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Thinkfinity Cornerstone 3: Interdisciplinary Informatics - Grant Application (3nd Round)

Interim Project Report

Security@Web: Teaching Security with Alignment in Trust on the Web

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Project Goals

A) Please outline your original goals.

This proposed project, Security@Web, will develop a course module that raises students' awareness of information security on the web by examining the relationship between perceptions of trust and attitudes towards security. The project will also entail a research component, i.e., a survey to assess the effectiveness of the course module. The course module will be informed by interdisciplinary research from both marketing and information security and therefore foster collaboration between the two participating schools.

Progress

B) What progress have you made towards your original goals on your project to date?

During Spring 2010, we have focused on researching previous literature and forming our own theory of students' perception of trust and security risk on the web. We will then design our course module based on this theory and test our hypotheses through student surveys. Our progress is shown in the following activities:

Theory Development

By researching previous literature, we have formed fundamental understanding on the concept of trust, in particular, web trust, and computer security risk. Trust has been defined in numerous ways in both the marketing and IT literature. Trust continues to be an elusive concept, defined and measured in numerous ways. As the study of business

exchanges has shifted from physical goods to services and from bricks and mortar to online, the antecedents and definitions of trust continue to evolve. Trusting beliefs are often categorized by three attributes -- competence (ability of the trustee to do what the truster needs), benevolence (trustee caring and motivation to act in the trustee's interests), and integrity (trustee honesty and promise keeping) (McKnight, Choudhury and Kacmar 2002). Perceived security risk refers to an individual's judgment of how risky a certain computer related activity is. For example, students might provide their personal information to their school web site since they think that the school site is very secure and they sense a low security risk on the site. Perceived security risk can be measured based on the individual's perceived probability of risk, perceived consequences, and perceived controls (security countermeasures). Understanding how individuals perceive the exposure and the effects of risk is considered an important part of analyzing and managing technology-induced risk (Morgan 1981). However, risk perception of computer security has yet to be fully studied although the general perception of risk has been found to greatly impact individual computer decisions (Hardee et al. 2006). Research has empirically verified that higher perceived security control is positively related to trust in e-commerce websites (Chellappa & Pavlou 2002; Chen & Barnes 2007; Suh & Han 2003), users' intention of purchasing (Bhatnagar et al. 2000; Ranganathan & Ganapathy 2002; Salisbury et al. 2001; Suh & Han 2003) and in willingness to use online banking (Liao & Cheung 2002).

Exploratory Study

We had conducted an exploratory study to investigate the factors that students consider when evaluating whether or not a website is secure and trustworthy. We developed a short online questionnaire, which includes two sections of questions. In section one, students were asked to list the five websites they use the most and why they go to these sites. In section two of the survey, they were asked several open-ended questions: (1) When would you trust a website? What are the signs and indications of a trustworthy website?; (2) Other than looking at the website itself, how else do you evaluate the trustworthiness of a website?; (3) How do you know a website is secure (i.e., your information is protected)? What are the signs and indications of a secure website?; (4) Other than looking at the website itself, how else do you evaluate the security of a website?

Course Activity

Two undergraduate marketing classes in the Lubin School were directed to complete an anonymous online survey about their Internet experiences. The classes are MAR 322 Marketing Research (26 students) and MAR 499 Advanced Marketing Management (27 students). The survey was done during class time and framed as an example of marketing research and demonstration of an online survey software (Qualtrics.com). The order of

questions on security and trust were reversed for half the sample to eliminate order bias. After completion of the online surveys, students were debriefed and given the opportunity to comment on the study.

Course Module Development

We are currently developing the proposed course module in web security and trust, which will be incorporated in classes during Fall 2010. The course module will consist of a short lecture on web security and a laboratory exercise to guide students in recognizing security cues on web sites. The module will take one-hour of class time including a 20 minute web survey regarding student perceptions of trust and security risk on the web.

The course module will introduce the following topics to students:

- Common computer threats on the web
- Practices against web security threats
- Web security cues and technology
- Anti-phishing strategies

We are also developing a questionnaire that we can use to test if the course module increases students' awareness of web security and therefore influences both their trust and security risk perception on the web.

Publications

We have so far produced three publications as listed below. If accepted, Dr. Long will present the first paper in the 2010 Direct/Interactive Marketing Research Summit, San Francisco, CA in October 2010. Dr Chen will present the second paper in the Sixteenth Americas Conference on Information Systems in Lima, Peru in August of 2010.

- Li-Chiou Chen and Mary M. Long, "Savvy or Naive?: Factors that Students Consider when Evaluating the Trustworthiness and Security of Websites, " under review, the Direct/Interactive Marketing Research Summit, San Francisco, CA in October 2010.
- Li-Chiou Chen and Gaurav Bansal, "An Integrated Model of Individual Web Security Behavior," Proceedings of the Sixteenth Americas Conference on Information Systems, Lima, Peru, August 12-15, 2010.
- Li-Chiou Chen and Mary M. Long, "Perceived Online Security and Trust from a Student Perspective: An Exploratory Study," Journal of Global Business and Technology, Volume 6, Number 1, Spring 2010.

Impacts

C) Has your project impacted students? If so, how many?

In general, the results of our study and the course module will have an impact on students in terms of increasing their awareness in web security. In particular, during Spring 2010, the students in both MAR 322 Marketing Research and MAR 499 Advanced Marketing Management have learned about designing an exploratory survey on web trust and security risk perception.

D) Has your project impacted other faculty members? If so, how many?

Since this project aims at designing a course module for students, the project does not intend to have direct impact on faculty. In the future, if our course module performs as well as we hypothesized, we will disseminate the course module to other faculty for future course adoption.

Next Steps

E) What are your next steps?

During Summer and Fall 2010, we will be conducting the following activities:

- **Refine the course module in web security**: We are further refining the course module in web trust and security. We need to refine course slides, reading materials and short laboratory exercises so that they can be delivered in a one-hour class for non-computing students in either CIS101 or UNV101 classes.
- **Design a follow-up questionnaire and experiments**: We are designing the questionnaire that will be administrated after each class that has adopted our course module. We also plan to administrate the same survey in classes that do not adopt our course module for comparison. The results of this study will be used to validate our hypotheses on students' perceptions of trust and security risk on the web. In particular, we are interested in knowing if their perceptions will be impacted after adopting our course module. We will apply for an IRB exempt for our survey study.
- **Design experimental web**: We are also designing web sites that will serve as examples of unsecure web sites for our course module and the follow-up study. We are hiring a summer student research assistant to design the web sites.

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