Open Knowledge Exchange Systems
The Users’ Perspective

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Abstract: The development of an Open Knowledge Exchange (OKE) system, designed to free knowledge dissemination from the bottleneck of traditional peer review methods, requires careful consideration of not only the technical capabilities such a system should provide, but also how users’ rights and privileges should be distributed amongst contributing authors, conference organizers, and registered system users/reviewers to ensure a fair and legitimate socio-technical system. A survey was developed and administered to solicit input from prospective users regarding these issues. Survey results indicated that researchers’ assumptions of what would constitute a fair system did not always agree with users’ responses, particularly in the areas of paper rating, social networking functions, and required community participation.

Keywords: Academic Knowledge Exchange, Academic Publishing, Socio-technical Systems

INTRODUCTION

Academic conferences strive to disseminate knowledge, bring researchers with common interests together, and encourage collaboration. But these goals, even with significant advancements in computing, the Internet and the frameworks of social media, are stymied in part because reviewers for these events follow the same protocols as journal editors and reviewers, and are therefore at times bottlenecks, prohibiting all but a select few to pass their scholarly work through the gates of peer review. This bottleneck affects not only the amount of knowledge being disseminated, but also, as is the case for journals, the timeliness or relevance of the knowledge to be shared, as authors submit their work months in advance and wait months for feedback, only to find their work rejected or accepted with required revision (Armstrong, 1997; Lawrence, 2003; Weller, 2001).

One remedy to this situation is the creation of an Open Knowledge Exchange (OKE) system. OKE is a web-based socio-technical platform that allows information and conversation to flow among conference attendees, authors and organizers before, during, and after a conference, and can be used whether the conference is physical or virtual. Critical aspects of the OKE system’s design and potential user acceptance are the support of not only robust capabilities but also respect for the rights and responsibilities of the various system users (Mumford, 2006).

This paper presents the results from a survey designed to solicit user input regarding both the technical capabilities of an OKE system and how control over these capabilities should be dispersed to ensure fairness and equity for users of a system that facilitates open collaboration and knowledge dissemination. Of particular interest are results contradicting researchers’ assumptions of what would constitute a fair system, as evidenced in responses about paper rating, social networking functions, and required community participation.
Background

A fervent debate is currently taking place in academia on the worth of the peer-review process (Jennings, 2006; Thomas, 2011) and the tight control it exerts on the timely diffusion of research artifacts (Fitzpatrick, 2010). Whether it is because of the traditions and prestige associated with peer-reviewed publications or because of the concerns about the openness of digital media, an entrenched academic process is being questioned, reexamined, and, in some disciplines, reconsidered.

Peer refereeing as a process leaves behind the vast amount of potentially valuable work that researchers generate, thereby depriving the scholarly community of important and creative knowledge. A similar, but necessarily much shorter refereeing process is used for conference publications, shorter because conferences are intended to disseminate information rapidly. This process also suffers from some of the same shortcomings with which journal refereeing struggles (Halpern & Parks, 2011). However, the desire of authors to disseminate results quickly via conference proceedings has come at a high cost. Grudin (2011) argues that authors have opted for “short-term research” projects in order to meet conference deadlines as opposed to engaging in deliberate, long term investigations that traditionally lead to strong and carefully reviewed journal publications.

Proponents of alternative systems to peer reviewing argue that the protracted process can be considerably compacted, and the use of socio-technical systems can facilitate new idea generation, archive worthy knowledge, and encourage scholarly collaborations (Adomavicius & Tuzhilin, 2005; Sobecki, 2006). Because one of the goals of a socio-technical system is to develop communities through computer-mediated interaction, it can be an equalizer, redistributing social power by redistributing the competencies required to achieve a certain goal (Hovav, 2008).

As a socio-technical system applied to the complex domain of knowledge generation, evaluation and dissemination, the main purpose of the OKE system is the facilitation of interaction among its users via functional technology for the benefit of the scholarly community (Bryl et al., 2009; Baxter & Sommerville, 2011). As such, the OKE system offers an open environment for a democratic assessment of scholarly work, quickly exposing such work to a larger audience, allowing any interested person to review, provide comments, and ultimately contribute to the production of a final version of research that reflects critically vetted and iteratively enhanced content (Rao & Talwar, 2008).

The interest of the users’ community can only be assured if an equitable balance among the various stakeholder needs and desires is maintained (Baxter & Sommerville, 2011) and none of the participants can illegitimately obtain an advantageous position or outcome. Whitworth and de Moor (2003) propose that legitimate interaction within socio-technical systems promotes social well-being that is fair to individuals and beneficial to the group. Proponents insist that to increase a socio-technical system’s potential, its development must both embrace democratic values and accommodate design principles such as usability, user functionality, and task distribution (Baxter & Sommerville, 2011; de Moor, 2002; Whitworth & Friedman, 2009a; Whitworth & Friedman, 2009b). These values translate into actual system behavior, ensuring a fundamental ideal, equality, along with an appropriate architecture that is intentional in its design for democracy and fairness.

Method

A survey was developed to measure respondents’ perceptions of legitimacy, fairness, and usefulness of the following system capabilities: Registration, Rating, and Social Interaction.

Survey development was conducted over a four-month period, and a link to a survey of 55 questions was e-mailed to leadership of ACM Special Interest Group for Information Technology Education (SIGITE) and Common Ground Publishing, as well as posted in forums of Drupal
wiki users. These groups were chosen for specific reasons: the Drupal group was solicited because of their strong presence in the open source web development community; ACM SIGITE had offered to be a beta testing site for the prototype system; and Common Ground Publishing is at the frontier of open source publishing. Based on the varied interests represented by these three groups, the responses are indicative of the opinions of the broader computing academic population.

Once the survey was closed, responses totaled 142, with an average of 84 complete responses per set of items about a type of system capability. Results of the survey, discussed in the following sections, guided the decisions of the OKE research team in the design of their prototype system’s functionalities. Survey responses were based on a seven-point Likert scale with values as follows: Strongly Agree, Agree, Slightly Agree, Neither Agree nor Disagree, Slightly Disagree, Disagree, and Strongly Disagree, and grouped into categories (agreement, neutral, and disagreement) for discussion (Clason & Dormody, 1994). At the end of each system capability section, the survey included an open text area for additional comments from respondents. Comments were analyzed individually and after grouping by key concepts (Miles & Huberman, 1994; Morse, 1994; Thomas, 2003).

Results

The following sections discuss in detail the results of our survey, organized by general system functions. Beginning with initial registration and user profile creation, topics proceed through formal and informal voting for papers and social interaction functions. Each section provides background information regarding researchers’ expectations of rights and functions, followed by an analysis of respondent attitudes towards what they would consider a fair and legitimate OKE system.

Registration

The Registration portion of the survey measured respondents’ attitudes towards rights and responsibilities associated with participating in an OKE system. The goal of system registration is to reduce spam by controlling who can submit rather than what is submitted, allowing the system to maintain order and establish a “common ground” for users (Girgensohn & Lee, 2002) while still encouraging community participation (Whitworth & Friedman, 2009b). The distribution of responses is shown in Table 1.

<table>
<thead>
<tr>
<th>Table 1: Frequency of Responses Regarding Registration Tasks and Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strongly Agree</strong></td>
</tr>
<tr>
<td>Registration should include a default agreement to rate submitted papers.</td>
</tr>
<tr>
<td>Registration should let users create profiles listing their interests, collaborators, and recommendations.</td>
</tr>
<tr>
<td>Registration should let users create special interest groups to which other users can link their profiles.</td>
</tr>
<tr>
<td>I would consider linking my profile to a special interest group that interested me.</td>
</tr>
</tbody>
</table>
Community participation is a critical aspect of a successful OKE. Much like Wikipedia, an OKE system must rely on community participation of its members to review and assess (Hirschheim & Klein, 1994; Girgensohn & Lee, 2002), but a democratic socio-technical system must also respect users’ freedom by offering choices instead of taking choices away (Hirschheim & Klein, 1994). Participants were therefore asked whether system registration should include a default agreement to rate submitted papers. Although slightly more than 50% of respondents indicated some level of agreement, 36% of respondents expressed disagreement with such a requirement. Subsequent comments addressed the perception of users’ rights and choices, as in “Easy and no strings attached”.

Because fostering social interactions, i.e. the ability to connect to other researchers, was a central goal of a knowledge exchange system (Girgensohn & Lee, 2002; Kling, McKim, & King, 2003), respondents were asked whether registering for the system should allow users to create profiles (91% affirmative responses), special interest groups (90% affirmative responses), and links between the two (89% affirmative responses). These links would allow the OKE system to become a knowledge portal, allowing users to “drill out” to an author’s home page or other website (Whitworth & Friedman, 2009b). Although agreement with each of these statements was strong, subsequent comments again focused on making these functions available but not forced, reflecting participants’ views of a fair system providing capabilities without imposing requirements. Several respondents indicated that all of these features should be “available but optional” or “optional, not required”.

Rating Submitted Papers

While the formal peer-review process typically invites expert ratings of submitted papers based on categories such as rigor and relevance, a more democratic system would support complementary, informal ratings by readers, perhaps based on views or downloads. The reasoning here is that, while “experts may bias to rigor, readers may bias to relevance” (Whitworth & Friedman, 2009b). Additionally, voting is considered an important social interaction mechanism that can “engage the participants in discussion, in sharing experiences, and in providing feedback about the value of people’s contributions” (Girgensohn & Lee, 2002). Table 2 illustrates the distribution of responses to rating questions.
Table 2: Frequency of Responses Regarding Formal and Informal Rating of Papers

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Slightly Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Slightly Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The prototype system should support informal reader ratings based on the frequency of reader views or downloads.</td>
<td>8.24%</td>
<td>25.88%</td>
<td>20.00%</td>
<td>28.24%</td>
<td>8.24%</td>
<td>5.88%</td>
<td>3.53%</td>
</tr>
<tr>
<td>My online actions, like viewing or downloading a paper, should contribute to an informal rating of submitted papers.</td>
<td>7.06%</td>
<td>22.35%</td>
<td>24.71%</td>
<td>20.00%</td>
<td>5.88%</td>
<td>11.76%</td>
<td>8.24%</td>
</tr>
<tr>
<td>The prototype system should allow formal ratings in which formal votes for papers are based on specific categories such as rigor of the argument or relevance to the conference theme or discipline.</td>
<td>15.29%</td>
<td>42.35%</td>
<td>22.35%</td>
<td>8.24%</td>
<td>4.71%</td>
<td>4.71%</td>
<td>2.35%</td>
</tr>
<tr>
<td>Only conference committee members should be allowed to formally vote for papers based on specific categories.</td>
<td>5.88%</td>
<td>20.00%</td>
<td>20.00%</td>
<td>16.47%</td>
<td>12.94%</td>
<td>17.65%</td>
<td>7.06%</td>
</tr>
<tr>
<td>All registered system users should be allowed to formally vote for papers based on specific categories.</td>
<td>7.06%</td>
<td>27.06%</td>
<td>22.35%</td>
<td>15.29%</td>
<td>11.76%</td>
<td>12.94%</td>
<td>3.53%</td>
</tr>
<tr>
<td>I would be willing to vote formally for or against submitted papers on various categories.</td>
<td>11.76%</td>
<td>41.18%</td>
<td>14.12%</td>
<td>21.18%</td>
<td>3.53%</td>
<td>4.71%</td>
<td>3.53%</td>
</tr>
<tr>
<td>As an author, I would let registered users see how other people rate my paper on various categories.</td>
<td>7.06%</td>
<td>42.35%</td>
<td>14.12%</td>
<td>14.12%</td>
<td>10.59%</td>
<td>8.24%</td>
<td>3.53%</td>
</tr>
</tbody>
</table>

Girgensohn & Lee (2002) and Whitworth & Friedman (2009b) propose that reader ratings based on downloads or views could identify papers that are receiving user interest. However, when survey respondents were asked if the prototype system should support informal reader ratings based on the frequency of reader views or downloads, a significant number (28%) selected the neutral response, and 19% expressed disagreement. Analysis of subsequent comments revealed people’s concerns regarding an informal rating method of this type. One respondent commented that informal ratings could turn the rating process into a “popularity contest… what if there are 100 people in a field and they download a paper. Is that any better than the paper with 10 people in the field?” Another respondent stated, “‘Voting’ of this type degrades the intellectual process and encourages trendiness of subject matter, popularity contests instead of critique…” A few respondents did express support for informal ratings based on views or downloads. “The benefits of social media are precisely to let the group have a voice on the issues of interest for them,” stated one respondent. Another respondent offered a compromise: “I think that formal reviewers and all users should be able to rate papers, but it would be helpful to be able to tell the difference between the two ratings…”

Interestingly, although there was strong concern voiced over informal reader ratings, 54% of survey respondents indicated agreement that their online actions should contribute to an informal rating of submitted papers, although again, 20% of respondents selected Neither Agree nor Disagree, and 25% chose some level of disagreement.
Support for formal ratings on specific categories such as rigor or relevance was much stronger, with 80% of respondents selecting an affirmative response. Whitworth and Friedman (2009b) propose a democratic reputation ratings schema in which everyone’s vote counts. When asked if only conference committee members should be allowed to formally vote for papers, or if the voting should be available to all registered system users, survey responses indicate that formal voting should be open to all registered system users, although support for both options were not overwhelming. Voting only by committee members received 45% affirmative responses, 16% neutral responses, and 37% negative responses. Voting by all registered system users was only slightly more appealing, with 56% affirmative responses, 27% negative responses, and 15% neutral responses. One participant suggested that formal ratings be limited to the conference committee, while informal ratings be based upon voting by all system users, not downloads or views. Additionally, 67% of participants responded in the affirmative that they would be willing to vote formally for or against submitted papers on various categories, while 21% selected Neither Agree nor Disagree. Again, the concerns about voting becoming a “beauty contest” are evident in these responses: “I’m pretty uncomfortable with the whole online rating process when it’s open to the entire community. It’s nothing like a statistically valid sampling.”

The final question regarding rating submitted papers asked respondents whether, as authors, they would let all registered users see how other people rated their paper. While 63% of respondents selected an affirmative response, 22% selected some level of disagreement, raising the question of the perceived value of voting in a knowledge exchange system. Some respondents pointed out that commenting functions are more important to them than rating functions: “...In the long run, [the] commenting process most likely will have more impact on public discourse and thinking in the field than will the formal selection process.”

Social Interaction

Conferences play a crucial role in establishing connections that may lead to future collaborations (Girgensohn & Lee, 2002; Kling, McKim, & King, 2003). Our survey solicited input regarding the importance of providing social interaction capabilities within an OKE, with results shown in Table 3.
Table 3: Frequency of Responses Regarding Social Interaction Capabilities

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.67%</td>
<td>39.29%</td>
<td>11.90%</td>
<td>19.05%</td>
<td>1.19%</td>
<td>9.52%</td>
<td>2.38%</td>
</tr>
</tbody>
</table>

As an author, I would invite others to a chat-type, real-time conversation about my paper.

| 10.71%            | 27.38%   | 17.86%            | 20.24%                     | 7.14%          | 8.33% | 8.33%        |

If authors invited me to a chat-type, real-time conversation about their paper, I would participate.

| 9.52%            | 30.95%   | 19.05%            | 19.05%                     | 5.95%          | 9.52% | 5.95%        |

I would seek to follow up and connect with someone who commented on my paper.

| 9.52%            | 44.05%   | 25.00%            | 16.67%                     | 4.76%          | 0%    | 0%           |

I would use the conference attendee profiles to initiate a contact with an author after a conference.

| 11.90%            | 52.38%   | 17.86%            | 14.29%                     | 2.38%          | 1.19% | 0%           |

Girgensohn and Lee cite critical design principles for a socio-technical system as “fostering social interactions” and “promoting visibility of people and their activities” (2002). An effective OKE system should support not only typical conference activities such as paper submission and reviewing, but also social networking functions encompassed within the same system (Whitworth & Friedman, 2009b). The first question in this section therefore asked respondents whether the system should provide social networking functions for registered system users. Although most respondents agreed that social networking functions were an important aspect of the system, (affirmative responses totaled 67%), a surprisingly large number of respondents (19%) chose the neutral response (Neither Agree nor Disagree). An analysis of subsequent comments indicated that many respondents felt very strongly about these capabilities. “This will be the best part of the system as this will provide chances to connect for more serious researchers with the projects in a more straightforward [sic] way”, stated one respondent, while another said, “Social networking functions come closest to mimicking the hallway conversations that have always been the most valuable parts of conferences.” However, other respondents were concerned about the burden of having to access yet another site to track their social interactions: “…because many people are inundated with social networks and social network accounts, you may find that they do not participate in this as much as expected, unless there is a particular draw.” Similarly, another respondent suggested that the OKE system explore “the ability to utilize existing social networking functions. I am a bit concerned about managing multiple inputs.”

The next question asked respondents if, as an author, they would invite others to a chat-type conversation about their papers. In this case, negative responses accounted for almost 24% of the total responses, while the neutral claimed 20% of total responses. One participant pointed out, “Real-time chat is not possible across global time zones… particularly for us in the Southern Hemisphere where we seem always a day ahead or behind our peers.” Another participant’s concern about real-time chatting was that it might be a conversation “preserved forever”, reflecting a perception of a loss of ownership of one’s communications.
The next question in this section reversed the previous question, asking participants if they would participate in a real-time chat if invited by an author. Again, the results indicate some level of disagreement (20%) with a strong neutral (19%), citing the same concerns as mentioned above. One participant commented, “My pref [sic] is for async comm rather than real-time chatting. Async can be answered at any time; real-time chatting can be disruptive.”

The final two questions in this section measured interest in connecting with someone after a conference, either as an author connecting with a commenter, or as a commenter or conference attendee connecting with an author. Responses to both of these questions were overwhelmingly affirmative. 78% of respondents indicated that, as an author, they would seek to connect with someone who commented on their paper, while 82% indicated they would seek to connect with an author after a conference. As one respondent pointed out, “Making connections and sharing is essential to the growth and dissemination of scientific ideas and data”.

Discussion

The capabilities of a successful OKE system—one that maintains rights, distributes responsibilities, and encourages interactions amongst researchers—were described in First Monday articles (Whitworth & Friedman, 2009a; Whitworth & Friedman, 2009b) that ultimately led to the National Science Foundation supporting this research. As these and other researchers point out, the social requirements to be implemented in a successful socio-technical system must be ascertained before technical requirements can be determined (Baxter & Sommerville, 2011; Whitworth & Friedman, 2009b). A system that is illegitimate, that does not respect the rights and freedoms of its users, will fail just as surely as a system that suffers from critical hardware or software failures. The results of the survey therefore informed development decisions, particularly with respect to ownership, attribution, and delegation rights.

Of particular interest to researchers are the areas in which the survey findings did not agree with their presuppositions of what would constitute a fair and legitimate system. For example, while capabilities to create profiles and connect to others were strongly supported, dedicated social networking functions garnered less support from survey respondents who were concerned about having to access yet another social networking site. Although community participation was viewed as a key aspect of an OKE, respondents felt that the system should provide opportunities without imposing requirements such as a default agreement to rate papers. Similarly, respondents felt that using paper views or downloads to automatically vote for a paper could turn the system into a popularity contest. In fact, none of the survey questions regarding paper rating and voting received strong support. Survey responses stressed the importance of feedback about human-computer interactions before creating any usable system, particularly one that would encourage knowledge dissemination, invite collaboration and, ultimately, be accepted by the academic community.

Conclusion

The primary goal of academia—to produce, assess, and disseminate knowledge—is becoming more and more difficult as the journals and conferences that serve as dissemination conduits become bottlenecks, allowing only a small percentage of submissions to pass through. As Whitworth and Friedman (2009a) lament, “Can a system where rejection is the norm claim its primary goal is producing knowledge value?” When top journals claim single digit acceptance rates, new knowledge is stifled by the stranglehold of the peer review process. When academic rigor is given too much priority, the relevance of information frequently suffers.

These issues are further compounded by rising costs and shrinking budgets. Not only are publication subscription costs prohibitive, travel budgets for conferences and symposiums are being reduced or cut completely. How, then, can academics and researchers share new findings,
disseminate new knowledge, or seek collaborators for innovative research? The answer lies in an open knowledge exchange system. By developing a system that not only provides robust functionality to support conference activities but also respects the legitimate rights of the user community, the OKE was created as a socio-technical environment in which research and knowledge can be nurtured, shared, and expanded without the feudalistic tendencies of prior knowledge sharing venues. In fact, the OKE system, which supports paper submission, commenting, and reviewing, as well as conference management tasks, is available to any group wishing to use it.

While many capability and rights questions were clarified through the survey, other questions were raised, particularly in areas where researchers’ expectations of desired rights and functionalities proved inaccurate. Future work will be required to examine issues including what benefit rating papers may serve in an OKE system, if any. Similarly, publishing and archival rights must be explored to free authors to publish work in other forums while still maintaining a corpus of knowledge in the OKE system.

The prototype OKE system demonstrates that a socio-technical system whose focus is on both fairness and technical robustness can increase scholarly collaboration and expedite knowledge dissemination in an era of pervasive Internet communication when face-to-face interactions are becoming costly and difficult to achieve. The goals of timely knowledge dissemination, increased collaboration, and community participation can become a reality in an open source socio-technical knowledge exchange system.

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REFERENCES


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The International Journal of Technology, Knowledge and Society explores innovative theories and practices relating technology to society. The journal is cross-disciplinary in its scope, offering a meeting point for technologists with a concern for the social and social scientists with a concern for the technological. The focus is primarily, but not exclusively, on information and communications technologies.

Equally interested in the mechanics of social technologies and the social impact of technologies, the journal is guided by the ideals of an open society, where technology is used to address human needs and serve community interests. These concerns are grounded in the values of creativity, innovation, access, equity, and personal and community autonomy. In this space, commercial and community interests at times complement each other; at other times they appear to be at odds. The journal examines the nature of new technologies, their connection with communities, their use as tools for learning, and their place in a “knowledge society”.

The perspectives presented in the journal range from big picture analyses which address global and universal concerns, to detailed case studies which speak of localized social applications of technology. The papers traverse a broad terrain, sometimes technically and other times socially oriented, sometimes theoretical and other times practical in their perspective, and sometimes reflecting dispassionate analysis whilst at other times suggesting interested strategies for action.

The journal covers the fields of informatics, computer science, history and philosophy of science, sociology of knowledge, sociology of technology, education, management and the humanities. Its contributors include research students, technology developers and trainers, and industry consultants.

The International Journal of Technology, Knowledge and Society is a peer-reviewed scholarly journal.