Achieving Success With a New Design of Hybrid Information Systems Major: The Case of University of ABC’s Operations and Technology Management (OTM) Program

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Abstract
Decreasing IS enrollment has become a huge concern to business schools around the United States. IS academic leaders are interested in finding ways to attract students to major in IS, make IS programs current, offerings valuable, and students marketable. We discuss the case of a hybrid major called Operations and Technology Management (OTM) which was started at University of ABC at the peak of the recession in IS enrollment and chronicle how it achieved success and industry recognition. We elaborate on the strategies that underpinned the success of the program such as inter-disciplinary nature of the major, curriculum design and delivery, student recruitment efforts, industry outreach, use of advisory boards and alumni, and a successful student placement model. We hope these details will motivate IS administrators to reverse the past trends in the decline of IS enrollment.

Keywords: IS enrollment, IS innovation, Strengthening IS programs, Innovative curriculum.
Introduction
The question of how to build a strong Management Information Systems (MIS) program has been at the center of Information Systems (IS) education research for several years (Barnes et al. 2012; Looney and Akbulut 2007). This research gained prominence after the enrollment numbers in many IS programs around the world plummeted after 2001 (Granger et al. 2007b). Although some published research indicates that the IS enrollment has rebounded in some universities (Koch et al. 2010), the quest to build successful and lasting IS programs is still on. However, many IS programs still face tough challenges. IS academic units continue to operate under the threat of being phased out or being combined with others, are unable to hire competent faculty because of budget cuts, and face employers demanding higher number of quality graduates. Therefore, best practices that enable universities to build and maintain successful IS programs should still be relevant and must be disseminated. This paper reports a successful design and implementation effort of a hybrid major called Operations and Technology Management (OTM) at University of ABC. The philosophy of OTM is based on the idea that operations and information technology (IT) management are two sides of the same coin and the “science of doing things better” must bring together these two disciplines to provide training that is necessary for students to solve the challenging problems faced by organizations.

The paper is organized as follows. We first discuss literature on how to strengthen IS programs. Second, we discuss the case of University of ABC’s OTM program. Specifically, we discuss the background for this new major, curriculum design and delivery, student recruitment efforts, industry outreach, use of advisory boards and alumni, and successful student placement efforts. We end with lessons learned and conclusion sections.

Literature Review
Although several myths surround IS major such as that there are no IS jobs upon graduation, and even if jobs do exist, they are outsourced (Granger et al. 2007a), jobs data for IS careers suggests otherwise. The data from the Bureau of labor statistics in Table 1 shows that, for major IS occupations, the jobs outlook between 2012 and 2022 suggests faster growth than the national average (US Department of Labor 2015).

<table>
<thead>
<tr>
<th>Occupation</th>
<th>2012 median pay</th>
<th>Number of jobs, 2012</th>
<th>Jobs outlook 2012-22</th>
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</thead>
<tbody>
<tr>
<td>Computer systems analyst</td>
<td>$79,680 per year</td>
<td>520,600</td>
<td>25% (Much faster than average)</td>
</tr>
<tr>
<td>Computer and Information Systems Managers</td>
<td>$120,950 per year</td>
<td>332,700</td>
<td>15% (Faster than average)</td>
</tr>
<tr>
<td>Database administrator</td>
<td>$77,080 per year</td>
<td>118,700</td>
<td>15% (Faster than average)</td>
</tr>
<tr>
<td>Web developer</td>
<td>$62,500 per year</td>
<td>141,400</td>
<td>20% (Faster than average)</td>
</tr>
<tr>
<td>Computer Support Specialist</td>
<td>$48,900 per year</td>
<td>722,400</td>
<td>17% (Faster than average)</td>
</tr>
</tbody>
</table>

Table 1. IS jobs outlook data. Source: U.S. Department of labor (2015)

While the demand for IS majors is projected to grow over the next decade, the story is not great on the supply side. Many IS programs have reported experiencing some level of trouble in enrollments in the last decade (Granger et al. 2007a; Koch et al. 2010). A substantial amount of research has been done to address the problem of improving the quality of IS programs and the steps necessary to increase IS enrollment. While the literature is fairly extensive, we summarize the current knowledge in this area by using a few representative studies.

To understand how to improve IS enrollments, it is first important to understand factors that motivate students to major in IS. Akbulut-Bailey (2012) found that social support (perception that choice of major is approved and supported by important people in their lives), outcome expectations (consequences of pursuing a major), and student interest influence students’ choice of IS as major. However, student interest can be an ambiguous concept and it is important to understand what exactly student interest
means. Ferratt et al. (2010) conducted a study to shed light on this question. They find that student interest is comprised of three factors: (1) link between business and technology, (2) practical application of course work, and (3) daily variety. Therefore, prior research provides some reasonable understanding of how students select IS as their major. However, to create and sustain student interest in the IS major, it is imperative for programs to have a strategy.

Previous research suggested excellent teaching in the introductory IS course as one possible strategy (Firth et al. 2008; Gudigantala 2013; Looney and Akbulut 2007). This is not trivial because the introduction to IS course serves as a gateway for many pre-business students to learn about what IS is and the viability of IS major for pursuing a career. Prior research examined both the use of effective teachers and delivery mechanism as effective conduit for such purposes. Looney and Akbulut (2007) examined if there is a link between the use of effective teachers in introductory IS course and increase in IS enrollments. Using survey data from 305 students, they found that students who are taught by effective instructors are more likely to be attracted to the IS discipline. The authors also suggest a mechanism through which this relationship works. They theorize that teaching effectiveness increases students’ confidence in their ability to successfully perform as IS majors, bolsters students’ expectations that it is possible to get jobs by majoring in IS, and enable students to develop long-lasting interest in the IS field. Gudigantala (2013) discusses the use of active learning techniques in introductory IS course to teach content effectively and to ignite the interest in the minds of pre-business students for IS majors. Use of semester-long group projects, individual presentations, team-exercises, case studies when teaching the introductory IS course have been shown to be effective in engaging students and making them realize the value of IS to business. Firth et al. (2008) provide a 12-step program to make Introductory IS courses more interesting to students and motivate them to major in IS. These steps include: (1) assign the most effective teachers, (2) teach IS, not IT or CS, (3) use writings from non-IS authors to tell the IS story, (4) force the students to write and write and write, (5) expose the students to innovative and interesting technology, (6) recruit peers and alumni as guest speakers, (7) expose students to career and internship counseling, (8) provide sufficient levels of assistance to students, (9) provide opportunities for reflective growth, (10) identify and market to the top students, (11) be nimble, and (12) focus on local strengths of the city in which the university is situated. These three studies show that the introductory course, when taught well, will usually have the desired effect of increasing student interest and thereby increasing enrollment numbers.

In addition, many researchers suggest a multi-pronged strategy that worked well at their respective universities to improve their IS offerings and consequently increasing IS enrollments. In a panel discussion on increasing enrollments during 2007 America’s Conference in Information Systems (AMCIS), the discussants recommended change of curriculum and improving marketing efforts (Granger et al. 2007b). For instance, marketing steps such as advertisements on campus buses, articles in student newspaper, t-shirts with reasons to major in IS, orientation for IS majors, social events for IS majors, faculty, and recruiters, current IS majors recruiting other majors, and international trips to China for studying the use of IS in another culture improved IS enrollments from 27 in fall 2006 to 80 in fall 2007 at University of Georgia (UGA)(Granger et al. 2007b). Granger et al. (2007a) discuss strategies to increase IS enrollments and also attempt to dispel myths surrounding IS careers. Some of the myths they dismiss are: no IT jobs when students graduate; all IT jobs are being outsourced; IT salaries are depressed; and IT degrees are worthless. As for approaches to increase enrollments, they suggest: (1) curriculum-oriented approaches, (2) modifications to course offerings including offering minors and certifications in IS, (3) marketing and promotion approaches, and (4) approaches to increasing visibility of IS within a university setting.

Now we discuss some strategies that were used successfully around several U.S. universities. Barnes et al. (2012) discuss a strategy consisting of five steps which successfully resulted in increasing IS enrollment at Lamar University, Texas. The first step in their strategy is to improve curriculum on a continual basis. This step involved updating IS curriculum based on the recommendations of Association for Computing Machinery (ACM)/Association for Information Systems (AIS) curriculum taskforce, making the introductory course to IS interesting and motivating for students, and integrating SAP R/3 application program in many courses. The second step involved increasing visibility of IS degrees to prospective students including promoting the program in area high schools. The third step involved creating job opportunities for students by working closely with the career center and by networking with former
students. The fourth step consisted of the IS department chartering an IS student chapter to increase faculty-student engagement and to provide opportunities for learning and competition for students through AIS chapter. The final step involved retraining faculty in technologies related to Oracle, SAP, and Tableau to keep them current. The major outcome from this strategy has been an increase of 53% in enrollment over three years.

Koch and Kayworth (2009) discuss a unique strategy used at Baylor university to increase IS enrollment. The main component of their strategy is to host an IS summit, a recruiting event conducted every spring for pre-business majors, and the use of a student-driven recruitment approach wherein existing IS majors get course credit for the promotion and recruiting work they do to plan and manage activities and events leading to improving IS enrollments. Koch et al. (2010) share best practices for improving IS enrollments and recommend a program perspective. This perspective has three phases: attract, retain, and place students. To attract IS majors, they recommend running awareness campaigns, events, early intervention strategies (promoting to high school students), and making curriculum changes to add value. To retain, they recommend conducting orientation events to further interest of existing IS majors, running student organizations, and providing exceptional experiences to IS majors. As for exceptional experiences, Baylor University has used competitions and field trips, University of Georgia (UGA) implemented an international experience and a leadership program, and Washington State University (WSU) has established an IS fellowship program. Finally, to place students, the authors recommend mentoring to students by faculty, IS leaders, and businesses and actively using industry ties. The authors state that the implementation of this program has resulted in increased IS enrollment.

In conclusion, the literature review shows that successful programs develop some unique strategies to strengthen their programs and improve enrollments. The literature also shows variation in what different universities do to succeed. In the next section, we discuss the case of OTM major at University of ABC.

The Case of OTM major at University of ABC

Background

University of ABC is a small private university in the western part of the United States. The business school is accredited by AACSB. The school until 2008 had no separate department for IS or operations management (OM). Two instructors taught the relevant courses in IS and OM and were part of the management department. However, in fall of 2008, University of ABC started the hybrid major in OTM.

Our Rationale for Creating OTM Major

As the business environment changes, IT has assumed an increasingly important role in achieving the business organizations' strategic goals and objectives. The IT unit has executed more of organizations' mission-critical tasks and business-oriented activities compared to its back-office IT counterpart of the olden days (Anonymous 2010; Chan et al. 1997). In addition to using IT as a change agent, organizations have been keenly pursuing continuous improvement efforts. To do this effectively, organizations needed to build or possess capabilities with which they could quantify or measure what they would like to improve (and evaluate whether or not their efforts for improvement worked).

The current business environment emphasizes the need for a new type of professional who is knowledgeable about project management methods; able to perform complex analyses involving uncertain outcomes, constraints and regulatory requirements; understands supply chain management, quality management, forecasting and predictive modeling and the nature of operational systems; understands the integration of business processes and technology; and who commands a set of analytical and technology tools enabling him/her to enhance the competitive performance of his/her organization. The American Management Association’s (AMA) survey on requisite critical skills set for today’s business professionals revealed critical thinking and analytical/problem solving overwhelmingly as the most important skills. Current business practitioners echo the importance of analytical skills in terms of big data as one of the most important resources enabling business organizations competitive (Anonymous 2010; Baker and Leak 2006; Manyika et al. 2011; Savitz 2012).

Accordingly, more business-oriented IT professionals with business and technology competencies are in demand as their activities have become more pervasive (Eom and Lim 2012; Jiang et al. 2003). This
point is in line with how we viewed IT should be: business-driven IT. That is, IT must be understood and discussed as how it will help improve or enable business processes and operations and how business processes and operations harness existing and available IT to advance an organization’s bottom line. IT professionals need to possess analytical and critical thinking capabilities with which they can find business problems and seek innovative solutions using IT. Therefore, we concluded that the students must not only be good with IS-related knowledge and skills, but they must be proficient at understanding and improving operations through the use of IS.

Anecdotal evidence told us that industry professionals in our area were unhappy with newly hired grads lacking proper background knowledge and IS skills. They expressed their need for new hires possessing tools and problem solving abilities necessary for identifying business opportunities involving business processes and operations tied with the use of systems applications, key data, and OM theories and methods. Initially, our institution offered neither IS nor Operations majors and we taught one required business core course per each discipline independently: both courses were seen as ‘necessary evils’ by both undergraduates and MBAs. We needed to break students’ old perception of IS as programming and Operations as old-fashioned manufacturing.

In the introductory courses for IS and Operations Management, we tried to offer them in a way they would feature topics/concepts and skills (e.g., IS covering database application providing information to solve business problems, DSS modeling using Excel, business process management using systems perspective, constrained optimization modeling of IS resource allocation, modeling risks in IS projects, capacity planning & management, and quality management). This effort created awareness of how integrating IS with business process improvement and operations could be essential for Finance, Marketing, and even Accounting. These two revised courses created new interest among the student population and motivated them to study more about IS and operations. While teaching these two courses, we honed in on the concept of IS as including IT (e.g., hardware, software, and data), and more importantly the ‘context’ in which IT is deployed, as IT tends to produce different impacts on the organization/user depending on who uses it, when and how it is used, where it is implemented as well as people (end-users) and operational standards and procedures where IT is used, and the way these key factors interact/influence each other. This effort ultimately led to increased student understanding of IS and Operations can work synergistically to improve organizations and solve business problems.

These experiences led to our creating Operations and Technology Management (OTM) major. This hybrid IS major combines IT and Operations Management and is designed to equip students with the tools necessary to manage global operations and be active problem-solvers. This major prepares students for excellence in careers relating to either information systems or operations management (business systems analyst, database administrators, supply chain analyst, inventory manager, management consultant, quality engineer, data/information analyst, etc.).

With both the University’s (core skills for writing and analytical and logical reasoning) and Business School’s core courses (business foundation and skills in finance, accounting, marketing, economics, organizational behavior, decision modeling, innovation, management policy and professional development), OTM curriculum provides students with innovative and quantitative courses designed to focus on tools necessary to handle the growing challenges and constant changes in managing global operations. These courses consist of foundations of operations management, project management, supply chain management, and business process-oriented systems analysis and design. Then students delve into in-depth learning in information-based business problem solving through database management, business analytics, simulation, and problem-solving using Visual Basic Application (VBA), effective project management through project management and project management processes and certification, and optimal operations and improvement through inventory management, process analysis and quality management, and optimization.

Creation of Executive Advisory Board
To develop relevant hybrid curriculum, we strongly believed in the idea of industry collaboration and wanted to incorporate the industry insight. In addition, we believed that working with industry would be beneficial for this new major in terms of promotion and development. With the inception of the OTM
major, we also created an Executive Advisory Board (EAB) for OTM. The composition of the board was unique in that it featured 8 IT executives and 8 Operations executives. Our vision for OTM is to educate and fully prepare students for careers in Operations and Information Systems and to become an established source of exceptional talent and a resource of great value for the business community. EAB’s founding members consisted of 16 renowned IT and Operations executives sharing the same vision. In September 2008, EAB was established to advise, promote, and proactively support the interests of the OTM program and students. EAB has been instrumental to OTM’s success in every possible venue: EAB has helped us design OTM curricula featuring relevant skills, keeping it dynamic and relevant to current and future business needs. EAB has also helped us by offering internship positions and full-time job placements, often customized closely to concepts and skills our OTM program offers. EAB has worked closely with us through mentoring OTM students, delivering guest lecturers, and panels at career discussion to name the few.

**Creation of OTM Speed Networking**

On the premise that we needed to create a market for our graduates as well as to make our program attractive to prospective students, we identified internship and post-graduation employment placements as an OTM program critical success factor. Observing the University’s traditional internship and job fairs we noticed two disturbing patterns: 1) students tended to flock to the big name companies leaving others with little student contact, and 2) a handful of assertive students tended to monopolize company representatives’ time. Neither of these was conducive to the level of market awareness and placement capacity we wished to generate.

To address this issue we created ‘OTM Speed Networking’, a new and innovative form of internship fair modeled after speed-dating. We believed it was important for students to speak with every company, gaining awareness of the kinds of career/work accessible to them before deciding on the one company that excites them most. Every participating employer meets with every attending student for 7-10 minutes. One significant outcome that we observe time and again is that the students changed their company and career direction preferences, with high frequency, after participating in speed networking. For instance, students often indicate a strong preference for Company X’s internship, which they had not had even considered previously, having been influenced by preconceptions about their ideal company (usually one of the big companies in town), due to the exciting opportunities offered by Company X. Employers have been especially pleased with the speed networking event, liking the idea of interacting with all OTM majors and the fact that it allows them to very efficiently narrow the field to a manageable number of candidates for their open positions. OTM speed networking success has been so pronounced that the dean has followed our model with all of the other disciplines within the business school.

**Outreach Efforts by Faculty**

To establish true industry collaboration, all OTM faculty members have worked closely with key businesses and organizations strongly related to the OTM major within the immediate region: local chapters of Society of Information Management (SIM), American Production and Inventory Control Society (APICS), and Project Management Institute (PMI), as well as many key employers. Through the collaboration with these organizations, OTM has created a strong partnership and benefited the program in various ways: annual scholarships for OTM since 2009 (cumulative amount of $70,000), sending OTM students to monthly professional chapter meetings to network with professionals for the purposes of mentoring, having members from those organizations on campus for career night, special lectures, etc. In particular, with the collaboration with APICS, OTM students have been participating in APICS case competition for the past 4 years with considerable success.

In addition, we have worked with the local SIM chapter to have our students actively participate in its Science Technology Engineering and Mathematics (STEM) outreach to talk to middle school students to increase their awareness and interest in technology-related fields. All these actions have raised the visibility of the OTM major in the local region. In addition, during every fall semester, the OTM discipline hosts the annual ‘Meet-and-Greet’ event, a venue with which we actively recruit more business organizations with little or no previous understanding of our OTM program to come to campus and informally meet with OTM faculty, current students, OTM alumni, and EAB members. This informal
introduction establishes a conduit through which companies become engaged in speed networking, and possible collaboration and partnerships.

**Results**
The success of our approach is evident as shown in statistics collected since the program’s inception in fall 2008. The OTM major started with 4 students and increased its enrollment almost every year (Figure 1 and Figure 3) competing with traditionally popular business majors such as Accounting and Finance (Figure 2). We graduated three students in 2009 and the total number of OTM graduates reached 81 in spring 2014. The OTM major has enjoyed high placement rates upon graduation as compared to other majors – with 100% job placement for two years in 2011 and 2012. Most OTM graduates work as an ‘analyst’, probably an inevitable consequence of the OTM curriculum places on developing the analytical and critical thinking of students with quantitative skills (Table 2 and Figure 4). The positions for which our students were recruited are: business systems analyst (64%), data analyst (12%), supply chain analyst (8%), sales operations analyst (4%)(Table 3 and Figure 5). Additionally, in line with our vision of OTM, our graduates work in a variety of industries utilizing IT for better and more efficient operations.

![Figure 1 Undergraduate OTM Enrollment](image1)

![Figure 2 Top Four Business Majors By Enrollment](image2)
Figure 3 Number of OTM Graduates

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>Total</th>
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<td>Analyst</td>
<td>1</td>
<td>3</td>
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<td>2</td>
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<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 1 Composition of Top Four Job Titles (2009 – 2014)

Figure 4 Compositions of Top Four Job Titles (2009 – 2014)

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
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<th>2012</th>
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</tbody>
</table>

Table 2 Analyst Job Title Breakdown
In addition to encouraging placement statistics, the success of OTM program has also been evident through testimonies from its direct stakeholders including students and industry partners, as well as the university (its visibility gets heightened as a ‘go-to’ place for new hires with requisite skills set in local business community). The following is a representative sample of testimonies:

**Student/Graduates of OTM**

“I am certain that obtaining a degree in OTM will enhance the ability of a student to secure gainful employment within their chosen career field upon graduation. I am proof. Thank you for your hard work and efforts on my behalf. I will never forget the opportunities with which you and the program have provided to me”
“These days, I’ve been using the spreadsheet modeling techniques I had learned from OTM courses a lot. This is a serial skill that helps me to logically think. It also helps me to convince my company’s management team that is super logical”

“All the knowledge that I gained from the OTM courses is being put to good use at my new job. I wanted to let you know how much the OTM classes have helped me even in my first week! My team was grateful that I understand nuts and bolts about the project and know the concept of a query to pull information from different databases”

“What you and the OTM program taught me is just so amazing. You as well as the OTM program were a big part of the foundation of skills I learned forever I am truly blessed and extremely thankful that I was able to have you and all OTM faculty as professor and mentor over the years”

Industry Partners

“The OTM major has a curriculum that sets the foundation and covers essential skills required and highly touted in the area of IT and Operations today. I wish I had this major when I was in college”

“OTM graduates have been star performers at work from the start. They are very professional, smart (especially in problem-finding and analytical thinking), committed, and equipped with skills we seek. We would look forward to having more OTM graduates with the same pedigree on board in the future”

“One thing I like about the OTM major is its flexibility and agility to adapt to changes on top of its core courses”

The success of the OTM undergraduate program resulted in local business community expressing interest in a specialized graduate program in OTM. We introduced our MSOTM (Master of Science in OTM) degree in Fall 2015 aiming to provide graduate students with analytical and critical thinking skills through the hybrid OTM curriculum. MSOTM curriculum consists of a set of fundamental courses (business analytics, project management, process analysis and quality management, decision modeling, research methods) during the first year and in-depth coverage in specific courses during the second year depending on students’ inclination to specialize in IS (systems analysis & design, database management, telecommunication & network, E-Business, IT project management) or Operations (optimization, inventory management, supply chain management, logistics management, production & operations scheduling). To support and manage the new MSOTM program without mortgaging the quality and success of undergraduate program, we have added a full-time OTM faculty line and made a previously OTM core course an elective for non-OTM majors in order to free faculty availability for MSOTM.

Lessons Learned

The first lesson that became clear to us was that faculty must articulate and share clear vision of ‘how to be relevant in market’, take ownership and show conviction to that vision with a plan featuring actionable tasks, and realize the true value and meaning of ‘industry collaboration’ during the execution. If faculty can explain the value proposition to business practitioners, business executives are more than willing to partner with faculty and programs to make positive things happen.

One important critical success factor is the dedication of committed faculty who can put in time-intensive groundwork while balancing their limited resources over teaching, research and business outreach. In terms of business outreach, it is not typical of academics to proactively reach out to businesses. However, our experience is that once the faculty take the initiative, most businesses like our approach and are open to possible partnerships. Thus, we sincerely believe in the close collaboration with industry and business community to make the curriculum relevant. In addition, we believe a successful curriculum must feature courses that effectively combine theory with practice.
Another critical success factor is full support from the administration. Building and developing a successful program requires not only a strong commitment from the faculty, but great support in terms of financial resources and administrative support (given how challenging and time-intensive it is generally to create a new degree program going through multiple layers of review and approval in higher education).

One clear finding from our experience is that prospective OTM students like the idea of having many opportunities to gain exposure to real business opportunities through internships, meeting company representatives, and networking with EAB members, members of professional associations, and their colleagues, and that these potential students tend to be more interested in exploring about OTM and contributing to expanding awareness and excitement about OTM in the student population.

Conclusion
The success of this hybrid major, OTM, is based on the premise of relevant curriculum that provides value to all stakeholders, OTM faculty, OTM students, and industry (business community). To attract dedicated and committed students who show interest in learning analytical and critical thinking skills, the faculty must show substance in course offerings where prospective students can see their learning needs being met and in which they prepare themselves with the requisite skills for their future careers. To do so, outreach and close collaboration with industry is not optional, but necessary, to develop and sustain valuable and relevant curriculum. Such collaboration usually results in many opportunities for students concerning mentoring, job shadow opportunities, internships, and full-time positions. These opportunities enable students to make the connection between skills learned from the curriculum and the business practices where such skills are essential and applicable. In the coming years, we believe that only the growth and sustainability of IS-related or supported programs, rather than tenure, provide faculty members with stability and longevity. To sustain the success, faculty must continuously innovate in collaboration with industry as a guiding force. In addition, industry’s inclination towards programs with good track record of industry partnership requires universities to put forth continuous effort in taking these relationships to the next level.

References


