contextualized more precisely. Social software functionalities can certainly be fruitfully integrated into ES for improving collaboration and communication within and across enterprise departments (e.g., as more flexible ways to share knowledge, for chitchatting, or to engage with colleagues), thus being in line with the very reasons that ES were designed for. We believe, however, that the value of applying social design features in ES is highly context-dependent when enterprise-sensitive information is shared

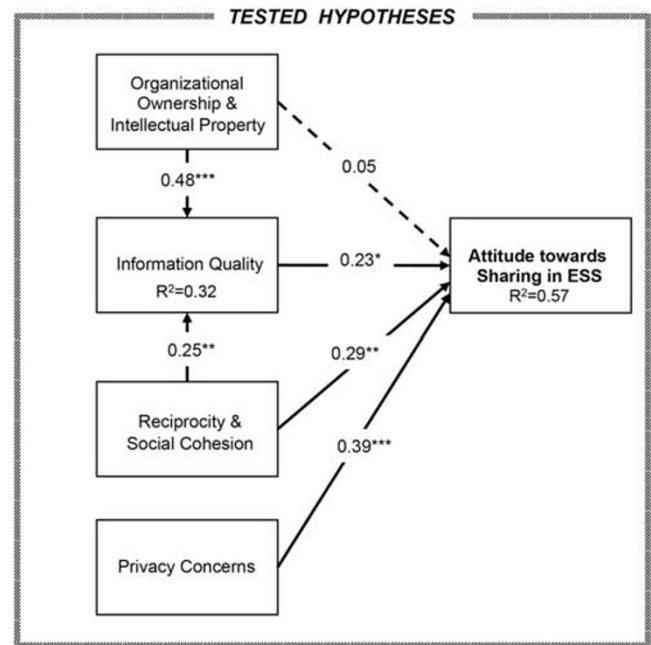


Figure 6 Results of structural model estimation with significance at * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

(e.g., ratings and reviews of customers and suppliers, experiences with internal or external service providers, company-specific cost or revenue information). For such use scenarios, our results showed that reciprocity and the quality of information to be obtained as compensation were strong motivators for business users to utilize social design features or not. In contrast, privacy concerns greatly reduced business users' positive attitudes toward information sharing. It is therefore not surprising that the analysis also revealed a strong preference of business users to remain anonymous and to be rewarded for the potential risks they took when sharing information in our use scenarios. It is, however, worth noting that the assumed risks were not necessarily related to the infringement of organizational ownership or intellectual property norms. Significantly, business users simply found it unsafe to share business-critical information with others in an ESS environment.

Implications for practice

Despite the mentioned concern that there is a need for a more contextualized and practical definition of the term ESS, our experiment has demonstrated that business users – depending

on the specific use scenario – could imagine actively using globally interconnected and interpersonal ESS, even for sharing enterprise-sensitive information. Following on this, we see three specific, actionable implications of the current study.

First, if business users really should be using social features in ES, software vendors need to consider actively incentivizing and motivating them. Our experiment showed that business users are more willing to share when they are promised some type of reward. This does not necessarily mean that a financial exchange mechanism needs to be designed. Current research has provided evidence that gamification and reputation-based incentives could also be beneficially applied in enterprise environments in order to positively influence user behavior (Zichermann and Cunningham, 2011; Maan, 2013).

Second, software vendors need to take privacy concerns seriously and have a strong intuition in selecting and designing secure and privacy-preserving ESS use scenarios. In addition, a clear description of how and where the information is stored and who (within and outside of the company) will be able to retrieve and possibly modify it is also recommended. This may help to reduce privacy concerns, which based on our study findings had a major influence on business users' information-sharing behavior in the ESS context.

Third, software vendors need to consider group dynamics when implementing ESS use scenarios. As with the private use of social software, our analysis revealed that social cohesion and reciprocity also had a positive effect on business users' information-sharing behavior. However, although social group effects can certainly be used as triggers for improving information-sharing behavior, they can also raise additional concerns. Our analysis indicates that in particular, use scenarios that implemented socially enhanced ratings and reviews were less well received. In this sense, any use scenario that possibly jeopardizes personal relationships with other users or companies should be approached with great caution. This may also explain the strong preference of business users for using anonymous rather than open information-sharing procedures.

Implications for theory and research

The results of this study also suggest a range of relevant implications for future research. As already mentioned earlier, there is a need to further shape the concept of ESS. Our study explored different ways that social design features can be integrated into ES environments and studied the corresponding user reactions to these use scenarios. Although our results suggest that business users are influenced by a number of factors in their decisions to accept or reject ESS use scenarios, we did not determine which exact combinations of use scenario characteristics (e.g., structured vs unstructured or strategic vs operational sharing) or social features (e.g., weblogs, wikis, reputation systems) could also be of relevance for these decisions. Accordingly, future research could more closely investigate users, use scenarios, and instantiations of social design features in ES environments in order to better comprehend the scope and use-specific value of ESS. This may certainly facilitate a more accurate definition and limitation of the meaning and a possible approximation of varying connotations of ESS.

Moreover, a more general reflection with respect to the compatibility of the social and business world is required. Our study showed that business users' motivations might differ

from those of private users, which will undoubtedly affect how social design features are used and how value is appropriated. Thus, there is also the exigency for more practical case studies and empirical evidence on how ESS are designed, adapted, and used in different industrial and nonindustrial settings in order to better determine the commonalities and possible differences in social technology usage and to capture the potential for businesses.

Limitations and conclusion

In this paper, we have suggested that investigating business users' underlying motivations and doubts about information sharing may represent a useful starting point for better understanding why ESS possibly are not unfolding their full potential. We have shown that the willingness to share information in ESS is limited, particularly with enterprise-sensitive information such as employee, product and service reviews or supplier and customer base ratings; that reciprocity, social cohesion, and high-quality user-generated information positively affect information sharing in ESS; and that privacy concerns have a strong negative effect, whereas organizational ownership norms do not directly influence information sharing in ESS.

From a practical perspective, our findings may be helpful to further improve the design of ESS and inspire new ways to incentivize participation and sharing in the business context.

This paper also presents a promising avenue for exploring potential further theoretical considerations related to the implementation and adoption of ES and ESS.

This study is of course not without limitations. In order to familiarize business users with the idea of ESS in general, and with using social design features for sharing enterprise-sensitive information in particular, we created a number of clickable and navigable mockups. In doing so, our experiment only measured the business user's first-time experience or perception based on a possible realization of an ESS. Our experiment did not, however, measure actual, long-lasting experiences in real use environments. Furthermore, the validity of our findings is limited to ESS use scenarios in which sharing enterprise-sensitive information is a central component. We thus did not focus on use scenarios that supported other aims such as retrieval, filtering, or extraction of information using social design features. In addition, because of the novelty of the ESS concept and the lack of prevailing reference studies, the majority of the scales and the items on the corresponding user survey were self-developed and are thus exploratory. Arguably, further evaluations should also include considerations regarding the criticality of the shared information, which we did not consider in our experiment. Finally, also further technological developments have happened since our initial data collection in 2009–2010. Accordingly, it is possible that our design experiments do not cover all the possibilities for integrating social design features in ESS that are available today.

With the results of our study in mind, it can be assumed that in the future, the integration of social design features in ES environments could be viable and could provide business users with additional value over traditional ES solutions. We believe that the presented use scenarios for interpersonal and globally interconnected ESS are a first approximation of what will not only be technically feasible but also socially accepted and demanded by prospective business users.

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