Navigating an Interdisciplinary Approach to Cybercrime Research

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Abstract

The internet has created new markets and enabled alternative business models for criminal activity, such as human trafficking. Consequently, research is needed to understand the complexity, occurrence, and impact of internet-enabled crime on victims and society. Many scholars have called for interdisciplinary approaches to study and develop interventions to address a broad range of cybercrimes, but this call is challenging to implement. Therefore, we provide a confessional account of our experience associated with developing an interdisciplinary research team and conducting research related to a specific form of cybercrime, predatory crime involving deceptive or covert solicitations. Our confessional account allows us to reflect on our project and discuss the challenges we have encountered along with a discussion of how we have addressed these challenges. We offer guidance to researchers in various stages of conducting interdisciplinary research based on our experiences with a specific form of cybercrime, internet-enabled crime.

Keywords: Interdisciplinary research, cybercrime, internet-enabled crime, human trafficking, machine learning

1. Introduction

The internet and information technology have created new markets and business opportunities for legitimate organizations; however, illicit actors are also able to leverage the same technologies to benefit their criminal enterprises. Among the many forms of cybercrimes made possible through advances in technology is internet-enabled crime, which involves covert or deceptive solicitations or communications that facilitate a physical exchange of illicit goods or services. An example of internet-enabled crime includes criminal entrepreneurs using the internet to widen their market to sell illegally obtained pharmaceutical drugs and counterfeit goods worldwide. The marketing and transactions of these illicit goods occur through digital communications media, while the illicit product is transported physically through legal shipping channels. In another form of criminal activity, human trafficking, internet technologies allow traffickers to shift large segments of their operations online; thus, many human trafficking activities can now be considered a category of cybercrime or internet-enabled crime. As an example, sex traffickers use social networking sites (e.g., Facebook, Instagram) to recruit trafficking victims (Sarkar, 2015). Additionally, online classified platforms or commercial sex websites (e.g., Craigslist, Backpage) advertise services performed by sex trafficking victims (Latonero et al., 2011; Roe-Sepowitz, 2019).

Funding agencies increasingly are requesting proposals for research conducted by interdisciplinary teams that include academic and practitioner partnerships. Interdisciplinary research integrates methods and theories across academic disciplines to research a phenomenon. The authors of this paper have engaged in interdisciplinary research and received federal grants to address cybercrime, with much of this research examining internet-enabled sex trafficking in the United States. We have experienced many challenges and benefits associated with working with a diverse team, which prompts our research objective. In this paper, we explain *how researchers can engage in effective interdisciplinary research projects based*

on our experiences researching deceptive or covert online solicitations for services or goods. We provide a confessional account (Kaplan & Duchon, 1988) explaining how we are navigating an interdisciplinary research project to investigate the detection of illicit activities within online consumer-to-consumer (C2C) marketplaces. Our confessional account allows us to candidly reflect on our project, discuss the challenges we encountered, and share our approach to addressing these challenges.

The paper is structured as follows. First, we discuss the research context, internet-enabled sex trafficking. Next, we provide a confessional account of our interdisciplinary approach to exploring how to detect illicit activity within online C2C marketplaces. After this, we generalize our experiences by providing recommendations for other researchers conducting interdisciplinary research studying specific forms of cybercrime, such as internet-enabled crime.

2. Sex trafficking and the internet

The United Nations broadly defines human trafficking as the recruitment, movement (domestic or international transportation and transfer), or harboring of people using force, fraud, or deception to exploit them for profit (UNODC, 2020). Global estimates suggest the number of detected and reported victims (estimated as 50,000 per year) significantly underrepresents the magnitude of the problem; at any time, more than 40 million people are being victimized through forced labor, forced marriage, or forced sexual exploitation (ILO, 2017). While 65% of victims are female, victims represent all genders, ages, and socio-economic strata (UNODC, 2020). There are three forms of human trafficking (HT): sex, labor, and trafficking of human organs. Much of our research has focused on sex trafficking, which occurs when a person is compelled to perform a commercial sex act such as prostitution or pornography by using force, fraud, or coercion (Polaris, 2017).

A common business model for sex trafficking within the United States is the escort services model (Polaris, 2017), wherein sexual services are advertised on commercial sex platforms or classified advertising platforms. Buyers soliciting sexual services are often unaware if the individual performing the sexual services is doing so willingly or is being compelled (i.e., trafficked). Since it is generally illegal to purchase or sell sexual services within the United States, sellers and buyers of sexual services often initiate transactions through commercial sex advertising websites, which may be operating illegally within the United States or in a country that does not criminalize the advertising and sale of sex.

One practical challenge in countering HT is that insufficient resources exist within law enforcement agencies to investigate all platforms and online advertisements for sex trafficking activity (Harkin et al., 2018). The number of commercial sex advertisements posted is substantial, with one organization estimating that 150,000 advertisements are posted daily (Thorn, 2020). Researchers, law enforcement agencies, technology companies, and nonprofits use data from these sites to glean insight into social and criminal patterns, including the demand for sex work and potential sex trafficking. As such, stakeholders and scholars are searching for commonalities in text and image-based expressions that may signal a potential victim of sex trafficking (Dubrawski et al., 2015; Hultgren et al., 2018; Ibanez & Gazan, 2016; Ibanez & Suthers, 2014) to develop efficient, deep multimodal processes to identify online advertisements that likely involve sex trafficking victims (Tong et al., 2017). The increasingly large amount of data posted publicly requires the use of novel experimental techniques based on machine learning-based natural language processing (Dai et al., 2019; Radford et al., 2021).

Efforts to analyze data from online escort advertisements could have an even greater impact on crime reduction if algorithms could identify universal indicators of illicit commerce. Universal indicators of illicit commerce are advertising characteristics associated with illegal activity, including stolen goods or illicit sales of controlled substances, such as opioids. Therefore, we are conducting an interdisciplinary research project to examine if we can apply knowledge gained from identifying suspected HT advertisements to other online C2C marketplaces that may have criminal activity, such as the sale of stolen motor vehicle parts. We discuss our interdisciplinary project in more detail in the next section and reflect on the challenges we encountered during our project.

3. A confessional account of navigating interdisciplinary research on cybercrime

Our research uses an interdisciplinary approach to investigate detection methods of illicit activity, including sex trafficking and the sale of stolen goods, within consumer-to-consumer (C2C) marketplaces. Prior research offers a clear understanding of what conditions facilitate the emergence of risky behavior settings in a physical context, but additional research is needed to extend this work to the context of cyberspace (Brantingham & Brantingham, 2015; Guerra & Ingram, 2022; Volodko et al., 2020).

Specifically, we want to identify if universal markers (or indicators) of illicit activity exist within advertisements placed on online C2C marketplaces. By doing so, we can examine whether universal markers have sufficient reliability to support law enforcement agencies and legitimate organizations in conducting investigations and interventions to limit or stop the trade of illicit goods and services online (Vasquez et al., 2020). This research begins by identifying markers of sex trafficking within online C2C advertisements. Then, we will apply the knowledge to advertisements within online C2C marketplaces to identify possible stolen or illicit goods.

Navigating an interdisciplinary research project exploring the use of technology to facilitate, detect, or disrupt the sale of illicit goods and services online, provides opportunities to significantly advance research and practice. However, conducting interdisciplinary research also introduces new, critical challenges. This article shares an account of our experience in developing and conducting research in cybercrime with an interdisciplinary team. We are using a confessional account of our experience, which seeks to offer a "self-revealing and self-reflexive account of the research process" (Schultze, 2000) (Schultze 2000, p. 4), consistent with other works, such as Sarkar et al., (2020). Through this article, we reflect on our experiences and generalize our experiences through recommendations for researchers seeking to conduct interdisciplinary research related to certain forms of cybercrime.

Often research articles explain the finished research product and findings as if all was known from the start of the research effort. However, many research projects tend to have a winding, organic approach to their development. Our experience in working with an interdisciplinary team is no exception. Therefore, in this paper, we embrace and explain the non-direct approach required to allow this group to develop a research team to identify universal indicators of illicit commerce.

Before we developed an interdisciplinary project team, identified the research questions, and sought funding to study questions regarding universal indicators of illicit online commerce, we first had to develop an interdisciplinary research team. We sought to bring people together from a mix of perspectives across academic disciplines and practitioners to identify research questions and interventions to detect and disrupt sex trafficking activity. As a result, we reflect on two separate activities as part of this research effort: (1) building an interdisciplinary research team and (2) conducting research on cybercrime in an interdisciplinary setting.

3.1. Building an interdisciplinary research team

Two authors of this paper, both scholars within the discipline of information systems, began researching how technology is used to facilitate, detect, and disrupt HT networks in 2019. We interviewed numerous stakeholders involved in creating, disseminating, and using technology to investigate and detect HT online (Giddens et al., 2023; Petter et al., 2020). As we continued this project, we realized the value of developing an interdisciplinary research team to enable a more holistic understanding of the depth and impact of the use of technology in HT operations in the United States. These two authors applied for and received a grant from the National Science Foundation (NSF) to assemble a team of academics, nonprofits, law enforcement officers, and technology companies. The research team's goal was to consider how information technology is used to conduct HT and how it may be used to detect, disrupt, and dismantle domestic HT networks from a range of perspectives. The research grant funded two in-person workshops to enable research team members to meet and establish a plan of action for further academic research and practical interventions. Using a holistic approach, the research team examined ways to leverage information technology to improve the detection, disruption, and dismantlement of domestic sex trafficking networks in the United States.

The first task for the original two authors was to create an interdisciplinary team of individuals by identifying the areas of expertise needed to complement our current understanding of the intersection between HT and information technology. As information systems researchers who had been researching information technology use to investigate HT, we wanted to deepen our understanding of technology, criminal networks, and the social and economic impacts of trafficking. We made a list of expertise that could be helpful to study various research questions of interest. We wanted to recruit individuals with expertise in economics, political science, criminal justice, computer science, and engineering. In addition to academics, we wanted individuals with experience in prosecution, law enforcement, information technology developers creating technology to support criminal justice agencies, and nonprofit leaders involved in anti-trafficking efforts. We assembled a group with wide-ranging, interdisciplinary expertise consistent with prior calls by researchers (Shelley, 2018). We wanted an interdisciplinary group who could inform one or more elements of the entire HT process from identifying vulnerable populations, recruiting victims,

conducting day-to-day HT operations, identifying victims, providing services for survivors, to prosecuting traffickers.

As we were identifying potential research team participants, some people reached out to us as our universities publicized our work. For example, an individual with academic and practical experience in nursing who conducts HT research reached out to one of the authors. Initially, we did not consider nursing as an area of expertise for the research team. Yet, a conversation revealed the value of including this type of knowledge within our team. During and after the first workshop, we discovered gaps in knowledge within our research team. As such, we asked members for referrals of new team members or suggestions of expertise to include in our new group. This allowed us to expand our research team over time.

Although making a list of expertise needed for an interdisciplinary research team was not difficult, it was challenging to identify experts and connect with academics and practitioners with whom we did not have prior relationships. Initially, we reached out to people within our networks pursuing HT research or anti-trafficking efforts. A project partner on the original NSF grant (and a co-author on this paper) is an executive at an anti-trafficking nonprofit. We leveraged his network of law enforcement agencies, prosecutors, and technology company contacts to connect us with potential research team members. We also contacted two labor trafficking researchers with whom we already had relationships to recommend other HT researchers who might be interested in the project. These researchers became early supporters of the grant and helped us identify new team members.

After exhausting our personal networks and those of the initially identified research team members, we needed to create new relationships with people who had the areas of expertise needed on the project. To identify academics outside of our discipline, we read recent articles published by scholars from various disciplines to identify possible candidates. Then, we sent emails to see if we could establish contact with the individual. We shared our interest in their research and briefly summarized our specific research interests in cybercrime (i.e., examining the role of information technology in HT). Depending on the person's response, we scheduled a virtual meeting to discuss our shared research interests. If the meeting revealed that the person would provide a new perspective to the research team, we invited them to participate in one or both NSF-sponsored workshops.

We did experience difficulties connecting with potential team members to join in on our grant workshops. First, some emails went unanswered, particularly for those with whom we had no direct relationship or connection. A second issue is that some researchers are more protective of their projects or had conflicting research efforts that prevented them from participating in the workshops and as part of the research team. Third, some practitioners expressed that their work was confidential or that their supervisors (or legal departments) would not let them participate. They expressed concerns about ensuring proprietary data or work remained protected or avoiding sharing information that may negatively impact an ongoing investigation. For those expressing concerns about disclosing private or sensitive information, we explained that we would not ask team members to disclose sensitive or proprietary information during the workshops.

Once we reached a predetermined number of individuals who committed to our first workshop, we stopped invitations and focused our attention on planning the workshop activities. Prior to the workshop, we created a Microsoft Teams site to communicate with team members about the workshop, including travel details and the schedule. We purposely kept participant preparation for the workshop to a minimum, and we did not ask participants to make a formal presentation. Instead, we asked participants to attend the workshop and share their expertise and experience with the group. After short introductions during the workshop, participants briefly explained their work and approach to HT research or complex problems in general. We developed several small group activities designed for brainstorming and discussing knowledge and lack of knowledge in understanding HT networks and how technology can be used to detect and disrupt HT operations.

After small group discussions, the team met as a single group to report on the discussions that emerged from the brainstorming sessions. We shared these findings with the group at the workshop and created a report of detailing the activities and findings in our workshop for the public (Etzel et al., 2021). Of note in the first workshop was the discussion that HT is a complex problem that cannot be solved by the criminal justice system alone. There was also a focus on developing preventative measures. We learned about counter-trafficking efforts and research occurring in various fields and settings, with each expert noting the need for additional research and interventions to address HT.

For the second workshop, we invited additional experts as needed to fill gaps in our knowledge about HT and illicit supply networks. We built on our work in the first workshop and engaged in additional brainstorming sessions to elicit ideas for future research projects to address HT. Additional

information about the second workshop and its activities can be found in our report (Etzel et al., 2022). Research team participants provided feedback after each of the workshops.

During the workshops, we identified several areas of current HT research needing attention. The participants discussed how encouraging it was to find others doing similar work and discussed challenges in researching HT or engaging in anti-trafficking interventions. The breakout groups were successful in identifying numerous future research activities. We noted from the first workshop that some participants wanted more information about academic and practitioner partnerships, including the benefits of engaging in such partnerships. We incorporated a session into the second workshop to address the challenges and benefits of academic and practitioner partnerships and how we the partnership is mutually beneficial. The team members continue to work together on other research endeavors, and we communicate via an online collaboration platform.

3.2. Conducting interdisciplinary research in cybercrime

While completing the activities of our first NSF grant to build an interdisciplinary research team examining technology used in HT networks, an interdisciplinary subset of the research team developed a research project. This research is funded by the United States' National Science Foundation, and this research is currently in progress. The team consists of experts from computer science, information systems, criminal justice, business, linguistics, and HT. This section provides a narrative of the project and our research experiences.

Our interdisciplinary project team uses a machine learning-based natural language processing (NLP) approach to detect illicit activities in online C2C marketplaces. While prior research has examined the use of machine learning techniques to detect sex trafficking in online commercial sex advertisements (Alvari et al., 2016, 2017; de Vries & Radford, 2022; Dubrawski et al., 2015; Ibanez & Suthers, 2014; Tong et al., 2017; Zhu, 2019), it is unknown how well findings can be transferred to other illicit marketplaces. Recent breakthroughs in machine learning-based NLP are capable of understanding text and images under highly noisy conditions. The recent introduction of large language models based on transformers (Dai et al., 2019) and multimodal contrastive learning CLIP (Radford et al., 2021) are transforming text and image understanding from web-based, social media, and online C2C marketplace data. However, little research has used these breakthroughs to analyze HT data and identify if the findings from the detection of trafficking in online commercial sex advertisements could detect other illicit online activities, such as advertisements for stolen motor vehicle parts within online C2C marketplaces.

Online C2C marketplaces selling motor vehicle parts also exhibit a mix of legal and illicit activity. Criminal activity is fueled by increased demand coupled with a diminished supply of motor vehicles and parts and the soaring price of metal due to supply chain disturbances during COVID-19 (Channick, 2021; National Insurance Crime Bureau, 2021). Catalytic converters are a prime example; theft of catalytic converters increased to 14,433 in 2020 from 3,389 reported thefts in 2019 (National Insurance Crime Bureau, 2021), with many stolen motor vehicle parts sold in online C2C marketplaces. Multi-jurisdictional interdiction efforts improve stakeholder capacity to identify individuals and groups stealing, selling, and profiting from the sale of stolen motor vehicle parts. Insufficient resources are available to monitor all online platforms and advertisements for suspicious activity. Therefore, our team is examining if machine learning-based NLP can be used to learn and identify useful patterns and markers of suspected online illicit activity and whether these markers are transferable across commodities and marketplaces.

There are several challenges we experienced when developing this research project. First, we had to develop a research objective and research questions that engaged the expertise of all team members. Our goal was to conduct research that would make an interdisciplinary knowledge contribution (Tarafdar et al., 2018) that contributes to information systems and other disciplines. While the focus of our first grant-funded project examined how information technology facilitated HT, we agreed that we wanted to know if what we are learning from online HT activity applies to other forms of illicit activity. Commercial sex advertisements posted on C2C marketplaces have some similar characteristics to other online C2C marketplaces where illicit activity can occur. We discussed the types of data on these sites and the implications for criminal justice and information systems in detecting illicit activity. Therefore, we are not only examining detection models but also platform design and governance policies that make some online C2C marketplaces vulnerable to criminal exploitation.

After agreeing on the research project objectives and goals, we moved to securing data for the research project. Gathering data on illicit activity, especially sex trafficking, is problematic for several reasons. First, although commercial sex advertisements, our primary source of data for language-based analysis, are on the surface web and easily accessible, the

advertisements contain photographs. These photographs often involve nudity and sexually explicit content. Some advertisements may depict minors who would be considered victims of child sex trafficking. Given the photographs' sensitive and potentially criminal nature, we made the decision to not download, obtain, or analyze any photos associated with the commercial sex advertisements. By choosing not to gather, store, or analyze photographs, we avoid legal or ethical issues related to storing photographs for this research.

The second issue with gathering data on commercial sex advertisements is the volume of online advertisements across the many online C2C marketplaces enabling individuals to promote sexual services. Each site requires a different protocol to scrape advertisements from the site, with some having additional checks to prevent web scraping. This makes it time-consuming to build scripts to scrape online advertisements across websites. Additionally, many advertisements are duplicates, posted and reposted on and across multiple online escort sites. Moreover, the advertisements are in different formats and contain different metadata, further complicating gathering and storing data for analysis. To overcome this challenge, we are leveraging a database developed by one of our non-profit research partners. This organization has a database of commercial sex advertisements and is allowing us access to this dataset for our research. In working with nonprofits, law enforcement groups, and technology companies, researchers conducting cybercrime research may also find that research partners have useful data sets or methods of gathering data that alleviate issues in gathering cybercrime data.

Additionally, understanding advertisements for sexual services can be challenging for those unfamiliar with the terminology used within this domain. The advertisements often contain misspelled words, emojis, acronyms, and context-specific language that is difficult to interpret. Our nonprofit organization research partner has created a lexicon to help researchers across disciplines to read and understand the content within the advertisement.

Another challenge we encountered was getting internal review board approval from our respective universities. In the United States, internal review board, or IRB, approval is required for all research projects. One of our universities provided an IRB determination that our research did not qualify as human subject research since we were using secondary data that does not contain personally identifiable information. However, two other universities involved did not accept this determination and required us to obtain an IRB from each university. The differences in IRB determinations across universities are unusual.

Still, given the sensitive nature of the research and data, we wanted each researcher to be protected and ensure we minimized any risks associated with conducting this research. Not only did we consider the risks of our research for identifying people involved in criminal activity, but we had to consider the risks associated with exposing our students and research team members who might work on these projects to commercial sex advertisements. The advertisements contain sexually explicit material, and some depict the victimization of individuals who are being trafficked and exploited. Law enforcement officers we have partnered with have noted that HT investigations, including looking through advertisements that indicate trafficking, can impact one's psychological and emotional wellbeing. Evidence suggests that observing victimization further dehumanizes the victim (Park & Park, 2015). As such, we are being careful with how we involve student researchers.

Finally, we also had difficulty obtaining training data for our machine learning models. Getting a training data set is essential for researchers using learning-based models. However, it is difficult to get a "true" data set or a commercial sex advertisement that is known to be trafficking. There are many indicators of trafficking in commercial sex advertisements, and experts who work in HT are trained to look for specific indicators of HT. For machine learning purposes, what is the ground truth for a HT advertisement? Is it an advertisement depicting a known victim? Does the advertisement have to be identified within a criminal case against a convicted trafficker? Few criminal cases charge individuals with HT within the United States, and many suspected traffickers are charged with crimes other than trafficking (e.g., prostitution, drug charges, sexual assault, or money laundering). Furthermore, court proceedings rarely identify specific online advertisements used for HT. As a result, there is minimal data to identify commercial sex advertisements that are known to be advertisements of sex trafficking victims. Consequently, our team is in the process of deciding how to create our training dataset. We are working with law enforcement agencies and nonprofit partners on this endeavor.

4. Recommendations

To support researchers who seek to engage in interdisciplinary research, particularly research related to internet-enabled crime, we provide a series of recommendations based on our experiences. Some recommendations may be applicable for any interdisciplinary research team, but other recommendations are unique to certain phenomena studied as part of cybercrime research.

4.1. Building an interdisciplinary research team to support cybercrime research

As previously discussed, we encountered several challenges in building an interdisciplinary research team to study a cybercrime phenomenon—sex trafficking. After reflecting on our experience, we offer some recommendations for researchers interested in building a research team to study cybercrime. Although these recommendations are derived from our experience in technology-facilitated HT, the recommendations are applicable to other forms of cybercrime research.

Choose team members open to engaging in interdisciplinary work and contributing knowledge to the team. Interdisciplinary research takes time because team members must listen to other experts and understand their field. Often other academics and partitioners use a vernacular and concepts that are unfamiliar to some team members. This can make general communication and having a shared understanding of methods and approaches difficult. Thus, engaging in interdisciplinary work requires academics who are experts in a field to be vulnerable and ask questions about others' expertise when we do not fully grasp their theories, methods, or frameworks. Sharing knowledge in interdisciplinary groups also requires time and vulnerability as one must be patient in explaining concepts and methods to those unfamiliar with your field or even unfamiliar with research in general and the goals of academia. Those who join an interdisciplinary team should be aware of these challenges and be willing to share knowledge, ask questions, and understand new and unfamiliar approaches to research. Team members must be patient and willing to explain concepts that may seem elementary or trivial in their field to those with different research or philosophical perspectives. Our team takes time to explain relevant theories or methods with other academics and non-academics. Only through this constant inquiry, open communication, and discussions can we develop new ideas, such as integrating what we can learn from machine learning to extend social science theories.

Openly discuss how each person's expertise can bring value to the project. Each discipline approaches topics from a different lens, which can offer new perspectives to study a phenomenon. For example, in our project, criminal justice experts understand how to locate criminal data and understand behavior associated with criminal activity. Computer scientists know how to sort, wrangle, store, secure, and analyze data from multiple data sources, both online and offline. Law enforcement and nonprofit partners provide insight into HT operations and how current cases are being investigated and prosecuted. Information systems researchers understand the business models of online C2C marketplaces, their governance, their use by buyers and sellers, and the impact of design and policies on users.

Choose research team members who are willing to express their failures or obstacles in conducting interdisciplinary cybercrime research. Many team members who participated in one or both workshops shared their frustration with working in HT research or counter-trafficking activities. These team members were quick to share previous failures or obstacles to HT research, including obtaining data on HT, publishing their research, and identifying research partners. Our non-academic team members also experienced setbacks when engaging in counter-trafficking activities, whether in the criminal justice system, the corporate environment, or nonprofits. Because of their willingness to express failures or challenges, academics and practitioners could discuss new strategies to overcome these challenges and can provide guidance to help others avoid similar mistakes or problems.

Provide time for all research team members to share their assumptions. During our workshop first workshop, we included time to question and identify assumptions specific to their area of expertise. These inquiries helped focus our activities and efforts. For example, we spent a significant amount of time during the first workshop discussing how to measure success in HT research. Law enforcement officers and prosecutors may measure success as the number of arrests or convictions. Those working in victim services or social work may measure victims served or services performed. Others may measure success as an increased risk for those purchasing sex, while others would measure success as the complete eradication of HT. The differences in measuring success across disciplines and areas of expertise can create conflicts in terminology and goals related to researching, publishing, grant writing, or developing counter-trafficking initiatives.

Build and maintain non-academic partnerships to ground research. It is essential for academics to work with non-academic partners to obtain a complete understanding of complex social problems, such as HT. Our research team included nonprofits, criminal justice professionals, and businesses to understand how they are working to counter HT and other illicit activities online. Including these team members helped academics to understand the nuance and complexity of illicit networks and operations. The partnerships allow us to ensure that our research can inform practice while making an intellectual contribution to our respective fields. We also ask our

non-academic partners how we might provide value to their organizations. We have included our non-academic partners on funded research projects and have published open-access reports to ensure our findings are accessible to academics and practitioners. Many national funding agencies prioritize cybercrime proposals that incorporate relationships from the criminal justice and business communities. We have successfully leveraged our partnerships in our research projects and continue to learn from our partners. Although these partnerships take considerable time to maintain, the interaction between research and practice is invaluable when conducting interdisciplinary research on cybercrime.

4.2. Conducting interdisciplinary research in cybercrime

Working on an interdisciplinary project has many rewards, but it also offers multiple challenges. We have worked past many of these issues in our pursuit of cybercrime research. In this section, we generalize our experiences to offer recommendations for researchers conducting interdisciplinary cybercrime research or planning to do so in the future.

Work with non-academic partners to help overcome challenges with gathering data on illicit activities. One key to conducting research is our successful partnerships with nonprofit and law enforcement partners. Although we approached several law enforcement agencies to join this project, some agencies did not find the research project of interest. Others expressed resource constraints that prevent them from working with us. Some law enforcement partners agreed to work with us if they could remain anonymous. We are careful to make good use of our non-academic partner's time and ensure we can provide value to them for their effort on the project. For instance, because we have received grant funding for this research, we can pay non-academic partners for their time through our grant. We are also attentive to the time we spend with our partners by managing meetings to respect their time and resources.

Understand the ethical and practical challenges of securing sensitive data. Researchers should understand the ethical issues involved in working with data from the dark web (Harviainen et al., 2021) or surface web that contains possible identifying information about crimes, individuals who have committed a crime, or are victims of crime. It is critical for researchers to consider the potential harm if individuals involved are identified through the research process. Also, non-academic partners will have additional legal and ethical concerns with the acquisition and use of data. Although the IRB process ensures our research is conducted in an ethical manner, we also have a responsibility to think beyond the risks of the project that an IRB might not adequately cover. Including non-academic partners in open communication with members of the interdisciplinary research team is critical to identifying, understanding, and responding to special considerations associated with using sensitive data.

Ensure the work results in deliverables that provide benefits to all team members. Our interdisciplinary team is composed of tenure-track and tenured faculty from different universities and departments, as well as non-academic partners. As such, we all have different goals and needs in our careers and in support of organizational objectives. Some of the team is reliant on procuring sponsored research for tenure and promotion purposes. Others are in fields that desire journal articles, books, or conference presentations. Non-academic partners are concerned with improving investigations and victim services. Our team discussed these goals and deliverables early in the project openly. We seek to support each team member based on how outputs are valued in their discipline or to their organization. Senior faculty in our project are especially considerate of the needs of junior faculty and seek to prioritize scholarship that will help junior faculty receive credit for this research project. The team identified opportunities to publish disseminate our work and continue to consider outlets in everyone's respective fields including interdisciplinary journals and practitioner forums open to our research. For example, practitioners may want to publish a white paper or report to share the implications of our study with other criminal justice agencies and service providers. We also set aside money in our grants to pay open-access fees for any articles resulting from our research.

5. Conclusion

Although interdisciplinary research in cybercrime presents challenges, there are also opportunities to make significant intellectual and applied contributions to cybercrime research. As cybercrime proliferates and becomes more complex, it stands to reason that taking a systems approach to understanding cybercrime and the stakeholders involved is needed to anticipate and counter the negative impacts cybercrime has on victims and society. This paper discusses our process and recommendations associated with developing an interdisciplinary team to conduct research on a specific form of cybercrime, internet-enabled crime related to covert or deceptive solicitations. Our approach and recommendations have applicability to

researchers engaging in interdisciplinary cybercrime research. However, we recognize that our confessional account is limited to our experience with research efforts examining a specific form of cybercrime (i.e., internet-enabled sex trafficking) in a specific jurisdiction (i.e., the United States), which has different laws and norms compared to other parts of the world. We acknowledge that cybercrime occurs across the globe and spans multi-jurisdictional boundaries. As such, future research might examine the challenges of conducting interdisciplinary, cybercrime research on an international level. We hope researchers will continue to document how to conduct cybercrime research in a way that encourages contributions to academia and practice while protecting both researchers and research subjects.

6. Acknowledgements

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