Proceedings of the 13th Colloquium for Information Systems Security Education
University of Alaska, Fairbanks
Seattle, WA June 1 - 3, 2009

Information Assurance Awareness: Partnership between Students and Community

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Abstract – The University of Findlay (UF) is located in a small city in northwest Ohio, with an active business community and strong ties between the university and local business leaders. When a committee of the local chamber of commerce decided to benchmark technology use in the local business community, a partnership developed with the Center for Information Assurance Education at UF.

For five years, the Technology Infrastructure Committee (TIC) Annual Business Technology Survey has been tracking the trends in technology growth and levels of IA application among small businesses. This provides research opportunities for the IA classes at UF, and material for their Annual IA Forum, which is open to campus and community.

Using the survey with various classes has brought research into the classroom, and demonstrated the very real impact of IA awareness to the students in ways not likely possible otherwise. The community and the TIC benefits from greater IA awareness and better knowledge of the local business technology climate. The faculty and the university gain the opportunity to contribute to the community while enhancing the learning of their students.

Index terms – information assurance, awareness, service learning, community based research

I. Introduction / Background

Cyber security threats to the nation's infrastructure have increased, with slow progress on security issues [1]. Ubiquitous and multidisciplinary approaches to IA are needed to make a difference in the security levels in the nation [2]. The UF has partnered with the local business and government community to determine the level of IA practice in the community. This approach combines the resources of the university classrooms with the needs of the community to increase IA knowledge and awareness for all. This paper describes the UF IA program, the community partner, and the results and benefits from the partnership.

The TIC is a committee of GreaterFindlayInc (GFI), the chamber organization for Findlay, Ohio. GFI combines traditional chamber of commerce, economic development, and travel and tourism functions in one proactive group [3]. The TIC supports the GFI leadership by seeking ways to help leverage technology to improve business opportunities in the region. They promote educational opportunities, and are proactive in bringing technology resources to the community.

In 2000, a state initiative produced a map of key capacity ecommerce cities in the state, and the TIC realized that they were not even "on the map" [4]. The TIC did not want Findlay to be left behind in the new economy, so they worked to bring telecommunications providers to the area to discuss when they would be connected, and when better services would be available to increase competitiveness for the area [5]. The TIC, in existence since 1999, has been active in keeping Findlay on the radar for telecommunications providers, state agencies working on technology initiatives, and other potential providers for technology resources to the area. TIC originally stood for Telecommunications Infrastructure Committee, and as this goal was accomplished, and the committee saw its mission broaden, their name changed to the Technology Infrastructure Committee.

The UF IA program is a small program, dedicated to making a difference in the region despite limited resources. They have an annual IA Forum, and wanted students in their capstone class to contribute presentations aimed at spreading IA awareness, a general goal of IA curriculum [6] and one of the 13 key cybersecurity responsibilities identified for the Department of Homeland Security [1]. At the same time, service learning initiatives at the University were growing, and faculty sought ways to contribute to the community in real and positive ways that would enhance the learning of the students.

II. Problem Definition

The university and GFI had different needs that were solved by the joint project. To better prepare students, faculty in the UF IA program wanted to give students a better sense of IA in the real world, to research the level of technology dependence and security deployment in the local community, and to increase awareness of IA issues. The chamber desired to benchmark business technology in the region, to better understand technology use in the local business community, and to determine unmet needs and opportunities to enhance the business climate. The TIC determined that a survey of the members of the Findlay • Hancock County Chamber of Commerce would provide a good starting point, as they were interested in

the business use of technology, rather than home use of technology. They also desired to know how well that technology was secured.

A survey of technology impact in local businesses held the opportunity for both groups to move towards meeting their goals. Particularly in light of the fact that national surveys do not typically reflect smaller businesses and less metropolitan areas, a local survey would have the advantage of providing more targeted information for decision making about efforts needed in the area.

The TIC survey was developed by the members of the TIC, with input from the UF's Center for Information Assurance Education (CIAE). The questions address basic demographics of the companies completing the survey, technology infrastructure, business impact of technology, and security/IA constructs. Roughly one-third of the questions are devoted to IA, including existence of security policies, backup practices, and disaster recovery and business continuity planning. These questions can be combined with infrastructure questions identifying supporting hardware and networks to give a picture of the security posture of regional businesses.

The TIC enlisted the CIAE in processing the results of the survey, because of knowledge of software tools available to post the survey online, and the ability to conduct research with appropriate confidentiality. The effort to process and analyze the survey results has been collaborative over the years, with multiple classes participating in the project. Faculty members have coordinated their approaches to the survey to provide different angles to their coverage. Undergraduate classes involved in working with the survey include statistics and technology, business research statistics, project management, secure ecommerce, management information systems, the information assurance capstone, as well as some independent study students. Two classes from the MBA program have also worked with the data analysis and interpretation.

Students use the results of the survey to present their interpretation of the trends at the annual IA Forum. The Forum includes presentation of the survey results, and student related research in the morning, and invited speakers from the IA field in the afternoon. The themes have varied from year to year, but have included presentations aimed at small to mid-size business needs, reflecting the needs perceived in the community.

As students researched IA surveys used in the business world, it became clear that national surveys focused on larger companies in larger metropolitan areas. Policies and practices common in large enterprises seemed inappropriate to the businesses the students were familiar with. Even "small businesses" in the surveys seemed very different from the students' expectations. Half of the nation is employed by small firms of 500 or less [7]. Using the U.S. Small Business classifications of small businesses [8], the students learned that depending on the industry, a small business enterprise may have 500 employees. In this region, an employer with 500 employees is a major employer. Students had trouble relating their future work life in a small business in northwest Ohio to the concepts presented in the context of large corporate settings. The concepts did not seem to scale down appropriately.

The TIC survey provided the local twist that helped students put IA concepts into perspective. Based on responses to the survey, students calculated the impact on the community if those who responded that they could not recover within 48 hours of a disaster, were to go out of business at rates commonly cited in disaster recovery statistics. In the Findlay-Hancock County region, this would be a potential loss of 100 businesses and $925,000,000. These statistics about the community helped the students understand the importance of business continuity planning even in the very small businesses of Northwest Ohio.

III. RESULTS

The first TIC survey was developed in late 2003, sent out by GFI to its members in 2004, with responses online or mailed to UF. After the survey period ended, the students entered the paper responses into the online tool for a consistent result set. Students did descriptive statistics, charts & graphs, and presented them at the fall Forum. Capstone students reviewed the data and results, and did further study based on an aspect of the results that interested them. They also present these longer sessions at the Forum. Their presentations may address a perceived need for education, a desire to raise awareness of a problem area, or an emerging trend or technology.

Statistics from the five years of the survey are summarized in the table below.

Survey year	Year	Survey Period	Chamber Members (Total/ Primary)	Responses Total	% returned	
					online	paper
1	2004	Jan-Feb	1100/850	234	25%	75%
2	2005	Jun-Aug	1100/850	164	20%	80%
3	2006	May-Jun	1050/800	153	22%	78%
4	2007	Mar-Apr	1000/750	136	20%	80%
5	2008	Mar-Apr	900/700	162	43%	57%

In 2004, after the first survey, the TIC offered educational sessions as a follow-up to needs perceived in the results of the survey, as reported by the students. The first offering

was a forum designed for a company's CEO and CIO to attend together, to offer a platform for conversations about the value of appropriate technology within the business. This was in response to survey results that indicated many technology decisions were made with the involvement of executive management and that the vast majority of businesses responded that technology had a positive impact on their bottom line. Additional outreach offerings were put on hold while the mayor's Visioning Process for the City of Findlay was in progress, which involved the community in setting goals. The TIC wanted to make sure that their goals were aligned with the outcome of the visioning process, including the development of educational centers and outreach efforts envisioned for a new complex to be built in the downtown area. As the TIC started planning how to integrate their efforts with the city's vision, the region was hit with a hundred-year flood in August 2007. All energies across the area turned to recovery and restoration for some time.

As the plans for the 2008 survey were being discussed in February, another massive flood hit the region, reinforcing the TIC's desire to continue the survey, and to include further questions regarding the floods and disaster recovery/business continuity. Participation in the TIC survey ranged from a high of 28% of GFI primary members, to a low of 15% during the first four years. With the 2008 version of the survey, including the flood questions, the response rate rose back up to 23%. These rates are consistent with the 10-30% response rates for general market research surveys [9], and higher response rates would not necessarily provide higher quality data [10]. The TIC feels these return rates are reasonable. The flood edition saw the first significant jump in online entries: 43% of respondents completed the survey online, compared to 20-25% in the first 4 years. It is not yet known whether this is a trend or an anomaly, or why this change occurred.

Student presentations from the survey project were geared to the Annual IA Forum. The non-IA classes were focused on statistical analysis of the results, and the IA capstone students focused on questions related to IA, computer security, and disaster recovery planning. Capstone students were also expected to research additional information based on their findings in the survey results. Some of the students in the capstone class have seen the survey project multiple times before they get to the capstone level, which increases their appreciation of the results over time.

Networking with the speakers, learning about state of the practice from practitioners in the field, and talking with TIC representatives who attend the forum gives students better insight into the professional world ahead. In 2008, for the IA students, tying their survey analysis to other research in the field became particularly interesting following the floods of 2007-2008. The idea of disaster recovery and business continuity had led them to studies such as the Chicago Loop Flood of 1992, but the August 2007 and February 2008 flooding of Findlay, Ohio were very real for them. Many of the students were affected in their homes and on their way to start the college year, and they got to see the impact on the businesses in Findlay, Ohio. Some students also worked in local businesses that were impacted. Community service and volunteer opportunities continued throughout the school year, and in the classroom, the research took on a new significance.

IV. Stakeholder Benefits

This research with local businesses, and local impact, brought the research into the classroom in ways that never could have been matched by any simulated teaching exercise. It has multiple benefits for the key stakeholders, including the community, the students, and the faculty. The ongoing survey project continues to provide synergistic possibilities for the participants each year.

A. Community Perspectives

The community benefits by having a better picture of their business climate, and a better informed TIC to advocate on their behalf. The Annual IA Forum is a resource for companies who desire to learn more about IA issues. Anecdotal evidence from area technology solution providers indicates that some businesses have sought additional information after reading questions on the survey that they did not know how to answer.

In 2005, based on attendance at the Forum, and hearing the results presented, inquiry was made by a representative from another area in Ohio about using the survey with their chamber of commerce. Although that ultimately did not occur, the interest in some sense validated the concept that smaller communities have needs that they feel are not being addressed by the mainstream security community. Interest was also expressed by the governor's regional representative for economic development for a wider deployment of the survey, by making it available to chambers of commerce throughout the state. In the process of documenting the outcomes of the survey, feedback was gathered from the involved stakeholders about the value of the project.

Viewpoints from members of GFI and the TIC included the fact that information technology is a proven enabler, and ways are needed to help strengthen education, security, disaster preparedness, and availability of supplemental resources (e.g., community help desk, etc.). Integration of IT into business strategy is key. By benchmarking the community as a baseline, prior to new initiatives, the impact of economic stimulus projects can be better measured. Had the survey been taken before and

after the state's ecommerce initiative Ecom Ohio, greater insight into the project's influence on the region might be known.

Additional community viewpoints come from IA Forum attendees, who respond to assessment surveys each year at the forum. Attendees are surprised by the economic impact stated in terms of the local business community, although some disagreed with the results, which apparently challenged their perceptions of the state of IA and technology use within the community. The CEO/CIO attendees commented that CEOs actively involved in technology decision making is a double-edged sword: as the level of awareness and comfort increases, if comfort outstrips knowledge, it can lead them to bad decision making, which underscores the importance of a continuing technology education process for CEOs. CEOs also stated that the emphasis should be on the business reasons for making technology decisions, so that the decisions back the business strategy.

The survey respondents liked the personalized graphs showing the community results, and where their responses fell, and even small businesses with no computers took the time to fill in the survey and return it. Perhaps this was a sign that they felt it was important to the community.

B. Student Perspectives

Based on surveys given to students participating in the project, the students liked working on a real project, which would actually be used to help with local decision making. The students found it challenging to work with "real" data that didn't always fit, but felt it was good preparation for their future work and life. Students were also surprised at the statistics for the community, as some of their ideas about the local business community were challenged by the results. Many of the students who live and work in the region, are sometimes surprised by the statistics that emerge from the survey, and it is a reality check for them to realize what the actual technology landscape in the region looks like.

Students learn the soft skills, including communication, organization, team work, time management, and professionalism from working on the survey project. They gain confidence in knowledge of the field, and the state of security practice in smaller organizations. Participating in the forum presentations gives them valuable experience in presenting their ideas to others, and makes them more appreciative of the invited speakers who come to present on IA topics. For students in the IA classes, who will have repeated experience with the survey in multiple classes may increase the likelihood that the students will engage in service after they graduate, as multiple-semester projects have been shown to have more impact on students' future actions than single semester experiences [11]. While there are challenges in managing field experiences [12], the use of field experience, in many forms, elicits positive responses from students, faculty, and employers [13, 14, 15].

C. Faculty Perspectives

The faculty see great opportunity for students to deal with a real project, including the uncertainties, and anomalies that accompany non-textbook data. They can use the project in many different class settings, including project management, statistics, and capstone research. Real world challenges and opportunities for creativity and innovation, presented by enthusiastic professors, can do much to improve student learning [16]. While the benefits of internship and co-operative education programs is better documented, smaller organizations lacking the resources to devote to mentoring and monitoring student interns can still benefit when faculty provide structured opportunities for students to work with clients on IA awareness issues. Faculty see the benefit of networking opportunities for students making presentations to community leaders; and the advantage of showcasing university students and programs. Faculty observe that students gain an internalized example that they can use to put the lessons of the classroom into context. Working with colleagues in other disciplines, such as business and management information systems, has enabled the IA outreach to penetrate into other classes. Faculty at this university also like the opportunity to contribute to community-based research and to give back to the community.

V. CONCLUSIONS

Successful civic engagement comes from universities finding the intersection of student learning opportunities and real community needs [17]. Nance and Hay [2] stated, "most successful programs integrate computer security principles and practice across … research, education, and outreach… interweaving information assurance concepts between these missions and across disciplinary boundaries." Using a community based research project, and collaborating between classes and across colleges provides a content-rich environment from which to observe and analyze security practices. Partnering with GFI to provide the annual forum outreach reinforces the link between community issues and the research potential to address them. One longitudinal study of high school youth indicates that service experience involving direct interaction with people leads to future civic involvement [18]. Students learning and sharing with the community may become better practitioners, serving the learning and outreach cycle in new roles in the future.

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