Final Report of the R2 Committee

Committee Members:

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1. Introduction

1.1. The R2 Mandate

The “Reviewing Reviewing” (R2) Committee was formed in response to the issues raised by T.N. Vijaykumar and others at the ISCA 2016 business meeting about the reviewing model and practices used by past ISCA program committees. The charge to the R2 Committee was to identify problems with the current ISCA reviewing practices, and then propose, and potentially implement solutions. The mandate was developed jointly between ACM SIGARCH and IEEE TCCA Executive Committees. The focus of the mandate was to consider changes to ISCA, and did not specifically mention any other meetings sponsored by SIGARCH and TCCA.

1.2 Committee Selection

The two R2 co-chairs David Kaeli and Christos Kozyrakis were selected by the Executive Committees using the ISCA PC chair selection process. Each Executive Committee member provided a ranked list, and Condorcet voting was used, weighted inversely by the size of the Executive Committee, to create an overall ranked list. The rest of the R2 Committee members (Natalie Enright Jerger, Gabe Loh, Tom Wenisch and David Wood) were chosen by consensus of the TCCA chair, SIGARCH chair, and R2 co-chairs. At the time of creation of the R2 committee, two of committee members were also members of the SIGARCH Executive Committee (Natalie Enright Jerger and David Wood) and four were members of the TCCA Executive Committee (Natalie Enright Jerger, David Kaeli, Gabe Loh, and Tom Wenisch). The formation of the committee was completed in mid-March 2017.

1.3 Summary of the R2 Timeline

The activities of the R2 Committee can be broken down into two phases. The first involved data collection to identify and gain a better understanding of any existing problems. The activities included reaching out to several other computing research communities that had experimented with changes to their paper submission/reviewing models. The second phase involved developing proposals to revise the ISCA program committee practices.

In Spring 2017, the R2 committee completed a survey, receiving 621 responses from the Computer Architecture community. Results of the survey were presented at the ISCA 2017 business meeting (slides). During the Fall of 2017, the R2 Committee discussed lessons learned from the survey, and proposed a number of areas for changes. The R2 Committee also discussed feedback received from the other computing research areas. During the January-February period of 2018, the committee formulated an initial proposal targeting ISCA 2019 and 2020. We received feedback from both SIGARCH and TCCA on this proposal, and in April 2018 we developed a revised proposal.

The revised proposal has not been approved. The R2 Committee presented a summary of its activities at the ISCA 2019 business meeting and this document constitutes the final on its activities and learnings. The R2 Committee will dissolve after this report has been delivered to SIGARCH and TCCA.

2. R2 Activities

2.1 The R2 Survey

The R2 Committee began by surveying the community on a range of topics related to the general practices used by past ISCA program committees. We solicited participation for the survey using the past ISCA mailing lists, and the SIGARCH and TCCA mailing lists. The survey was developed with help from polling/survey experts (Dr. Cherri Pancake from ACM, Dr. Emanuel Mason from Northeastern U.), providing feedback on structure, length, and objectivity. The survey included 38 questions on a wide range of topics.

The survey was organized in sections:

1. Demographics (2 questions) - While the survey was anonymous, the survey included questions about the respondents to collect their demographics, including occupation, rank, and general level of participation in both ISCA submissions and ISCA program committees. We asked for this information so that we could better understand viewpoints from different groups. We received response from faculty, students, industry, and government.
2. General ISCA Questions (5 questions) - The goal here was to ask questions about how the respondent viewed ISCA in terms of quality, timeliness and connection with journal.
3. Role of the ISCA Program Committee (2 questions) - The goal here was to understand views on priorities for the program committee.
4. The ISCA Review Process Questions for Authors (11 questions) - The goal here was to ask ISCA authors about their past experience with the various ISCA practices, including review quality, number of reviews, rebuttals, revisions, and other topics.
5. The ISCA Review Process (11 questions) - The goal here was to ask the broader ISCA community (and specifically past PC members) about various ISCA practices, including size of the PC, the number of papers assigned per PC member, reviewing resubmitted papers, review profile sharing and other topics.
6. Other Comments about the ISCA Review Process (1 open-ended question) - Provided the respondent with an open form response.

2.2. Survey Report at ISCA 2017

The main purpose of the survey was to develop a better understanding of problems related to the current ISCA program committee practices, specifically leveraging quantitative data to identify the scale and scope of issues, and helping guide the R2 committee to make

recommendations regarding ISCA program committee practices to the SIGARCH and TCCA Executive Committees. The slides presented at the ISCA 2017 business meeting can be found here.

The R2 survey yielded the following results that suggest many current practices in ISCA work well:

- ~96% feel ISCA is a top quality venue for publishing Computer Architecture research
- ~84% believe that ISCA accepts high quality submissions
- ~70% feel ISCA acceptance rates are about right
- ~90% feel the number of reviews per paper is about right
- ~87% feel pre-PC meeting and online discussions are useful
- ~85% believe that the current conflict criteria used is right
- ~74% favor a double-blind review process
- ~74% believe in-person PC meetings are important

In terms of feedback received that suggests changes are warranted in current practices:

- ~50% feel that program committee members are overloaded
- ~50% would like to see ISCA tied to a journal
- ~45% believe the current review process takes too long
- ~40% favor a revision-based model

Other feedback that should potentially be considered in future changes includes:

- ~33% believe that reviews should help authors improve their work
- ~33% feel that reviews are not always fair
- ~25% feel that the reviews are not always done by experts

The R2 survey, combined with feedback provided from leaders from other research computing communities (e.g., SIGMOD, VLDB, IEEE Graphics, OSDI, SIGCOMM), helped to shape the development of proposals. The R2 proposal was then presented in the format of a two-year experiment, which was presented to SIGARCH and TCCA.

3. Experiment V1 - Year-round Deadlines with Revisions

The results of the R2 survey are broadly in line with concerns that have been identified and addressed in a number of other computing areas. The database community has been a leader in addressing these challenges. Their first attempted solution—passing reviews between the SIGMOD and VLDB conferences—was deemed a failure for a number of reasons, including lack of conference independence (see Jagadish 2008). Their second attempt maintains conference independence, with VLDB moving to full journal-first, revision-based reviewing and SIGMOD moving to two full review-and-revision cycles per year. These multi-deadline, revision-based models are widely considered to have been very successful and variations of these models have been adopted by SIGMETRICS, IEEE Security & Privacy ("Oakland"), and a number of other conferences.

Based on the survey and R2's analysis of best practices in other communities, the R2 committee proposed a two-year experiment for ISCA using a multi-deadline revision-based model. This proposal called for three deadlines, approximately four months apart. Papers submitted to each deadline could receive an Accept, Revise, or Reject decision. Authors whose manuscripts received a Revise decision would be allowed to submit a revised manuscript to one of the next two deadlines (which might be for the next year's conference) and would be guaranteed to be re-evaluated by the same reviewers. Such a model would allow for ISCA to be paired with a journal (if adopted permanently).

The goals of the proposal are:

(1) Gather data on PC and author satisfaction with the various elements of the proposed process from actual experience through a limited-time experiment.
(2) Reduce the number of reviews program committee members are asked to submit at each deadline in the review process, to reduce "reviewer fatigue" and review variance and decrease the burstiness of reviewing service. Fewer reviews per reviewing deadline make it easier for PC members to manage their review load, without the need to further expand PC size.
(3) Reduce the gap between architecture submission deadlines increasing the likelihood that papers will be submitted "when ready" rather than "when the deadline arrives".
(4) Introduce an "opportunity cost" for submitting work that is not ready, as a rejected paper may not be resubmitted to the next two ISCA deadlines.
(5) Allow papers to appear in the digital library immediately when a final decision on them is reached, reducing the typical-case time from submission to publication.
(6) Provide a major revision process that gives authors sufficient time to address reviewer feedback and be re-evaluated by the same reviewers. Importantly, this process ensures "revision" outcomes are decisions, provides explicit instructions on what needs to be

revised, and allows a significant time to address the revisions, fulfilling a key requirement to later tie ISCA to a journal.

3.1 The V1 Proposal

The proposal put forward to SIGARCH and TCCA was to use ISCA 2019 and ISCA 2020 as an experiment to address reviewer load and review quality issues that were identified in the R2 Committee's survey (as well as observed in many other communities). Ultimately, assuming positive community feedback, the model would be adopted permanently so that ISCA could be paired with an ACM and/or IEEE journal.

The complete text of the proposal is available here. In bullet form, it can be summarized as:

- 3 deadlines for submissions, ~4 months apart
  - 2 virtual PC meetings, 1 in-person PC meeting
- Short review process (~60 days to notification)
  - Early publication of accepted papers (DL/Xplore)
  - Rejected papers cannot be submitted to other ISCA deadlines in same year
- Allows major revisions, re-submit to next two deadlines
  - Revisions can rollover from ISCA 2019 to ISCA 2020

Table 1 presents the the datas for ISCA 2019, associated with the V1 proposal.

	Summer	Fall	Winter
Abstract	6/15/18	10/5/18	2/1/19
Paper	6/22/18	10/12/18	2/8/19
Submission delta	111 days	119 days	
Revision delta	48 days	54 days	
PC meeting	8/23/18	12/14/18	4/12/19
Notification	8/25/18	12/16/18	4/14/19
Review period	62 days	63 days	63 days

Table 1: Proposed paper submission, revision and PC meeting schedule associated with the V1 proposal.

3.2 Tradeoffs Associated with the V1 Proposal

The proposed review process requires the PC to make decisions at multiple points during the year. The R2 committee felt it was impractical to ask PC members to travel to multiple in-person PC meetings. Hence, the proposal included only a single in-person meeting with decisions for the other deadlines made via a virtual meeting. SIGMETRICS currently uses this approach.

In aggregate, the total review load a PC member would complete under this model, spread over all deadlines, was anticipated to exceed the current load of ISCA service by 15-20%. However, at each review round deadline, the load was anticipated to be at most 6-8 papers for round 1 and 2-3 for round 2. The expectation is that this lower load per deadline is more manageable and will lead to better on-time completion percentage and fewer cursory/rushed reviews.

The proposal did not include rebuttals in the process due to schedule constraints.

3.3 Feedback from SIGARCH and TCCA on the V1 Proposal

This V1 proposal was presented first to the SIGARCH Executive Committee and then to the TCCA Executive Committees for feedback and approval. SIGARCH had a number of suggestions for improvement, but was supportive of moving forward with the experiment. In contrast, TCCA was very concerned about the possible impact of the proposal on HPCA (and MICRO), and asked for a substantial revision. Both executive committees provided feedback to the R2 Committee.

SIGARCH provided the following feedback:

- (+) Longer resubmission interval allows major revisions, eventual tie to journal
- (+/-) Multiple deadlines
  - (+) Reduces rushed resubmissions, spreads load, improves quality
  - (-) ~4 month spacing may hurt HPCA and MICRO, evaluate during experiment
- (-) Virtual PC meetings don't scale to 50+ people
- (o) Linking ISCA, HPCA, and MICRO possible in long-term, but needs more study
  - Gather metrics on impact on ASPLOS, HPCA, MICRO, as well as ISCA

The SIGARCH EC voted in favor of carrying out a 2-year ISCA 2019/2020 experiment.

TCCA provided the following feedback:

- (-) Multiple interleaved ISCA deadlines will "steal" top papers from HPCA and MICRO
  - Always an ISCA deadline within 2 months of another conference deadline
  - Create/increase perception that HPCA and MICRO are second tier
- (o) Too big of a change without more community feedback
  - Present at ISCA business meeting

- (-) Survey indicated that the community favors in-person, not virtual PC meetings

TCCA voted 13-5 to approve the following process to revise the proposal:

> (i) [The TCCA EC] asks the R2 committee to revise the R2 proposal with two specific requests: (a) schedule the paper submission deadlines such as to prevent/minimize ISCA hurting the number of submissions to HPCA (and MICRO), and (b) investigate the possibility for multiple staggered deadlines rather than interleaved deadlines. (Note that (a) could possibly be accomplished through (b).)
>
> (ii) Given a revised proposal that makes progress on the issues listed above, [the TCCA Chair] will then ask the TCCA EC to vote on the revised proposal. It would be strongly expected that no more changes be required.

In response to the concern that multiple year-round deadlines will negatively affect submissions to HPCA and MICRO, and based on the specific direction of TCCA, the R2 committee developed a revised proposal.

4. Experiment V2 - Exclusive Windows with Pipelined Bulk Commit

The R2 committee took the feedback under consideration and proposed a revised model that was responsive to TCCA's specific requests.

To address interaction with other conferences, the fundamental principle of the V2 Proposal is "exclusive submission windows". Namely, each of the three main architecture conferences---ISCA, HPCA, and MICRO---will have a 4-month exclusive submission window for new manuscripts. These windows will be roughly centered around the recent history of conference submission deadlines. Specifically, we proposed the following exclusive submission windows:

- ISCA: 10/1-1/31
- MICRO: 2/1-5/31
- HPCA: 6/1-9/30

Each conference may have as many deadlines as they choose, but new manuscripts may only be submitted to deadlines that fall within their exclusive window.

To address concerns about virtual vs. in-person PC meetings, the virtual meetings were removed from the V2 Proposal and replaced with the concept of "bulk commit", where all decisions that can not be reached by consensus through discussion in the review software are deferred to a single in-person PC meeting.

4.1 V2 Proposal

The complete text of the V2 proposal is available here. In bullet form, it can be summarized as:

- Divides the calendar into 4-month “exclusive windows” for new submissions to ISCA, HPCA, and MICRO, consistent with deadlines in recent years.
- ISCA 2019 would use three staggered deadlines within its exclusive submission window.
    - Distributes reviewing load and facilitates major revisions
- Pipelines submissions, reviews, and revisions with “bulk commit”
    - Decisions made in online discussions and a single in-person PC meeting
- Adds a post-PC meeting “Revision only” submission deadline for papers that will appear in following year’s ISCA.
- Proof-of-concept schedule with HPCA 2020 using same model, demonstrating how they could work well together.

The sample schedule below illustrates how the submission and review calendar could look if both HPCA and ISCA adopted the V2 Proposal:

	HPCA 2020				**ISCA 2020**			
	HPCA 1	HPCA 2	HPCA 3	RevOnly	ISCA 1	ISCA 2	ISCA 3	RevOnly
Abstract	6/1/19	7/3/19	8/31/19		10/1/19	11/5/19	1/14/20	
New Papers	6/8/19	7/10/19	9/7/19		10/8/19	11/12/19	1/21/20	
Revisions Due	n/a	n/a	10/12/19	12/16/19	n/a	n/a	2/25/20	5/5/20
R1 reviews	7/6/19	8/7/19	10/12/19	1/13/20	11/5/19	12/10/19	2/25/20	6/2/20
R2 reviews	8/3/19	9/4/19	11/9/19		12/3/19	1/14/20	3/24/20	
Sub. delta		32	59			35	70	
PC meeting			11/16/19				4/4/20	
Notification	8/13/19	9/14/19	11/18/19	1/20/20	12/13/19	1/24/20	4/7/20	6/9/20
Review delta	66	66	72		66	73	77	
Revision delta	60	28	28		74	32	28	
Conference			2/15/20				6/15/20	
Notify to Conf			89				69	

Table 2: ***Proposed paper submission, revision and PC meeting schedule for HPCA2020 and ISCA2020, assuming adoption of the V2 proposal.***

4.2 V2 Proposal Tradeoffs

“Bulk commit” may defer some decisions on papers submitted to the first deadline until the in-person PC meeting. Though we expect only a subset of papers to fall in this class, the time from submission to decision is lengthened over the current ISCA practices for these submissions.

Papers that receive a “Revision” outcome at the PC meeting can be submitted to the “Revision Only” deadline and will appear in the associated journal as part of the proceedings of the year in which they are accepted. However, due to the limited gap from the revision-only notification to the conference, the presentation of these papers is deferred to the following year. The envisioned revision model expects only a small number of papers to be affected.

The R2 Committee developed a separate document that explained the benefits of multiple deadlines and major revisions for both reviewers and authors. It also sought to clarify how the V2 Proposal seeks to address some of the concerns raised during the discussion of the V1 Proposal.

4.3 Feedback from SIGARCH and TCCA on the V2 Proposal

The V2 Proposal was presented to the SIGARCH and TCCA ECs. SIGARCH unanimously approved the V2 Proposal on an 8-0 vote. Despite the fact that this proposal includes "multiple staggered deadlines" to "minimize ISCA hurting…HPCA (and MICRO)," the vote by TCCA resulted in a 9-9 tie. Because approval required a majority vote by both ECs, the proposal was not approved.

5. Other Issues Considered by the R2 Committee

5.1 Diversity Policy for ISCA

Of the non-student responders to the R2 survey, 50% have never served on the ISCA PC, 25% have not served on the ERC, and 17% have not reviewed any ISCA papers. One mechanism to mitigate concerns about high reviewer load is to ensure that the load is more evenly spread throughout the community. In concert with this, we also want to ensure that the ISCA program committee is sufficiently diverse along a number of axes. SIGPLAN has a set of well-established diversity guidelines for SIGPLAN sponsored events. We used these guidelines as the inspiration for proposing the following set of guidelines for ISCA.

- Coverage of meeting topics.
- Turnover: Each year's committee should be substantially distinct from previous years' committees. Some overlap to promote continuity is permissible. Where applicable, distinction from committees in related activities from peer organizations (e.g., SIGARCH, TCuARCH, SIGMICRO) shall also be considered.
- Diversity of institution: A given institution should not be significantly more/over-represented compared to others in the committee.
- Academic lineage: The success of our PhD training has created many lines of academic progeny spread across many institutions around the globe. Committees should be formed to minimize over-representation from any particular lineage.
- Type of institution: Committees should contain a mix of experts from Industry, Academia, Government, Small/Large, Established/New, etc.
- Years of experience: Committees should include a mix of junior, mid-level, and senior members of the community.
- Geographic distribution: Members should come from all parts of the world active in the given research area.
- Gender.

- Ethnic background.

It should be noted that these guidelines were not included in the official R2 proposal and have not yet been approved (or rejected) by TCCA and SIGARCH. Despite the rejection of the R2 proposal, we recommend that TCCA and SIGARCH continue to discuss and potentially adopt these guidelines.

5.2 Collecting/Sharing Reviewer Performance Statistics

One of the messages we learned from the R2 Survey was that ~82% of the respondents feel that collecting and sharing individual review statistics with future ISCA program chairs would improve the process. ~89% of the respondents said they would approve of their ISCA reviewing statistics to be shared with future program chairs.

The R2 committee considered the possibility of collecting performance statistics on individual reviewers, either to assist PC chairs in selecting committee members, or to use peer pressure to attempt to improve review quality. Several mechanisms were discussed. We also investigated attempts to collect reviewer performance data in the CHI and SIGGRAPH communities.

Ultimately, prior efforts to collect such statistics in other communities were abandoned due to privacy concerns. European Union regulations regarding privacy call into the question the legality of creating and distributing any dataset that was not based entirely on public records. Moreover, the committee could not identify clear objectives of such an effort or what subset of data we felt comfortable archiving. As such, we decided not to pursue this issue further.

We note that Martha Kim has collected and is maintaining a dataset on PC and ERC service at the top five architecture program committees (ISCA, HPCA, ASPLOS, MICRO, Top Picks), which can be a valuable resource for PC Chairs to spread load within the community and identify individuals to invite (e.g., to enhance diversity of committees across multiple dimensions). We would recommend that future PC Chairs reference this dataset when selecting future program committees.

6. Next steps for R2

The R2 Committee presented their activities at the 2019 ISCA business meeting. The presentation included a brief summary of our efforts over the past two years. The presentation was followed by a discussion on a proposal to carry out a one-year version of the V2 Proposal. The slides presented on the summary and the one-year experiment can be found here. A detailed description of the one-year compromise proposal is available here. The straw vote at the ISCA business meeting was 71 votes in favor of the one-year proposal and 53 votes

against. At this point, the R2 Committee has dissolved, and it is up to SIGARCH and TCCA to find the best path forward for improving ISCA.