

Program Committee Chairs Report for the IEEE Security and Privacy Symposium 2021

Alina Oprea and Thorsten Holz

May 2021

Since 1980, the IEEE Symposium on Security and Privacy has been the premier forum for computer security and privacy research, presenting the latest developments and bringing together researchers and practitioners in the field. Due to the ongoing COVID-19 pandemic, the organizing committee decided to hold for the second time a virtual conference on May 24-27, 2021. We would like to provide more details on how we selected the program for the 42nd IEEE Symposium on Security and Privacy, and give some insights into the reviewing process and comparison with previous conferences.

Submission Model and Overall Statistics

This year marks the transition from a monthly submission model introduced in 2019 to quarterly submission deadlines. This change happened after extensive discussion with the community, starting at the 2019 IEEE S&P conference in San Francisco and continuing online, in coordination with other leading security conferences. The 2021 Symposium had four submission deadlines:

- March 5, 2020 for the Spring cycle,
- June 4, 2020 for the Summer cycle,
- September 3, 2020 for the Fall cycle, and
- December 3, 2020 for the Winter cycle

We received a total number of 952 submissions in all the quarterly submissions cycles, with the highest number of 329 submissions in the December cycle. In addition, 21 papers which received a Revise decision in last year's Symposium were also submitted to the first deadline (20 of which were accepted). The total number of submissions, as well as the number of Accepted papers and the number of papers receiving a Revised decision in the four quarterly cycles, are given in Figure 1. Compared to the 841 submissions received in 2020, this represents a 13.2% increase in the number of submissions. We observe that the last two submission cycles (Fall and Winter) received more submissions, as we get closer to the final submission deadline of the year. A total of 30 papers were desk rejected because they violated the Call for Papers (e.g., they were not properly anonymized or the main text exceeded 13 pages), and these papers were not reviewed by the Program Committee (PC).

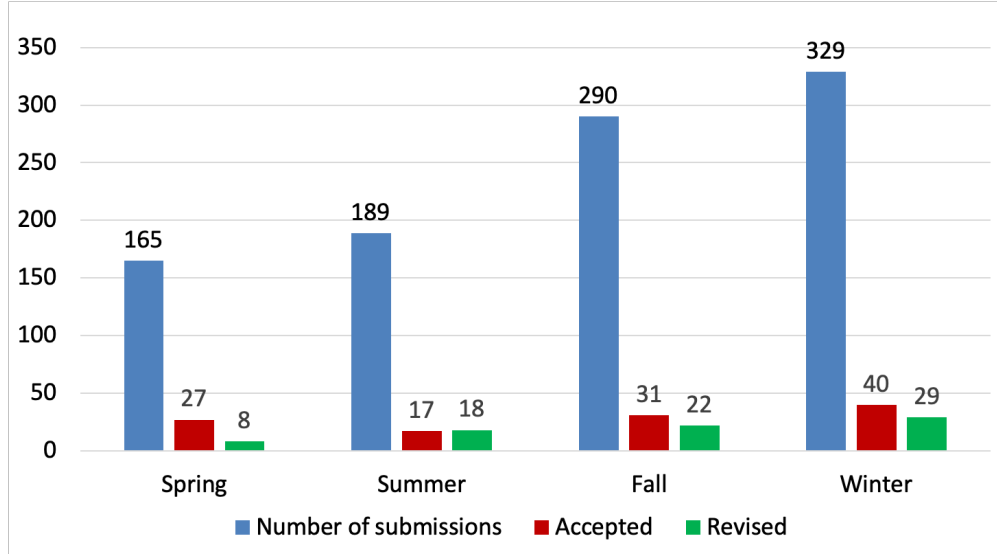


Figure 1: Number of total submissions, as well as Accepted and Revised submissions, in the four quarterly cycles for the 2021 Symposium.

We continued the tradition of double-blind reviewing, in which both reviewers and authors were anonymous during the whole reviewing process. Each reviewing cycle had two rounds of reviewing, and early reject notifications were sent to a set of papers after the first round of reviewing. A total of 409 papers received an early reject decision (119 in the Spring cycle, 128 in the Summer cycle, 87 in the Fall cycle, and 75 in the Winter cycle).

All the papers advancing to the second review round received at least four reviews, and papers with diverging reviewing scores in the first round were assigned more reviewers. The papers were also extensively discussed online by the reviewers and the PC at large. A total of more than 6,900 comments were posted in the reviewing system (1,065 in Spring cycle, 1,494 in Summer, 2,134 in Fall, and 2,229 in Winter cycle). A selected number of papers were chosen for discussion during a quarterly Program Committee virtual meeting.

Papers receiving the Revised decision were provided a list of specific revision requirements to address, and were given the option to resubmit in the next two cycles. Resubmissions of Revised papers were usually evaluated by the same set of reviewers to ensure consistency in the reviewing process.

Program Creation

The process on how we created the final program for this year's conference is described in Figure 2. The Program Committee recommended direct acceptance of a set of 59 papers, and gave a Revise decision to 77 papers. From the Revised papers, 36 were resubmitted and accepted for publication at the 2021 Symposium. A set of 35 Revised papers will be reconsidered for the 2022 IEEE Symposium on Security and Privacy. In addition to these, we included in the program 20 Revised papers from the 2020 Symposium, which were evaluated

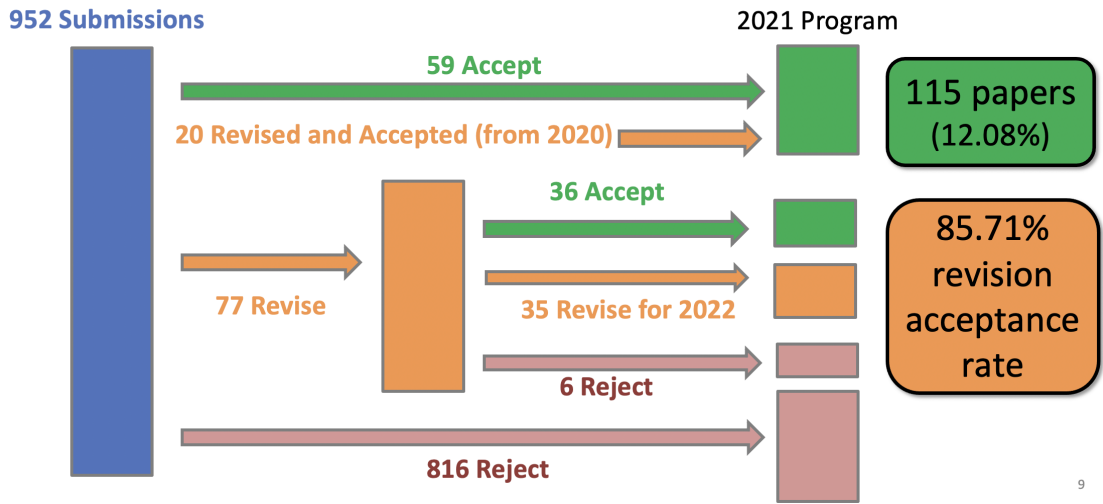


Figure 2: Details on how the program for this year was selected.

and accepted by the 2020 Program Committee. That brings the total number of papers presented at the 2021 Symposium to 115. The Symposium acceptance rate is at 12.08%, which is in line with the acceptance rate at the conference in the last 10 years.

Paper Scoring during Reviewing

Our Program Committee worked very hard for the entire year to evaluate the submissions and make final decisions on which papers will be included in the program. A total of more than 2,800 reviews were written, with an average of 22 reviews per Program Committee member in the four reviewing cycles. We would like to thank the PC members for their hard work, especially during these challenging times! The distribution of review word counts is shown in Figure 3. The median review length is 600 words, and some reviews even exceed 2,000 words. Oakland really strives to enforce high quality in the review process and review length is one of the metrics we can use as a proxy of review quality.

Each paper received a score between 1 (lowest score) and 5 (highest score). We originally had a scoring system with six choices in the Spring submission cycle, but then moved to a scoring system with five levels ranging from *Reject/Weak Reject* to *Weak Accept/Accept/Strong Accept*. The overall merit score distributions for all submission deadlines is given in Figure 4. The median score is 2, while the 12% of the score distribution is 3. The score distributions for Accepted and Rejected papers are given in Figure 5, excluding the Revised papers from IEEE S&P 2020. As expected, Accepted papers tend to have higher scores than Rejected papers. A small number of papers (19) received the maximum score of 5 (*Strong Accept*).

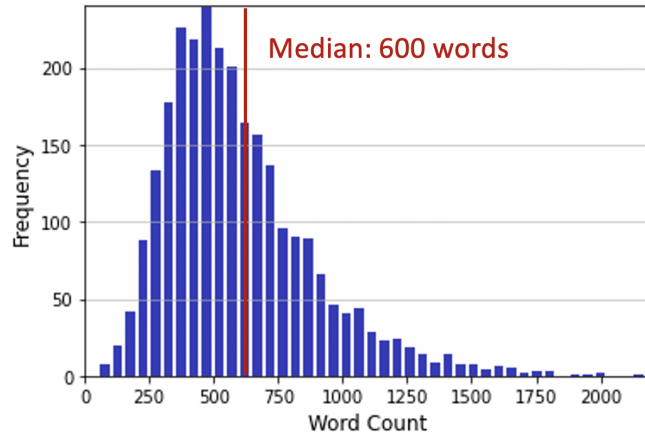


Figure 3: Review word count distribution.

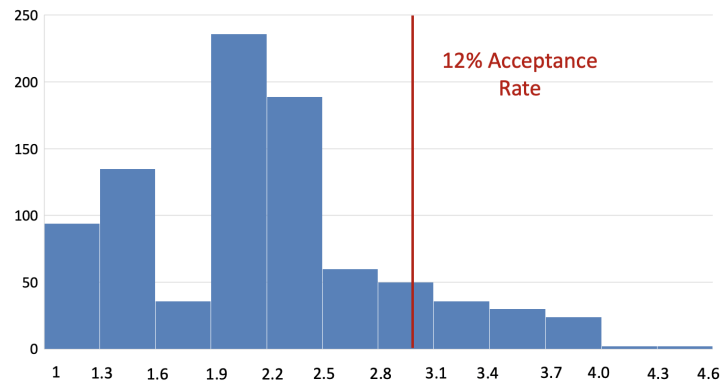


Figure 4: Overall merit score distribution.

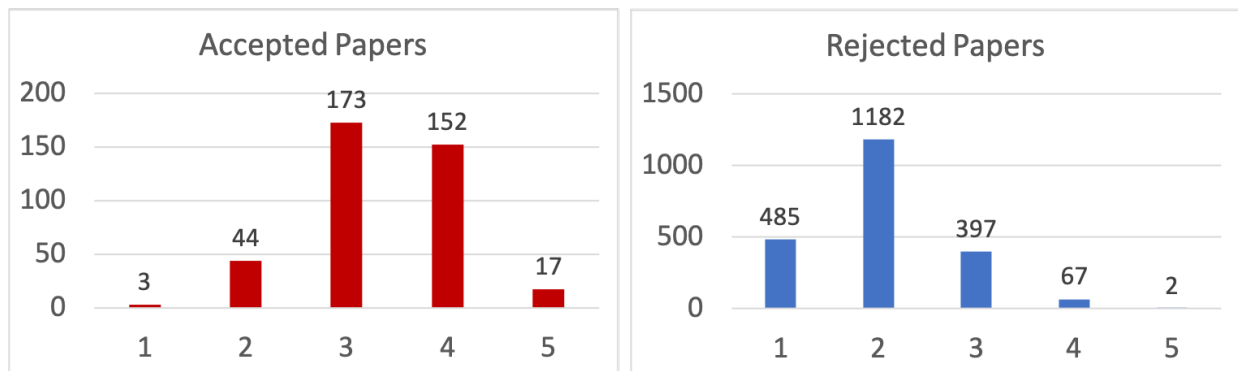


Figure 5: Accepted and Rejected paper score distribution.

Paper Topics

The Symposium covers a broad range of computer security topics, with papers presenting advances in the theory, design, implementation, analysis, verification, or empirical evaluation and measurement of secure systems. During the submission process, authors were able to select topics suitable for their paper from a predefined list of topics. Figure 6 show the distribution of paper topics for all papers submitted to the Symposium. We can observe that *Attacks and defenses*, *Machine learning and AI security*, and *Systems security* are among the most popular topics. Compared to last year, we observed an increase in popularity for the *Machine learning and AI security*, *Applied cryptography*, and *Blockchain and distributed ledger security* topics.

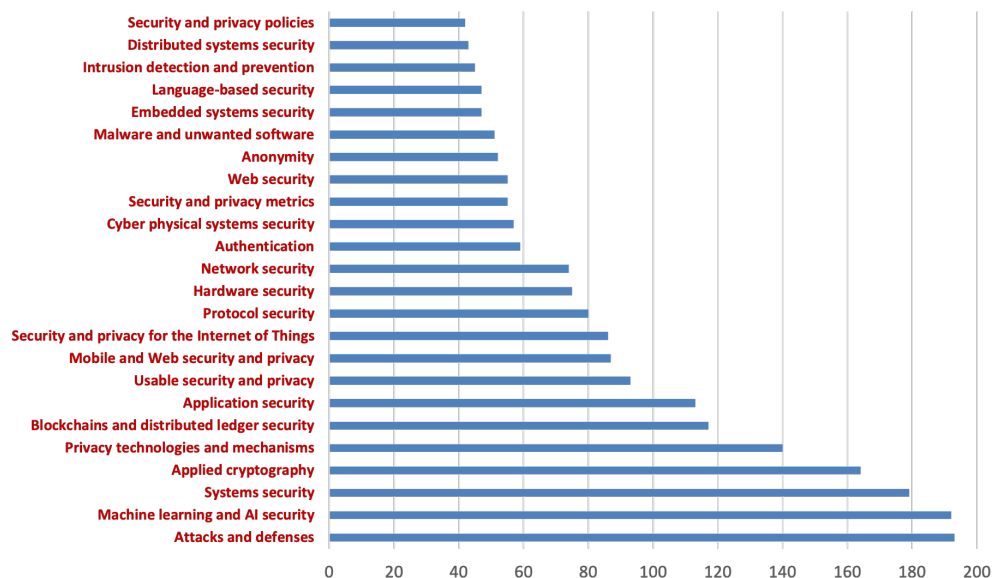


Figure 6: Paper topics.

Author Geographical Location

The Symposium is an international event and authors from all over the world present their latest research results. Figure 7 provides an overview of the geographical distribution of the authors of accepted papers. Authors from the United States clearly dominate this statistic, with China and Germany in 2nd and 3rd place. In total, authors from 22 countries and 5 continents presented papers during the conference and the figure shows the geographical distribution of the authors.

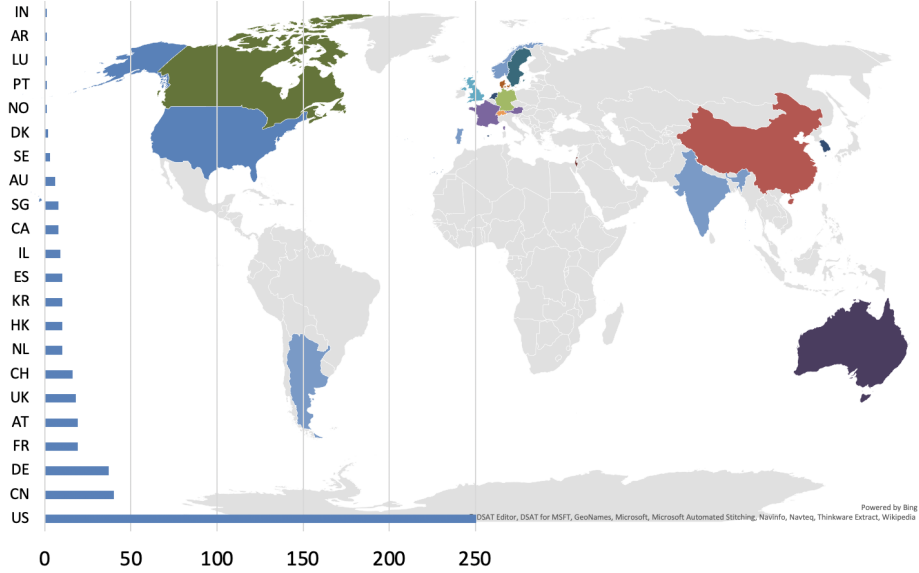


Figure 7: Authors geographical location.

Systematization of Knowledge (SoK)

Oakland introduced in 2010 the *Systematization of Knowledge* (SoK) category of papers, a special type of paper aiming to systematize a certain area of security research and provide a unique perspective on that field. From the Call for Papers, “SoK papers provide an important new viewpoint on an established, major research area, support or challenge long-held beliefs in such an area with compelling evidence, or present a convincing, comprehensive new taxonomy of such an area”. Other security conferences, such as the IEEE European Symposium on Security and Privacy (EuroS&P) and ACM AsiaCCS adopted SoK papers lately. We performed some analysis of the SoK paper scores and, interestingly, we determined that scores for SoK papers are lower than those of regular papers. The graphs for score distribution for SoK papers and Regular papers are shown in Figure 8. This difference is statistically significant: When running multiple two-sample statistical tests on the two distributions, including the T-test, the Kolmogorov-Smirnov test, and the Epps-Singleton test, the p -values were very small, confirming the difference in the distributions of SoK and Regular paper scores. It would be interesting to understand in more depth the underlying reasons for this score difference between SoK and regular papers. This year, the program includes 7 SoK papers out of the total of 115 papers. An overview of all SoK papers published at prior editions of this Symposium is available at <https://oaklandsok.github.io/>.

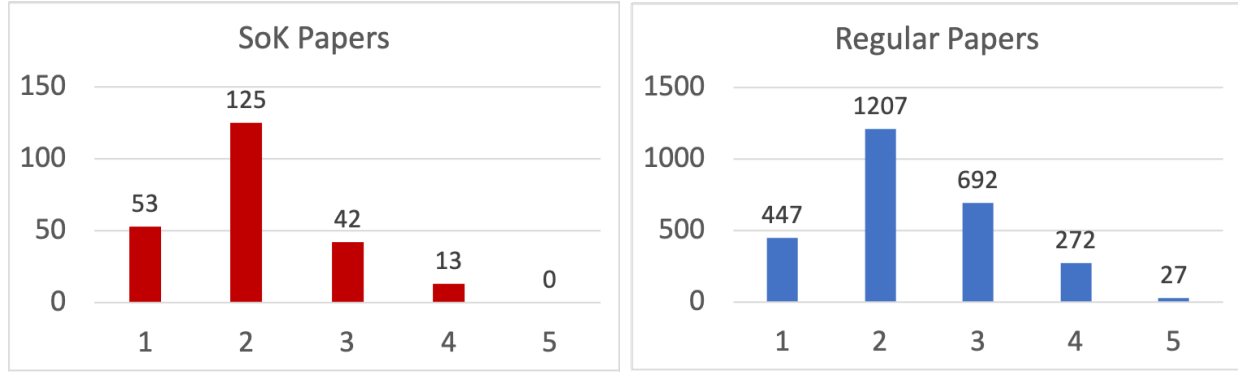


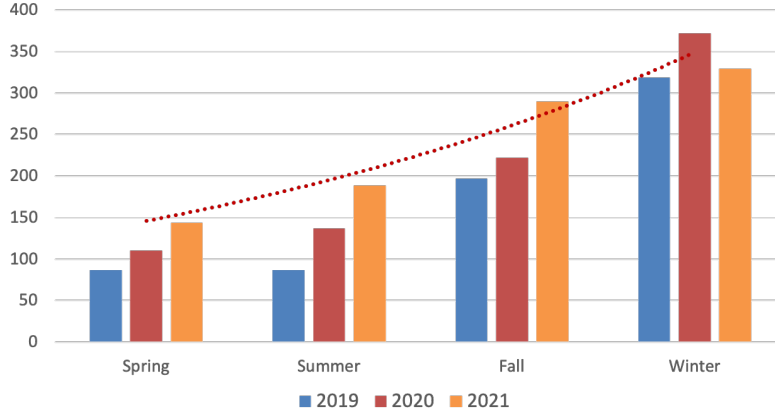
Figure 8: Score distribution for SoK and Regular papers.

Reviews from Prior Submissions

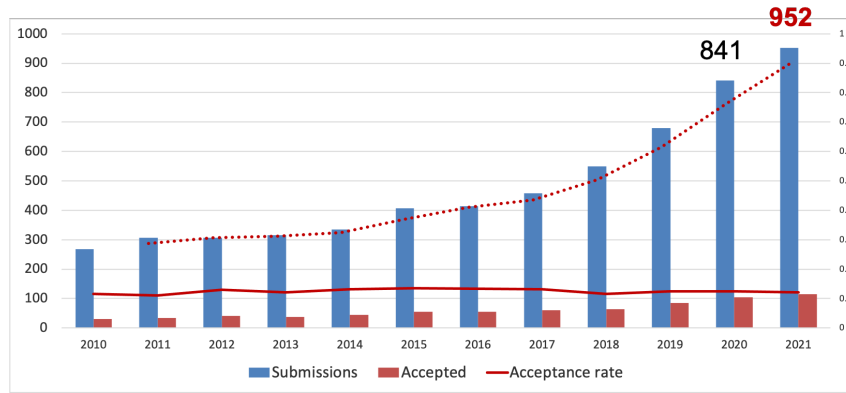
In this year’s conference, authors of submissions previously rejected from another venue were requested to submit the prior reviews. Authors have the option of including a response about how they addressed the comments from the reviews. In order to not influence the reviewers’ evaluation, the prior reviews were made available after the review forms were submitted by reviewers. We performed an in-depth analysis of the distribution of scores of papers with and without prior reviews (using multiple two-sample statistical tests), and we found that the score difference is not statistically significant. The benefits of requesting prior reviews and using them during the review process still needs to be carefully examined in future editions of the Symposium.

Historical Trends

The number of submissions per quarter for the 2019, 2020, and 2021 conferences are shown in Figure 9a. The 2019 and 2020 conferences had monthly submission deadlines, but we aggregate the papers by quarter for comparison with this year’s conference. We can observe a clear trend, the number of submissions per quarter has increased significantly in recent years. Compared to last year, we received 13.2% more submissions this year.



(a) Number of total submissions per quarter for the last three years.



(b) Historical yearly statistics since 2010.

Figure 9: Historical statistics on the last 3 years (a), and the last 12 years (b).

Historical statistics for the last 12 years are given in Figure 9b. Especially in the past five years, we can observe a steady increase in the number of submissions per year. The acceptance rate is surprisingly stable and consistent at around 12%.

Acknowledgements

We would like to acknowledge the contributions of many people whose hard work and dedication contributed to the success of the conference. We had a large Program Committee with more than 120 members covering a wide geographical distribution and broad expertise (including industry and government representation), many external reviewers helped with their expertise. We extend our thanks to the General Chair Alvaro Cárdenas and Vice Chair Rakesh Bobba, the IEEE Computer Society’s Technical Committee on Security & Privacy, its chair Bryan Parno, and ex-chairs Úlfar Erlingsson and Sean Peisert, and the newly established IEEE Security & Privacy Steering Committee.