Investigating Ownership and the Willingness to Share Information Online (pre-print draft)

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ABSTRACT

Networks offer the promise of sharing information. This project aims to experimentally investigate aspects of the propensity to share information online, with a specific focus on the system-induced status of information. Is a simple manipulation of the cognitive status of information sufficient to gain changes in sharing levels? A simple computerized game was used to simulate business decision situations that required participants to use information, and enabled sharing it. . Our hypotheses compared the willingness to share under different conditions of system-induced ownership of information. Participants' perception of information source and ownership was the independent variable. Sharing was higher for privately owned expertise than it was for organizationally owned content. Ownership makes a difference. It serves to increase sharing of information. Ownership can and should be framed by system design.

KEYWORDS

Information sharing; willingness to share; ownership

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INTRODUCTION

Sharing information is one of the more promising prospects of information technology and networks. This research project aims to experimentally investigate some aspects of the propensity to share information online. Specifically, we focus on the system-induced ownership status of information, and how this status may affect the inclination of online system users to share information in business contexts. We define information sharing online as providing a helpful response to a request for information in an electronic medium such as email, instant messaging system, forum or other. Modern internet public spaces (Jones, Ravid and Rafaeli, 2004) such as 'blogs', 'wikis', and the like, join more established media such as listserv and Usenet in depending on information sharing. Information sharing has been studied in a variety of disciplines. The general consensus in the literature is that the tendency to use computers and networks to share information is largely a socio-behavioral issue. Our claim in this study is that system-controlled constructions of the ownership status of information play a major role (ceteris paribus) in the degree to which information is shared.

Although people invest substantial resources in creating or obtaining information, they are often willing to share it without immediate recompense. In fact, some attribute humanity itself to the act of sharing information (Dunbar, 1996). Sharing occurs regularly, even spontaneously, via formal and informal channels. Sharing happens in departmental meetings, through written reports, telephone conversations, water-cooler meetings and other traditional forms. Recent years have seen increased information

sharing over online information systems. One unique advantage of online information sharing is that interactions are or can be documented, both information and process can be stored and retrieved. Storing shared information or expertise provides a means of capturing part of the knowledge transferred in the organization. We use the terms 'expertise' and 'knowledge' interchangeably representing what a person knows as a result of studying, working, interacting and so on. Expertise and knowledge refer to data and information synthesized in a person's mind and possibly applied in practice in real life (Rafaeli and Raban, 2005). The success of information systems in promoting information and expertise sharing depends largely on system-based psychological and social influence. Research investigating such influences is therefore important for system developers and for information systems research. We present a review of the pertinent psychological and social research literature leading to our hypotheses about the relationship between system-based representation of information ownership and information sharing.

An often cited assumption is that information is, or can become, a "public good". Some people tend to share while others are free riders, using shared information without contributing themselves. We suggest that information in organizational settings should not always be regarded as a public good. Information systems can help implement this, and we propose that, in agreement with previous research, sharing will be favored by system-induced private ownership of information.

Much ideology and some research support the notion of information as a public good in the private sector. A pioneering series of experiments on contribution of information to a discretionary database in a business game setting showed that some participants contribute while others free ride (Connolly and Thorn, 1990). These

experiments also showed various effects on contribution rates such as asymmetry of costs, value of information or privatization. Privatization reduced free riding but did not eliminate it altogether. The authors explained that the root of the problem of under-contribution of information was that discretionary databases are public goods and therefore rational actors will choose to free ride. Privatization was the recommended solution to overcome the free rider problem. The experimental setup was such that each participant possessed a single unique and valuable contribution. Naturally, if not everyone contributed, then an under-contribution problem had to arise: The group did not receive all the valuable information possible.

A public good may be produced by the collective action of a critical mass of highly interested and resourceful people (Macy, 1990; Marwell and Oliver, 1993; Constant, Kiesler and Sproull, 1994). Online communities are a typical example of achieving the public good by forming a critical mass. Online communities are based on interpersonal communication. This is in contrast to discretionary databases where the communication is between a person and a machine. Differences may occur in the propensity to share information via databases compared to sharing directly with people (Sproull, Subramani, Kiesler, Walker and Waters, 1996) . Sharing via databases can be viewed as mediated sharing since the database acts as a medium from which people later retrieve information. People will need communication discipline (Markus, 1990) to proactively contribute, and users will need motivation to initiate a search in the database. In contrast, interpersonal electronic communication means such as electronic mail, newsgroups etc. provide a direct linkage between people. In these media people are prompted to participate by other users.

The problem of sharing may stem from medium-induced cognitions rather than from the willingness to share (Dixon, 2000). People may be naturally willing to share information as suggested by Constant et al. (Constant et al., 1994; Constant, Sproull and Kiesler, 1996) but the effort of using technology to do so may be too great, or the reward may not be apparent due to lack of feedback from the database or from the recipient. This is what makes information sharing in discretionary databases seem like a public good problem: Contribution is made to a sort of "general repository", where the lack of human touch, or feedback, or apparent use, discourages contributions. In systems where information is shared directly between people a similar problem may arise when contributors, whose contributions are of high quality, will be inundated with more and more requests to share their knowledge, and may see this as a disturbance to their work or even a blunt attempt by free riders to evade their work.

One possible solution that has been suggested is communality, where the public good is not the information itself but the sense of belonging to a community and viewing the community as a source for expert advice (Fulk, Flanagin, Kalman, Monge and Ryan, 1996; Wasco and Faraj, 2000). Communality also suggests that the total sum of contributions is greater than its components thanks to synergy: Different views are expressed or a trend may be observed and so forth. Communities develop information sharing norms implying that sharing may be enhanced over time while taking part in a community (Burnett, 2000). Another solution is assigning a leadership role to one of the participants who will take care of the social management of the group (Butler, Sproull, Kiesler and Kraut, in press). A group leader is often called the group 'owner'. It is interesting to note that this intuitively assigned semantic title implies increased

involvement and contribution. Butler et al. referred to ownership of the group and the medium where it 'meets', for example an online forum.

Ownership of information can be defined from a legal aspect or from a psychological aspect. We use the latter, psychological, definition of ownership which refers to an individual's perception or belief that information or knowledge is owned by the individual. This definition is subjective and ambiguous; ownership may be evenly or unevenly distributed among a group's members. Does even ownership predict more sharing than uneven ownership or, to the contrary, is there more pressure to strive for ownership equilibrium in a group with uneven information ownership. Peer-to-peer systems exhibit uneven ownership of valuable files and have been found to be highly vulnerable to free-riding (Adar and Huberman, 2000).

Another line of research on information sharing (Constant et al., 1994) relied on social exchange theory. Social exchange theory predicts sharing based on self-interest and reciprocity. Self-interest was shown to be the main driver for sharing expertise in the study. Expertise was perceived to be privately owned rather than owned by the organization. Information as product, a computer program, was perceived to be more organizationally owned. Sharing an organizationally owned information product was found to be mediated by prosocial transformation, people weighed the social good more than their personal benefits. In other words, private ownership supports sharing more than organizational ownership when it comes to tacit knowledge according to this research. This finding is somewhat surprising with respect to the general consensus in the knowledge management literature, which stresses the main difficulty as sharing tacit knowledge (Davenport and Prusak, 1998). This distinction, too, may relate to anonymous database vs. personal relations. Constant et al. (1994) cautioned that

sharing attitudes in the case of organizationally owned information may bring about the occurrence of free riding. As prevention they suggested the public good should be produced by a critical mass of enthusiasts and that organizational culture should promote sharing. Although this sounds reasonable, building on a relatively small group of active participants may be potentially problematic because of job mobility and other factors that may cause frequent changes in that core of enthusiasts. Other researchers (Wasco and Faraj, 2000) go a step further suggesting that knowledge would be better managed as a public good causing people to contribute based on moral obligation, such as the culture often prevalent among programmers.

A survey of sharing in collaborative electronic media among university personnel (Jarvenpaa and Staples, 2000), provided further support for this. Information perceived to be owned by the organization was less likely to be shared. The difference here, too, could be the perception of the source as being public (the organization) or private (the person). Organizationally owned information may be perceived as part of some "public domain", therefore there is less need or obligation to share it by a specific person. It may be perceived as widely-available, regardless of its objective availability. In addition, knowing they are part of a group of equally-knowledgeable peers, perceived to own the same information, people may exhibit a diffusion of responsibility and refrain from sharing (Latane and Darley, 1968; Latane and Rodin, 1969). On the other hand, a person who is an expert in his/her field and believes he/she is the only source for or owner of particular information may be more willing to share it, knowing that he/she will enjoy personal benefits such as gratitude and improved reputation. Thus an important motivator for information sharing may be personal ownership of information. Evidence for this is seen in a field trial of household computer use where "gurus"

emerged within families. Even within families, knowledge was not equally acquired by all family members (Kiesler, Zdaniuk, Lundmark and Kraut, 2000).

Jarvenpaa and Staples (2001) dealt subsequently with antecedents of the ownership perception. They report a positive association between private and organizational ownership: knowledge workers believed that information products or expertise that they created were owned jointly by themselves and by the organization they worked for. The organization has rights to the products of their work, a research finding that corresponds to the general norm. This finding lends further support to the prosocial transformation that influences employees' perceptions of ownership and sharing behavior. An interesting point is that organizations should not assume that all information produced by their employees belongs only to the organization and base their information system design on this wrong assumption. Instead, it is suggested that co-ownership be nurtured. The present research examines ways to influence the perception of ownership of information products in order to enhance sharing.

Following Heider's (1958) theory of association and self-enhancement approaches (Baumeister, 1982; Brown and Smart, 1991) Beggan (1992) demonstrated experimentally that mere ownership increases individuals' valuations of objects. Expertise is part of a person's most personal endowment, his/her intellect. It follows that if personal endowments play an important role in the individual's self, then sharing such endowments without losing them, as is the case of sharing expertise, can serve to enhance one's self-image. The present research aims to show experimentally that mere ownership of information supports sharing both of expertise and of information products.

Another factor likely to influence sharing is the fact that the mechanism for sharing information is often copying. Sharing a copy leaves the originator in his/her original state less the cost of sharing. Not losing one's own possession of information seems likely to lower the barrier to information sharing. Still, we know that people do not participate equally in information sharing activities (Adar and Huberman, 2000).

Information fulfills one criterion of public goods. Its consumption is non-rivalrous. It is easy to copy, especially when digitized. However, the other two criteria of public goods, non-excludability and non-rejectability, are not always met for information since it is technically easy to exclude people from a group of information users as well as for people to reject electronic information. It follows that information can be a public good when all criteria are met, but it is usually not a public good in organizations. An interesting perspective by Fulk et al. (1996) presents information as a hybrid good, where public good is achieved by individuals or companies acting out of their private interests. Patents are an example of a hybrid good, where an assignee's private interests are protected while yielding public good by the publication of the invention. In fact, with patents the personal benefit is the driver to achieve the public benefit. Another example is academic articles which are published thanks to the interests of researchers but ultimately they provide the public good of advancing science and informing people of these advancements. Similar sentiment is offered by Connolly and Thorn (1990) who proposed privatization as a solution to the public goods problem, and by Jarvenpaa and Staples (2001) who coined the term "shared ownership" of information by the individual and the organization.

One problem of public goods is free riding because it results in unbalanced contribution: some enthusiasts contribute while others enjoy those contributions

without reciprocating. Eventually, enthusiasm will erode leading to the slowdown or even demise of the group or community. Free riding is made easy when certain participants can "hide" by using the good without contributing. Lack of physical proximity coupled with computing power results in the common practices of false identities and multiple identities which are widely practiced in the World Wide Web (Rafaeli, Raban and Kalman, in press). False or multiple identities seem like the ideal hideout. Following the same logic, increased transparency should reduce free riding. Communication systems can help increase transparency. Although passive anonymous usage of shared information, known as "lurking", is very convenient in electronic systems (Preece, Nonnecke and Andrews, 2004), it is not an efficient form of information collection because one reads whatever is published regardless of one's own interests.

Equity theory states that employees strive to achieve the same ratio of output to input as their colleagues (Adams, 1965). Despite the natural tendency to apply equity theory to electronic environments by having everyone contribute symmetrically to an electronic communication system, it may not necessarily be the best mode of behavior. Free riding may be a blessing for online communication systems connecting many to many for a variety of reasons (Fulk et al., 1996).

In summary, although information does exist as a public good, organizational information sharing is not necessarily beset by the classical problems of public goods and is only partially enhanced by the solutions offered in the literature: communality, leadership, critical mass, moral obligation. Lurking or free-riding are not necessarily bad in computerized networked

contexts. Instead, it is suggested that organizational information sharing may be hampered by the perception of ownership. Acknowledging private ownership by giving personal credit to information creators and developers by system design may facilitate better sharing. Some theoretical as well as empirical literature, based on survey methodology, has pointed in this direction. In the project reported here we seek support for this line of research using an experimental approach.

Fig. 1 summarizes research findings found in scientific literature pertaining to private and public ownership of information goods. Visually, the model suggests a preference for private ownership over public ownership, when sharing is the declared goal of a system. Obviously, the model is incomplete and awaits further research validation and expansion into additional factors. We provide experimental support of private ownership as an enhancer for information sharing and show that ownership can be simply depicted by system design.

Insert Fig. 1 about here

The research question examined here will be: How does the status of ownership of information, as expertise or as an information product, affect the propensity to share information? The corresponding hypotheses are that private ownership fosters sharing and that information system mediated "privatizing" of organizationally owned information products may enhance sharing them. Privatization may carry some negative connotation related to control and pricing, however, in the context of information sharing, ownership is believed to enhance sharing.

H1: Information presented by the online system as privately-owned expertise will be shared more than information depicted as an organizationally-owned product.

H2: Information presented by the online system as a privately-owned product will be shared more than information depicted as an organizationally-owned product.

METHOD

A simple computerized business game was used to simulate a decision making situation. The game procedure required participants to use information, and enabled sharing information. In this framework, the status of information, the manner in which it is presented by information systems, can be manipulated as the **independent variable**. We used a simple online business game called "The Lemonade Stand". In this game, participants made inventory, quality and pricing decisions in the management of a simple business. Decision rounds are termed "business days" and take about two minutes each to complete. The game was played in 'stand alone' mode, player's actions did not influence others. Therefore, the unit of analysis was the individual player. The goal was to improve profits, based on an estimation of future demand. One parameter that affected this demand was the (simulated) weather conditions. System-controlled information about weather predictions served as the central experimental stimulus (independent variable). The Lemonade Stand is very simple to understand and to operate: It does not require much prior knowledge. Decision making is simple and involves a limited number of variables and values. Participants can make sound

decisions intuitively. A pilot experiment performed with 31 undergraduate students showed that the participants understood the game well (Rafaeli and Raban, 2003). The pilot experiment revealed that participants enjoy the game, are challenged by it, and are enthusiastic and motivated to play. A basic version of the game can be seen and experienced at (http://valueofinformation.rafaeli.net).

For the information sharing experiments the participants were randomly divided into three different treatment groups. Each group was given a different presentation on the source of weather information. Weather predictions provided were identified as based on expertise, corporate information, or private information and were available throughout the game on a separate web page linked to the respective main screen of the game. The link to the page and the page title and heading indicated the type of source (expertise, corporate information, private information). The players were seated in a computer lab with an individual computer for each player. They were allowed to interact through an instant messaging application.

One hundred and seventy three (173) MBA students from several universities participated in the information sharing experiments: Seventy one (71) received the information source 'expertise', sixty six (66) received the information source 'corporate information', and thirty six (36) received the information source 'private information'. The third group is smaller as a result of chance fluctuations in subject availability, however, it is large enough to yield sufficient statistical power to our tests.

An instant messaging (IM) application was used to enable information sharing. Players faced a split screen containing the game itself and the IM application in adjacent windows. The IM application was made salient and permanently accessible to increase the players' awareness of incoming messages as well as to encourage the use of this

option. The IM application was implemented using a pair of Java-based client and server programs that allow establishing synchronous group text communication. There was no theoretical limit on group size or server load. The IM enabled sending and receiving both **personal and public** messages. Both the sender and the recipient(s) saw the message appearing on their respective screens with a banner stating whether the message was personal or public. Users had access to a full record of the chat session starting at the time they connected.

As indicated, weather information can influence the demand for lemonade and therefore is relevant and important to the players. On the other hand, such information is not an outcome of the players' actions which means identical weather information can be presented to all participants and thus controlling for game (stimulus) variation between participants.

The **dependent variable** was the willingness to share information (WTS). WTS was collected from the response to personal and general Instant Messaging (IM) messages sent by the experimenter under an alias identity requesting the sharing of information: "Does anyone know the forecast for the next three days of the game?" Or: "I heard you have the forecast for the next three days. Would you be willing to share that information with me?" Textual answers to the IM requests were transformed to numerical values reflecting willingness to share or lack thereof (this is a nominal variable with two levels: 'share' and 'not share').

The **independent variable** was ownership of information. Ownership was operationalized in two ways: (1) Stated in the labeling of weather information provided to the user both in the link to the information and in the web page itself: either expertise

(assumed to be private), organizational content, or private content. And (2) By asking for shared information privately or publicly.

The experiment was preceded by a detailed written presentation of the instructions and sample screenshots. Participants were invited to play a single game of 20 business days (decision rounds), including 6 "practice" days. Each player faced a screen comprising three parts: 1. The Lemonade game. 2. The IM system. 3. The information source (link to another window containing expertise or content). Players received requests for information from what seemed to them to be other players. In fact, these were standard messages sent by the experimenter. Players were given information labeled as either expertise or an information product (corporate or private). As the game progressed, participants received IM elicitations to share their expertise or content product. Table 1 summarizes the manipulations:

Insert Table 1 about here

RESULTS

In the following, we report on the behavior of one hundred and seventy three (173) students who played the simulation. Each participant received two online (IM) requests for sharing information during the game. One request was addressed personally and only viewed by the intended recipient, and one request was sent publicly to all participants. Table 2 lists the number of participants who shared information upon receiving private and public requests respectively.

Insert Table 2 about here.

H1: Information presented by the online system as privately-owned expertise will be shared more than information depicted as an organizationally-owned product.

To test this hypothesis a 2X2 Chi Square (χ^2) test was performed to find whether the two sources of information (expertise/corporate information) were associated with two levels of information sharing (share/not share). Since the hypothesis is directional Fisher's Exact Test significance for one-sided hypotheses is reported here. The data and results for the χ^2 test are shown in Tables 3-4.

Insert Table 3 about here.

Insert Table 4 about here.

Table 3 shows a statistically significant difference in the willingness to share expertise vs. corporate information when the request is made privately. For public requests no such significance was detected. Generally, sharing was lower in response to public requests compared to personal requests (15 vs. 24 sharers out of 137 participants).

When studying the response to both type of requests (Table 4), about 28% (20 of 71) of participants shared expertise while less than 17% (11 of 66) shared corporate information. This difference is not statistically significant.

H2: Information presented by the online system as a privately-owned product will be shared more than information depicted as an organizationally-owned product.

To test this hypothesis a 2X2 Chi Square (χ^2) test was performed to find whether the two sources of information (corporate information/private information) are associated with two levels of information sharing (share/not share). Since the hypothesis is directional Fisher's Exact Test significance for one-sided hypotheses is reported here. The data and results for the χ^2 test are shown in Tables 5-6.

Insert Table 5 about here.

Insert Table 6 about here.

Table 5 shows a borderline statistically significant difference in the willingness to share private information vs. corporate information when the request is made personally. Sharing is lower for public requests compared to personal requests. For public requests no statistically significant difference was observed for the information sources used. Overall when combining the data from both types of requests a statistically significant difference in willingness to share was observed: As hypothesized, sharing is higher for private information than for corporate information (Table 6).

Although no hypothesis was made for the public vs. personal requests, a McNemar test for repeated measures was performed to see if there was a difference between the two request types in terms of the willingness to share information. A significant difference was indeed detected ($p<0.035$) for the request types. Sharing was higher for personal requests (33 sharers) than for public requests (20 sharers).

Hypotheses H1 and H2 called for comparing the willingness to share in two pairs of information sources: expertise – organizational content, private content – organizational content. The third possible pair of information sources, expertise – private content, was not part of the formal hypotheses, however, we performed an analysis of this pair as well in order to complete the analytical picture. A 2X2 Chi Square (χ^2) test was performed to find whether the two sources of information (expertise/private information) are associated with two levels of information sharing (share/not share). No statistically significant difference was found for this pair.

DISCUSSION

Ownership emerges as a catalyst to the flow of information. Furthermore, simple system changes that affect the manner in which information ownership is framed can significantly affect the degree of sharing. As is the case with the newfound popularity of "blogs" compared to the more democratic Usenet, people are more inclined to share information when that information is identified with them personally. Results of the information sharing experiments indicate that ownership plays an important role in the willingness to share. Sharing was higher for information described as privately owned expertise than it was for information products designated to be organizationally owned.

The difference in willingness to share was statistically significant when the request to share was made privately. This lends further support to the notion of ownership. Not only is expertise a private source of information by definition, sharing activity was stronger when the request was made in private. In fact, 23.9% of the players complied

with a personal request for sharing expertise and 10.6% of the players complied with a personal request for sharing organizational content. Results in the same direction, where the willingness to share expertise was higher than that for organizational information, were obtained when the request was sent publicly, however, this effect was not statistically significant probably because of the relatively low response rate. When receiving a public request for sharing information 14.1% of the players shared expertise, while only 7.6% shared organizational content. The overall willingness to share (responses to personal and public requests combined) was also in the same direction (sharing expertise was higher than sharing organizational content) but lacked statistical significance, probably because of the lack of significance in the public request. Overall, 28.2% of the players shared information when it was introduced as their own expertise while 16.7% shared organizationally owned content. Ownership affected the willingness to share consistently and in the expected direction as shown by descriptive statistics as well as by statistical analysis.

Sharing was also higher for a privately owned information product than it was for an organizationally owned information product (Tables 5-6). The difference in willingness to share was statistically significant when the sharing request was made personally, again, lending further support to the notion of ownership. A quarter (25.0%) of the players shared private information when asked personally compared with 10.6% who shared organizational content upon a personal request. Results in the same direction, where the willingness to share a private information product was higher than that for organizational information, were obtained when the request was sent in public. 13.9% shared private information following a public request and 7.6% shared organizational information. This effect was not statistically significant possibly because of the

relatively low response rate. The overall willingness to share (responses to personal and public requests combined) was also in the same direction (sharing private information was higher than sharing organizational content) and was statistically significant ($p<0.048$). One third (33.3%) of the game participants shared private information while 16.7% shared organizationally-owned information.

The overall propensity to share was as hypothesized in H1 and H2: highest willingness to share was displayed by players who received a private document (12 of 36) or expertise (20 of 71) as their information source. In comparison, among those who were given an organizational information product only 11 of 66 shared. The difference in sharing expertise and a private document was not statistically significant strengthening the claim that ownership is the underlying cause and not the information source per se.

The extent of sharing observed in the current experiment (10-33% of participants shared) was low. This is surprising in light of the encouragement to share, social desirability and the intensive instant messaging activity that took place. Players sent 262 personal messages and 484 public messages in total. Thirty three (33) personal messages were the responses to the sharing request. Only 20 public messages were responses to sharing requests. Interestingly the IM messages showed that participants discussed the assignment, and were focused on it, though not to the point of sharing information. Instead, the messages were of an individual, "sharing the experience" nature. People boasted of their performance, asked for others' views and achievements, and the like. Example messages include "I am doing great", and "How are you doing".

Was information overload (overall message volume) partly responsible for reduced sharing? Interestingly, despite less use of the personal IM channel, sharing was much

higher in the personal channel. Sharing needs personal induction while broadcasting in the public channel seems to come more naturally. Some support for this notion may be inferred from a recent survey by the Pew Research Center who discovered that 44% of Americans have contributed content online (Lenhart, Horrigan and Fallows, 2004). Previous academic research attributed this pattern of sharing more in private than in public to a diffusion of responsibility in the public domain (Barron and Yechiam, 2002). The tension between sharing privately and publicly 'broadcasting' deserves further research attention. Future research may also look into the correlation between general participation and helpful sharing.

Another reason for moderate sharing in the present research may be that no incentives were used. Incentives would probably enhance sharing. However, the interest here was in studying how the traits of information itself or the system that conveys it influence sharing. Providing incentives would make it harder to discern the effects of the variables of interest. Information sharing based on prosocial transformation has been reported previously (Constant et al., 1994). Positive regard for an organization can substitute for direct incentives (Constant et al., 1996). To summarize this issue, while incentives would promote sharing they are not relevant to the present research.

Yet another explanation for the observed rate of sharing may be that our groups of participants were **not** online communities. Such communities develop norms (Burnett, 2000) which may include a norm for helpful responses to requests for sharing. Our groups were formed for experimental purposes and did not have the characteristics of online communities. The rate of information sharing in communities is likely to be different than the rate observed in the present research. Our research helps expose the

basic personal norms of sharing which can and should be improved. People have many opportunities to share when they are not part of communities and that's where the present work points to.

The frequent use of the instant messaging (IM) application demonstrated that the tool was well-understood, there were no technological impediments to sharing, the game did not detract attention from the IM application. Why, then, was the level of sharing relatively low? Research literature and semi-popular writings on information sharing and knowledge management discuss the problem of sharing, or lack thereof, stating that non-sharing or manipulative/strategic sharing practices harm organizations by causing a duplication of efforts, loss of productivity, accidents and may even lead to legal action against the firm (Davenport and Prusak, 1998; Messick, 1999). Information sharing levels reported in the literature range between one (1) and 55 percent (Preece et al., 2004). These values shed a new light on the experimental results received here. The sharing level found here is compatible with the level of sharing reported previously. Also, considering that the request was for factual data, the weather forecast, a minimal sharing level can be acceptable as long as at least one reply containing the facts was given. This point may contribute to the lower response rate to the public request.

The effect of ownership on information sharing is discussed in a very limited manner in the academic literature. One article discussed implied ownership: people with higher education levels tend to become list owners more than less educated people. Community owners are known to be more active in online communities (Butler et al., in press). One way to look at this association is to say that people who own more information (in this case by having graduate education) tend to be more active in online communities. However, the survey conducted by Butler et al. showed that community

owners did not contribute more content than other active members. This outcome is probably a result of more investment in and focus on community building and maintenance rather than on particular content issues. The mere fact that more educated people tend to be community owners is in agreement with the observation of this study where people who own expertise tend to be more active contributors than people with access to organizational content.

More specific research on information ownership has highlighted the ambiguous perception of ownership inherent in information (Jarvenpaa and Staples, 2001). That study found that employees who have a higher propensity to share will tend to assign their organization ownership rights for the information they created in the course of work. Such 'pro-organizational' attitude may reflect organizational citizenship but may also suggest that social desirability motivated some of the responses to the survey. The present study found that private ownership promotes sharing but did not investigate perceptions of ownership. Comparing these two different research methodologies, survey and experiment, is difficult. However, the common theme to results of both studies is that there is a strong relationship between ownership and sharing behavior.

There exists a tension between personal and public sharing. Sharing information online is promoted by factors such as community sentiments and dynamics, trust, reciprocity, etc. Sharing may be hindered by other processes such as free riding, diffusion of responsibility and hierarchies. However, pronounced expression of ownership serves to significantly enhance sharing.

The information sharing experiments reported here show that mere variations in labeling of the information sufficed to elicit the hypothesized main effect. Information systems can and often do manipulate the presentation of ownership. In networked

contexts, where location, access permissions and ownership status are given prominent display this is even more pronounced. There has been significant interest in personalization of information as a way to increase its profitability in electronic commerce. The economic reasoning is that a personalized product is not a commodity and will be assigned higher value and pricing (Shapiro and Varian, 1999). Personalization of products, and especially of information products, generates a higher profit margin. The novel claim of the present research is that personalization, creating a sense of ownership, will, perhaps paradoxically, serve to enhance information supply by sharing. Creating a sense of personal ownership by users must be a design goal for designers of knowledge management and other information sharing platforms. System users should be viewed as suppliers by system designers.

The main limitations of the present research are related to the method chosen, namely, the external validity of experiments. Participants were drawn from a fairly limited and possibly biased population. The decision problem used is not necessarily representative of all problems and shared information. For example, we did not test for the influence of a competitive situation on sharing behavior. In future experiments it will be interesting to divide the participants into small groups which will compete with each other. Another limitation of experimental work is that the need for a controlled environment may sacrifice the ability to see non-controlled effects. For example, a different experimental setup may give rise to power struggles reducing information sharing. Obviously, it would be beneficial to run the same experiment in other settings and with other populations as well as to triangulate it with other research methods, such as a field experiment.

Numerous additional questions related to sharing are raised by this project. Is sharing information perceived more as a solution to information overload or to information deficiency? Will information sharing be increased when fee-based information is available simultaneously? When sharing and trading information are available simultaneously, which will prevail? Fig. 1 can also be used to discover areas for future research. For example, what are additional factors beside self-interest which reduce sharing of private information goods? What are the factors that enhance or reduce sharing of hybrid information goods?

Both the instantiation and the meaning of ownership of information are enigmatic and controversial. Often, it is discussed in the macro level relating to issues such as intellectual property, equity, social good, policy making or the tendency for formation of monopolies in the information industry (Levitan, 1982; Gandy, 2002; Lievrouw and Farb, 2003). The ambiguous ownership structure inherent in information together with the economies of scale required for market penetration and success are antecedents of the mixed information market which exists today offering private and public goods concurrently. This research has undertaken to investigate the micro level, the perception of ownership by individuals and how it affects their information choices and behavior. Despite its ambiguity information ownership makes a difference. It serves to increase sharing of information. Increased value leads to under-trading in market environments, but enhances sharing. Ownership can and should be framed by system design according to the particular circumstances.

Information co-exists as both a privately-owned traded or shared good and a publicly-owned traded or shared good. The value of information is in the eye of the

beholder. Ownership affects the value of information in sharing, and the propensity such sharing would take place.

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Information Received Before Game	Elicitation Method
Expertise	IM-private
Expertise	IM-public
Organizational content	IM-private
Organizational content	IM-public
Private content	IM-private
Private content	IM-public

Table 1: Summary of the independent variables: methods of elicitation for each manipulation of information.

	Private Request for Information		**Public** Request for Information	
	Shared	Not Shared	Shared	Not Shared
Expertise	17	54	10	61
Corporate Information	7	59	5	61
Private Information	9	27	5	31

Table 2: The number of participants who shared or did not share weather information upon receiving a private or public request for help.

	Private Request			Public Request		
	Share	Not Shared	Total	Share	Not Shared	Total
Expertise	17	54	71	10	61	71
Corporate Information	7	59	66	5	61	66
Total	24	113	137	15	122	137
χ^2	4.211			1.486		
Fisher's Sig.	0.033			0.173 (NS)		

Table 3: χ^2 tests for frequency of sharers and non-sharers in response to private and public requests for expertise and corporate information.

	Combined Requests		
	Share	No Share	Total
Expertise	20	51	71
Corporate Information	11	55	66
Total	31	106	137
χ^2	2.585		
Fisher's Sig.	0.080 (NS)		

Table 4: χ^2 test for frequency of sharers and non-sharers in response to both private and public requests for expertise and corporate information.

	Private Request			Public Request		
	Share	Not Share	Total	Share	Not Share	Total
Private Information	9	27	36	5	31	36
Corporate Information	7	59	66	5	61	66
Total	16	86	102	10	92	102
χ^2	3.649			1.050		
Fisher's Sig.	0.054			0.245 (NS)		

Table 5: χ^2 tests for frequency of sharers and non-sharers in response to private and public requests for private information and corporate information.

	Combined Requests		
	Share	No Share	Total
Private Information	12	24	36
Corporate Information	11	55	66
Total	23	79	102
χ^2	3.705		
Fisher's Sig.	0.048		

Table 6: χ^2 test for frequency of sharers and non-sharers in response to both private and public requests for private information and corporate information.