

Proceedings

2022

**Symposium on
Usable Security and Privacy
(USEC)**

April 28, 2022
San Diego, CA, USA

Published by the





Internet Society
11710 Plaza America Drive
Suite 400
Reston, VA 20190

Copyright © 2022 by the Internet Society.
All rights reserved.

This volume is published as a collective work. The Internet Society owns the copyright for this publication and the copyrights to the individual papers are retained by their respective author[s].

Address your correspondence to: NDSS Program Manager, Internet Society, 11710 Plaza America Drive, Suite 400, Reston, VA 20190 USA, tel. +1 703 439 2120, fax +1 703 326 9881, ndss@elists.isoc.org.

The papers included here comprise the proceedings of the meeting mentioned on the cover and title page. They reflect the authors' opinions and, in the interest of timely dissemination, are published as presented and without change. Their inclusion in this publication does not necessarily constitute endorsement by the editors or the Internet Society.

ISBN Number (Digital Format) 1-891562-79-7

Additional copies may be ordered from:



Internet Society
11710 Plaza America Drive
Suite 400
Reston, VA 20190
tel +1 703.439.2120
fax +1 703.326.9881
<http://www.internetsociety.org>

Table of Contents

Message from the Program Chairs

Steering Committee

Program Chairs

Program Committee

Security Awareness

PickMail: A Serious Game for Email Phishing Awareness Training

Gokul Jayakrishnan, Vijayanand Banahatti, Sachin Lodha

Phishing awareness and education – When to best remind?

Benjamin Berens, Katerina Dimitrova, Mattia Mossano, Melanie Volkamer

SoK: A Proposal for Incorporating Accessible Gamified Cybersecurity Awareness Training Informed by a Systematic Literature Review

Junibel De La Cruz, Sanchari Das

Analyzing and Creating Malicious URLs: A Comparative Study on Anti-Phishing Learning Games

Vincent Drury, Rene Roepke, Ulrik Schroeder, Ulrike Meyer

Emerging Themes

Explainable AI in Cybersecurity Operations: Lessons Learned from xAI Tool Deployment

Megan Nyre-Yu, Elizabeth Morris, Michael R. Smith, Blake Moss, Charles Smutz

Effects of Knowledge and Experience on Privacy Decision-Making in Connected Autonomous Vehicle Scenarios

Zekun Cai, Aiping Xiong

Usability of Cryptocurrency Wallets Providing CoinJoin Transactions

Simin Ghesmati, Walid Fdhila, Edgar Weippl

Privacy

Trust & Privacy Expectations during Perilous Times of Contact Tracing

Habiba Farzand, Florian Mathis, Karola Marky, Mohamed Khamis

"So I Sold My Soul": Effects of Dark Patterns in Cookie Notices on End-User Behavior and Perceptions

Ida Marie Borberg, Réne Hougaard, Willard Rafnsson, Oksana Kulyk

A Study on Security and Privacy Practices in Danish Companies

Asmita Dalela, Saverio Giallorenzo, Oksana Kulyk, Jacopo Mauro, Elda Paja

Message from the Program Chairs

Welcome to the 2022 Symposium on Usable Security and Privacy Symposium (USEC)! This is a special year for USEC – we are back with NDSS as a *symposium* acknowledging the growth of our field and the efforts of past USEC organizers. We would like to thank Prof. Jean L. Camp and NDSS organizers for helping us make this transition! We are also excited to have a largely in-person symposium, while still accommodating colleagues who could not travel.

Within a span few years, USEC was able to establish itself as one of the top venues for publishing work on a wide range of topics in human-centric security and privacy. Papers published at USEC continue to make significant impact on academic research and practice. This year we received 19 submissions. Although not very high compared to previous years, it was gratifying to see this many submissions despite the significant hurdles our community faced with conducting research with human subjects during the pandemic. We are particularly pleased with the quality of the submissions. Our wonderful program committee had a difficult time making paper decisions. We are also excited to welcome a growing number of new faces to the community who are publishing for the first time at USEC and related conferences!

The papers accepted this year falls into three main themes. The first is security awareness. Despite two decades of research, human susceptibility to phishing continues to be an important challenge addressed by our community. We are happy to have a dedicated session with papers providing game-based solutions for this problem. The second session addresses privacy issues that people face in a variety of situations including privacy challenges that must be considered by while designing Covid-19 contact tracing applications. Finally, our third session includes papers addressing emerging research areas such as challenges people face with using cryptocurrency wallets, privacy issues with using connected autonomous vehicles and solutions for developing explainable AI to facilitate security operations. We would also like to thank our esteem keynote speaker Prof. Ross Anderson who is kicking off our sessions with exciting projections into the future of usability research in security and privacy.

We would like to thank our excellent program committee members who have done a wonderful job in helping us put together the program this year. We would like to thank them for their dedication and tireless efforts. We would also like to thank Yasemin Acar, Ben Stock and Karen O'Donoghue for steering us through the process, especially during some tough times caused by Covid-19. We would also like extend a special thanks to David Balenson for helping us publish the papers! There are many others who have helped us to put together a successful program. Importantly, our session chairs and student volunteers who helped us run the session smoothly. We would also like to extend a special thanks to Prof. Jean L. Camp for being an advisor, and a tireless cheerleader of USEC!

Lastly, we thank all our presenters without whom this would not have been possible. We look forward to hosting an exciting day of high-quality work and networking in San Diego!

Katherine Krombholz, *CISPA Helmholtz Center for Information Security*
Prashanth Rajivan, *University of Washington*
Program Chairs, USEC 2022

Steering Committee

Yasemin Acar, *Max Planck Institute for Security and Privacy*
Andrew A. Adams, *Meiji University*
David Balenson, *SRI International*
Jim Blythe, *University of Southern California*
L. Jean Camp, *Indiana University Bloomington*
Angela Sasse, *University College London*
Matthew Smith, *Rheinische Friedrich-Wilhelms-Universität Bonn*

Program Chairs

Katharina Krombholz, *CISPA Helmholtz Center for Information Security*
Prashanth Rajivan, *University of Washington*

Program Committee

Aiping Xiong, *Penn State University*
Alena Naiakshina, *Ruhr-University Bochum*
Diane Staheli, *MIT Lincoln Lab*
Fariza Sabrina, *Central Queensland University*
Hyoungshick Kim, *Sungkyunkwan University*
Imani N. S. Munyaka, *University of California, San Diego*
Josiah Dykstra, *National Security Agency*
Karima Boudaoud, *University of Nice Sophia Antipolis*
Katharina Krombholz, *CISPA Helmholtz Center for Information Security*
Kuldeep Singh, *University of Texas El Paso*
Lea Gröber, *CISPA Helmholtz Center for Information Security*
Leah Zhang-Kennedy, *University of Waterloo*
Matthias Fassel, *CISPA Helmholtz Center for Information Security*
Megan Nyre-Yu, *Sandia National Labs*
David Schuster, *San Jose State University*
Palvi Aggarwal, *University of Texas El Paso*
Pardis Emami-Naeini, *University of Washington*
Prashanth Rajivan, *University of Washington*
Sanchari Das, *University of Denver*
Simson Garfinkel, *George Washington University*
Varun Dutt, *Applied Cognitive Science Lab, Indian Institute of Technology*
Verena Distler, *University of Luxembourg*