

Developing a Research Laboratory around Standards Participation

Background

The function, purpose, development, and implementation of standards are woefully underrepresented topics in higher education. Of the approximately 2,500 universities and colleges in the US, only four offer courses in standards. Other courses may briefly cover standards but without discussing the full development process. Although standards are highly intertwined with societal and technological development, universities have not readily incorporated standards courses in the degree plan of study. Nonetheless, incorporating standards into the academic environment as an educational and research discipline can create a “win-win-win” for students and faculty working in academic endeavors—research, service, teaching as well as international collaboration opportunities. Another benefit is to provide continuity of expertise and training for those entering standards organizations.

Purdue University’s Biometric Standards, Performance, and Assurance (BSPA) Laboratory, formed within the College of Technology, provides an example of a research laboratory model that encompasses standards into the curriculum, as well as within their research agenda.

Problem

Even college students in complex technology programs struggle to name standards, unless they are commonplace in the market (such as ISO 9000 and 802.11 wireless standards). The process of standards development and the impact of standards on daily life—such as standard credit card size or bar code symbologies eludes them.

How can higher education institutions increase standards education within their curriculum? How can universities help students become knowledgeable about and gain practice in standards development? How can students see standards development as a potential career path? And how can institutions bridge the gap between academic classroom work and the real world processes?

Approach

The BSPA Lab developed a graduate course in biometrics, the science and technology of measuring and analyzing biological data. In information technology, biometrics uses such characteristics as fingerprints, eye retinas and irises, voice patterns, facial patterns, and hand measurements for authentication.

After the events of 9/11, biometrics became a mainstream concern. Within the biometrics community, a movement began to standardize aspects of biometrics technology. The InterNational Committee for Information Technology Standards (INCITS) established Technical Committee M1 Biometrics in November 2001 to advocate for comprehensive international biometric standards.

The Purdue BSPA Lab joined the movement to standardize aspects of biometrics technology. The Lab was present at INCITS M1's initial meeting and consistently sent representatives to participate in the four to five committee meetings per year since 2002. For the BSPA Lab's participating faculty and students, INCITS M1 provided a network for engaging with biometrics professionals who were involved in the industry. The Lab's involvement with INCITS M1 took considerable investment of time and travel funds. However, the return on that investment was significant. The members of the standards community mentored students and faculty associated with the Lab. They provided advice and guidance to faculty and students, persuaded companies and colleagues to donate or provide equipment, and played an active, supportive role in the Lab's work.

By 2003, the Lab had grown sufficiently that its graduate students became involved in the standards development process, including attending INCITS M1 meetings. The graduate student's term of only two or three years with the Lab limits participation in the standards development process. However, interacting with biometrics professionals expanded students' professional networks. In time, the Lab increased its involvement to include participating in the international committee on biometrics, ISO/IEC JTC 1 SC 37, which expanded the opportunities described above to the international sphere.

As both undergraduate and graduate students continued serving as M1 and SC37 committee members, they became eligible to serve as co-editors of technical documents. In evaluating students' requests to serve as editors, the Lab faced several issues. Given the student's short tenure and the longer standards development process (average 4 years), students can rarely participate from the initial New Work Item Proposal through publication of the standard. However, the most complete participation in the process provides the optimal education experience. So the Lab had to determine whether consistent funding was available for the duration of the project, how involvement in the process would effect the student's progress in the academic program, and should the student leave the development process, would the Lab be able to assign another student.

Members of the Lab were able to resolve these problems well enough to serve in a number of official positions including INCITS M1 Secretary and Vice Chair, INCITS Executive Board member and Vice Chair, and International Representative of INCITS/M1.5 and Project Editor or Co-editor of several technical documents..

Work with the standards committees influenced the Lab's research, in both specific projects and entire research strands. The Lab's research, in turn, provided information to the standards committees. For example, a graduate student worked on an INCITS M1 ad-hoc committee on e-authentication. The ad hoc committee worked to "investigate and make recommendations regarding how biometrics should be applied in a remote e-authentication environment" based on the "E-Authentication Guidance for Federal Agencies" document, which very narrowly defined biometric authentication. The committee provided its first draft in November 2005, and concluded its work on March 30, 2007 with the graduate student serving as report editor. This activity provided the graduate student with the experience of working with a team of professionals outside of the university lab environment, and gave him an opportunity to participate in developing

and publishing a document that the biometrics community would use. While this work required considerable time and effort, it shows how graduate students can participate in biometrics standards activities as well as how the development of standards can include all stakeholders.

Another exciting result of the Lab's work with standards is the development of a new subfield, Human Biometric Sensor Interaction (HBSI). In the process of testing and evaluating many biometric systems – including iris, face, voice, signature, keystroke, hand geometry, and vein systems – the research team observed interactions that the existing performance standards might not explain. As a result of this research, the Lab co-edited INCITS 1602-D - Biometric Performance Testing and Reporting - Part 7: Framework for Testing Methodologies for Specific Environments of Biometric Systems.

A key driver for creating standards is to promote interoperability and interchangeability. When subsystems perform in the same way, multiple vendors can supply the parts/modules. Interoperability in biometrics involves issues at the biometric sensor level, template generation level, and matching level. Testing effectiveness and identifying issues related to biometric systems interoperability has significantly influenced the Lab's research agenda.

Outcomes

Discussions between the research team and biometrics professionals over years of standards meetings prompted many experiments conducted in the Lab. The results of the Lab's experiments provided crucial information to the standards community that they used in standards development. In one case, the Lab's work sparked a new research discipline, HBSI. The Lab was able to contribute to the development of many different standards, including serving as co-editors.

Standards professionals also contributed to the academic experience for the Lab's students. The technical committee provided mentorship and growth to the students. Committee members supplied information and advice on research topics, and sat on some students' MS examining committees. Work with the standards committees expanded the students' learning experience.