Jim Marquardson
Research Statement

My research focuses on helping people leverage the full value of information systems while reducing burdens. To that end, I have investigated methods to improve password security, novel applications of credibility assessment support, and ways to make technology more persuasive in a decision support scenario. Going forward, I plan to continue finding ways to help people be more efficient and effective through the use of technology. I have used a combination of experimental, survey, and data mining methods to carry out my research.

System designers often default to usernames and passwords for authentication and authorization. In contrast to many biometric solutions, passwords are relatively simple to implement and users are familiar with the username and password paradigm. But, passwords have downsides. For example, strong passwords can be hard to remember, and system designers often create policies that limit password choices thereby increasing the cognitive burden of password selection. Users sometimes compensate in ways that compromise security, such as reusing or writing down passwords. Ideally, system designers could create effective solutions that enable users to behave securely without adding cognitive burdens. I have published two papers regarding password security. In my first study, I investigated the effects of password policy on cognitive load and password selection. In the second study, I helped to investigate the influence of website quality cues on security intentions and password strength. These studies support the idea that users want to behave securely, but perhaps do not know how to achieve their goals. For example, in the second study we found that website visual appeal was positively correlated with intentions to create a secure password, but those intentions were not correlated with password strength.

Experiences outside of the laboratory drive many of my research interests For example, our research lab is developing a system named the AVATAR--a kiosk-based system that performs interviews and makes credibility assessments. In the first semester of my PhD program, we brought the AVATAR to a Customs and Border Protection (CBP) Trusted Traveler enrollment center in Nogales, Arizona to perform a field test. CBP agents were supposed to use the AVATAR's output to aid them in assessing the credibility of Trusted Traveler program applicants. While observing how people interacted with the AVATAR, I noted that the CBP officers rarely looked at the AVATAR's output to aid them in their credibility assessments. I decided to investigate the factors influence how people use decision aids. This research would evolve to become my dissertation. One of my completed studies assessed how attitudes and cognitive processes affect the way that people process information. My research found a strong recency effect, such that people aligned their decisions with the system's decisions more frequently when the system's decision was presented immediately prior to making the final decision. I also found that perceived system credibility was positively correlated with decision alignment, and perceived self-efficacy was negatively correlated with decision alignment. This research contributes to the field in theoretical and practical ways. Theoretically, this research

provides new information about the way that people perceive decision support information. Second, it provides guidance for practitioners who develop systems. My research points to several training and process-related issues that should be considered when designing and deploying decision support technology.

I have experience getting funding for my research. For example, my peers and I saw a need for a tablet-based AVATAR. I helped write a successful grant application for initial funding for the tablet-based AVATAR. I helped to develop the software, experimentally test the system, and analyze the data. After initial success of the tablet-based AVATAR, I took the lead on a grant to further the research. The Center for Identification Technology Research (a National Science Foundation supported institution) awarded my lab $40,000 to improve the tablet-based AVATAR and investigate the gyroscope and accelerometer sensors in detecting deception cues. This research will help us to improve the AVATAR's decision algorithms, which in turn will help officers make better decisions.

I have found that research is more meaningful when academic and industry partners are involved in the research. For example, our CBP partners helped to generate research questions that led to the development of the AVATAR. In addition, research is often most effective when people from multiple disciplines are involved. For example, I worked with the Southwest Autism Research and Resource Center (SARRC) to data mine medical history datasets of people with autism and their families. Autism is a disorder with profound impacts on individuals, families, and society. I worked primarily with Dr. Gondy Leroy—an information systems professor at the University of Arizona— and Dr. Christopher Smith—a clinical psychologist at SARRC. Dr. Smith provided domain specific guidance about the nature of autism, and Dr. Leroy helped implement data mining methods. By leveraging the strengths of each party, we were able to put together a working paper that shows interesting patterns regarding autism. The research was stronger because we could leverage people with advanced knowledge in multiple disciplines.

Going forward, I plan to continue investigating how people can leverage technology to improve their lives. I want to investigate ways to improve decision-making performance, lower the cognitive burdens of using technology, and generally find ways to extract value from information. I am a curious person by nature. I am excited about the ability to participate in the research process to create new knowledge that benefits individuals and society as a whole. Though early in my research career, I believe that I have demonstrated the ability to carry out relevant research that can make a significant impact.