Mind the Gap: Exploring Human-Centered Security Researcher-Practitioner Interactions

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1 Introduction

Human-centered security researchers aim to identify ways to improve users' interactions with security technologies, processes, and services. While the burden of discovering and sharing research evidence falls on these researchers, the improvements they seek ultimately depend on security practitioners becoming aware of research evidence, understanding its relevance to their work, and taking action.

Not unique to the human-centered security field is the disconnect between researchers and practitioners, a well-known phenomenon known as the "research-practice gap." Researchers from diverse disciplines have investigated this gap, finding that it often stems from the differing incentives, values, and work routines across the two groups [1, 3, 5, 9]. To bridge the gap, researchers recommend knowledge transfer by building translational resources. These resources emphasize tailored content to ensure outputs are actionable and prescriptive, improved search and access capabilities so that practitioners can find relevant research evidence, and increased outreach in practitioner forums [4, 6–8, 11, 13]. Unfortunately, many of these strategies place the majority of burden on researchers [11, 12]. A potential strategy for bridging the gap without encumbering researchers is the creation of "evidence bridges," intermediary groups who synthesize relevant research, engage with practitioners to understand their evidence needs, and make evidence readily accessible to practitioners [12].

Innovation in the security field would benefit from evidence bridges between human-centered security researchers and practitioners. A bridge would allow researchers to channel their findings to practitioners who can apply research insights to improve users' interactions with, and perceptions of, human-centered security. In addition, bridges would enable practitioners to provide researchers with uniquely qualified insight on research topics with the most potential for practical impact and how research-informed solutions perform in the real world [6].

To date, most research-practice gap research has focused on activities at the culmination of research efforts (e.g., writing and distributing research evidence [7, 14]). Despite the importance of practitioner engagement "from the beginning to the end of the knowledge-creation process" [1], few have explored researcher-practitioner interactions and bridges throughout the entire research life cycle. Additionally, to the best of our knowledge, none have holistically investigated the gap phenomena in the human-centered security field specifically. The security field may be unique from disciplines for which the research-practice gap has been studied due to the impacts of rapidly evolving technology, threat dynamicity, sensitivity of security work, and job pressure among security practitioners [2, 10, 15]. Therefore, it is important to examine how human-centered security researcher-practitioner interactions and potential gaps between the two communities may differ from those encountered in other disciplines.

To that end, our work-in-progress study aims to develop an understanding of current researcher-practitioner interaction points and associated challenges throughout the entire human-centered security research life cycle by answering the following research questions:

Q1: How do human-centered security research and security practice inform and influence each other?

Q2: What is the perceived level of importance of researcher-practitioner interactions?

Q3: How do human-centered security research and insights reach practitioners?

Q4: What challenges do researchers and practitioners encounter during their interaction points?

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Q5: What are the differences in the answers to Q1-Q4 based on researcher and practitioner demographics and organization characteristics?

Q6: What human-centered security topics do practitioners think are most important to research?

Q7: What strategies might be helpful for building bridges to facilitate collaboration and knowledge translation between the groups?

2 Methodology

Study Design. We developed two surveys – one for researchers and one for practitioners – to help answer research questions Q1 - Q6. Since there have been a number of qualitative studies on the research-practice gap (albeit in different fields), we had a strong foundation for developing survey questions and responses.

Two subject matter experts reviewed the survey drafts to check for alignment with the research questions, clarity, and completeness. Both reviewers have extensive experience designing surveys for human-centered security research, and one has prior experience as a practitioner doing software development and technology project management for systems requiring high levels of security. We incorporated their suggestions into the final surveys.

The surveys consist of select-one-option, select-all-that-apply, Likert scale, and open-ended response style questions. Both surveys collect basic professional demographic and organizational characteristics of survey participants (e.g., years of experience, type of organization). In the researcher survey, we ask questions about perceived importance of and challenges when consulting practitioners throughout the different stages of the research life cycle, including research conceptualization, study design, data analysis, and research dissemination. We also collect ways in which researchers currently interact with practitioners. In the practitioners' survey, we examine perceived importance of integrating human-centered security insights into work practice, as well as preferred ways of receiving research evidence and the challenges in accessing, digesting, and utilizing those insights. We also provide practitioners the opportunity to suggest human-centered research topics that would be of most value to them.

Recruitment. Each of the two surveys include specific participant criteria and recruitment strategies. For human-centered security researchers, survey participants must be 18+ years old and have experience conducting human-centered security research. In order to recruit researcher participants, we will send email invitations to a compiled list of authors of human-centered security papers published in applicable conferences (e.g,. Symposium on Usable Privacy and Security, ACM Conference on Human Factors in Computing Systems, USENIX Security, IEEE Security & Privacy) from the past 3 years. We will also reach out to professional contacts, make social media posts, and send invitations to applicable researcher mailing lists.

For cybersecurity practitioners, survey participants must be 18+ years old and have jobs involving developing, administering, implementing, or overseeing security-related resources (technologies, systems, processes, policies, etc) or the security components of those resources. In order to recruit practitioners, we will make use of practitioner mailing lists, professional contacts, and social media posts.

Data Collection and Analysis. The survey study has been implemented using Qualtrics and approved by our Institutional Review Board. Survey invitations will be sent out to researchers and practitioners in the near future.

Participants will view an information sheet on the first screen of the survey that details the study purpose, procedure, and how their data will be protected. Advancement past this first screen will indicate participant consent. All survey responses will be assigned participant IDs for the sake of anonymous collection. We will report results in aggregate so as not to inadvertently identify a participant based on their characteristics. Any identifiable information entered in open-ended survey responses will be redacted from the research record.

We plan to analyze participants' responses in several ways. First, we will summarize responses with descriptive statistics. Then, we will calculate inferential statistics to explore the differences among participants based on their characteristics, for example, different organization types and years of experience. We will also compare the results between the two surveys to identify areas of disconnect and harmony between researchers and practitioners.

Future Work. Following survey data collection and analysis, we plan on conducting a small-scale, follow-up interview study with both researchers and practitioners. The main goal of this interview study is to address research question Q7, which can enable us to suggest strategies for facilitating collaboration and knowledge sharing between the two groups.

3 Anticipated Contributions

With little to no published research on the research-practice gap phenomenon specific to the human-centered security field and across the entire research life cycle, we hope to provide new insights that contribute to the theoretical body of research-practice gap knowledge. We also hope to make practical contributions that provide concrete recommendations for collaboration and inform the creation of more formalized bridges between human-centered security researchers and practitioners. These contributions can make way for research that discovers and contributes progressive evidence and, in turn, practice that acts on this evidence to facilitate innovation.

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