A Position on Effective Peer Reviews
-Rationale, Qualification, Process, and Policy-

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ABSTRACT

This paper argues for the value of the conference peer review process given certain constraints that include a proper process, qualifications of the reviewers, policy used in the review, and the motivation of the reviewers. The paper also addresses how the lack of proper criteria can be harmful in a peer review process. The peer review process for journals is not addressed as this is a universally accepted practice in academia. An analogy to software engineering code review processes is briefly presented.

Keywords: Peer Review, Knowledge Communication, Academic Publication

1. Introduction

Academia has universally long relied on a community of peers for many important decisions made in the academic environment. While such peer review might be associated with the quality of a particular publication – it is often used for other decision making purposes. For example, the long standing academic tenure process generally requires a committee of peers to review the credentials of a faculty member and to recommend to administrators whether or not the individual has excelled in their field. A similar process may be used when a faculty member is being considered for promotion – again, a committee of peers generally reviews the application looking specifically at accomplishments in a narrow field of activity. Grievance processes, university faculty senates, curriculum reviews, grant proposals, and many other activities rely on peer reviews. Such reviews are not only associated with academia and can often be found in government processes and industrial practices. While more explanation can be found in subsequent sections of this paper, one can quickly think of examples of governmental or industrial peer review practices. Prior to releasing a new pharmaceutical formulary for public use, a prudent government oversight body will generally have the safety tests and experimental results reviewed by other experts in the field. A software engineering company will have programmer code reviewed by peers to discover errors prior to delivering to a customer. Accounting firms often exercise a two person, separation of duty process to insure proper fraud control. Many other examples certainly exist. Common factors in all these seemingly disparate reviews are that the reviews are chosen based on their competency, independence, objectivity, and willingness to put forth a credible effort in the review. If such characteristics are not present in a review, clearly the review is likely to fail.

Such empirical observations seem obvious to most – but we often fail to apply these factors properly for academic conferences. While the argument can be effectively made that such problems exist with journal publications, it is this paper's premise that such examples are far more infrequent than for conferences. Therefore, this paper focuses on conferences only and it is the author's hope to prompt discussion in this area. The remainder of this paper is organized as follows. The next section

describes a generally accepted process for conducting a quality review. Section 3 will address policies that are useful for a peer review process. Section 4 discusses motivational factors for reviewers. We conclude with a brief summary and a cautionary note concerning process errors, shortcuts, and intentional damaging procedures.

2. Conference Peer Review Process

In the large, the conference peer review process must be decided upon far in advance of the conference in order to allow enough time to actually review the credentials of the reviewers and to insure that there are enough reviewers to accommodate the papers that the conference expects. Every paper should have a minimum of three reviews by reviewers with competency in the field. This serves several purposes – first it insures an objective review process in that similar reviews provide confidence in the quality of the paper and great discrepancy can indicate further review required. Reviews should be double blind – meaning that the reviewer does not know who the author is and the author does not know who the reviewer is. Reviewers should be selected by the conference officials and not the authors. While this seems to be a simple process, it is often improperly implemented. There appear to be several reasons this occurs.

First, reviewers' backgrounds are often not known or reviewed by the conference organizers. This happens because not enough time is allowed in the preparation phase or the number of papers expected is large prompting a need for a large number of reviewers. Typically a notice is electronically distributed calling for reviewers to volunteer. Volunteers are generally taken without question. This process error leads to improper reviews, cursory reviews, and acceptance of poor quality papers. One can legitimately ask why a reviewer would volunteer to review papers if they were not qualified or could not dedicate the time necessary to conduct a proper review. This occurs for a number of reasons. First, many

faculty are motivated to volunteer because benefit accrues to them for "service" to their profession. Almost universally, faculty are expected to serve the community by participating in activities such as conference/journal reviews, book editing, organizational activities, and other such functions. Conference review opportunities tend to be plentiful, often international, and seldom hold the reviewer accountable for their individual performance. Second, volunteers are often solicited for a "generic" conference without adequate descriptions of the technical nature of the papers to be reviewed and no process allowing the reviewer to decline a review due to a lack of proper background. Third, reviewers are often solicited from among those that have submitted papers to the conference with the thought that such a community of authors will naturally be competent in the subject matter being addressed by the conference. There is an obvious conflict of interest problem with this procedure.

Conference organizers can easily be faced with the stresses of time management in addressing the myriad of activities associated with such an activity. This can lead to a hurried effort in the review process which may prohibit the identification and use of qualified reviewers and may tempt the organizers to shortcut the review process. Typical shortcuts include using the conference committee to review papers in addition to their other duties (an acceptable process when the number of papers is low); asking authors of a paper under consideration to review several other papers (a conflict of interest); asking authors to recommend reviewers for their paper (a suspect process); or, simply calling on as many potential reviewers as possible without regard to qualification (simply solving the numbers problem).

Solutions to these pitfalls might include posting blind papers and/or abstracts on a protected web site allowing reviewers to select the papers that most closely match their expertise and interest. Grouping or categorizing papers into subspecialties within the general area being

addressed by the conference. Using professional organizations to solicit reviewers in the field also helps, but is often not possible. Discounting conference attendance fees or providing proceedings to the reviewers can help to motivate reviewers to volunteer – and to review more than the normal number of papers. Last, asking reviewers to provide brief background information on their credentials to aide in the selection process is not an unreasonable request.

3. The Peer Review Process

Once reviewers have been located – it is important to not abuse their time or burden them with requests to review extra papers beyond those originally assigned. The procedures expected of the reviewers need to be simple, effective, and straightforward. While this seems obvious, it is often not the case. The essentials of a review process are the following: understand the area being written about, be knowledgeable of other similar literature in the field, read the paper, comment on its technical contribution, comment on its professional characteristics (e.g., grammar, construction, and originality), and provide an overall assessment to the conference selection committee. A simple form that asks for overall ratings is needed (accept/reject) with room for referee comment on technical content, construction issues, and comments to the author is all that is needed. A web based review process is certainly acceptable and in many cases preferred.

An important part of this process is for the selection officials to actually read the reviews as a second level of checking and to intervene when multiple reviews result in inconsistent results. Assuming that a minimum of three reviewers comment on a paper – most papers will fall into either an accept or reject category. When split decisions result, additional review is necessary and should be performed – either by the conference organizing committee or by another trusted reviewer in the field.

Adequate time must be allotted for the review itself. While this varies from reviewer to reviewer – a 30 day period is generally sufficient. Less than three weeks increases the change of a cursory review and more than 4 weeks can result in a lack of responsiveness on the reviewers part as they tend to forget tasks too far in the future. It is incumbent on the conference committee to periodically remind reviewers of the due date and to check with the reviewer to determine if the reviewer is comfortable with the assignment. Three papers for review seem to be an appropriate load – assuming paper size of 6 to 15 pages. Shorter papers might allow reviewers to read four or five – but such papers will not often contain significant technical content due to their page limitation.

Finally, this author recommends that the papers submitted for review conform to the requirements for final paper submissions (in terms of format and length). Conferences sometimes review papers of 20 pages or so in length, accept or reject based on that review, and then ask the author to cut the paper in half for the proceedings. This results in papers that may not have much value to readers of the proceedings and in unpublished works for the authors. This occurs because the original work is not actually published and can be subsequently sent to another venue as an extension of the work published by the conference. This seems contrary to the purpose of the conference proceedings and should be avoided. What is refereed should be what is published.

4. Reviewer Motivational Factors

So what gets a reviewer motivated to volunteer, review, and spend the necessary effort on a paper? Some thoughts are offered here – mainly to prompt discussion. In academia, personal reputation is valuable and most take it very seriously. Reviews contribute to personal reputation – but only when there is personal attribution associated with the review. While

this may seem contradictory in a double blind review process, it can be accomplished. An interesting model can be found in the review process used by the Department of Defense journal titled CrossTalk – the Journal of Defense Software Engineering [1]. Their standard review procedure for short papers is to obtain three reviews independently. The reviewers do not know who the other reviewers are while the 1st phase of the review is taking place. All reviews are emailed to the editor who then reviews them and notes consistency or differences. All reviews (regardless of their outcome) are then sent to all reviewers with attribution. At this point, the editor summarizes the results on the paper and asks for any final changes to the individual reviews. During this second phase of the review, each reviewer knows the identity of the other two reviewers and can read all comments. Knowing this process going into the review causes reviewers to pay more attention to their choice of words, comments, and final recommendation. The second phase also assists in forming consensus on the final decision regarding the paper. Such a process can be implemented for conference publications also – but likely for small conferences only.

Reviews are also motivated when there is some gain to be achieved. Naturally the service being performed should be a reward in itself, but is often insufficient. Other rewards should be considered for reviewers that contribute the most – such as discounted conference registration fees or a copy of the proceeding. Naturally, a published list of reviewers for the conference also helps to motivate reviewers.

5. Summary and Concluding Remarks

In summary, process and policy in the review process is important to the successful review of submitted papers. It is the process and not the peer review itself that contributes to the quality of the paper. There is a significant body of work in the area of quality software production – much of which espouses the value of code review by peers [2, 3,4, and many others]. The key to successful review is always contingent on the quality of the reviewer, the process being used, and sometimes the perspective of the reviewer [5, 6, 7 and others] – which could be construed to be a motivational factor. While there are likely specific cases where peer reviews do not add significantly to the quality of the conference proceeding – it is argued here that such cases are extremely limited and rare. It is also argued that a failed process will lead to poor reviews and is detrimental to the quality objective.

6. Acknowledgments

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