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## How healthy are software engineering conferences?



Bogdan Vasilescu<sup>a</sup>, Alexander Serebrenik<sup>a,\*</sup>, Tom Mens<sup>c</sup>,  
Mark G.J. van den Brand<sup>a</sup>, Ekaterina Pek<sup>b</sup>

<sup>a</sup> Eindhoven University of Technology, PO Box 513, 5600 MB Eindhoven, The Netherlands

<sup>b</sup> University of Koblenz-Landau, Universitätsstraße 1, 56070, Koblenz, Germany

<sup>c</sup> Université de Mons, Place du Parc 20, 7000 Mons, Belgium

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## ABSTRACT

In this article we study the health of software engineering conferences by means of a suite of metrics created for this purpose. The metrics measure stability of the community, openness to new authors, introversion, representativeness of the PC with respect to the authors' community, availability of PC candidates, and scientific prestige. Using this metrics suite, we assess the health of 11 software engineering conferences over a period of more than 10 years. In general, our findings suggest that software engineering conferences are healthy, but we observe important differences between conferences with a wide scope and those with a more narrow scope. We also find that depending on the chosen health metric, some conferences perform better than others. This knowledge may be used by prospective authors to decide in which conferences to publish, and by conference steering committees or PC chairs to assess their selection process.

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## 1. Introduction

In computing science, and especially in software engineering, scientific publications in international conferences (as opposed to journals) are often considered *the* most important way of disseminating research results [1]. The preference for conference publications is motivated by such arguments as: the young age and high dynamism of the field requiring shorter turnaround time between submission and publication than journals typically offer (to avoid results becoming obsolete before their publication) [2]; the increased visibility and publicity associated with presenting a paper and discussing it with peers [2]; the prestige associated with publishing at highly-selective venues with low acceptance rate [3]; the increasing importance given to conference publications by decision makers assessing scientists, both in the USA [4] and in Europe [3].

However, the fundamental role of conferences in computing science is not undisputed [2,5–12]. The reported criticism is focused around the limited number of pages, too little time to revise a paper after receiving comments from reviewers, the ultimately higher impact of referenced peer-reviewed journal publications, and the increased volume of submissions. To keep the review quality high and the reviewer workload low, the latter requires the programme committee (PC) to grow larger. However, “the number of experienced reviewers does not appear to be growing at the same rate” [7], resulting in a “shrinking pool of qualified and willing PC candidates” [8]. This realisation brought a number of conferences to adopt a two-phase review process: first, a broad PC reviews the submissions, then a much smaller Program Board initiates, monitors, and guides the discussions with the PC members. In this way a balance is sought between a reduced review load and high review quality.

\* Corresponding author. Tel.: +31 40 2473595; fax: +31 40 2475404.

E-mail addresses: [b.n.vasilescu@tue.nl](mailto:b.n.vasilescu@tue.nl) (B. Vasilescu), [a.serebrenik@tue.nl](mailto:a.serebrenik@tue.nl) (A. Serebrenik), [tom.mens@umons.ac.be](mailto:tom.mens@umons.ac.be) (T. Mens), [m.g.j.v.d.brand@tue.nl](mailto:m.g.j.v.d.brand@tue.nl) (M.G.J. van den Brand), [pek@uni-koblenz.de](mailto:pek@uni-koblenz.de) (E. Pek).

Most software engineering conferences follow a single-blind peer reviewing scheme, in which the reviewers know the names of the authors, but not vice versa. This may increase the risk of conferences becoming closed communities, and they may suffer to some extent from introversion. We understand *openness* as the readiness to accept newcomers, either as authors or PC members. Indicative of low openness—closed communities—are, e.g., inviting roughly the same group of people to the PC each year, or preferential acceptance of papers by known authors that have previously published in the same conference. We understand *introversion* as the prevalence of papers (co)authored by PC members among the accepted papers. While theoretically everybody can contribute to any conference, in practice some conferences tend to attract more “new faces” than others. Both problems are well-recognised [7,8,13]. Crowcroft et al. [7] argue that “there is a distinct perception that papers authored by researchers with close ties to the PC are preferentially accepted with an implicit or overt tit-for-tat relationship”. Similarly, Birman and Schneider [8] question the quality of reviews, but suggest that “work by famous authors is less likely to experience this phenomenon, amplifying a perception of PC unfairness.” Therefore, it is useful to study to which extent and for which conferences such symptoms as introversion, closed nature, or shortage of PC candidates occur and, if so, what are the causes and consequences of this occurrence.

In this article we assess the health of software engineering conferences with respect to several criteria: community stability (author and PC turnover), openness to new authors, introversion, representativeness of the PC with respect to the authors’ community, availability of PC candidates, and scientific prestige. In general, our findings suggest that software engineering conferences are healthy: balanced PC turnover (high enough to avoid introversion, yet low enough to ensure continuity and coherence), high openness to new authors (“new” in terms of both turnover with respect to previous years as well as not having published at that conference ever before), and moderate introversion (in terms of fraction of papers co-authored by PC members). Nonetheless, some conferences perform better than others according to the aforementioned criteria. In addition, we observe important differences between conferences with a wide scope and those with a more narrow scope. This knowledge can be used by conference steering committees and PC chairs, e.g., to assess composition of the PC, paper selection process and adherence to conference charters. Furthermore, prospective authors might consider conference openness as well as prestige when deciding to which conferences to submit their work.

The remainder of this article is organised as follows. Section 2 describes our research methodology, including the selection of conferences, the metrics proposed to characterise the health factors, and the data extraction process. Section 3 details the statistical analysis carried out and its findings. Section 4 discusses the results on a per conference basis. Section 5 surveys related work. The threats to validity, part of any empirical study, are presented in Section 6. Section 7 sketches directions for future work and Section 8 concludes.

## 2. Methodology

### 2.1. Data extraction

Numerous software engineering conferences are organised every year. Moreover, papers addressing software engineering topics are also solicited by wider-scoped computer science conferences. In our study, we focused on the conferences studied in [13]: International Conference on Software Engineering (ICSE), European Conference on Software Maintenance and Reengineering (CSMR), International Conference on Program Comprehension (ICPC), International Conference on Generative Programming and Component Engineering (GPCE), International Conference on Software Maintenance (ICSM), and Working Conference on Reverse Engineering (WCRE). Of these 6 conferences, only ICSE has a wide coverage of the software engineering domain, while the others focus on a specific subdomain (maintenance, reverse engineering, program comprehension, and generative programming). To balance our sample in terms of scope, we added three more conferences with wide coverage of software engineering, namely International Conference on Automated Software Engineering (ASE), Symposium on the Foundations of Software Engineering (FSE), and International Conference on Fundamental Approaches to Software Engineering (FASE). Furthermore, to balance our sample in terms of age, we also included two younger conferences, namely Working Conference on Mining Software Repositories (MSR), and International Working Conference on Source Code Analysis and Manipulation (SCAM).

The data we analysed was restricted to the main research track of each conference: number of papers submitted and accepted (without distinguishing between long and short papers, if both were part of the main track), authors of the accepted papers, and composition of the programme committee. In order to facilitate replication of our study, we have published all the data and tooling developed during our work on GitHub at <http://github.com/tue-mdse/conferenceMetrics>. The dataset is described in more detail in [14].

For all considered conferences, most of the data of all accepted papers and their authors was extracted from the DBLP records [15]. The extracted data covers a period of at least ten years, as can be seen in Table 1. Data about the composition of the programme committee and number of submitted papers to each conference was retrieved from the websites of each conference and online proceedings volumes. For earlier editions we used the Wayback machine<sup>1</sup> to analyse websites which were no longer available as well as announcements posted by conference organisers in Usenet newsgroups.

<sup>1</sup> <http://archive.org/web/web.php>.

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