With the rise of globalization, virtual teams are more distributed than ever, across time, space, and culture. These dimensions correspond to challenges that can significantly impact the productivity of virtual teams and the quality of the inter-personal relationships of their members. Understanding issues unique to distance collaborations and the role that visual user interfaces can play in engendering team communication, interaction, and overall trust drives my research. My work has bridged two projects:

**Tools that Promote “Awareness” of Software Development Activities**

Dependencies in software source-code create a need for communication and coordination among developers working on that code. Motivated by this observation, I worked on Ariadne (http://awareness.ics.uci.edu/~ariadne), a Java plug-in for Eclipse that visualized socio-technical dependency networks of developers and code. My research team was awarded a 2005 Eclipse Innovation Grant for this project. We showed how the visualizations produced by Ariadne could help managers stay aware of evolving code dependencies between their teams, help developers stay aware of evolving dependencies to avoid last minute changes before deadlines, assist developers in finding the “right” person to talk to about the implementation of a particular interface, and help developers find “similar” developers who depend on the same source-code components [2]. We applied three usability inspection methods to Ariadne’s interface: heuristic evaluation, cognitive walkthrough, and cognitive dimensions of notations. The results showed that Ariadne supported the tasks above in a usable manner and addressed our motivating problem, elucidating the interdependencies among code and collaborating developers [4].

**Trust in Globally Distributed Software Development Teams**

Trust is a significant human aspect of successful and productive collaborations. Trust may be defined in terms of one person’s *expectations* of another [1]. Unfortunately, remote workers are likely to have much less and lower quality information about their remote collaborators and thus are more likely to erroneously attribute the cause of a breakdown in work to personal characteristics (dispositional attributions) of their collaborators, rather than characteristics of a situation (situational attributions).

I was able to explore the issue of erroneous attribution and trust in a recently completed NSF VOSS grant. The data we collected and my experience building software tools allowed me to research software tool support for engendering trust by supporting correct attribution. From targeted literature reviews [3][5], I theorized a design space for tools to support trust between remote collaborators. Using elements from this design space, I developed a tool called Theseus (http://www.ics.uci.edu/~etrainer/theseus). I assessed Theseus’ usability as well as its effect on trust in a laboratory experiment. Qualitative and quantitative analysis of the data showed Theseus was highly usable and it had a significant effect on distributed developers’ perceived trustworthiness toward their remote collaborators. In situational conditions, Theseus resulted in higher perceived trustworthiness and more situational attributions. In dispositional conditions, Theseus resulted in lower perceived trustworthiness and more dispositional attributions.
Future Work

My research stems from an interest in understanding and improving the ways in which collaboration tools support group work and interaction in virtual teams. My work spans three core themes, raising useful questions for future work:

- **Software Tools in Organizations:** In practice, organizational policies may mandate or prohibit the use of certain tools. Tools mandated by the organization but not perceived as useful by team members may lead to non-use or under-reliance. How can management influence their teams to adopt tools supported by the organization? What specific features or information do team members not perceive to be useful? Organizations may prohibit the use of tools that expose information that is not so easily available, such as individual progress, mistakes, and due dates. What organizational policies and assumptions about responsibility and power do these tools violate?

- **Software Engineering and Tool Design:** The design space I theorized highlights the importance of theoretically motivating data included in user interfaces, as opposed to using whatever data is available. Although generally supportive of high level tasks, what would it mean to consider the task specifically? What are common tasks whose successful completion engenders trust and communication among virtual team members? For each of these tasks, what can we measure? What should we measure? What are the consequences of including data X over Y for the user experience?

- **Globalization and Cultural Diversity:** One characteristic of virtual teams is cultural diversity. While much previous work has explored visual user interface design for various cultures, the design space I theorized considers information design by laying out specific information relevant to supporting distance collaborations. Do team members from different cultures interpret the same information differently? What are the ways in which culturally diverse team members prioritize different aspects of usability? How important is usability relative to successful task completion?

I want to be part of an exciting team working in user and interaction experience design. My experiences as a doctoral student and system builder will bring a fresh perspective to an organization as a whole and to any particular team with which I am affiliated. In conclusion, I am eager to work on new challenges in research and real-world problems.

References