ICSE 2019 PC Chairs' Report

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Executive Summary

This document reports on the paper submission and review process for the ICSE 2019 Technical Track, co-chaired by Tevfik Bultan and Jon Whittle. Highlights of the report are listed below.

- The Technical Track received 529 submissions (one short of the highest of any ICSE), of which 21% of papers were accepted.
- A very similar review process to 2018 was followed, using the two-tier Program Board (PB) and Program Committee (PC) model. The major change from previous years was that we did not run a face-to-face physical PB meeting. Instead, decisions on papers were made wholly online. Survey data from the PC suggests that this was well-received. There is no evidence of any degradation in the quality of accepted papers; indeed the statistics on various aspects of the submission and review process are very similar to 2018.
- "Heavy" double blind was used in a similar way to 2018. We were less strict in re-assigning reviewers if author identities became known. This appears to be a welcome decision in achieving balance between anonymity and practicality. This is borne out by both survey data and informal comments from the PB/PC.
- Diversity in the PB/PC has always been a major goal of ICSE PC-Chairs. In 2018, in particular, a strong emphasis was placed on gender diversity. This focus was continued in 2019: we achieved 50% female representation in the PB and 40% female representation in the PC. Generally speaking, geographic diversity was also achieved. However, given the growth in submissions from some countries, the ratio of submitting authors to PC members from a given country can vary widely. Such data suggests that China is significantly under-represented in the PB/PC (not just in 2019).

1 Introduction and Background

ICSE is the largest and most prestigious publication venue for software engineering research. Given its reputation and visibility, the primary consideration of PC Chairs is to maintain the high quality of the program while adapting to changes and growth in the field.

The ICSE 2019 Technical Track followed many of the same principles and processes that were successfully used in 2018. We used the two-level review model: a Program Board of 34 experienced ICSE researchers moderated discussions and helped to maintain quality in the paper reviews, which were written by a team of 98 Program Committee members. Reviewing followed the "heavy" double-blind review model where names of authors were not revealed until the final decisions (for accepted papers) or never (for rejected papers). The most significant change for 2019 was the introduction of a fully online review process: that is,

instead of a two-day face-to-face meeting for PB members, we introduced an online two-day final decision-making period in which all PB and PC members were involved.

Below, we summarize the key similarities and differences in 2019 compared to the 2018 model:

- 2019 used the PB/PC two-level model as in 2018. As with 2018, PB members were not expected to write paper reviews; their role was to moderate the reviews and the discussions, including suggesting improvements to reviews and bringing reviewers towards a consensus decision during discussions. Unlike in 2018, PB members were free to bring in their own views on papers - although, the recommendation was to aim to reach a reviewer consensus first.
- 2019 used a fully online review process; there was no face-to-face meeting of PB members. This culminated in a two-day online period for final decision making where all PC and PB members were expected to be available for 8 hours within the day (their choice, according to time zone). All decisions were finalized by the end of this two-day period. All discussions, including those during the two-day online period, were conducted by posting comments via the conference management software (Easychair was used in 2019).
- No submission of artifacts was allowed alongside paper submissions. Instead, a separate Artifact Evaluation Track was introduced, managed by independent Chairs. Authors of accepted papers in the Technical Track were invited to submit artifacts to the Artifact Evaluation Track.
- As in 2018, the 2019 process made a commitment to authors that they would get the chance to provide a response to ALL reviews. Crucially, this meant that no further reviews were solicited after the Author Response period.
- As in 2018, all papers were given a meta-review, written by the moderating PB member, summarizing the pros/cons of the paper and justifying the final decision.
- The review form for 2019 was changed from that in 2018. In particular, reviewers were no longer asked to score papers separately on Significance, Soundness, Novelty, Replicability and Presentation Quality since these scores were not considered to add significant value during the discussion phase. On the other hand, an additional question was added where the reviewers were asked to rank their set of papers - for each paper, to say whether the paper was in the Top 15%, Top 16-30%, Top 31-50%, Bottom 50% of the ICSE submissions in order to help reviewers normalize their recommendations with respect to the overall selectivity of the ICSE Technical Track.
- The ICSE 2019 reviews sent to authors did not include the scores entered by the reviewers. Scores were included in the ICSE 2018 reviews sent to authors but not in prior years. Some authors raised strong objections to scores being excluded from the reviews.
- The General Chair and PC Co-Chairs decided to introduce "blended" sessions for the ICSE 2019 program. That is, papers were not always scheduled by track but by topic. Papers from the Technical Track, NIER, Demo Track, Journal First Track and SEIP were all blended in this way, meaning that a given session on a topic could have papers related to that topic from any of those tracks. It was felt that grouping papers by topic rather than track would lead to a better overall experience for attendees.
- The program also designated some papers as more industrially relevant. These papers were marked in the conference program as part of the "Industry Program".

The decision on which papers to include was informed by an additional question in the review form asking PC members to mark industrially-relevant papers. Due to scheduling constraints, some Industry Program sessions also included papers not so marked - based on the General Chair/PC Chairs' best judgment. One of the three ICSE keynotes was a SEIP keynote and also advertised as part of the Industry Program.

2 Process

2.a PB/PC Two-Tier Model

The review process followed the two-tier PB/PC model from previous ICSEs. Similarly to ICSE 2018, the role of the PB members was to moderate the reviews and the discussions, serve as discussants but not serve as reviewers. Hence, all reviews were written by PC members. The instructions sent to the PB/PC outlined the distinction between these two roles.

The responsibilities for PC members included:

- Write detailed and high quality reviews of around 15 papers and submit them in a timely manner. PC members are required to do all the reviews themselves.
- Be responsive to requests from the PB and/or PC Chairs when the PB member asks for review quality to be improved, or when PC Chairs ask for additional reviews (which may be necessary in a small number of cases).
- Actively discuss reviews online with other reviewers and the PB member. PC members are expected to be respectful, courteous and professional at all times. The onus is on PC members to reach a consensus on accepting or rejecting a paper, so PC members are expected to actively work towards this consensus.
- Be available for the online PB/PC meeting. Book 2 full days (December 3-4, 2018) for participating in online discussions (through Easychair) for finalizing decisions on papers.

The responsibilities for PB members included:
- Check scope/formatting/anonymity violations for around 15 papers.
- Oversee the reviewing of these papers. This involves checking the reviews submitted by three program committee members to ensure that they meet the quality standards expected from ICSE reviews, requesting extra reviews when necessary, initiating and managing the on-line discussion and writing meta-reviews.
- Serve as a discussant for an additional 5 to 6 papers by participating in online discussion and helping to reach a decision.
- Be available for the online PB/PC meeting. Book 2 full days (December 3-4, 2018) for participating in online discussions (through Easychair) for finalizing decisions on papers.

In addition, PB members played two different roles, depending on the stage of the review process (see Section 2c):
- *Discussion Leader:* Read the papers and the reviews for assigned papers. Lead discussions and act as arbiter if consensus cannot be reached. Write the meta-review.

- *Discussant:* Read the paper and the reviews. Participate in discussion and help reach a decision.

2.b Fully Online PB/PC Meeting

The ICSE Steering Committee ratified a proposal to shift from a face-to-face PB meeting to a fully online PB/PC meeting (see Appendix A). Briefly, the background to this decision began at the ICSE 2018 PB meeting. After many discussions on the pros and cons of having an online vs. physical PB meeting, we held a vote of ICSE 2018 PB members to get their opinion on this issue. We asked the ICSE 2018 PB members to answer 'yes' or 'no' to the question: "Would you prefer an online PB meeting over a physical PB meeting?" The results were 22 in favour of an online meeting, and 11 in favour of a physical meeting, a two thirds majority. After further discussion with the ICSE 2019 General Chair and ICSE 2020 PC Chairs, we decided to propose a review process based on an online PB+PC meeting (Appendix A). We sent the proposal to the ICSE Steering Committee in February 2018. After an online discussion about the proposal among the ICSE Steering Committee members, there was a vote and the proposal was approved in March 2018 (16 votes for and 6 votes against).

2.c Selection of the PB and the PC

One can argue that selection of the PB/PC is the most significant task performed by any PC Chair. Our main goal was to select experienced researchers who have demonstrated excellent performance as reviewers and discussants in prior conferences as PB members, and to select researchers with a strong track record both as researchers and reviewers as PC members. We looked for significant prior PC experience for PB members. For PC members we looked for recognized expertise as demonstrated by strong publication records in quality venues, while taking into account their seniority and research area (which can lead to variations in publication records).

We identified several criteria for selection of the PB/PC:
- Aim for proportional coverage of research areas taking into account the historical number of submissions for each research area (we used the data for distribution of papers to research areas from ICSE 2018)
- Aim for a good gender balance
- Aim for geographic diversity
- Aim for industry representation
- Include the PC Chairs from ICSE 2018 and ICSE 2020 in either the PB or PC
- Aim to satisfy the SIGSOFT policy: For recurring events, at least one-third of the program committee membership should change. Most program committee members should not serve for more than three consecutive terms and in no instance should an individual serve more than four consecutive terms.

We created a spreadsheet containing information about candidates for PB and PC (such as research areas, organization, country, gender, industry/academia). We used scripts created by prior ICSE chairs for mining publications in DBLP and prior conference committees to search for overlooked candidates with strong records. We met with the PC chairs of ICSE 2018 and ICSE 2017 to get their input on past performance of PB/PC candidates. Based on

all the information we gathered and the guidelines we listed above, we created an invitation list and sent the PB invitations in December 2017 and the PC invitations in January 2018. The ICSE 2019 PB and PC were finalized by February 2018.

Of the 132 invitations that were sent out, 21 were either declined or ignored. For these, we added new names, maintaining the criteria given above. In the final list, the gender balance of the PB was 16F/16M and of the PC was 39F/59M. Statistics on geographic diversity are given in Section 4. Generally, we achieved good geographic diversity, although we could not identify suitable PC/PB members from some countries (most notably India) whilst satisfying other constraints. It is also instructive to compare the ratio of submitting authors to PB/PC members across countries: such an analysis reveals stark disparities. For example, the ratio for the USA is 11:1 but for China is 108:1. More is said on this in Section 4.

2.d Timeline and the Review Process

In order to meet the PB and PC members, prepare them for the review process, and receive their feedback about the review process, we organized two separate meetings at ICSE 2018, one for the ICSE 2019 PB and one for the ICSE 2019 PC. In these meetings, we went over a set of slides explaining the review process and asked for their input.

We used the same review criteria that were used in recent ICSEs:
- *Soundness:* How well the paper's contributions are supported by rigorous application of appropriate research methods,
- *Significance:* The extent to which the paper's contributions are novel, original, and important, with respect to the existing body of knowledge,
- *Verifiability:* Whether the paper includes sufficient information to support independent verification or replication of the paper's claimed contributions,
- *Presentation:* Whether the paper's quality of writing meets the high standards of ICSE, including clear descriptions and explanations, adequate use of the English language, absence of major ambiguity, clearly readable figures and tables, and adherence to the formatting instructions provided below.

Although the above criteria were listed in the review form, reviewers were not asked to score papers separately on Significance, Soundness, Novelty, Replicability and Presentation Quality. It was considered that these questions did not add value to the decision-making.

Another change in the review form compared to prior years was the addition of a question where reviewers were asked to rank their set of papers - for each paper, to say whether the paper was in the Top 15%, Top 16-30%, Top 31-50%, Bottom 50% of the ICSE submissions. Since no reviewer read all submissions, reviewers were asked to use their batch of submissions as a guideline. The rationale in adding this question was to get reviewers to self-reflect on any biases in their scoring and help them normalize their recommendations. For example, a reviewer marking a paper as top 15% but giving a strong reject might reconsider their decision and change either their ranking or the recommendation, or might provide an explanation of why those particular scores make sense during the discussion phase. Although we did not empirically evaluate the effects of this new question, in at least one instance the incongruence between the ranking and the score given by a reviewer was discussed and this had an influence on the decision making.

The review process was based on the following principles:
After the desk rejects:

- All papers received 3 reviews written by PC members
    - More reviewers could be assigned if the expertise among the current reviewers was low
- All papers got a chance at a rebuttal of ALL the reviews
    - This implies that no reviews were conducted after the rebuttal period, or equivalently, all reviews had to be submitted before the rebuttal period.
- All papers received a meta-review, written by the PB members, summarizing the discussion, the reaction to the rebuttal and the decision
- PB members did not re-review the papers but participated in discussions either as a moderator (discussion lead) or as an additional discussant

After the initial check for violations of submission instructions (which can lead to desk rejection) we carried out a three phase decision making process:

- *Phase 1:* After rebuttal, papers with unanimous negative or positive scores were marked as accept or reject as early as possible (we had expected ~60% of papers to be decided this way)
- *Phase 2:* Papers with mixed scores were discussed further to reach a consensus decision by the reviewers, under the guidance of the PB member (we had expected ~25-30% of papers to be decided this way)
- *Phase 3:* Papers for which reviewers were unable to reach a consensus were discussed during the two-day online PB/PC meeting (we had expected ~10-15% of papers to be decided this way)

A high level overview of the review process is shown in the figure below:
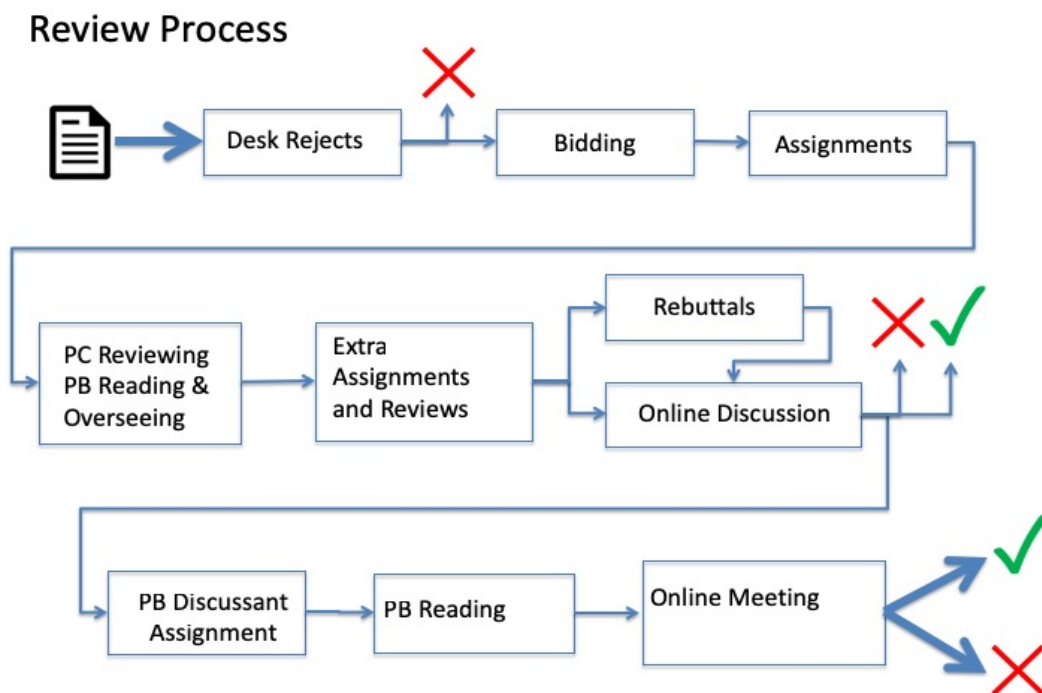
The actual numbers for different phases of the review process were as follows:

- 529 submissions were received.
- 25 (5%) papers were desk rejected either due to double blind rule violation or due to exceeding the page limit (we applied the page limit strictly; any paper that had technical content beyond page 10 was rejected even if it was a single line beyond the page limit).
- 10 (2%) papers were withdrawn by the authors at various stages of the review process.
- All remaining 494 papers received at least 3 reviews and one meta-review.
    - 302 (57%) consensus papers were decided in Phase 1
    - 192 papers received mixed scores and were discussed in Phase 2. For 127 of these papers (24%) PB and PC members reached a consensus decision before Phase 3.
    - The remaining 65 papers (12%) were discussed in Phase 3. All decisions were finalized by the end of the two-day online PC meeting.
- 109 (21%) papers were accepted.

It is interesting to note that our predictions about how many papers would be decided in each phase (which we made based on the data from prior years) were reasonably accurate.

We started the online discussions as soon as the reviews were received, although we asked reviewers not to make decisions before the rebuttal period (this differs from 2018 when reviewers were asked - but not mandated - to wait for the author responses). After Phase 2, we assigned two more PB members to each undecided paper as discussants. Discussant PB members were required to read the papers, all the reviews and the discussions. The role of the discussant was to add an additional perspective on a paper to aid decision-making and to take a view on unresolved issues in the reviews.

During the online meeting (Phase 3) the goal was to reach a decision within the 2 days on all papers. During the online meeting discussion, each paper had at least the following participants: 3 (or more) PC reviewers, a PB discussion leader, and 2 PB discussants. Moreover, the discussions were open to any other PB/PC member with no conflict-of-interest. We empowered the PB members to finalize the decision in cases where reviewers and discussants were unable to converge to a decision. In practice, consensus was always reached. The PB/PC were instructed that PC Chairs would make an executive decision if a paper remained unresolved at the end of the two-day period. This was not necessary for any papers.

During the online meeting we used Easychair for online discussion. We occasionally sent emails to the entire PB and PC to answer common questions that came up during discussions. The key issue during the online meeting was to make sure that the PB and PC members were responsive and the discussions were progressing. PC chairs monitored all the ongoing discussions to make sure that progress was being made. We did not use synchronous conversations (skype etc.). Time difference was a challenge but we do not think it adversely affected the review process.

The ICSE 2019 reviews that were sent to authors did not include the scores entered by the reviewers. Scores were included in the ICSE 2018 reviews sent to authors but not in prior

years. Some authors raised strong objections to scores being excluded from the reviews. Authors complained about the lack of scores in the reviews since they believed that having the scores helps them to write a better response to reviewers and to make a decision about whether they should withdraw the paper. We told authors that we view the reviewers' scores as part of the PB/PC discussions (like the online comments reviewers post about the paper). In their response, we encouraged the authors to focus on the substance of the reviews and the explicit questions provided by the reviewers. Sending review scores has become common in conferences, so author expectations may be changing due to this. Future chairs should consider the pros and cons of sending review scores.

One minor issue we faced during the process was that in preparation of the meta-reviews PB members sometimes upload "dummy" reviews to indicate which direction the decision is going, to be updated later when they had time to enter a complete meta-review. In one case, a PB member forgot to update the "dummy" meta-review and important feedback summarizing the discussion was not sent to the authors. We eventually noticed this and sent the information to the authors.

In another case, we received a complaint from authors of a paper that some comments in a review were discriminatory against non-native English speakers. We let the PC member know that it is not appropriate to speculate if an author is or is not a native English speaker in a review. The PC member promptly revised the review.

Given that the workload is significant for the PB and PC and the reviews and meta-reviews are written under time pressure, it is crucial for PB/PC members to make a "sanity check" pass on all their reviews and meta-reviews before they are sent to authors.

We did not make early reject decisions in ICSE 2019 other than desk reject decisions which were sent to authors in September. For the remaining submissions, the notifications were sent on December 12th as announced.

The timeline of the review process was as follows:

TASK	DATES
submission deadline	Aug 24 (Fri)
bidding + COI	Aug 25-Aug 29 (Sat-Wed)
desk rejects	Sep 3-4 (Mon-Tue)
paper assignments	Aug 30-Sep 5 (Thu-Wed)
1st round reviews	Sep 26 (Wed)
2nd round reviews	Oct 17 (Wed)
review assessment & improvement	Sep 26-Nov 7 (Wed-Wed)
additional review requests	Oct 18-23 (Thu-Tue)
additional paper assignments	Oct 24-25 (Wed-Thu)
additional reviews	Oct 26-Nov 2 (Fri-Fri)
rebuttal	Nov 12-14 (Mon-Wed)
online discussion	Sep 26-Nov 30 (Fri)
consensus accept & reject?	Nov 19 (Mon)
pre meeting accept & reject	Nov 26 (Mon)

assign extra PB members as discussant	Nov 26-27 (Mon-Tue)
online meeting	Dec 3-4 (Mon-Tue)
author notification	Dec 12

Note that we provided a table showing a detailed list of deadlines for both the PB and PC (Appendix B). The link for this was provided as a reminder in all email communications with the PB/PC: it served as an easily accessible source of information on upcoming deadlines and helped to keep everyone on track. Informal feedback has been that this resource was very well received and so we encourage future PC Chairs to adopt a similar practice. We also provided a link to a FAQ page (Appendix C), which we updated as the review process evolved.

2.e Conference Program

The General Chair and PC Co-Chairs decided to introduce a "blended" program for ICSE 2019 where papers from the Technical, SEIP, NIER, Journal First, and Demonstration tracks were combined in sessions organized by topic. The program consisted of 90 or 120 minutes long blended sessions. Presentation times were allocated for different tracks as follows:
- Technical track papers: 20 minutes
- SEIP track papers: 20 minutes
- Demonstration track papers: 20 minutes
- NIER track papers: 10 minutes
- Journal first track papers: 10 minutes

These timings include time for Q&A. For 20 minute presentations we recommended 15-17 minute talks followed by 1 or 2 questions from the audience. For 10 minute presentations we recommended 8 minute talks followed by 1 or 2 questions from the audience. Most sessions were followed with a 10 minute discussion period for the audience to ask more detailed questions of presenters. We invited the authors to bring a poster about their work to the presentation room to facilitate discussions during the discussion period at the end of the session.

The program also designated some papers as more industrially relevant. These papers were marked in the conference program as part of the "Industry Program". The decision on which papers to include was informed by an additional question in the review form asking PC members to mark industrially-relevant papers. Due to scheduling constraints, some Industry Program sessions also included papers not so marked - based on the General Chair/PC Chairs' best judgment. One of the three ICSE keynotes was a SEIP keynote and also advertised as part of the Industry Program

2.f Awards

ACM Distinguished Paper Award Selection
ACM allows ICSE to select up to 10% of accepted papers as award papers. Rounding up, this leads to up to 11 awards for ICSE 2019.

ACM partially stipulates a process for selecting awardees, namely: "The program committee will take a weighted vote, respecting the conflict of interest rules in place for the conference, to identify the top candidates among the papers. The program committee chair(s) will use the results of the weighted votes as a primary basis for selecting the award papers."

To make decisions on award papers, we applied the following process.

1. The review form included a question asking reviewers if they wanted to nominate the paper for the award. Of the 1487 reviews we received, 42 of them nominated a paper for the award. Of these 42, only 4 received a nomination from more than one reviewer.
2. We selected a longlist of 15 papers from these 42, according to the following criterion: at least one reviewer nominates the paper for an award AND there are no negative scores in the reviews.
3. We conducted a poll of the PB/PC asking them to vote for up to three papers from the longlist.
4. Based on the vote and a careful reading of the reviews and online discussion, 11 papers were selected to receive an award.

There appears to be no standard process for selecting Best Paper awardees at ICSE. Rather, each year, the PC Chairs use their best judgment to decide on a process. It may be worth the ICSE SC introducing a standard process.

Distinguished Reviewer Awards
PB and PC members are volunteers who spend a significant amount of time and effort during the review process. We believe that it is worthwhile to acknowledge the efforts of reviewers who do an outstanding job. For this purpose, we asked PB members to nominate PC members for the Distinguished Reviewer Award. PB members were asked to apply the following criteria:
1. The reviewer consistently wrote high quality reviews that:
   ○ Gave clear feedback to authors in terms of soundness, significance, verifiability and presentation
   ○ Gave clear recommendations for accept/reject decisions
   ○ Did so in a professional manner using polite and constructive language
2. The reviewer consistently participated in online discussions in a way that was responsive, constructive, collaborative and clear

32 PC members were nominated to receive an award. Most of these were nominated only once (26) with the others nominated multiple times. These 6 were all selected to receive an award; in addition, the PC Chairs added 2 names from the remaining list based on a careful reading of all the reviews from the nominees. Hence, 8 members of the PC received a Distinguished Reviewer Award.

3 Discussion on Key Aspects of the Review Process

3.a Double Blind Reviewing

ICSE 2019 followed the "heavy" double-blind review model where names of the authors are not revealed until the final decisions (for accepted papers) or never (for rejected papers). The same review model was used in ICSE 2018.

Checking submissions for double-blind violations can be challenging. The PC chairs and PB members checked papers for double blind violations. Some papers were desk rejected due to egregious double blind violations such as listing the authors' names with the title of the paper. Since double-blind reviewing is rather new to ICSE, we decided not to desk reject minor violations such as listing of grants in the acknowledgements that reveal author identities, providing a link to a repository where the user name of the owner is visible, blacking out names of authors in the pdf file (author names can be seen by copy-pasting the blacked out text). Future PC chairs may decide to apply the double-blind rule more strictly as the ICSE author community becomes more familiar with the process. It would also be helpful to provide some guidelines about how to prevent some common mistakes in anonymizing papers such as, incorrect anonymization of a web link, a tool repository, a pdf file, etc.

We instructed the reviewers not to actively search for submissions online and in general avoid activities that would deanonymize the paper. In some cases reviewers discovered the author identity for various reasons (they already reviewed an earlier version of the work, or they knew about the research as it was being developed, etc.). We did not reassign papers to other reviewers in cases where the author identities were inadvertently discovered by the reviewers. Our assessment was that the review process should not be disrupted to achieve perfect anonymity since there will always be cases where the reviewers can make an informed guess who the authors may be. We think that the costs and benefits of achieving better anonymity of the authors will continue to be an issue that future PC chairs will need to take into account.

We provided a Q&A page to clarify the rules for double blind submissions (which was a revised version of the Q&A page from ICSE 2018). However, we still received many questions about double blind reviewing. One issue authors struggle with is how to reference their prior work. The answer is to cite the prior work in third person. But this may not be possible if the prior work is not published (for example it could be a dissertation). We advised authors to omit citations to their unpublished work and add such citations in the camera-ready version of the paper. The important thing to communicate to authors is that the double-blind rule should never be used as a justification for not citing prior published work.

Some authors were concerned about how citing a previously published short paper by them (such as a NIER paper) would influence the reviewers. Authors believed that if the reviewers knew that the authors of the short paper and the full paper are the same, they would be less concerned about the significance of the contribution (delta) between the short paper and the full paper. We argue that the author identity should not matter in this scenario, but this is a scenario worth discussing with the reviewers since people may have differing opinions on this issue.

Several authors asked when they could post the paper to an online repository (such as arXiv.org). We advised the authors to wait until the submission of the rebuttal. Given the time it takes for the ICSE review process to conclude, it is reasonable for authors to request distribution of their work online before they receive the decision about their submission. In some cases the authors' organizations may want to advertise the work and in other cases authors may worry about being "scooped" by other researchers. We believe that this issue will continue to be a problem for double-blind. We believe that a double blind review process should not prevent sharing of ideas, so it is important to balance the desire to have an unbiased review process with the ability of authors to share their research with others.

3.b Artifact Submission and Evaluation

One change in ICSE 2019 (compared to ICSE 2018) was that authors were not allowed to submit supplementary artifacts simultaneously with the paper submission. Instead, artifact submission and evaluation was handled separately by an Artifact Evaluation Track. Authors of papers accepted to the Technical Track were invited to submit an artifact to the Artifact Track. The Artifact Evaluation committee reviewed the artifacts and classified the accepted artifacts as Functional, Reusable, Available, Replicated, or Reproduced. Artifacts that were classified as Reusable, Available, Replicated or Reproduced received badges in the program and the proceedings.

Since the artifacts were evaluated after the acceptance decisions were made, it was not necessary to anonymize the artifacts and check them for double-blind violations. This simplified the double-blind violation check.

There were some concerns raised about the inability of authors to submit supplementary material. Some argue that for some types of research it is necessary to have access to artifacts to properly evaluate a submission (for example, survey questions for an empirical study may not fit in the paper but could be easily provided as supplementary material).

As Co-chairs we believe that it is the authors' responsibility to provide enough information in the main body of the paper that enables the reviewers to assess the paper with respect to the reviewing criteria. If future PC chairs decide that reading the main body of a paper is not sufficient for evaluation in some areas of software engineering, then it will be necessary to develop mechanisms for anonymized submission of supplementary material. The ICSE SC may wish to take a view on this.

3.c Online PC/PB Meeting

ICSE 2019 departed from previous ICSE tradition of having a two day face-to-face PB meeting to make final decisions. Under this model, after reviews and the author response period, online discussions took place to attempt to reach consensus on papers. However, those papers without consensus were considered by a face-to-face meeting of all PB (but not PC) members. In 2018, this model was used - 74 papers were finalized at the physical PB meeting.

With the support of the Steering Committee, ICSE 2019 did not hold a face-to-face meeting. The proposal for this change, accepted by the ICSE SC in March 2018, is given in Appendix A.

Other than the move away from a face-to-face meeting, ICSE 2019 followed a similar process to ICSE 2018 in that after the author responses, an online discussion phase took place to reach consensus. To reach final decisions, a two day online meeting was held, with the participation of all PC and PB members. Because PB/PC members were in different time zones, members were instructed to make themselves available for any 8 hour period of their choosing on each day. Discussions were completely asynchronous. We used the Easychair commenting feature - the same mechanism used in the initial online discussion phase. At the beginning of this two day period, 65 papers were as yet undecided.

In this section, we reflect on the value of the online two-day meeting and present relevant survey data from PB/PC members. The PC Chairs have made a number of observations about the wholly online process:

1) It is the opinion of the PC Chairs that the quality of decision making did not suffer because of the lack of a face-to-face meeting. There is no hard evidence for this, of course, but the PC Chairs observed that, for most papers, the discussions (both during the initial online phase and two day online meeting) were thorough, rigorous, and in some cases, very lengthy. Indeed, one could argue that the online method led to better decision making because the physical meeting excludes PC members. In our case, ALL reviewers of a paper were involved in the final decision. In addition, the fact that all discussion is in Easychair means that there is a written record of how the decision was reached.

2) The online method did change the nature of the role of the PB member. In prior ICSEs, PB members were largely seen as moderators rather than decision makers. Their role was to help reviewers come to a consensus but if this was not possible, the final discussion was moderated by the PC Chairs at the physical PB meeting. Given the number of papers involved, in the online model, it was not possible for the PC Chairs to be up to date on all discussions at all times. As a result, the PB member role assigned to a paper took on greater significance - they were expected and instructed to be more proactive in steering decisions. In effect, they acted like "mini PC Chairs". The advantage of such a model is that decision making can effectively be decentralized. The disadvantage is that it risks introducing inconsistent decisions. The PC Chairs believe this not to be the case, however, as they had sight of all decisions and the reasoning behind them and so could preempt any cases where inconsistency was likely to creep in. Nevertheless, the online method necessitates that the PB members are clear on the scope and importance of their new role and are given very clear instructions and guidance on how to act.

3) Easychair comments were used to facilitate all online discussions. Reviewers were explicitly instructed not to have discussions outside Easychair - e.g., in synchronous Skype conversations or by email. In a small number of cases, a synchronous conversation between the reviewers could arguably result in a quicker decision; however, the downside is that the decision and its reasoning would no longer be visible to the PC Chairs. One suggestion is to use a conference management system

that has both asynchronous commenting as well as a synchronous chat feature - this way, reviewers could use chat if desired but this would also be recorded.

Appendix D presents detailed data from a survey of PB and PC members, which includes questions about the online review process. From this data, it can be seen that 62% of PB members and 74% of PC members were satisfied with the ICSE 2019 review process. 77% of the PB and 87% of the PC were either satisfied or neutral, leaving only a small percentage of dissatisfied members in each case. Out of 25 written comments to this question, only two mentioned the online meeting at all: one was negative ("I would much prefer a real meeting") and one was positive ("I have been on ICSE PC many times and this was just about my best experience. I wasn't dragged halfway across the world, sit in room for 2 grueling days, having debate dominated by strong personalities"). The reasons for dissatisfaction focus on workload, effectiveness of the PB/PC model, and the need for author responses - all issues which are well established in ICSE, but could be reviewed.

The PB were asked whether they thought online discussions resulted in good decisions. Only 8% thought not.

Both the PB and PC were asked two questions about the two-day online meeting: "Please rate your agreement with the statement 'The two day online PC/PB meeting for making final decisions was necessary'" and "Please rate your agreement with the statement 'The two day online PC/PB meeting for making final decisions was effective.'" 16% of the PB thought the two day meeting was not necessary; only 8% thought it was ineffective. For the PC, 11% thought it unnecessary and 8% thought it ineffective. A separate question asked respondents to rate their agreement with the statement: "The online PC/PB meeting was better than having a physical PB meeting." Only 23% of the PB preferred a physical meeting, compared with 8% for the PC.

These questions also solicited qualitative feedback on the online process. Positive comments tended to be that an online meeting reduced the need for travel. Negative comments focused on unresponsiveness of some reviewers, the fact that some discussions dragged on for too long in the effort to reach consensus, and that sometimes a synchronous chat function would have been more effective.

4. Key Statistics on the ICSE 2019 Review Process

This section contains current and historical data for the ICSE Technical Track. The table below presents data on number of submissions and acceptance rates. 2019 saw the second-highest number of paper submissions (by one!). The acceptance rate was consistent with prior years.

Year	Submitted	Accepted	%
2009	405	50	12
2010	380	52	14
2011	441	62	14
2012	408	87	21
2013	461	85	18
2014	495	99	20
2015	452	82	18
2016	530	101	19
2017	415	67	16
2018	502	105	21
2019	*529*	*109*	*21*

The table below summarizes the range of the scores for the submitted papers and compares with ICSE 2018. [X,Y] means that a paper received an overall score better (or worse, if scores are negative) than a minimum of X and maximum of Y. For example, the first row [1; 2] represents the category of submissions that received an overall score of least a 1 (weak accept) and a 2 (strong accept). This would include a paper with all scores of 2. As another example, [-2,-1] represents submissions with no individual score better than -1. Papers scoring (-2,-2,-2), (-2,-1,-1) and (-1,-1,-1) would all fall into this category.

Note that both the percentage of submissions in each category and the ratio of accepted/rejected submissions per category is very similar in 2018 and 2019. This can be considered evidence that the fully online model of 2019 did not significantly affect the decisions.

	ICSE 2018 (489 submissions[1])				ICSE 2019 (494 submissions)			
Range	Count		Accept	Reject	Count		Accept	Reject
[1; 2]	50	(9.9%)	49	1	40	(8.1%)	40	0
[-1; 2]	33	(6.5%)	23	10	38	(7.7%)	30	8
[-2; 2]	17	(3.4%)	8	9	13	(2.6%)	6	7
[1; 1]	17	(3.4%)	16	1	12	(2.4%)	12	0
[-1; 1]	83	(17.0%)	22	61	90	(18.4%)	16	74
[-2; 1]	60	(12.6%)	3	57	51	(10.3%)	5	46
[-2;-1]	229	(47.2%)	0	229	250	(50.6%)	0	250

Prior to ICSE 2018, review forms asked reviewers to report their expertise (X: I am an expert in the subject area of this paper; Y: I am knowledgeable in the area, though not an expert; Z: I am not an expert. My evaluation is that of an informed outsider). In 2018, reviewers instead were asked to report their confidence in the review (3 high; 2 medium; 1 low). This change continued in 2019. The table below compares the confidence values reported in 2019 with previous years. The comparison is direct for 2019 and 2018. Prior to 2018, confidence of 3 (high) was mapped to expertise X (expert), 2 (medium) to Y (knowledgeable), and 1 (low) to Z (outsider).

The table shows that the trend of increasing expertise on papers has continued in 2019. The figures for 2018 and 2019 are comparable, and the longer term trend shows a clear increase in the percentage of papers with at least one high confidence reviewer, with a corresponding decrease in papers with low expertise/confidence.

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[1] Note: 2018 data includes WITHDRAWN papers in this data; 2019 does not (there were 10 WITHDRAWN papers in 2019 - these could have been withdrawn at any stage of the review process, including once reviews were complete). Neither 2018 nor 2019 includes desk rejected papers.

	2013	2014	2015	2016	2018	2019
At least 1 high/expert	72.0%	77.0%	84.0%	83.0%	87.3%	86.8%
Minimum of 2 reviews with medium/knowledgeable (or higher confidence/expertise)	95.5%	96.0%	97.7%	99.2%	98.0%	98.8%
Papers with at least 1 low/outsider review	23.0%	18.0%	7.2%	20.6%	17.0%	16.2%

For ICSE 2017, no data was reported for confidence/expertise in the "Report on the Technical Track of ICSE 2017".

The following table lists the number of papers submitted and accepted in each topic category. The topic list was slightly different in 2019 compared to 2018 - data is compared to 2018 where possible. The last column also includes the number of PC and PB members who declared this area as their expertise. A couple of changes to note in 2019 in the topic list are:

- The topic "AI and software engineering" was added
- "Debugging, fault localization and program repair" was split into three separate categories
- 2018 had "performance" and "software performance". In 2019, the latter was dropped.

It is difficult to draw any real conclusions from this data. However, of note is that the acceptance rate for the human aspects of SE appears to have increased significantly: from 12 to 38% for HCI and from 21 to 36% for human aspects of SE. This coincides with the PC Chairs efforts to increase representation on the PC from those working in human/social aspects of SE (combined, an additional 15 PB/PC members in these areas).

Topic	Submissions (2018)	Accepted (2018)	Acceptance rate (2018)	PC members (2018)	Submissions (2019)	Accepted (2019)	Acceptance rate (2019)	PC members (2019)
Ubiquitous/pervasive software systems	2	0	0	9	-	-	-	6
Embedded software	3	0	0	10	4	1	0.25	5
Software services	5	0	0	16	12	1	0.08	12
Green and sustainable technologies	5	0	0	11	5	2	0.40	8

Crowd sourced software engineering	6	2	0.33	21	11	4	0.36	18
Software visualization	6	1	0.17	16	8	2	0.25	19
Traceability	6	1	0.17	24	9	1	0.11	15
End-user software engineering	7	1	0.14	18	5	1	0.20	25
Cyber physical systems	8	1	0.12	25	7	1	0.14	19
Component-based software engineering	9	1	0.11	30	9	-	0.00	19
Cloud computing	10	0	0	14	14	-	0.00	9
Configuration management and deployment	11	2	0.18	13	11	3	0.27	15
Software economics and metrics	11	0	0	16	12	2	0.17	21
Autonomic and (self-)adaptive systems	11	1	0.09	29	14	-	0.00	22
Parallel, distributed, and concurrent systems	13	3	0.23	10	20	3	0.15	10
Program synthesis	15	6	0.4	16	14	2	0.14	19
Reverse engineering	15	2	0.13	24	13	2	0.15	22
Human-computer interaction	16	2	0.12	17	8	3	0.38	24
Software product lines	18	4	0.22	26	14	4	0.29	23
Middleware, frameworks, and APIs	18	4	0.22	12	21	2	0.10	10
Distributed and collaborative software engineering	18	4	0.22	28	18	6	0.33	25
Performance	18	2	0.11	7	27	7	0.26	12

Specification and modeling languages	19	2	0.11	31	17	4	0.24	31
Agile software development	20	1	0.05	21	21	5	0.24	28
Model-driven engineering	20	1	0.05	36	19	3	0.16	24
Software architecture	21	2	0.1	28	24	3	0.12	25
Software process	22	3	0.14	17	14	3	0.21	14
Programming languages	22	4	0.18	15	23	6	0.26	22
Refactoring	22	3	0.14	19	17	6	0.35	22
Dependability, safety, and reliability	23	3	0.13	29	35	8	0.23	30
Requirements engineering	23	4	0.17	32	15	3	0.20	20
Recommendation systems	24	3	0.12	30	16	4	0.25	22
Software reuse	26	5	0.19	19	18	2	0.11	14
Software modeling and design	28	4	0.14	36	24	4	0.17	31
Search-based software engineering	30	8	0.27	34	26	3	0.12	25
Software performance	30	5	0.17	10				
Formal methods	32	7	0.22	25	29	4	0.14	31
Apps and app store analysis	33	8	0.24	26	22	2	0.09	20
Program comprehension	42	8	0.19	31	35	9	0.26	41
Mobile applications	47	11	0.23	25	44	9	0.20	20
Human and social aspects of software engineering	48	10	0.21	33	39	14	0.36	41

Validation and verification	55	12	0.22	39	54	8	0.15	47
Security, privacy and trust	58	6	0.1	25	60	10	0.17	25
Tools and environments	59	13	0.22	30	58	17	0.29	41
Debugging, fault localization, and repair	74	13	0.18	41				
Debugging					45	11	0.24	36
Fault localization					33	3	0.09	36
Program repair					19	6	0.32	36
Mining software engineering repositories	82	16	0.2	41	88	21	0.24	47
Software evolution and maintenance	91	16	0.18	46	117	23	0.20	47
Program analysis	97	21	0.22	32	115	27	0.23	50
Software testing	102	29	0.28	50	140	28	0.20	56
Empirical software engineering	146	29	0.2	56	134	34	0.25	57
AI and software engineering					84	15	0.18	50

ICSE 2019 received submissions from 1738 authors and 45 countries. The table below gives the distribution based on the country of origin and compares to 2018. From the table, a number of initial observations can be made:

1. Some countries significantly increased their number of authors in 2019, compared to 2018. For example, Australia, Austria and Hong Kong doubled; Italy almost doubled; Canada and the USA each increased by 20%; the UK increased by 27%; China increased by 50%; and New Zealand doubled (albeit from a low base). For most of these changes, a fairly obvious explanation can be provided: location of the conference (USA and Canada); the continued growth of China in research; a growth of software engineering faculty in Australia. Further historical data would be needed to draw any real conclusions.

2. Some countries significantly dropped in terms of author numbers, namely: France, Germany, Sweden, Spain, India, Portugal and Chile. The reasons for this are not clear given this limited dataset.
3. In terms of geographical coverage of the PC, 2019 had similar coverage to 2018, with a few countries either better or less well represented:
    a. The following countries were significantly better represented: Australia, USA.
    b. The following countries were significantly less well represented: Italy.

Australia can again be attributed to the growth in SE faculty in that country as well as the fact that one of the PC Co-Chairs is based in Australia. Italy is an interesting case given that the drop in PC members coincides with a significant increase in the number of submitting authors from that country.

Markedly, 2019 has no PC member from India, Pakistan or Japan. A glaring anomaly is the under-representation of PC members from China. As a comparison, the ratio of submitting authors to PC members is 108:1 for China compared to 11:1 for the United States. This may suggest that a significant number of Chinese PC members should be added. Note, however, that the acceptance rate for the USA is double that of China. Even when normalized for acceptance rate, the ratio for the USA is still higher: at 2.8 accepted authors to 1 PC member versus 16:1 for China.

Country or region	Authors (2019)	Authors (2018)	Acceptance rate (2019)	Acceptance rate (2018)	PC members (2019)	PC members (2018)
Algeria		1		0		0
Argentina	10	15	0.43	0.25	1	1
Armenia		0		1		0
Australia	33	17	0.50	0.52	7	1
Austria	16	8	0.07	0.27	1	0
Belgium	9	7	0.16	0	0	0
Brazil	68	62	0.01	0.22	3	3
Canada	93	77	0.22	0.25	13	15
Chile	1	14	0	0.15	1	1
China	432	285	0.15	0.13	4	5

Colombia	6	6	0.18	0.08	0	0
Czech Republic	3	1	0	0	1	1
Denmark	6	8	1.00	0.14	1	1
Ecuador	1	3	0	0.6	0	0
Estonia	2		0.17		0	
Egypt		3		0	0	0
Finland	8	5	0	0.43	0	0
France	15	37	0.35	0.09	1	1
Germany	110	145	0.12	0.13	8	7
Ghana	1		0		0	
Greece	6	4	0.17	0.16	0	0
Hong Kong	18	9	0.35	0.48	1	1
Hungary	3	7	0	0.4	0	2
India	11	20	0.24	0.05	0	2
Indonesia	1		0		0	
Ireland	4	0	0.53	0	2	1
Israel	10	12	0.15	0.38	1	1
Italy	49	28	0.17	0.24	3	11
Japan	14	20	0.29	0.13	0	1
Jordan		1		0	0	0

Korea, Democratic People's Republic of		3		1	0	0
Latvia		1		0	0	0
Lebanon		0		0	1	1
Luxembourg	20	26	0.12	0.24	2	4
Malaysia		1		0	0	0
Malta	1		1.00		0	
Mexico		4		0	0	0
Netherlands	24	26	0.10	0.46	3	5
New Zealand	8	4	0.21	0	3	0
Norway	4	8	0	0	0	1
Oman		1		0	0	0
Pakistan	6	11	0	0	0	0
Poland		1		0	0	0
Portugal	4	19	0	0.09	1	1
Qatar	3		0		0	
Romania	1		0		0	
Russia		7		0	0	0
Saudi Arabia		1		0	0	0
Singapore	39	32	0.19	0.34	2	1
South Africa		1		0	2	2

South Korea	18	15	0.54	0.47	1	1
Spain	7	19	0.28	0.17	1	3
Sri Lanka		1		0	0	0
Sweden	11	24	0.25	0	3	4
Switzerland	22	17	0.45	0.22	3	1
Taiwan		4		0	0	0
Trinidad and Tobago	3		0		0	
Tunisia		3		0	0	0
Turkey	1		0		1	
United Kingdom	61	48	0.08	0.18	13	17
United States	574	479	0.25	0.26	51	40
United States Minor Outlying Islands		2		0	0	0
Viet Nam		1		1	0	0

Demographic Data

The submission process included a number of optional questions collecting demographic data: on gender, industry affiliation, student status, and history of ICSE submissions. The tables below present this data and compares to 2018.

Gender diversity

	2018 [395 submissions]	2019 [374 submissions]
Papers with no female authors	207	179
Acceptance rate of no female author papers	24.8%	17.3%

Papers with at least one female author	188	195
Acceptance rate of at least one female author papers	21%	24.6%

Industry authorship

	2018 [388 submissions]	2019 [357 submissions]
Papers with no industry author	301	282
Acceptance rate of no industry author papers	23.2%	21.6%
Papers with at least one industry author	87	75
Acceptance rate of at least one industry author papers	16.9%	22.7%

Students

	2018 [395 submissions]	2019 [387 submissions]
Papers with no student authors	78	64
Acceptance rate of no student author papers	16%	21.8%
Papers with at least one student author	317	323
Acceptance rate of at least one student author papers	24.4%	21.4%

Prior ICSE submissions

	2018 [384 submissions]	2019 [350 submissions]
Papers with no prior submissions	53	33
Acceptance rate of no prior submission papers	6.8%	9.1%
Papers with at least one prior submission	331	317
Acceptance rate of at least one prior submission papers	24.4%	22.4%

5 Survey Results

5.a Survey Rationale and Process

As for ICSE 2018, we sent out two surveys once final decisions had been made: (1) a survey to all submitting authors (including for rejected papers), sent out on February 27; (2) a survey to the PB/PC, sent out on March 14. The timing of the surveys was chosen as follows. Full results of these surveys can be found in Appendix D.

For the author survey, by distributing after the author notification date, we can control for "happy" and "unhappy" authors and get separate data for each group. Hence, we sent out the survey after notifications. By waiting a few weeks after the notification, authors have "cooled" down and had time to think about the reviews. Most people will have had the opportunity to improve the papers based on the reviews (either for the camera ready or resubmission) and have an idea how useful they were. By waiting we can also collect statistics about venues for resubmission. This helps us to better understand the ecosystem of SE conferences.

Note that we allowed each author to participate in the survey rather than restricting to one response per paper. The rationale is that instead of having a per-paper measure, it's more important to measure the satisfaction of the community with the review process. People are more important than papers. Low-quality reviews for a paper with ten authors can hurt ICSE's reputation more than low-quality reviews for a paper with a single author.

For the PC/PB survey, we also built in some time for reflection. Arguably, the survey could have been sent sooner - say in early January so there is some time for reflection but also the PC/PB can still easily recall positives/negatives about the review process.

We kept the surveys as similar to the 2018 survey as possible. The author survey was identical. Changes were needed for the PC/PB survey because of the changes in the review process - most notably, questions were introduced about the fully online PB/PC meeting.

We are deeply indebted to Tom Zimmerman who prepared the surveys and provided links to the data.

5.b Survey Results

The survey results are provided in the links below and in Appendix D.

Author Survey:
- All responses: https://data.surveygizmo.com/r/655926_5c6a0fb6ab54e1.92756356
- No accept: https://data.surveygizmo.com/r/655926_5cb03796b96d68.51029190
- Some accept/some reject: https://data.surveygizmo.com/r/655926_5cb0379d6f2f57.57443321
- All accept: https://data.surveygizmo.com/r/655926_5cb0379a882d45.09065100

PC/PB Member Survey
- All responses: https://data.surveygizmo.com/r/655926_5c8bd8c7b69679.84271532
- PC: https://data.surveygizmo.com/r/655926_5cb03b93808e76.59119020
- PB: https://data.surveygizmo.com/r/655926_5cb03bcc711818.46590926

We make some general comments on the data here.

219 people completed the author survey (a completion rate of 12.6%), whilst 52 PB/PC members (13 PB/39 PC) filled in the survey, a completion rate of 39%.

Author Survey Results

A majority of authors were satisfied with the review process - 57%, compared to 70% in 2018. Not surprisingly, the satisfaction rate was much higher for those whose papers were accepted (94%) as opposed to rejected (39%).

Questions 2 and 3 were open questions asking for feedback on the review process. Author comments generally praised the clarity of the process, and agreed on the importance of the rebuttal and meta-review. There seems to be a genuine appreciation for the work of the PB/PC in taking rebuttals seriously and responding in revised reviews.

The main negative point raised was that authors would like to see the scores given to the papers, possibly both before and after rebuttal.

In general, the author responses were satisfied with the quality of reviews - 53% compared to 64% in 2018. Again, there is a large disparity between authors with accepted versus rejected papers. Qualitative comments again point to variability in the perceived expertise level of reviewers, although it is hard to know how much of this perception is "sour grapes" from rejected authors. 9 authors claimed that reviews contained unprofessional, rude or offensive comments. This is a percentage of 4%.

Author comments generally support double-blind reviewing, with 78% agreeing that it should be used for future ICSEs. Only 25% thought it is a lot of work to make papers double-blind. 59% thought that double-blind makes submitting artifacts more difficult. Only 23% believed that papers that accidentally reveal author names should be rejected.

36% of the responding authors were first-time ICSE submitters. 20% of responding authors were female.

PB/PC Survey Results

In terms of overall satisfaction with the review process, 62% of the PB and 74% of the PC were either satisfied or very satisfied, giving an overall satisfaction rate of 71.1%. This compares with 71% in 2018.

Questions 3 and 4 were open-ended questions asking for comments on the review process. From the PC point of view, PC members generally thought the process was clear, that there was a strong focus on producing quality reviews, and that the PB did a good job of

moderating discussions. In terms of areas to improve, some comments argue that the two-tier PB/PC model is unnecessary and also that rebuttals are unnecessary. PC comments also stated that the workload was too high, that discussions could sometimes go on too long, that some reviewers are overly critical, and that the role of the PB member was not always clear.

From the PB point of view, they liked that both the PC and PB were involved throughout decision-making, and they liked the quality of interactions between PC and PB members. On the more negative side, PB comments also noted that the PB/PC two-tier model may be unnecessary, and that the PB workload was too high.

Some of these qualitative comments were addressed elsewhere in the survey by closed questions. 33% of all respondents thought the workload was not manageable, but 54% thought it was. Perhaps surprisingly, 31% of the PC thought that the PB did not help to improve the quality of reviews. However, 46% thought that the PB did help. 74% of the PC thought that the PB members were effective at handling discussions. 90% of all respondents were happy that their decisions were not over-ruled by the PC Chairs. 64% of all respondents thought that the rebuttals were useful. Given these numbers, there does not appear to be evidence to suggest that the workload was too high or that rebuttals are unnecessary. The issue of the two-tier model is not addressed in the closed questions.

There was very high satisfaction with the quality of the reviews -- 77% satisfied, which compares with 79% in 2018. Qualitative comments do suggest, however, that there is significant variability in the quality of reviews.

The survey data shows strong support for double-blind, with 71% supportive (compared to 69% in 2018). In the closed questions, there are two issues to note, each related to slight modifications we introduced in 2019 versus 2018. Firstly, we did not allow artifact submissions. 60% of all respondents thought that including artifacts is made more difficult by double-blind. Secondly, we did not insist that authors recuse themselves if the author identity became known. Rather, we used our best judgment to decide whether they should recuse themselves or not. This is a less strict process than in 2018 where authors were moved off papers. Survey data shows that only 23% of respondents think that authors should recuse themselves if author identities are revealed.

The data on the online PC/PB meeting has already been covered in Section 4, and so will not be repeated here.

6. Recommendations to the ICSE Steering Committee

Based on our experience, we make the following recommendations for consideration by the ICSE Steering Committee and future PC Chairs.

Submissions

1. Adding strong wording to the submission instructions about common reasons for desk rejections such as exceeding the page limit (any content other than references, including appendices, should not exceed page 10) and double blind violations (no

author names, no acknowledgements, all citations in third person) may help reduce the number of desk rejections.

Review Process

1. The online PB/PC meeting was successful and we recommend is continuation.
2. The two-tier PB/PC model worked reasonably well. Having more experienced PB members acting as moderators was helpful. However, some comments in the survey questioned the value of the two-tier model, especially given the move to an online PB/PC meeting. The SC may wish to consider whether the PB/PC model continues in its current form.
3. The ICSE review process is complex and long. Clear guidance for PB/PC members is essential. We used an online timetable, accessible by the PB/PC, rather than just putting the information in emails. This was very well received and should be continued.
4. Regardless of whether the PB/PC model is used, clear guidance is needed for paper discussion moderators in an online PB/PC meeting. One consequence of a fully online meeting is that responsibility for decisions is more decentralized. Hence, to maintain consistency, PB members need clear guidance on their role and on how to deal with common situations. We also reinforce the need for experienced researchers to act as discussion leaders.
5. A message board that can be shared by all PB and PC members for common announcements would be helpful during the online discussion/meeting phases. We were told by Easychair that they were working on such a feature but it was not ready for us to use.
6. We did not allow phone/skype/hangouts meetings for discussion of papers since we wanted all discussions to be on record. We believe that it is important to have transparency in the decision making process and one way to achieve it is to have all PB/PC members who do not have conflict with a paper to be able to see/hear/read the discussions on that paper. Allowing small group meetings would violate that. We believe that this issue will continue to be discussed in the future.
7. We did not send reviewer scores with the reviews and some authors stated strong objections to this practice. It is now common for conferences to send the reviewer scores with the reviews and this may have changed the expectations of the authors. Future chairs should take authors' expectations into account when deciding to include or exclude reviewer scores.
8. The issue of the effectiveness of author responses was raised in the survey data; however, the data is inconclusive on the best approach. The SC may wish to take a stance on this issue.
9. Some PB/PC members are concerned by the heavy workload. Alternative models to reduce workload could be developed.

Awards
1. The ICSE process for selecting ACM Distinguished Paper Awards is somewhat ill-defined and changes from year to year. The SC may wish to standardize this process.

APPENDIX A

Proposal to change ICSE Program Board meeting from physical to online

Jon Whittle and Tevfik Bultan, ICSE 2019 PC Co-Chairs

1. Background

In four of the last five ICSE conferences, the ICSE Technical Track review process has been structured using a two-level model consisting of a Program Board (PB) that supervises the reviews of a Program Committee (PC). This PB+PC model was introduced to deal effectively with the growing number of paper submissions. Ever since its introduction, final decisions on papers have been made at a face-to-face *physical* meeting attended by all members of the PB. A condition for accepting a PB invitation has always been in-person attendance to this meeting. Indeed, one of the reasons for introducing a PB was to reduce the number of people required to attend a physical meeting, and hence reduce the financial and environmental costs of such a meeting, as well as making the decision process more efficient by limiting the number of people in the room. The physical meeting for ICSE 2013 (attended by a PC) had 49 participants, whereas the ICSE 2014 PB meeting had just 24 (excluding PC chairs). In recent years, in order to effectively process the high volume of submissions that ICSE receives, the PC and the PB – and thus the size of the physical meeting – has grown (see Table 1).

Table 1

	2013	2014	2015[2]	2016	2017	2018
# submissions	446	496	452	530	415	502
PB size	n/a	24	n/a	28	33	33
PC size	49	78	48 (+33 RC)	90	94	101

2. Proposal and Motivation

There are many pros and cons that can be argued on the benefits/drawbacks of a physical PB meeting versus a purely online PB meeting. These debates have taken place in many forums – both formal and informal – over the years; we do not wish to present a comprehensive list of arguments here. After much careful consideration, however, we would like to propose that ICSE change to an online PB meeting format, on the following grounds:

(i) **Cost**. The financial cost of bringing ~35 leading researchers from across the globe for a two-day meeting is significant. Even researchers at the top of their field have limited travel budgets and so a trip to an ICSE PB meeting can mean one less conference trip for the researcher or one of their team. In particular, more junior researchers are likely to struggle more with funding, so a physical PB meeting arguably disadvantages up-and-coming researchers. ICSE itself spends a significant sum on PB meeting costs (typical cost for a meeting of this size is around 8K) ; this money could be invested in other ways (e.g., to support student travel to the conference). The total cost to the community, assuming $1500 average travel cost per attendee, is around 60K.

(ii) **Environmental Impact**. A similar proposal from the ASE conference estimated that a physical program board/committee meeting for 20-40 people could result in 40 tonnes of CO_2 being released into the atmosphere through long-haul flights.

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[2] ICSE 2015 used a different model: the Program Committee (PC) physically met, with an additional Review Committee (RC) that did not participate in the PC meeting.

(iii) **Time**. Beyond the direct financial cost, there is a substantial indirect cost due to the time spent by the PB members themselves in attending a two-day meeting (considering the significant international travel time). In most program board/committee meetings, attendees spend significant time on their laptops without focusing on the current discussion, and infrequently engage in a discussion: a PB meeting by its nature is not very engaging. Many PB members fly around the world only to discuss 1 or 2 papers in their batch, the others having already been decided.

(iv) **Bias.** A physical meeting potentially introduces unwanted bias and hence makes it difficult for PC Chairs to achieve equality in representation. There is some evidence that women are less likely than men to accept invitations that require international travel[3]. Those from more geographically remote regions (parts of Asia and Australasia) incur significantly greater cost, both financially and time-wise by accepting a PB meeting invitation. And researchers from poorer countries, which a committee may want to target for representation, will not necessarily have the travel funds to accept a PB meeting invitation.

(v) **PB+PC model.** PB+PC model has been used with different variations since 2014 and each variation has its pros and cons. We will go with the model used in ICSE 2018 where PC members serve as reviewers, and PB members manage the discussion and write the meta-reviews, but do not serve as reviewers. We choose this variation since it clearly separates the roles of PC and PB members, provides uniform treatment of papers, and eliminates any imbalance in discussions among reviewers. One side effect of this decision is that, in the physical meeting, reviewers who are most informed about the paper are not present. We believe that this significantly reduces the benefits of a face to face meeting.

(vi) **Precedent**. After experimenting with different reviewing models like ICSE, both ASE and ESEC/FSE have now moved to online meeting model. The corresponding proposal (approved) from ASE is attached.

(vii) **Opinion of the PB.** At the end of the ICSE 2018 PB meeting in December 2017, the ICSE 2019 PC Chairs conducted a straw poll where PB members were asked to answer 'yes' or 'no' to the question, "Would you prefer an online PB meeting over a physical PB meeting?" The results were 22 in favour of an online meeting, and 11 in favour of a physical meeting, a two thirds majority.

There are, of course, arguments in favour of a physical PB meeting. The purpose of this document is not to debate them all, but we would like to comment on a couple of them:

(i) **Quality of decisions.** One could argue that the quality of the decisions at a physical meeting is better because more voices can be involved in the discussion. However, our experience indicates that at any given time, most PB members are not engaged in the discussion. One could also argue that a face to face, interactive discussion is more effective than an online discussion via messaging, especially when people are in different time zones. However, in the PB+PC model that we plan to use, the people who are most informed about the paper, i.e., the reviewers who serve on the PC, are not present at the physical PB meeting, hence, advantages of a physical meeting are not fully realized.

(ii) **Community building.** A physical meeting does offer a wonderful networking opportunity for people serving in the PB. However, we argue that the ICSE community could find other, better, ways of networking opportunities – e.g., a PB + PC dinner/event at the ICSE conference, a

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[3] Cf. *Fewer invited talks by women in evolutionary biology symposia,* Schroeder et al., Journal of Evolutionary Biology 23(9), Sep 2013, which showed that 50% of women decline invitations versus 26% of men.

newcomers' lunch to welcome those attending ICSE for the first time, mentor match schemes to pair up junior and senior researchers, equality initiatives, etc.

In short, we propose that ICSE move to an online PB meeting from 2019 onwards[4]. There is no simple way of deciding if a physical or online meeting is 'better'; this proposal does, however, have the support of ICSE PC Chairs from 2018, 2019, and 2020, as well as a majority opinion of the ICSE 2018 PB.

In this proposal we decided to discuss having an online meeting in the context of the PB+PC model. We believe that growing number of submissions to ICSE makes online meetings necessary independent of the PB+PC model. However, in order to make this proposal concrete, we chose not to present a general discussion on physical vs. online meetings, but focus on the PB+PC model that we plan to use for ICSE 2019.

The ICSE MOU contains guidelines for the responsibilities of the PC chairs (ICSE Guidelines Part E). MOU only mentions the PC and the PC meeting, not the PB or the PB+PC model. One interpretation of what is written in MOU could be that *all* PC members should meet in a *physical* PC meeting. Since PB+PC model has been used in prior ICSE conferences, this has not been the interpretation in prior years. Although the MOU does *not* mention a physical meeting, it does mention to "Select a date and location" for the meeting. We argue that having a specific date and an online meeting site satisfies the PC chairs' responsibilities listed in the MOU.

3. **Mechanics**

If the proposal is accepted, a natural question to ask is how will an online meeting run? Although this will require further discussion and elaboration by the ICSE 2019 PC Chairs, initial thoughts as to how this can work for 2019 are given below:

- ICSE retains the PB+PC model. ICSE 2019 is projected to have ~35 PB members and ~100 PC members. The roles of PB and PC members remain unchanged with respect to ICSE 2018 as discussed above: PC members review papers and PB members oversee the reviewing process but do not review papers.
- The paper review process continues in the same fashion as in previous years:
  - PC members write reviews; PB members continually check for quality and request improved reviews from PC members as appropriate.
  - Once all reviews are received, authors are given a chance to respond to the reviews.
  - PC members enter into an online discussion, moderated by a PB member, and attempt to reach a consensus taking into account all the reviews as well as the authors' response.
- We envision three phases for decision making:
  1. Papers with unanimous negative or positive scores are marked as accept or reject as early as possible. ICSE'18 data suggests that ~60% of papers are decided in this phase.
  2. Papers with mixed scores are discussed further to reach a consensus decision by the reviewers, under the guidance of the PB member who oversees the discussion. ICSE'18 data suggests that, for an additional ~25% of papers, the reviewers reach a consensus.
  3. Papers for which reviewers are unable to reach a consensus will be discussed during the online PB meeting while the discussion will be open to all PB members. We will ask PB

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[4] Note: invitations for ICSE 2019 PB members have already been sent out – the invitation stated that a proposal for an online meeting was under consideration by the Steering Committee but clearly asked researchers only to accept the invitation if they can commit to a physical meeting.

members to reserve 2 days for the online PB meeting where they commit to being as responsive as possible. We will assign two more PB members to each undecided paper (where these additional PB members will read all the reviews, authors' response, and the discussion). So, each undecided paper will be discussed further by at least three PB members and all the reviewers. The PC chairs will monitor all the discussions and bring the discussions to a close by the end of this phase.

Last phase is the only one that will be impacted by physical vs. online PB meeting, so we will elaborate on it further. In 2018, 75 papers (~15% of submissions) could not reach consensus during online discussion phase and were hence taken to the physical PB meeting. Different models for the PB meeting have been used in recent years – in 2017, each paper was discussed by at least 3 members (one of which was an additional reviewer); in 2018 by 2.

PB members should feel empowered to act as the final arbiter for making a decision on a paper if they clearly understand the arguments for and against the paper, and they have a clear opinion on what the right decision is even if the reviewers are unable to reach a consensus. However, we appreciate that there are going to be cases where the PB members may not be sure what the final decision should be and additional PB members may need to be brought in to help with decision making. So, for 2019, we are proposing that:

- Each paper not reaching consensus by the online meeting date will have 2 additional PB members assigned to read the reviews, authors' response, the discussion, and the paper (if necessary) and form an opinion.
- An online discussion then takes place between the 3 PB members and the reviewers for each such paper. This discussion can take place at any time, but we also are asking PB members to set aside two full days so that these discussions can be prioritized.
- During this time, the reviews and discussions are opened up to all PB members so PB members can comment on any active paper.
- If a consensus still cannot be reached by the PB members, the PC Chairs will make the final decision.

Hence, PB members set aside two full days for an online PB meeting – but this is an asynchronous discussion-based meeting rather than a physical meeting or a synchronized virtual meeting via tele-conferencing. Due to time zone differences, it will not be feasible to have synchronized discussions. However, by asking PB members to allocate two full days to the online PB meeting, our goal is to ensure their responsiveness during this period. On average, we expect each PB member to be responsible for leading the discussion of 2-3 papers in this phase. We believe that PB members and the PC chairs will be able to effectively monitor the discussions and ensure the responsiveness of the participants. As in a physical meeting, PC chairs will be monitoring all the discussions and bringing them to a close as soon as a decision emerges.

We plan to assess if online PB meeting has any influence on review quality by analyzing author surveys, and comparing them to data from prior years. We also plan to survey PC and PB members to assess their views about the online PB meeting.

Conclusion

We believe that, for ICSE, given the number of submissions, the size of the PB, and the current review model based on reviews by PC, the positives of an online PB meeting outweigh the negatives. Hence, we propose to organize an online PB meeting for ICSE 2019. We asked for input and feedback from ICSE 2020 PC Chairs in preparation of this document, and received their support for this proposal.

APPENDIX B

ICSE 2019 – PB Review Process and Timeline

Paper submissions are due on Friday August 24th, 2018 (AoE).

Task	Starts	Ends	Instructions	Action	Notes
Declare your expertise, your Conflict of Interests (CoI) & bid for papers	Aug 25	Aug 29	Declare your expertise areas. Go through the author list and declare CoI. Then, go through the paper list and enter your bids.	In easychair: 1. Use ICSE 2019 tab->My topics to select topics in your expertise areas. 2. Use ICSE 2019 tab->My conflicts to declare your CoI with authors. 3. Then, use Paper bidding tab to bid for papers.	While bidding choose "yes" for at least 50 papers.
Check for Double Blind Review (DBR) and formatting violations	Sep 1	Sep 4	Do a quick check: ● If any papers violate ICSE DBR rules, let the PC Chairs know immediately ● If any papers violate ICSE formatting rules, let the PC Chairs know immediately	Email to PC chairs about the papers that violate DBR rules, or ICSE formatting rules.	You will be assigned ~15 papers (you will serve as **discussion leader** for these papers). You do not need to read the papers at this stage: a quick scan should be sufficient.
Read papers	Sep 5	Oct 17	Read all papers assigned to you		As PB member you will not write reviews but we ask you to read all papers assigned to you
Initial review assessment and improvement	Sep 26	Oct 23	Read all reviews for your papers, assess their quality, help reviewers improve their reviews and their questions to authors for the rebuttal	Post comments to easychair to help reviewers clarify and improve their reviews. Make sure that the questions for the authors are clear. For each paper you are

				assigned, post at least one comment about your assessment of review quality (you could just thank the reviewers if all reviews are high quality).	
Additional review requests	Oct 18	Oct 23	Assess the need for extra reviews due to lack of expertise	Notify PC Chairs via email of the need for extra review assignments if necessary.	Extra review assignments should be requested only in rare cases where there is not sufficient expertise to assess a paper
Additional review assessment and improvement	Nov 3	Nov 9	Read additional reviews for your papers, assess their quality, help reviewers improve their reviews and their questions to authors for the rebuttal	Post comments to easychair to help reviewers clarify and improve their reviews. Make sure that the questions for the authors are clear.	
Online Discussion: Phase 1	Sep 26	Nov 2	Read all the reviews for all the papers assigned to you. Identify agreements and disagreements among reviews. Help reviewers clarify their reviews for rebuttal phase.	For each paper you are assigned, post at least one comment to Easychair summarizing agreements or disagreements among reviews.	You can start online discussion as soon as the reviews are submitted.
Online Discussion: Phase 2	Nov 2	Nov 19	Read authors' response when it becomes available. Initiate, coordinate and lead the online discussions for your papers.	Write and finalize the meta-reviews summarizing the final decision on consensus papers (papers with all accept or all reject scores)	Author responses are due by Nov. 14 (Wed). Consensus decisions should be finalized by Nov 19 (Monday).
Online Discussion: Phase 3	Nov 20	Nov 26	Initiate, coordinate and lead the online discussion to	For papers with both positive and negative scores act	Pre-online meeting decisions should

			finalize the decisions on papers with mixed scores.	as an arbiter and help reviewers in reaching a decision. Write and finalize the meta-reviews summarizing the final decision on papers where a decision is reached. Write a meta-review summarizing the different views on papers where a decision is not reached.	be finalized by Nov. 26 (Monday).
Discussant assignment and discussion	Nov 28	Dec 2	Read the papers and all the reviews for the papers that you are assigned as a discussant	Post at least one comment in easychair for each paper you are assigned as a discussant summarizing your views about the disagreements about the paper	You will be assigned ~5 papers as a **discussant**
Participate in online meeting	Dec 3	Dec 4	Lead the online discussions of your papers, which will now include 2 additional PB discussants. Participate as a discussant for the additional papers you are assigned and help reach a decision. Participate in discussion of other undecided papers that are in your expertise area to help reach a decision.	Post at least one comment summarizing the state of discussion for each of your undecided papers at the beginning of the online meeting. Actively lead the online discussion and probe the reviewers and discussants for their input. For the papers you are a discussant, actively participate in online discussion and be responsive	ALL decisions must be made by the end of the online meeting. **All PB members must be available for these 2 days** to participate actively in discussions and bring decisions to a close. Discussions will be asynchronous. All discussions must be captured in easychair (please do not arrange ad hoc

				to comments requesting your input.	meetings for discussing papers).

ICSE 2019 – PC Review Process and Timeline

Paper submissions are due on Friday August 24th, 2018 (AoE).

Task	Starts	Ends	Instructions	Action	Notes
Declare your expertise, your Conflict of Interests (CoI) & bid for papers	Aug 25	Aug 29	Declare your expertise areas. Go through the author list and declare CoI. Then, go through the paper list and enter your bids.	In easychair: 1. Use ICSE 2019 tab->My topics to select topics in your expertise areas. 2. Use ICSE 2019 tab->My conflicts to declare your CoI with authors. 3. Then, use Paper bidding tab to bid for papers.	While bidding choose "yes" for at least 50 papers.
Check for Double Blind Review (DBR) and formatting violations	Sep 5	Sep 7	Do a quick check: ● If any papers violate ICSE DBR rules, let the PC Chairs know immediately ● If any papers violate ICSE formatting rules, let the PC Chairs know immediately	Email to PC chairs about the papers that violate DBR rules, or ICSE formatting rules.	You will be assigned ~15 papers. You do not need to read the papers at this stage: a quick scan should be sufficient
Review papers (1st round)	Sep 5	Sep 26	You must have completed 50% of your reviews by this half-way deadline. It doesn't matter which 50%.	Enter your reviews in Easychair.	Ensure that all your reviews are QUALITY reviews
Review papers (2nd round)	Sep 26	Oct 17	You must have completed 100% of your reviews by this deadline. NO EXCEPTIONS.	Enter your reviews in Easychair.	Ensure that all your reviews are QUALITY reviews.
Online Discussion: Phase 1	Sep 26	Nov 2	Read all the reviews for all the papers assigned to you. Identify your agreements and disagreements with	For each paper you are assigned, post at least one comment to Easychair stating your agreements or	You can start online discussion as soon as you submit your review.

			other reviews. Help other reviewers clarify their reviews for rebuttal phase.	disagreements with other reviews.	
Review additional papers	Oct 26	Nov 2	In exceptional cases, an additional review for a paper may be required – this should be used if expertise is lacking. It should not be used if the reviewers simply cannot make up their mind about a paper.	Enter your additional reviews in Easychair.	We may ask you to review 1 or 2 additional papers.
Online Discussion: Phase 2	Nov 2	Nov 19	Read extra reviews, read authors' response when it becomes available. Participate actively in the online discussions for your papers.	Post at least one comment per paper to Easychair to finalize the decision and the meta-review on consensus papers (papers with all accept or all reject scores)	Author responses are due by Nov. 14 (Wed). PB/PC-Chairs will make consensus decisions by Nov 19 (Monday).
Online Discussion: Phase 3	Nov 20	Nov 26	Participate actively in the online discussion to finalize the decisions on papers with mixed scores.	Post at least one comment to Easychair to finalize the decisions and meta-reviews about papers where there may be both positive and negative scores.	PB/PC-chairs will finalize pre-online meeting decisions by Nov. 26 (Monday).
Participate in online meeting	Dec 3	Dec 4	Continue to actively participate in online discussions of your papers, which will now include 2 additional PB Discussants. Participate in discussion of other undecided papers that are in your expertise area to	Post at least one comment summarizing your views about each of your undecided papers at the beginning of the online meeting. Actively participate in online discussion and be responsive to comments	ALL decisions must be made by the end of the online meeting. **All PC members must be available for these 2 days** to participate actively in discussions and bring decisions to

			help reach a decision.	requesting your input.	a close. Discussions will be asynchronous. All discussions must be captured in easychair (please do not arrange ad hoc meetings for discussing papers).

APPENDIX C

Reviewing Process Frequently Asked Questions

Does there have to be a "champion" (i.e., +2 score) to accept a paper? (added Nov 26)
No; this is not an acceptance criterion. It is OK to have papers accepted without a +2 score if all reviewers are in agreement that the paper should be accepted. We do not want to reject papers with majority positive scores solely because no reviewer is willing to say that they are a "champion" for the paper. To make a decision on a paper, a consensus from the reviewers should be sufficient. If a consensus cannot be reached, we prefer to move such papers to the online meeting phase.

Can we assign extra reviewers? (added Nov 20)
We do not plan to assign any more reviewers at this stage. Our goal was to have authors respond to all reviews, and since the author response period has passed we will not assign any more reviewers.

Is "conditional accept" an option? (added Nov 20)
No, we do not plan to have conditional accepts.

Can a submission be moved to a more appropriate track (such as SEIP)? (added Nov 20)
No, we are only evaluating submissions for the track that they are submitted to.

What should be included in a meta-review?
A meta-review typically contains the following:
- A short summary of the reviewers' views about the paper. For consensus papers this could be just a single sentence listing some of the shortcomings or the strengths that the reviewers noted in their reviews.
- A summary of the discussion, while noting that the authors' response has been received and taken into account during the discussion.
- A recommendation (which is done by clicking on accept/reject; if there is no decision reached yet, this field could be left as no-recommendation).

What are the ICSE CoI rules?
ICSE follows the ACM SIGSOFT conflict of interest policy specified here. Declaration of conflict of interests by authors and PB and PC is crucial for the double blind review process.

What are the ICSE rules on plagiarism?
The submission must also comply with the ACM plagiarism policy and procedures. In particular, it must not have been published elsewhere and must not be under review elsewhere while under review for ICSE. The submission must also comply with the IEEE Policy on Authorship.

What are the ICSE DBR rules?
No submission may reveal its authors' identities. The authors must make every effort to honor the double-blind review process. In particular,
- Authors' names and affiliations must be omitted from the submission

- References to their prior work should be in the third person
- Authors should not rely on author identity revealing supplementary material in the paper or in the rebuttal submitted during the clarification period.

Further discussion on the DBR process can be found in the [Q&A page](#).

What are the ICSE formatting rules?

A Technical Track submission must not exceed 10 pages, including all text, figures, tables, and appendices; two additional pages containing only references are permitted. It must conform to the IEEE Conference Proceedings Formatting Guidelines (title in 24pt font and full text in 10pt type, LaTEX users must use \documentclass[10pt,conference]{IEEEtran} without including the compsoc or compsocconf option).

What are the ICSE reviewing criteria?

Each paper submitted to the Technical Track will be evaluated based on the following criteria:

- **Soundness:** How well the paper's contributions are supported by rigorous application of appropriate research methods,
- **Significance:** The extent to which the paper's contributions are novel, original, and important, with respect to the existing body of knowledge,
- **Verifiability:** Whether the paper includes sufficient information to support independent verification or replication of the paper's claimed contributions,
- **Presentation:** Whether the paper's quality of writing meets the high standards of ICSE, including clear descriptions and explanations, adequate use of the English language, absence of major ambiguity, clearly readable figures and tables, and adherence to the formatting instructions provided below.

Should we formulate Author Questions for every paper?

We encourage you, wherever possible, to formulate explicit questions to authors and enter them in the two "Author Question" fields in the review form. Providing questions to authors that will help in making a decision about the paper is important, and will make it clear to authors what they should focus on in their responses. We understand that there may be some submissions for which it would not be necessary to have explicit questions, however, for majority of the submissions we believe that providing explicit questions to authors improves the review process.

What constitutes a QUALITY review?

- Write detailed and technical reviews
- Write an evaluation of the paper based on the ICSE evaluation criteria
- Do not spend too much time on summarizing the paper
- Be constructive in your criticism
- Write the reviews yourself
- Provide questions that will help in making a decision about the paper

How to interpret the new question in the review form about ranking papers?

- Provide your best estimate for the ranking of the paper among all ICSE technical track submissions

- Assuming that a representative set of 14-15 papers are assigned to you as a reviewer, you would mark around 2 papers as Top 15%, around 2 papers as Top 16-30%, around 3 papers as Top 31-50%, and around 7 papers as Bottom 50%
- We understand that your paper assignments may not be a representative set, and we ask you to use your best judgement and provide an estimate ranking for each paper
- This information will not be used to 'score' papers but simply as additional information in discussions; so estimates are ok

What is the protocol for online discussions?
- Be proactive, post your views
- Be responsive - when your input is needed, respond quickly
- Aim to accept papers
- Do not sit on the fence; make decisions
- Be respectful of authors and other reviewers
- Update your reviews with any pertinent details from the discussions
- Aim to make decisions as early as possible – DO NOT SIMPLY DEFER TO THE FINAL ONLINE MEETING

What is the timezone for deadlines?
- All the deadlines will be interpreted as the AOE (Anywhere on Earth) timezone

What are the different online discussion phases for?
All decision making for ICSE 2019 is online; there is no face-to-face PC/PB meeting. There are 4 phases in the online discussion, designed to incrementally make decisions as EARLY IN THE PROCESS AS POSSIBLE:
- Phase 0: initial discussions (ends Nov 2). This is before the author response is due. You are encouraged to discuss with other reviewers even before the author response.
- Phase 1: consensus decisions (ends Nov 19). Reviews agree on a decision; decision is made and PB member writes a meta-review.
- Phase 2: mixed review papers (ends Nov 26). Reviewers do not agree but aim to come to consensus through online discussion.
- Phase 3, Online meeting: final decisions. MUST be made by Dec 4. Additional PB members will be assigned to bring a new perspective.

NOTE: it is in everyone's interests to make decisions in earlier phases. Decisions SHOULD NOT be simply deferred to a later phase simply because reviewers cannot make up their minds or are not willing to try to come to agreement.

APPENDIX D: Survey data

Review Evaluation Survey:

All responses: https://data.surveygizmo.com/r/655926_5c6a0fb6ab54e1.92756356

No accept: https://data.surveygizmo.com/r/655926_5cb03796b96d68.51029190

Some accept/some reject:
https://data.surveygizmo.com/r/655926_5cb0379d6f2f57.57443321

All accept: https://data.surveygizmo.com/r/655926_5cb0379a882d45.09065100

PC/PB Member Survey

All responses: https://data.surveygizmo.com/r/655926_5c8bd8c7b69679.84271532

PC: https://data.surveygizmo.com/r/655926_5cb03b93808e76.59119020

PB: https://data.surveygizmo.com/r/655926_5cb03bcc711818.46590926

PART ONE: DATA FOR ALL COMMENTS AND ALL SUBMISSIONS

SUMMARY:
- Total number of comments: 6500
- Max. number of comments for a paper: 96
- Average number of comments per paper: 13
- Max. number of PB/PC involved in discussions for a paper: 11
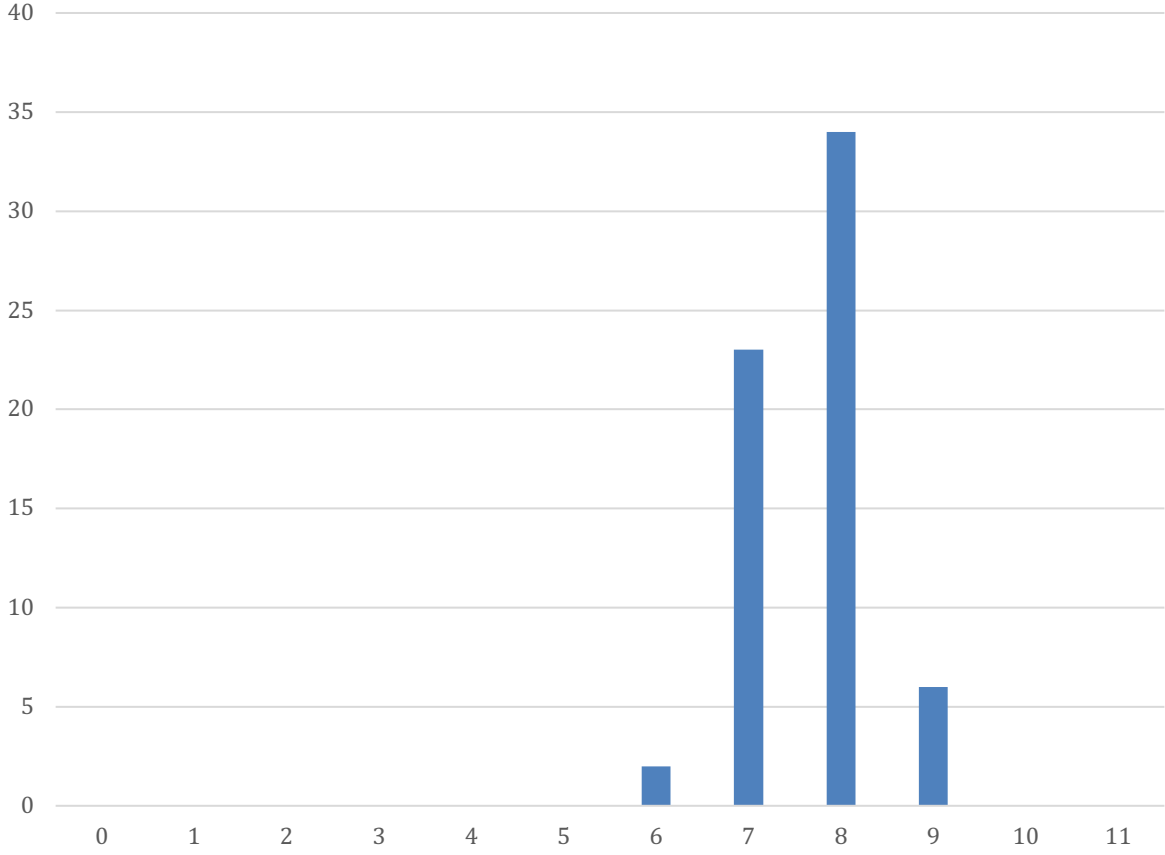- Av. Number of PB/PC involved in discussions for a paper: 5

CHARTS:

(a) Chart shows the number of submissions receiving each range of comments
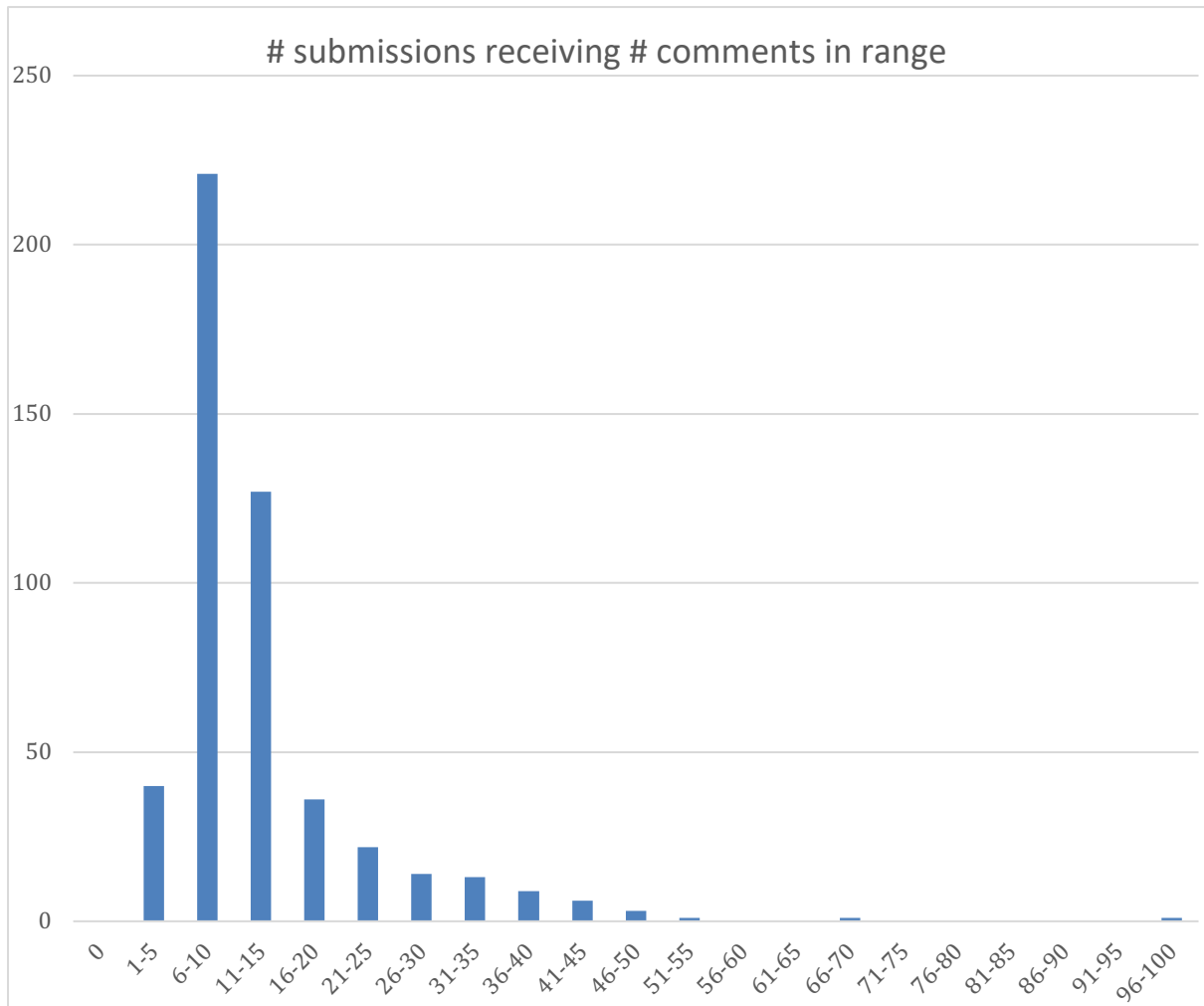
(b) Chart shows the number of PB/PC members involved in online discussions by # submissions [note: PC Co-Chairs also count if they commented]

submissions receiving comments from # PB+PC members
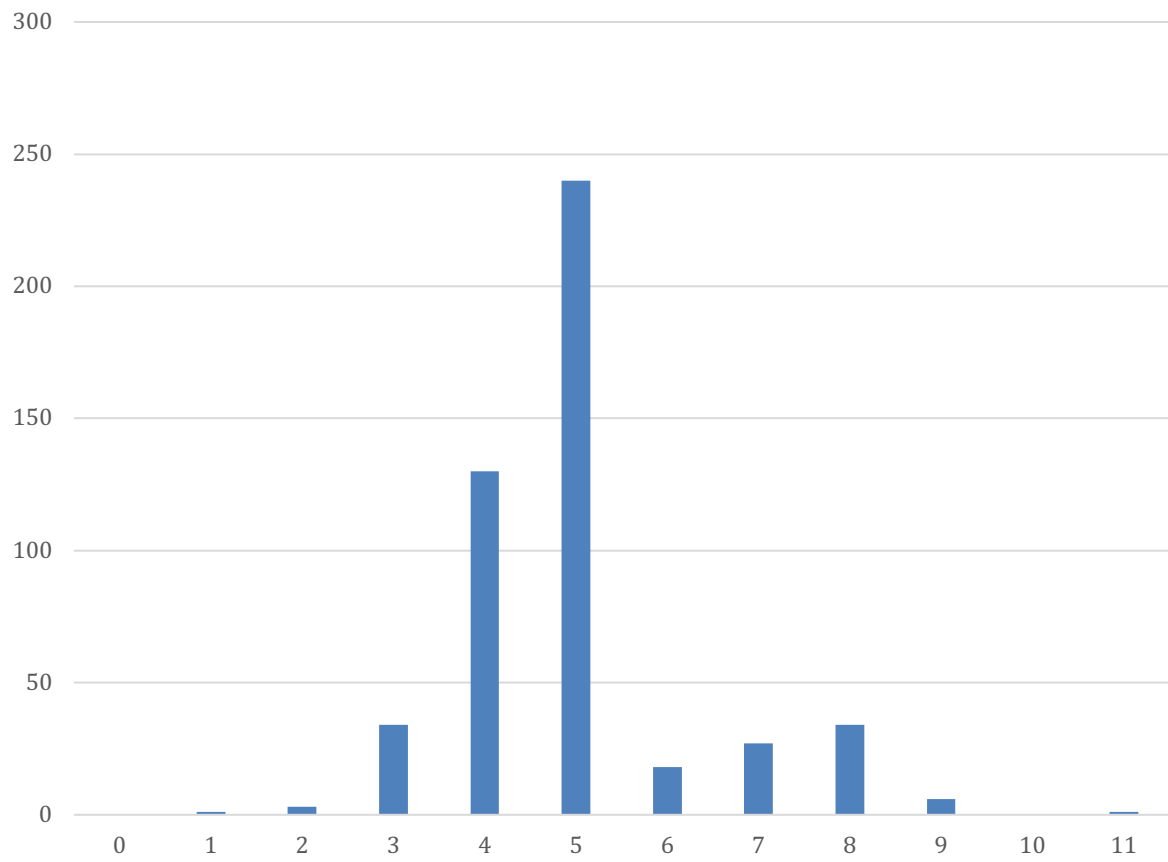
PART TWO: DATA FOR ALL COMMENTS ON THOSE PAPERS THAT WENT TO PHASE 3 (THE TWO DAY ONLINE MEETING)

SUMMARY:

- Number of papers that went to Phase 3: 65
- Total number of comments: 2019
- Max. number of comments for a paper: 96
- Average number of comments per paper: 31
- Max. number of PB/PC involved in discussions for a paper: 9
- Av. Number of PB/PC involved in discussions for a paper: 8

CHARTS:

(a) Chart shows the number of submissions receiving each range of comments (total comments in all Phases)
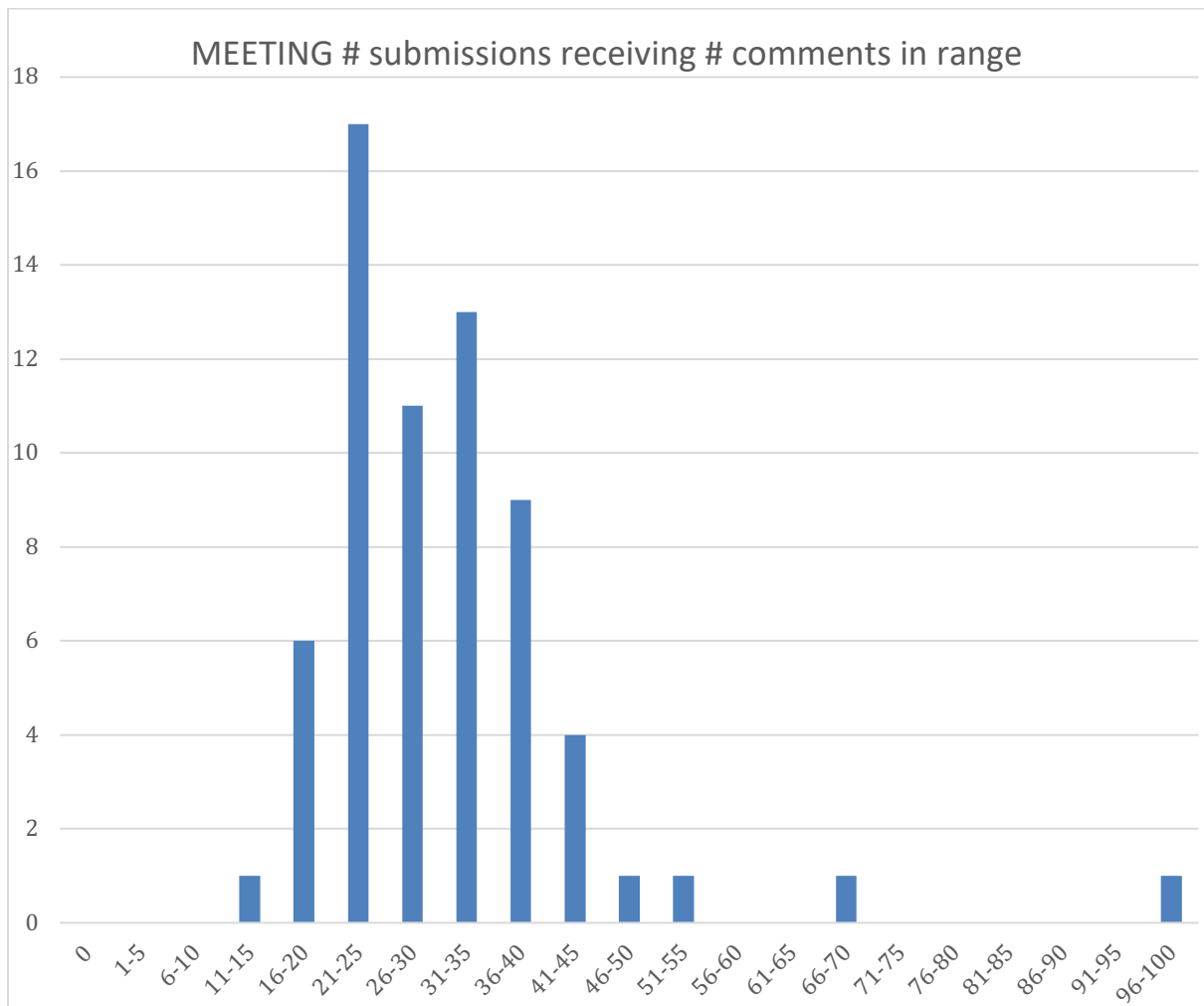
(b) Chart shows the number of PB/PC members involved in online discussions by # submissions, counting total comments (not just those in Phase 3) [note: PC Co-Chairs also count if they commented]

MEETING # submissions receiving comments from # PB+PC members

PART THREE: DATA FOR PHASE 3 COMMENTS ONLY ON THOSE PAPERS THAT WENT TO PHASE 3

SUMMARY:
- Number of papers that went to Phase 3: 65
- Total number of comments: 806
- Max. number of comments for a paper: 60
- Average number of comments per paper: 12
- Max. number of PB/PC involved in discussions for a paper: 9
- Av. Number of PB/PC involved in discussions for a paper: 8

CHARTS:
(a) Chart shows the number of submissions receiving each range of comments (Phase 3 comments only)
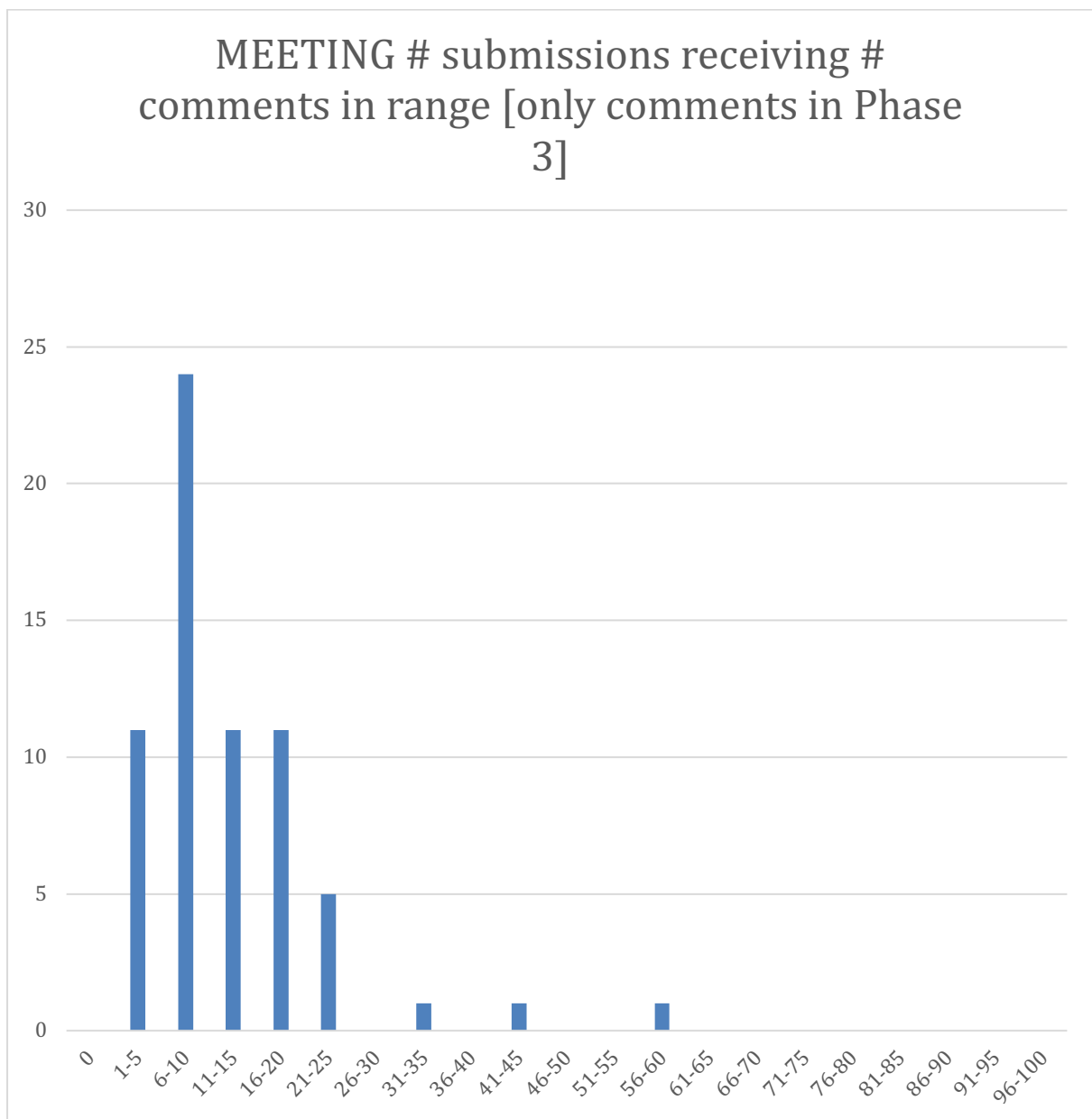
(b) Activity level of PB/PC members during Phase 3

Phase 3: #PBPCmembers submitting #comments
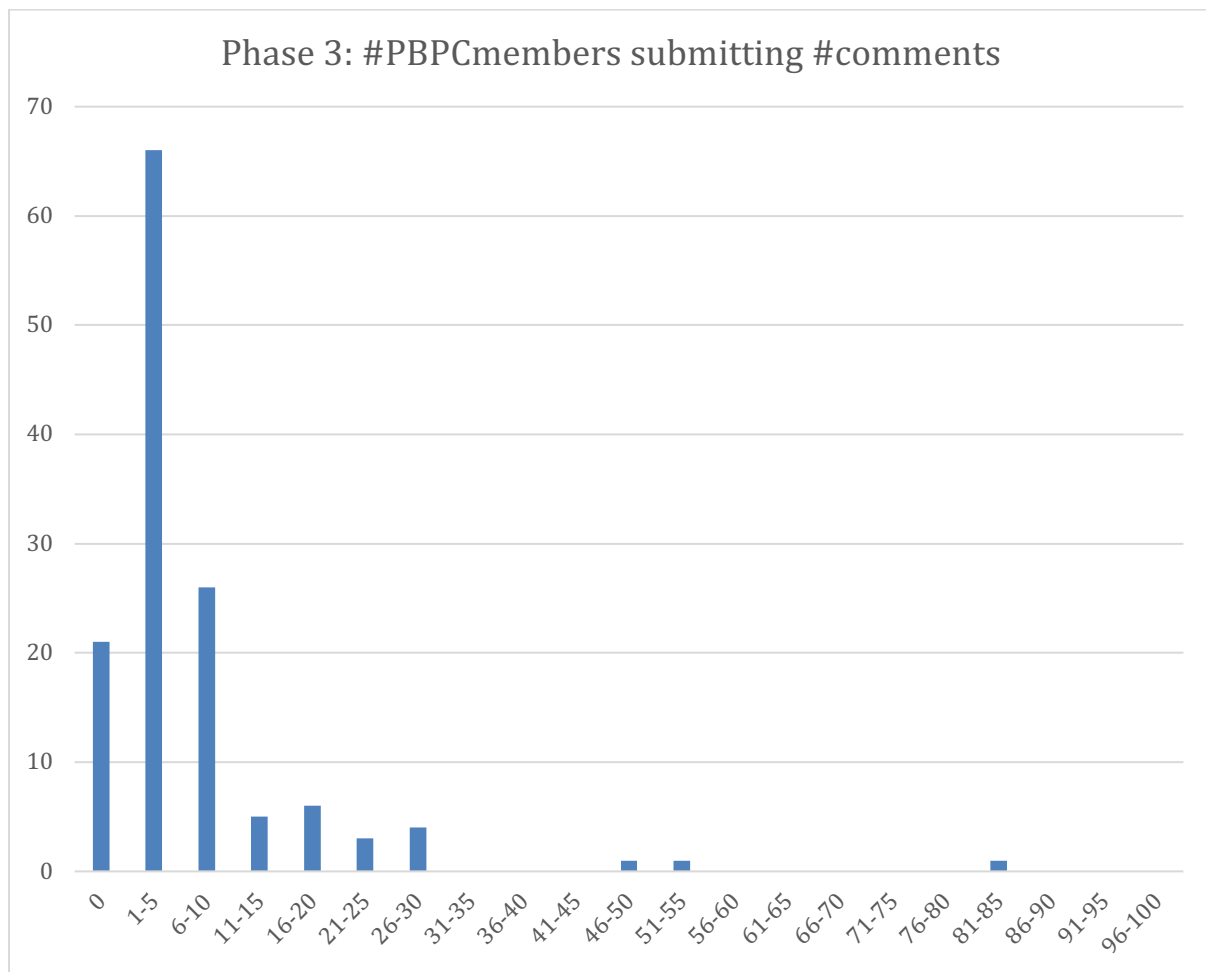
NOTES
- We discussed only 12% of the papers (65 out of 529) in Phase 3 and we got participation from 84% of the PB+PC (111 out of 132). 21 out of 132 (34+98) PB+PC members posted no comments during Phase 3. Note that if we had a physical PB meeting, we would have had comments from only 34 PB members and 0 comments/participation from 98 PC members.
- According to the opening slides from last year, there were more than 5000 comments posted in 2018. We had 6500 comments in 2019. One could expect a larger difference given that we had an online PB/PC meeting. But we need to keep in mind that the online PB/PC meeting only affected the process for 12% of the papers, so for the majority of papers the number of comments should have stayed the same.