RESEARCH STATEMENT
Caryn Conley
NYU Stern School of Business
ccconley@stern.nyu.edu

Overview
My research program is about exploring new ways to answer the question of how to effectively organize human behavior. Researchers across many disciplines and managers across many industries are interested in this enduring question. The widespread and ever increasing reach of the Internet affords new opportunities to effectively organize human behavior in, for example, organizations (e.g. virtual teams, offshoring), social networking groups (e.g. myspace.com, facebook.com), social commentary venues (slashdot.org), fantasy sports leagues (e.g. games.espn.go.com), political groups (MoveOn.org), and primary and secondary markets (e.g. threadless.com, ebay.com). An additional new opportunity for organizing in the Internet age, and the focus of my dissertation, is the voluntary, distributed, and decentralized production of digital goods. These projects do not use a formal organizational hierarchy or contracts to assign and enforce tasks; instead, Internet-based volunteers self-organize to create high quality information products and services. Examples include Wikipedia (http://wikipedia.org), open source software (OSS) development (e.g. http://sourceforge.net), Open Directory (http://www.dmoz.org), and Distributed Proofreaders (http://www.pgdp.net/c/). My dissertation examines how product characteristics and work relationships among volunteers affect outcomes in these virtual projects. In my first study, I examine the effects of product modularity on product development and product quality. In the second study, I examine how work group structure (the “contribution network”) affects future product development and product quality. In other research, I have examined why volunteers contribute to these projects and other online communities, and how technology has enabled networked forms of organization.

Modularity and Division of Labor
Product modularity is a strategy for efficiently organizing complex products (Baldwin & Clark, 1997). Modular systems are comprised of components “that are designed independently but still function as an integrated whole” (p. 86, Baldwin & Clark, 1997). Interfaces “describe in detail how the [components] will interact, including how they will fit together, connect, and communicate” (p. 86, Baldwin & Clark, 1997). Thus, modularity describes the degree to which components within a product or system are independent or loosely coupled from one another, yet function as an integrated whole using interfaces (Baldwin and Clark, 2000; Sanchez and Mahoney, 1996). Products with a low degree of modularity are considered highly integrated products, because the functionality is tightly coupled and interdependent, regardless of the number of components.

In the first study of my dissertation, I examine the relationship between product modularity and characteristics of product development and product quality in the voluntary, distributed, and decentralized production of digital goods. Many researchers have explored the psychological reasons why people voluntarily participate in these online groups, but researchers have yet to examine how various project characteristics will affect a volunteer’s contribution behavior in a specific project. In my work, I explore how characteristics of product modularity may affect characteristics of the tasks to be performed, which may subsequently affect voluntary participation in these projects. Specifically, I explore how product modularity affects task...
structure and the division of labor in a sample of OSS projects, and how the resulting task structure and division of labor affects product quality. As product modularity increases, the total number of independent components increases, and the average product component size decreases. Each component should then contain less information and more specialized information on average. By decreasing the quantity of information per component, cognitive demands on project volunteers should also decrease through reduced information requirements (March & Simon, 1993). In addition, increasing the number of smaller and independent components should decrease the costs of coordination, as volunteers should be able to work more independently. I therefore hypothesize that increased product modularity will be associated with lower cognitive task demand and coordination costs, which should be associated with increased voluntary participation and higher product quality. My findings indeed suggest that increased product modularity is associated with increased project participation, reflected by an increase in the number of voluntary product contributions. I find partial support for a positive relationship between modularity and product quality, as measured by software complexity and the number of software defects. As product modularity increases, the average degree of software complexity decreases as expected. However, a surprising finding is that increased modularity is also associated with a greater number of product defects, thus lower product quality. A paper based on this work is currently being prepared for submission to Information Systems Research.

**Work Group Structure**

As previously mentioned, researchers have yet to examine project characteristics that may affect a person’s choice to contribute to a specific project in the voluntary, distributed, and decentralized production of digital goods. As described in the first study of my dissertation, I examine how product modularity may affect volunteer behavior. In the second study of my dissertation, I examine how characteristics of the online work group structure may affect a person’s contribution behavior using another sample of OSS projects. To assess the work group structure, I introduce the concept of a *contribution network*, which is a bimodal network that describes the structure of work relationships among volunteers in relationship to the work product within these distributed and decentralized projects. One set of nodes, member nodes, represents volunteers who have made at least one product contribution. The other set of nodes, component nodes, represents the components of the product. A tie exists between a member node and a component node when a volunteer has made a product contribution to the component node. No direct ties exist between member nodes or between component nodes. Two project contributors relate to each other when they make product contributions to the same software component.

I apply concepts from social network theory to derive hypotheses regarding the effects of the contribution network on characteristics of task structure and product quality. A person’s position in the network affects his or her contribution behavior – the more centrally located (i.e. the greater his or her degree centrality), the more likely he or she will contribute (Wasko & Faraj, 2005). However, as the degree centrality of each member node decreases, network density decreases because the nodes are more isolated. I therefore hypothesize that less effort will then be required to coordinate or organize work (Ghosh, 2003), positively affecting effort spent performing work, which should increase the total number of product contributions and volunteers. In addition, I hypothesize that the reduced coordination requirements in a low density network will increase product quality. The probability of introducing an error decreases since the
likelihood that a contribution affects a contribution made by another volunteer decreases. Data are currently being analyzed for this study.

**Future Research**

I am currently conducting a field study of internal distributed software development teams at a large global financial firm. I am studying the impact of the adoption of a centralized project management and development tool on software development project outcomes, such as communication, collaboration, and software quality. In addition, I am performing a case study analysis of the introduction and adoption of internal open source software development projects within the software development group. Data are currently being collected for both projects.

I hope to extend the work of my thesis in several ways. First, I intend to theorize about the effects of product modularity and the contribution network on characteristics of task structure and product quality in a single model, and test the model using an additional sample of OSS projects. In addition, I plan to survey the volunteers of the projects sampled to better understand their motivations for participation and their perceptions about the product architecture and their working relationships with other project members. Finally, I envision designing and running experiments to directly measure the cognitive effects of product modularity on product development tasks. It would also prove interesting and useful to design and run experiments to examine both the effects of the contribution network on product development tasks, as well as the simultaneous effects of product modularity and the contribution network on product development tasks and product quality.