Women and Cyber Security: Gendered Tasks and (In)equitable Outcomes

S. Bagchi-Sen, H. R. Rao and S. Upadhyaya

University at Buffalo, SUNY, Buffalo, NY

{geosbs, mgmtrao, shambhu}@buffalo.edu

I. Goals of the project

1. Is there a trend of task differentiation along gender lines?

2. How institutional intervention (e.g., Federal government initiatives, university-level changes) can make a difference in removing gender inequities?

I. Goals of the project cont.

The Research Questions are

- What differences exist in the career trajectories of females and males involved in cyber security?
- What are the challenges at different stages of their education and career?
- Is there a gendered division of labor?
- How effective is institutional proactivity for career advancement of women in cyber security?

II. Main activities to date

1. **We researched a broad literature on career selection theory and women in IT**

2. **We developed a set of research models to explain how personal, social and institutional barriers can be overcome to maximize retention and advancement of women in cyber security**

II. Main activities to date cont.

3. We are collecting data from middle and high school students, NSF Cyber security Fellows and (ISC)2 certified information security professionals.

- **In-depth interviews and survey of 150 Executive women (SEP.2004)**
- **One-day workshop for high school students (Buffalo area in spring, 2005)**
- **In-depth interview of 40 NSF cyber security fellows**
- **Online survey of NSF SFS (Scholarship for Service) students and ISC2**

III. Main results to date

1. Gender discrimination in education and gender difference in specialized skill sets could be main causes of generating gender inequity in cyber security career

2. Students, who think they can do well in the cyber security job, have more positive outcome expectation and higher interest in a cyber security career

III. Main results to date cont.

3. Students who feel barriers about cyber security occupations are less likely to have a cyber security career:

Family/social concerns, femininity concerns, and limited education or experiences are major perceived barriers

III. Main results to date cont.

4. Students' self-evaluation on their ability of doing information security related task and perceived importance of the information security are the key contributors for driving students' information security interest and behavior.

III. Main results to date

5. There is gender difference on the Internet and computer usage.

- **More females show Internet usage than males for instant messaging and taking online courses**
- **More males use the Internet than females to play games and trade stocks**
- **Females who have higher computer education level might be less vulnerable to computer crimes**

IV. Next Steps Planned

1. **Analyzing data, testing our set of research models, and applying the research findings on improving women's entry and advancement on information security career**
2. **Publishing papers and making presentations to all participant organizations**
3. **Holding a session that can reach out to students in order to encourage them to participate in cyber security field**

V. Key open research questions

- **What are the lessons learned from students involved in cyber security?**
  - **What factors motivated women to specialize in cyber security?**
  - **What educational programs and institutional factors are supportive of women in this sub-discipline of IT?**
  - **Early Career: What worked and/or what went wrong at school?**
  - **Current Work Experience: What are the challenges and constraints in the workplace?**

V. Key open research questions

- **What are the lessons learned from professionals at different stages of their career in cyber security?**
  - **What motivated current professionals to first join IT and then focus on cyber security?**
  - **Is there a gendered division of labor within cyber security?**
  - **How do women overcome barriers to advancement? What specific skills (technical and non-technical) determine success?**

VI. Dissemination efforts

- **This study has a significant research impact on female students and workers on cyber security.**
  - **This research is the first exploration of gender and diversity in the cyber security arena**
  - **Statistical analysis and the preparation of cyber security demos for outreach efforts to local schools and teaching colleges**

VI. Dissemination efforts cont.

- **The research results will**
  - **Support curriculum design in schools and universities to promote enhanced participation of women in cyber security**
  - **Provide effective methods for retention and advancement of female students in cyber security education**
  - **Supply valuable insight to potential information security workforce ,government policy makers and educational institutions**

VI. Dissemination efforts cont.

- **The wider societal importance of the research are:**
  - **A deeper understanding of the interaction between personal, social and institutional factors in determining career trajectories**
  - **Enhancing women's participation in science and technology**
  - **Understanding women's role as an agent of technological change rather than a passive recipient of new technologies**