Answerer Engagement In An Enterprise Social Question & Answering System

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Abstract
Many studies about social question and answer (Social Q&A) platforms have focused on the recommendation algorithms designed to find the right person for the question. But very little literature has investigated how to motivate the selected potential answerers to answer a question, especially in an enterprise setting. In this work, we designed an in-situ experiment in an enterprise social Q&A system to understand how different design aspects (e.g., exposing relationship information, directly asking the answerer, indicating question's importance and urgency, and using virtual points as incentives) could influence answerers' engagement behaviors. We found that two design features examined in the experiment can affect answerers' viewing and answering behaviors. These findings lead to specific design recommendations, which are also discussed in the paper.
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1   Introduction

Employees in enterprise often rely on their colleagues to get work done. People in an enterprise setting are thus required to collaborate and to share information as a social obligation. A variety of computer systems have been developed and adopted by enterprises to support knowledge sharing and collaboration, such as enterprise blogging, enterprise wikis, social bookmarking, and social networking sites (Olson and Olson 2013). Such software has been proven useful to increase employees' social capital and the collaboration work efficiency (Steinfield, DiMicco, Ellison, & Lampe, 2009), especially when collaborators are using an appropriate "collaboration pattern" (Wang et al. 2015).

Recently, Social Question and Answer (Q&A) sites have played an important role in knowledge sharing and information seeking in public spaces. Many social media sites such as Facebook and Twitter have been used for questions and answers between friends and organizations (Hou & Lampe, 2015; Lampe, Gray, Fiore, & Ellison, 2014). Public social Q&A sites such as Yahoo! Answers, Quora, and StackOverflow allow users to directly ask questions and leverage the power of a volunteer crowd to give answers. As in enterprise settings, researchers have also developed similar social Q&A systems to support enterprise collaborations (Luo, Wang, Zhou, Xin, & Hang, 2014; Pan, Luo, Chi, & Liao, 2013). Although the potential of using social Q&A systems to address the challenge of enterprise knowledge sharing is exciting, few empirical studies have been done to investigate how to engage potential answerers in enterprise social Q&A sites.

Enterprise social Q&A systems have many unique characteristics compared to the public social Q&A sites. For instance, enterprise users in general are more cooperative, and it is critical for a company to motivate its employees to collaborate and to share knowledge. Employees in an organization are normally organized in hierarchy, whereas the public users are autonomous. Besides, all employees are identifiable to other users in the enterprise social systems, and employees' reputation and performance are constantly evaluated (Jacovi, Guy, Kremer-Davidson, Porat, & Aizenbud-Reshef, 2014). As a result, it is important to investigate the unique design requirements under the enterprise context.

One active research topic in enterprise social Q&A research so far has focused on developing recommending algorithms to locate suitable people to answer ("answerers") a question. This research developed a number of algorithms that use people's question answering history, social content and behaviors to model their relevancy and ability as potential answerers to the posted questions, or answerers' willingness and readiness to enhance the question-answerer *matching* accuracy.

Another line of the research, which has not been fully understood yet, is to identify users' motivation and the engaging designs to enhance the possibility of answerers' contribution after the algorithm finds the potential answerers However, how these engagement factors can be applied in an enterprise social Q&A system is unclear.

In this paper, we investigate what additional information (other than the question) and information presentation formats could impact answering behavior after the question is routed to a potential answerer by a matching algorithm. We referenced the algorithm proposed and validated by (Luo et al., 2014). In

this paper, we choose email as our engagement method, and designed an in-situ experiment to explore how different designs of the engaging email and the user interface of the Q&A system can affect the potential answerers' behaviors in an enterprise setting. Our study was driven by the following research questions:

RQ1. What design features in the email can attract potential answerers to open and read the question page after receiving an invitation email?

RQ2. What design features in the email and in the system user interface can further influence an answerer's inclination to answer the question?

RQ3. How are these different design features affecting an answerer's satisfaction ratings of the system, and his/her answering effort?

2   Related work

Our study is guided by research around the two steps of engaging answerers in an enterprise social Q&A system: answerer recommendation (to find the right person), and answerer engagement (to motivate them to answer the question). Answerer recommendation focuses on matching a question to potential answerers, which is related to answerers' readiness and relevance to the question, and answerer engagement addresses answerers' willingness to answer questions in enterprise Q&A system.

2.1   Enterprise Knowledge Sharing and Social Q&A

People in an enterprise setting are required to collaborate and share information. Previous research suggested that employees do turn to enterprise social information sharing platforms such as organizational microblogging tools (Zhang, Qu, Cody, & Wu, 2010) for social information seeking and to ask work-related questions (Thom, Helsley, Matthews, Daly, & Millen, 2011).

Research on expertise locating systems also showed that common social connections, and self-described expertise are useful information when users want to find expertise in a system (Ehrlich & Shami, 2008; Shami, Ehrlich, Gay, & Hancock, 2009). We are interested in whether these research findings and design implications concluded from the public Social Q&A platforms could generalize to the enterprise settings.

2.2   Expertise Recommending Algorithm

Research has been done to find users who have expertise in answering a question by modeling the potential answerers. These research uses the similarity between the question content and the user's profile, employee profile information, as well as enterprise social relationships to automatically identify answers (Campbell, Maglio, Cozzi, & Dom, 2003; Ehrlich, Lin, & Griffiths-fisher, 2007; White & Richardson, 2011).

Some recent work on both public and enterprise social Q&A systems uses additional factors to model not only answerers' capabilities, but also answerers' personal traits and willingness and readiness to answer routed questions, such as time of routing, asker-answerer relationship history, and personality traits predicted from user texts (Dror, Koren, Maarek, & Szpektor, 2011; Mahmud, Zhou, Megiddo, Nichols, & Drews, 2013).

2.3   Answerer Motivation and Engagement

The second challenge in an enterprise social Q&A system is how to engage potential answerers to the routed questions once they are identified (Peters, Castellano, & de Freitas, 2009). These studies provided valuable contributions because users who meet the expertise criteria with lower motivation may choose to ignore the question request. As a result, understanding answerers' motivation and useful engagement methods is the key interest in this paper, and it helps the design of the enterprise Q&A systems related to answerer engagement.

Prior work investigating answerers' motivations revealed that altruism, learning, and social ties are frequent intrinsic motivators for answerers to help others (Ackerman & McDonald, 1996; Nam & Ackerman, 2009). Some researchers also found that *extrinsic motivation* such as reputation systems and monetary payments are effective extrinsic motivators (Lee, Kim, Yi, Sung, & Gerla, 2013; Mamykina, Manoim, Mittal, Hripcsak, & Hartmann, 2011). More importantly, these motivators have not been evaluated in an experiment for an enterprise social Q&A system, partially due to the difficulty of manipulating the designs of a real social Q&A system.

Some research has studied specific engagement designs through an effective request message to solicit answerers' contribution to the social Q&A site. One effective engagement design is to reveal the request's *social value*. Previous research on public social Q&A has demonstrated that revealing the social

value in the request can increase the response rate. For instance, Nichols and Kang (2012) designed an experiment to solicit strangers about airport waiting time on Twitter. The experiment results suggested that adding a simple motivational sentence that indicates the value of the answer (e.g. "answering question is helpful to others") can significantly increase the response rate. Revealing social value to motivate users' contribution has also been found in various fields other than social Q&A, such as online communities (Rashid et al., 2006), but whether this kind of request design is useful or not for enterprise social Q&A platforms an open question.

Directly asking is another design being used in the request messages. Phrases such as "asker directly invited you to answer the question" hint social pressure, which increases the possibility of users responding the request. This effect has been proved in other enterprise social software. For instance, researchers built and evaluated an enterprise blog topic recommendation system called Blog Muse. They found that the readers' direct requests can impose social pressure on the writer and (s)he is more likely to write a blog post (Dugan, Geyer, & Millen, 2010; Geyer & Dugan, 2010). But whether this effect still holds in an enterprise social Q&A system is not answered.

There are many ways to send out the engagement message, such as via email, phone call and instant messages. In companies, email is the most preferred communication channel because of its preciseness, reviewability, and visibility (Turner, Qvarfordt, Biehl, Golovchinsky, & Back, 2010). Therefore we designed the promoting message to be sent only via email, and then manipulated the design of the information contained in the email.

In this work, we examine the designs of the invitation emails and the user interface of an enterprise Q&A site. Previous studies mostly rely on publicly accessible log data or qualitative research methods, since it is hard to directly manipulate the user interface design of a public Q&A platform (Gazan, 2011). In contrast, we are able to access an existing social Q&A system code directly and to examine different design features under controlled experiment conditions. By exposing additional information to the experiment groups, and comparing their answering behaviors and satisfaction rates of the system with the control groups, we can examine the following design features in a more detailed level.

3   Design Features and Hypotheses

Based on previous literature about answerers' answering behavior on enterprise and public question-answer systems, we derived four design features that may influence answerer's engagement behavior in an enterprise social Q&A site:

3.1   Social Relationship

We are interested in whether presenting the social relationship between the asker and the answerer could influence the answerer's behavior. Previous literature has suggested that people's Q&A behaviors on social media are partially attributed to the pursuing of social capital (Morris, Teevan, & Panovich, 2010) and social connectons were used in expert location (Horowitz & Kamvar, 2010; Pan et al., 2013). When both the question asker and the potential answerer are colleagues of the same enterprise, the potential answerer's valuing social capital should motivate him/her to help other colleagues. It is even more likely if the system explicitly presents their relationship.

Hypothesis 1: An enterprise social Q&A system and its invitation email with the design indicating the social relationship (**Social Relationship**) between the asker and the potential answerer will: **H1a**. increase the possibility that the answerer views the question; **H1b**. increase the possibility that the answerer answers a question; **H1c**. increase the answerer's effort in answering; **H1d**. improve the answerer's satisfaction rating with the system.

3.2   Directly Asking

When someone asks a question specifically to you rather than to a general community, especially when he/she is from the same enterprise, it exerts pressure on the potential answerer from the peers or the environment, as it is a more direct expression to let the people feel he is personally in charge.

Hypothesis 2: An enterprise social Q&A system and its invitation email with the design feature of **Directly Asking** the potential answerer to answer a question will: **H2a**. increase the possibility that the answerer views the question; **H2b**. increase the possibility that the answerer answers a question; **H2c**. increase the answerer's effort in answering; **H2d**. improve the answerer's satisfaction rating of the system.

3.3   Question Importance and Urgency Level

We are also interested in whether different levels of the question's importance and urgency play a role in answerers' engagement. We would expect that the higher importance level and the higher urgency level a question has, the more likely answerer would view and answer it. Therefore we designed two more variables to represent these two features, which leads to four experiment participant groups: high/low importance levels * high/low urgency level. Assuming that answerer's altruism plays an essential role in answering other's question, their answering behavior should be more engaging when the question is at high important level or high urgent level.

Hypothesis 3: An enterprise social Q&A system and its invitation email with a high question's importance/urgency level (**High Importance, and High Urgency)** will: **H3a**. increase the possibility that the answerer views the question; **H3b**. increase the possibility that the answerer answers a question; **H3c**. increase the answerer's effort in answering; **H3d**. improve the answerer's satisfaction rating of the system.

3.4   Incentive

The incentive mechanism has been shown to be effective in motivating people to engage in the online question-answering activities (Mamykina et al., 2011; Raban & Harper, 2008). It can be a monetary incentive or virtual award such as points or badges. Most of the public Q&A platforms use virtual awards to recognize users' behavior and to motivate them to contribute more answers. However, this kind of system is not likely to be effective within an enterprise setting. Most of the companies have their own employee performance evaluation mechanism, and the participation on an internal social Q&A platform is probably not on the list of performance goals. Therefore how employees perceive the virtual point incentive system, and how it would affect their answering behavior is still an open question.

Hypothesis 4: An enterprise social Q&A system and its invitation email with the design of an incentive mechanism (**Incentive**) will: **H4a**. increase the possibility that the answerer views the question; **H4b**. increase the possibility that the answerer answers a question; **H4c**. increase the answerer's effort in answering; **H4d**. improve the answerer's satisfaction rating of the system.

3.5   Measures

In addition to the 4 design features, we also have 4 major measurements as dependent variables, each of which is measured by:

- Answerer's Viewing Behavior: Whether or not the user clicks the link in the email and looks at the question.
- Answerer's Answering Behavior: Whether or not the user answers the question after he/she views the question page.
- Answerer's Effort: We use the length of the answer (in character) as a proxy to the answerer's effort.
- Answerer's Satisfaction: We measure the participant's satisfaction toward the design of the user interface by using a self-report 5-point Likert scale question at the bottom of the question page.

In summary, we use 4 independent variables representing different design features, and 4 dependent variables to quantify the influence from each design feature. In total, we have 7 experiment conditions, each of which has 30 participants, and 1 control group that has 120 participants.

4   Experimental System

We developed the experimental system (as shown in Figure 1) as an extension to an existing enterprise Social Q&A platform, which was described in details in (Luo et al., 2014), on top of which we manipulated the page setting to limit our participants seeing only the question that we routed to. In order to save space in this paper, we visualized all the 7 experiment design conditions in the Figure 1. Those plus the baseline condition that contained no addition information comprises all the 8 experiment conditions. The participant could not see previous answers by other participants even if they were asked the same question. We sent an invitation email with a URL linked to the question page (as shown in Figure 1) to the pre-selected participants. With the help of the server's log data, if participants clicked the link and looked at the question, we would record it as **Viewed**. If they further answered the question, we would record it as **Answered**. The strategy of choosing participants will be discussed later in the research method section. Within the page, we also asked them to answer a 5-point Likert-scale satisfaction question about the user interface design in general.

4.1   Interface Design and Invitation Email

We created a fake user named "Shally Launder" with a complete profile (e.g., photo, email, rank, department and address) in the enterprise Social Q&A system, but this person does not exist within the enterprise's employee catalog. Within this question page, we have the question title, question's description (was used only if the title was short in space), an open text space for the user to input the answer, and a satisfaction rating about the overall design of the system. Then based on the different experiment conditions, we have various design manipulations of the user interface as described in section 3. The invitation email would also change accordingly with the manipulation of the user interface of the enterprise Social Q&A site. In the engagement email and the question answering page, we did not reveal to the participants that this was an experiment. After the participants submitted the answers on the website, they would see a "thank you" page with information about this experiment.

In the **Social Relationship** condition, we used a "*You and Sally may have a friend in common*" phrase to represent there is a social relationship between the asker and the answerer and to evaluate how users' motivation of gathering social capital might influence their answering behavior.

In the **Directly Asking** condition, we used a simple sentence: "Shally invited you [answerer's name] to answer a question" phrase in both the invitation email and in the user interface. The control condition does not have this sentence.

In the **Question Importance and Urgency** condition, participant sees two color-coded tags (orange color means high level and gray color means low level, as in Figure 1) on the question page representing the question's importance and urgency at different levels (importance level and urgency level), and the invitation email will be labeled as "[Important/Not Important]" and/or "[Urgent/Not Urgent]" in the title. The control group email contains no importance and urgency information at all.

In the **Incentive** condition, we embed a sentence on the right-top corner of the question page "*you can win 50 points award by answering this question*" and in the content of the invitation email; whereas in the control group, there is no such expression on the question page or in the email. We did not indicate any use of the virtual points.
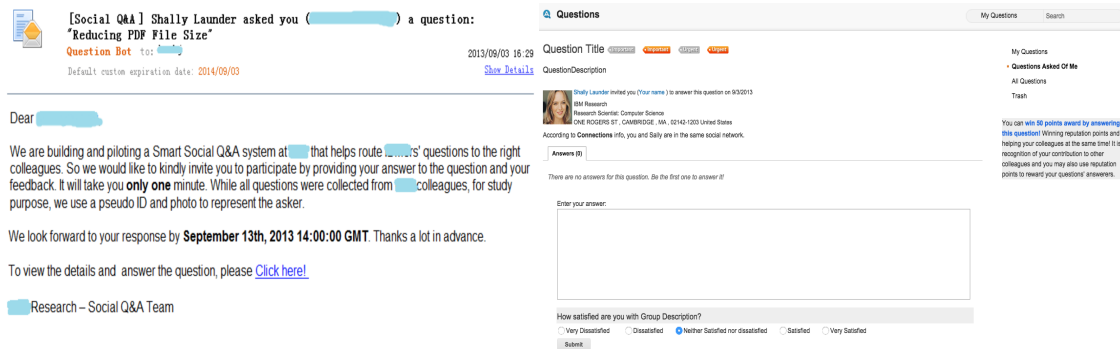

Figure 1. The email invitation (left) and design interface (right) of the enterprise social Q&A system.

4.2   Question Set

We randomly collected questions from another existing intranet social Q&A platform, Answers@TAP, which mainly supports employees' technical and enterprise information questions (Pan et al., 2013). In total 69 questions were collected and then coded by two independent coders following a coding schema of the question types proposed in a previous study (Morris et al., 2010). The Cohan's Kappa is 0.711, which indicates a high agreement on the questions' types. Among the 69 questions, 57 questions were coded as the same type. Therefore, we randomly selected 33 questions out of the 57. The complete 33 questions list is available upon request.

4.3   Answerer Recommendation Algorithm and Participants

As mentioned earlier, we did not randomly select our participants from the whole employee pool within the enterprise. Instead, we used an answerer recommendation algorithm to pre-select our participants for answering the question (Luo et al., 2014). The recommendation algorithm matches employees with the questions based on the employees' expertise and their previous online behavior. Here we explain how we used the algorithm to select our participants.

We entered each question into the recommendation system and it generated a list of recommended employees based on a predictive model. We then chose the top 10 employees proposed

by the algorithm as our potential answerers for that question. The recurring employees were then deleted to ensure each participant is tested only once. The selected participants were assigned into 8 experiment conditions. In total we have 330 participants in this study.

5   Results

The experiment was conducted between September 5th and September 13th 2013. We divided participants into different test groups (8 groups in total) and sent the customized invitation emails to them. Out of 330 participants, 158 participants (47.9%) accessed the enterprise Social Q&A website and viewed the question. Of these, 70 participants (44.3%) answered the question. Results were analyzed using a Generalized Estimating Equation (**GEE**). The GEE method is an extension of generalized linear modeling (**GLM**) method to analyze the data with potential correlations within each cluster. Within our dataset, each question was asked to 10 participants therefore there might be potential correlations among the 10 participants' behaviors of viewing or answering the question, which violates the error independence assumption of GLM. In addition, in this study we are not interested in the individual patterns of response, but in the overall effect of a design feature on answerers' view and answer behaviors, which were coded as binominal data. Moreover, our dependent variables (viewing/answering the question) are of binary value (yes/no) and require a binomial logistic model. Therefore we chose the GEE method to analyze our data using binomial logistic model with the unstructured correlation structure, with Question ID as the repeated measure and the viewing or the answering behavior as the dependent variable. Dummy variables for each of our design features were the independent variables, with the condition that only has the asker's profile feature as a baseline condition. All other conditions have the made-up asker's profile feature plus one additional feature, so our models test the effects of this additional feature on answerers' viewing/answering behavior.

5.1   Answerers' Viewing Behavior

The **Directly Asking** (B=1.08, p<.01) and **Incentive** (B=.89, p<.05) features had a significant effect on viewing behavior (Table 1). Answerers being asked directly by the asker were 2.94 times more likely to view the question than those who did not receive explicit pressure, even though the social pressure manipulation in this study was simply a sentence "*Shally invited you to answer a question*" (instead of "*Shally asked a question*") in the email title and on the user interface of the enterprise Social Q&A system. An enterprise Social Q&A system that expresses explicit pressure in the invitation email or on the user interface can motivate participants to view the question page. **H2a** is supported.

Answerers of the enterprise Social Q&A system with an incentive system were 2.44 times more likely to view the question than those of the system without incentives, even though the incentive system in this study was merely a virtual points award. An enterprise Social Q&A system with an incentive mechanism can motivate answerers to view the question page. **H4a** is supported.

There was no effect of the **Relationship** feature on viewing behavior (p=0.55): expressing the social relationship between the asker and the potential answerer did not significantly increase answerers' viewing behavior. **H1a** is not supported. The potential explanations for this will be discussed later. There was also no significant difference in viewing behavior between low and high urgency levels (p=0.85) or importance levels (p=0.38) of the question, indicating high urgency and importance did not increase viewing behavior for any question. **H3a** was rejected.

Effect	Beta	S.E.	p	Odds Ratio
(Intercept)	-0.58	0.19	<0.01	0.56
Relationship	-0.59	0.35	0.09	0.55
Directly Asking	**1.08**	**0.31**	**<0.01**	**2.94**
High Urgency	0.09	0.47	0.85	1.09
High Importance	-0.46	0.52	0.38	0.63
High Urgency * High Importance	0.29	0.73	0.69	1.34
Incentive	**0.89**	**0.37**	**0.02**	**2.44**

Table 1: Parameters from Answerer' Viewing Behavior GEE Analysis (N=330).

5.2   Answering Behavior

The only effect that was statistically significant was the incentive, B=1.24, S.E.=0.21, CI=(0.82,1.66), *p*<0.01. Participants of the enterprise Social Q&A system with an incentive system were 3.46 times more likely to answer the question than those of the system without incentives, even though the incentive system in this study was merely a virtual points award. An enterprise Social Q&A system with an incentive mechanism can motivate potential answerers to answer the question. **H4b** is supported, but **H1b, H2b, H3b** are not supported.

5.3   Answerer Effort

As we explained in the experiment design section, we used the length (in characters) of the answer as a proxy of the answerer's effort. We acknowledge that the length of the answer may not necessarily reflect the quality of the answer, but it can reflect the effort that the answerer spent, therefore it is another reasonable indicator to measure the participant's engagement level.

Similar to answerers' viewing behavior and answering behavior analyses, we chose the GEE method to analyze the answerer's effort. Because the question length is a count variable, we use a Poisson loglinear model, with the unstructured correlation structure to account for repeated questions. 33 question IDs was used as the repeated measure, all the design features are independent variables, and the length of the question is the dependent variable. We report only the **significant** effects. The **Relationship** (B=-0.8, p<.05, N=135), **High Urgency** (B=1.17, p<.01, N=135) and **High Importance** (B=1.25, p<.01, N=135) features had a significant effect on the answerer effort.

Participants who received explicit **Relationship** information from the invitation email and from the user interface of the enterprise Social Q&A system gave answers that were only 41% the length of the answers of participants who did not receive the information, even though the **Relationship** information in this study was simply a sentence "According to Connection, *Shally and you have friends in common*" versus nothing in the email title and on the user interface of the enterprise Social Q&A system. An enterprise Social Q&A system that expresses explicit social ties in the invitation email and on the user interface can actually prevent answerers from giving longer answers. **H1c** is rejected.

The answers would be relatively longer if the value was assigned as high urgency (3.22 times) or high importance (3.49 times) than the ones were assigned as low urgency or low importance, respectively. These offset the negative effects of showing the urgency (1.31 times) and importance (1.42 times) tags. Therefore given the tags exists, the answerer tends to provide longer answers to the questions that were assigned as high urgency or high importance. **H3c** is supported.

5.4   Answerers' Satisfaction

The answerer's satisfaction about the system's interface was measured by a 5-point Likert-scale question, with 5 as "very satisfied". We found that the responses were reasonably normally distributed (no high skewness or kurtosis). Therefore, we used GEE with a simple linear model to analyze the answerer' satisfaction rates. Again we chose the unstructured correlation structure to account for repeated questions, with Question Id as the repeated measure and all the design features as independent variables. We report only the **significant** effects in this model.

The **Relationship** (B=-1.16, p<.01, N=127) and **high importance level** (B=.69, p<.01, N=127) features had a significant effect on the answerer's satisfaction rating of the system. The overall satisfaction rates from answerers who received explicit social tie information from the invitation email and the user interface of the enterprise Social Q&A system were on average 1.61 points lower (on a 5 point scale) than the rates from the ones who did not receive that information. An enterprise Social Q&A system that expresses explicit social tie information in the invitation email or on the user interface can lower participants' satisfaction level. **H1d** is rejected. If the tag is marked as high importance, it can increase their satisfaction rates by 0.69, which offsets the negative effect from having the importance and urgency tags. **H3d** is supported, but **H2d** and **H4d** are not supported.

6   Discussion and Limitation

6.1   How to Design the Engagement Email and the Question Page

Out of many communication channels to send out the engagement message, we controlled the experiment condition to use only emails. Even though it is a simple email template, how it is designed and the message is phrased can still influence answerer's behaviors and engagement with the questions, such as clicking the question link and answering the question. Based on our experiment results, we

propose the following design features that are critical for the design of engagement email and the question page user interface: directly asking and incentive.

6.1.1   Directly Asking

Our results showed that directly asking the potential answerer to answer a question increased the likelihood of answerer to access the question page. This result echoed previous research on the influence of direct question phrasing on blog contribution in enterprise blog topic recommendation (Dugan et al., 2010) and question answering in enterprise social networking site (Teevan, Morris, & Panovich, 2012).

The effect of direct messages could be explained by the fact that directly asking someone can enhance the social pressure and remind people directly they could make unique contribution bear on the question and thus reducing social loafing (Karau & Williams, 1993). Social loafing is the phenomenon of people making less effort when they work in a group because they feel their contribution do not count. By directly asking an answerer for help, the pressure increased the feeling of responsibility and the possibility to look at the invitation question.

This result implies that to enhance the engagement of targeted answerers in the enterprise social Q&A system, one strategy is to incorporate social pressure message and explicitly address the request to the potential answerer in the invitation email or in other requesting formats. We suspect that this might be more effective in the enterprise setting than in the public domains, as in the enterprise setting: a) people know that they are expected to behave collaboratively; b) it is a trustful network; c) and all users are exposed with their real identity. However, further multisite comparison studies are needed to examine these assumptions.

6.1.2   Incentive

Our results found that incentive of adding to an answerer's reputation points was a significant factor for potential answerers to open the invitation email and to answer the question. This result is consistent with previous research on the effect of extrinsic motivation, especially reputation system on the answer quality (Raban & Harper, 2008).

The surprising finding is that even though the employees knew that the reputation point system had no use in the enterprise setting, the control group and the experiment group still behaved significantly differently. It is similar to the findings from the public Social Q&A platforms. However, in public Social Q&A systems (e.g., Quora and Stackoverflow), the reputation point system is related to users' certain privileges. The more reputation points a user has, the more advanced function (s)he is allowed to use in the system (Raban & Harper, 2008). Whereas in an enterprise setting, the system is rarely designed to have a virtual point ranking system and to limit certain functions to users. Since the virtual reputation point system is not related to a user's privilege or his/her performance evaluation, it is inspiring that this "meaningless" design feature can still influence users' viewing and answering behaviors.

We suspect that the effectiveness of this virtual point system as incentive may also attribute to the name of "reputation points". Managing one's workplace reputation is an important factor for enterprise scenarios. Reputation as an expert can be beneficial to one's career, thus it becomes an important motivation for people to bolster their standing as an expert (Thom et al., 2011). Freyne, Jacovi, Guy, and Geyer (2009) also demonstrated that a variety of enterprise social media traces were used to assess employee's reputation. Therefore, the participants may change their answering behaviors if they perceive the "reputation points" as an indicator of their reputation. A follow-up qualitative study is needed in order to explore how the participants perceived the reputation point system.

6.2   Relationship between the Asker and the Answerer

Exposing the relationship information between the asker and the answerer in the Q&A system did not significantly increase the viewing and answering rate. On the contrary, it reduced the answerer's efforts and their satisfaction rates of the system. Although prior work showed that answerers might be driven by the intrinsic motivation to answer the question in order to maintaining social relationship as well as acquiring social capital (Morris et al., 2010), we did not find any significant effect of the social tie design on potential answerers' viewing and answering rate.

There are two potential reasons that can explain this result. First, we did not specify the properties of the social relationship, such as the strength or the type. Prior work which identified that social ties were related to the answering behaviors, specified that particular types of social ties (e.g., geographical and social distance) (Ehrlich et al., 2007). However in our study design, we only introduce this design feature by including a sentence of "having friends in common", which seems quite weak to some participants.

The second possible explanation is that, in our study, we created a fake employee profile as the asker and introduced a fake weak social between the asker and the potential answerers. Their suspicion of the asker's profile may prevent them from engaging with the questions. The social relationship feature could be useful if we set up the experiment using a real employee identity and reaching out to his/her real social connections within the company, but then it will limit the questions that we can ask in the experiment, as we want to ensure the participants have the necessary expertise to answer the question we routed to them by using the answerer recommendation algorithm. Therefore we made the tradeoff as designing the experiment in a way of question-centered.

6.3   Limitations

There is a limitation, which has been mentioned earlier that the question asker in this experiment uses a fake profile. She has an entire set of profile information (e.g., photo, email, rank, department and address) in the experimental Social Q&A system, but does not exist in the enterprise. If some participants check with the human resource department, or look for her in the employee catalog, they could not find her. In future research, it would be ideal if we can test the actual social relationship between the potential answerer and the question asker, yet it would require a much broader user population.

In addition, we used the answer's length as a proxy of the answerer's effort, which is imperfect. From the literature, we know that the answerer's effort is the combination of the answer's usefulness, objectiveness, trustworthiness, balance and readability (Pal, Farzan, Konstan, & Kraut, 2011). In this study, we did not qualitatively code each answer's quality. However, we believe the counting the length of the answer is a good quantitative proxy to measure how much effort the answerer dedicated in this answering behavior, as suggested in (Harper, Raban, Rafaeli, Konstan, & Carmel, 2008).

7   Conclusion

In summary, we designed an in-situ experiment to investigate how different design features in the invitation email and on the user interface influence the engagement activities of the potential answerers in an enterprise social Q&A system. We identified two design features that led to more answerer engagement behaviors in the sense of opening and viewing the question page: **Directly Asking** the answerer, and designing a virtual point system as **Incentive**. The virtual point as **Incentive** design also led to more answering behaviors from the answerers. Our results shed light on the design of the engagement process after the potential answerers are identified by a relevancy model, and provide useful implications for the design of the engagement messages and the user interfaces of both the social Q&A system and other collaboration-supported systems in enterprise settings.

8   References

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