Approaches to Incorporating IT Entrepreneurship into the Information Systems Curriculum

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ABSTRACT

The success of tech company IPOs such as Facebook, Twitter, and Snap has not been lost on today's Information Systems (IS) majors. The demand for entrepreneurship education has grown rapidly from a just a few college classes in entrepreneurship in the 1970s to the over 3,000 colleges and universities providing entrepreneurship curriculum today (Davidson, White, and Taylor, 2012; Morris, Kuratko, and Cornwall, 2013). Information Systems (IS) students interested in launching their own tech startup can benefit from the common body of knowledge found in general entrepreneurship coursework. However, such coursework generally does not take into account the specific characteristics of IT services and software. This translates into the need for a special set of entrepreneurial skills for developing and launching an IT startup. While there has been some research into software and IT entrepreneurship in the fields of software engineering and computer science, little curricular guidance exists for IS students wishing to launch their own tech startup. This paper explores current approaches to teaching the IT and software entrepreneurial skill set. Experience with a dedicated course in tech startup entrepreneurship is described. A sample syllabus for IS majors is provided. The paper concludes with lessons learned and suggestions for implementing an entrepreneurship component as part of an undergraduate IS program.

Keywords: IT entrepreneur, Tech startup, IS major, Entrepreneurship, Pedagogy, Curriculum design & development, Experiential learning & education

1. INTRODUCTION

Venture capital funding for software startups is at an all-time high (Castellanos, 2014). Acquisitions of break-the-mold innovators such as Skype ($8.5B in 2011), WhatsApp ($19B in 2014), and LinkedIn ($26.2B in 2016) by major software houses like Microsoft and Facebook continues apace with astounding market capitalizations. Finally, the success of tech company IPOs such as Facebook, Twitter, and Snap has not been lost on today's college students. With this, the demand for entrepreneurship education has grown rapidly. From just a few college pioneers offering courses in entrepreneurship education in the 1970s, today there are 3,000 colleges and universities fielding entrepreneurship coursework and programs. Most of the offerings are located in schools of business with coursework either delivered by a separate entrepreneurship academic department or offered through management departments (Morris, Kuratko, and Cornwall, 2013; Shinnar, Pruett, and Toney, 2010).

Student interest in entrepreneurship education ranges from a single course to a full-blown undergraduate major or graduate masters in entrepreneurship (Staff, 2015). Undergraduate majors and minors in entrepreneurship and MBA concentrations in innovation and entrepreneurship

continue to capture student interest (The George Washington University Center for Entrepreneurial Excellence, 2014), with enrollments in entrepreneurship minors trending up. Typical curriculum includes a common body of knowledge designed to develop entrepreneurial skills (Kourilsky, 1995). Information Systems (IS) students interested in launching their own tech startup can benefit from this common body of knowledge found in general entrepreneurship coursework. However, as Kontio et al. (2006) claim, "general business education does not take into account the specific characteristics of software." This translates into the need for a special set of entrepreneurial skills for developing and launching a tech startup, such as addressing the "chicken/egg problem" for multi-sided markets (Evans, 2003) or the production and marketing of networked digital goods (Kontio et al., 2006). While there has been some research into software and IT entrepreneurship in the fields of software engineering and computer science (Fu, Doboli, and Impagliazzo, 2010; Hickey and Salas, 2013), little curricular guidance exists for Information Systems students wishing to launch their own tech startup (Frydenberg, 2013). A promising pedagogical development (Hickey and Salas, 2013; Järvi, Taajamaa, and Hyrynsalmi, 2015) is the use of the Lean Startup methodology (Ries, 2011) to teach software entrepreneurship, a

methodology which has its roots in the Agile Software Development.

This paper explores current approaches to teaching the software entrepreneurial skill set. After a summary of the relevant literature, experience with a dedicated course in tech startup entrepreneurship is described. A sample syllabus for IS majors is provided. The paper concludes with lessons learned and suggestions for implementing an entrepreneurship component as part of an undergraduate IS program.

2. SOFTWARE AND IT ENTREPRENEURSHIP IN THE CURRICULUM

According to Katz (2003), the modern entrepreneurship education movement began in the early 1970s. Early forays into comprehensive entrepreneurship curriculum can be traced to the University of Southern California with its entrepreneurship concentration in the MBA program and later its undergraduate major in entrepreneurship. By the 1980s, Kuratko (2005) reports there were over 300 universities sponsoring courses in entrepreneurship and small business management. Initial academic debate centered on whether entrepreneurship could, in fact, be learned, calling into question the appropriateness of teaching something that was believed to be inherently inborn. Further research debunked the myth that entrepreneurship (like leadership) cannot be taught (Henry, Hill, and Leitch, 2005a, 2005b). The upshot was a keen interest within academia for shaping an entrepreneurial mindset and imparting entrepreneurship skills such as opportunity identification, customer development, and business model development. Perhaps, the management sage, Peter Drucker (1985), articulated the modern entrepreneurship education mantra best: "It's a discipline. And, like any discipline, it can be learned."

Today, thousands of colleges and universities around the globe host seminars, courses, and programs in entrepreneurship (Morris, Kuratko, and Cornwall, 2013). Often, those programs are housed in schools of business (Morris, Kuratko, and Cornwall, 2013; Shinnar, Pruett, and Toney, 2010). They are usually general in nature, focusing on a universal set of entrepreneurship skills for new business development. Rarely, however, are they tied to the information systems discipline directly or to IT and software entrepreneurship in particular. There are exceptions. Some programs differentiate themselves by taking a domain specific approach such as focusing on entrepreneurship for medical professionals, music/film/television production, or environmental science (Shinnar, Pruett, and Toney, 2010). Engineering schools often sponsor innovation centers with linkages to campus technology transfer initiatives. In the realm of IT entrepreneurship, many computer science programs have a history of engaging in software product development (Daimi and Rayess, 2008). Specialized entrepreneurship education for Information Systems majors is rare (Read, Derrick, and Ligon, 2014), perhaps because most business schools have taken a general approach to skill development. In the next subsection, we review the literature on entrepreneurship education in software engineering and computer science programs. Following that, we examine the sparse literature on entrepreneurship education in information systems programs.

2.1 IT Entrepreneurship in Software Engineering and Computer Science Programs

For many years, the software engineering and computer science academic communities have explored the integration of entrepreneurship education into the curriculum (Kontio et al., 2006). The literature reveals examples of common strategies for curriculum inclusion: (a) adding topics to a required existing course (Fu et al., 2010), (b) redesigning an existing course (Kussmaul, 2000), (c) experimenting with the capstone course (Björkqvist et al., 2012), (d) developing a stand-alone software/IT entrepreneurship course (Aaen and Rose, 2011; Daimi and Rayess, 2008), (e) implementing an entrepreneurship-across-the-curriculum initiative (Gary et al., 2008), and (f) offering a course series (Hickey and Salas, 2013) or an entire program dedicated to software entrepreneurship (Bareiss and Mercier, 2010).

In terms of IT Entrepreneurship pedagogy, Kussmaul's paper on converting a systems design and implementation course into project-based software entrepreneurship class, Daimi and Rayess' (2008) paper on the role of software entrepreneurship, and Björkqvist et al.'s (2012) paper on integrating innovation into the capstone project course provide the most detailed insight into a potential course design for an IS course offering.

Kussmaul (2000) describes the redesign of the CS 334 *Systems Software* course into a projects course at a small private college in the eastern U.S. Redubbed *Systems Design and Implementation* (CS 334), the revised computer science course was enhanced to emphasize entrepreneurship and communication skills needed for startup ventures. Students were assigned to teams and undertook projects with a common theme. Financial support for the course redesign came from VentureWell, formerly known as the National Collegiate Inventors and Innovators Alliance (NCIIA), and a local foundation. Course design goals included experience with a significant software project, exposure to the vagaries of project management and non-technical issues attendant with real-world assignments, and improved written and oral communication skills honed for entrepreneurship. The course was structured as a virtual software development company with the instructor acting as the general manager (GM). Teams met weekly with the faculty GM to provide progress reports.

The entire class convened at least once a week for guest lectures, code reviews, and project-related presentations. The GM assigned readings based on the nature of problems and challenges arising from the project. At a minimum, topics covered in the course included software engineering, project management, business fundamentals, and entrepreneurship. Each semester was centered around a development theme (e.g., handheld computers). By the end of the course, students were expected to produce a proof-of-concept to demonstrate product feasibility. Team composition was decided by the GM instructor with team members required to commit to an Employment Agreement and a Code of Conduct that set out expectations for team participation. External resources included student volunteers from the *Business and Community Writing* course (English 295) who reviewed and edited project team member documents. Future directions for the course redesign included the need to add more content on project management (e.g., work breakdown schedules, Gantt charts)

and a transition to multidisciplinary teams with students from other departments to round out the group's skill set.

Daimi and Rayess (2008) proposed a stand-alone course in software entrepreneurship targeted to computer science and engineering majors. In their model, the course would cover "essential concepts, methods, techniques, theories, models, and practice of entrepreneurship" (p. 56). This content would be coupled with entrepreneurial practice in the form of a term project. Students would be expected to identify a commercial software opportunity and develop a business plan to promote the software product. The plan would include feasibility, marketing, financial, and risk management components. Students would also be expected to explore new venture financing. In addition to the course project (40% grade weight), students would be assessed through an exam (15%), case studies (15%), a research paper (10%), and guest speaker and instructional video reflection papers (20%). Course resources would include interdisciplinary faculty, guest speakers, and working entrepreneurs acting as external mentors. While the course has never been implemented (Daimi, 2016), it offers an interesting perspective on course design for technical majors not previously exposed to previous entrepreneurship education.

Björkqvist et al. (2012) detailed how they integrated innovation education into a multidisciplinary, project-based, capstone course in a small Finnish university. The motivation for the revision was the consolidation of computer technology and information systems majors into the department of computer science. With students from three separate but related disciplines, the authors decided to update the capstone course to focus on software entrepreneurship. Students self-formed teams, developed their own project ideas, and produced a working prototype. The instructor assisted the group process by providing guidance on Tuckman's (1965) stage model of group development. Team composition was between four and six students complemented by a faculty mentor. The mentor's role was to ensure the team stayed on track with the required milestones; teams met with the mentor on at least four occasions.

Course deliverables included (a) a working professional quality prototype suitable for display at the annual showcase event open to the public and (b) a business plan demonstrating how the product created value and could be launched into a viable business. The five-unit, masters-level course spanned seven months and was assessed based on an initial team presentation (10%), a demonstration of the in-progress prototype (30%), and evaluations of the final deliverables (60%). The focus of the course was on "doing" entrepreneurship under the guidance of a faculty mentor. An external panel of business-oriented professional and members of the student entrepreneurship club judged the final presentations. As partial evidence of the success of the course revision, the authors cite the launch of two IT startups as an outgrowth of the project course (Björkqvist et al., 2012).

2.2 Software Entrepreneurship in Information Systems Programs
The 2010 IS Model Curriculum (Topi et al., 2010) does not directly mention entrepreneurship, nor does the 2015 curriculum proposal by Rosenthal, Dhariwal, and Whitehouse (2013). IS 2010 does, however, place emphasis on

"[e]xploiting opportunities created by technology innovations" (Topi et al., 2010, p. vii) in the service of the IS profession. The model curriculum authors seem to have been focusing more on monitoring new technology to achieve competitive advantage than in launching a startup. We take a broader reading. IS majors should not only apply new technology to create value for their organization, but should seize the opportunity to create their own tech companies. This requires a set of entrepreneurial skills largely missing from traditional IS curriculum. Further, that skill set requires attention to the unique characteristics of software and IT solutions as the products to be manufactured, sold, and distributed (Read et al., 2014).

While most of the extant literature on software and IT entrepreneurship draws from the realm of computer science and engineering, there are a few academic pioneers who have explored entrepreneurism in the Information Systems curriculum. Approaches include: (a) identifying the role of entrepreneurship self-efficacy in student intention to launch a startup (Chen, 2013), (b) providing an entrepreneurial experience by re-purposing the traditional tutoring lab as a quasi-business startup (Frydenberg, 2013), (c) injecting information technology fundamentals into a course targeted to small business/entrepreneurship majors (Wang and Wang, 2015), and (d) the introduction of elective courses in Applied IT Innovation (Read et al., 2014) and Lean Software Startup (Järvi, Taajamaa, and Hyrynsalmi, 2015).

To better understand the factors that influence college students to pursue IT entrepreneurship, Chen (2013) surveyed business students at a mid-sized, public university in the U.S. Midwest ($n = 116$). Using structural equation modeling, he found that students' intention to undertake new venture development can be traced to their belief in their ability to succeed as an entrepreneur, anticipated outcomes and rewards, and a supportive social network. Based on the results of his research, Chen advanced several recommendations regarding IS curriculum: (1) teach IT development trends and the implication to business, (2) train IS majors to transform technology innovation into business ventures, and (3) improve student's technology and entrepreneurial self-efficacy. Suggestions for increasing entrepreneurial self-efficacy included involving students in business plan competitions, inviting entrepreneurs to guest lecture, encouraging internships with entrepreneurial companies, and incorporating real-world projects into the systems design course.

Frydenberg (2013) described an experiment in which the campus computing lab at a small, private college in the U.S. Northeast was re-imagined as a learning lab for entrepreneurship. The physical space was converted from a formal desktop computer lab with rows and rows of PCs to an informal lounge with group tables and collaboration displays for multiple attached devices. To encourage exploration, a variety of hardware, operating systems, gaming platforms, and tablets were provisioned. The lab layout was remodeled to "promote a sense of playfulness and discovery" (p. 36). Lab governance adopted a quasi-business perspective to operations, inviting staff to "take ownership" by developing extracurricular activities (mobile app development, game development) and a social-media presence, complete with blogs and screencasts. Survey results from students involved in the project ($n = 15$) indicated that the "CIS Learning and

Technology Sandbox" did indeed facilitate development of entrepreneurial skills such as risk-taking, resourcefulness, and creativity.

Wang and Wang (2015) proposed an indirect approach to entrepreneurship integration. Rather than introduce entrepreneurship content into the IS curriculum, Wang and Wang inverted the pedagogy, choosing instead to inject key information technologies into a course designed for small business and entrepreneurship majors. In this elective course, the culminating deliverable was a "project report of comprehensive IT planning for a real small business organization" (p. 39). The focus was supporting entrepreneurs with exposure to IT solutions and services. The course was successfully classroom-tested using a fully online delivery mode with non-IS students majoring in small business/entrepreneurship.

Read, Derrick, and Ligon (2014) took a more direct approach, opting to introduce a new course in IT entrepreneurship as part of an interdisciplinary Bachelor's in IT Innovation at a large, Midwestern U.S. university. ITIN 2220 *Applied IT Innovation* employed Agile Development methods to foster entrepreneurial skills. Fourteen students ($n = 14$), participating in four development teams, were required to create a minimum viable product (MVP) by semester's end. (An MVP, as defined by Ries (2011) is that version of a new product which allows a team to collect the most validated learning from target customers with the least development effort. In short, an MVP is a customer prototype and can be something as simple as a paper mockup to a partially-featured working prototype.)

The MVPs were then used to solicit customer feedback in order to determine need for the product under development. Students began the process with an "80 Word Idea Pitch Presentation," self-formed into teams, and then undertook four 3-week Scrum-style sprints. Faculty provided mentoring which included technical guidance, help with team dynamics, and assistance with the Agile Development process. Near semester end, teams were required to formally pitch their products (three mobile apps/one web app) to invited venture capitalists.

The authors cite initial investments ($25k - $50k) in two of the products as partial evidence for the success of the student projects. Based on end-of-project surveys, the authors maintain that Agile methods can increase the likelihood of developing entrepreneurial skills. Lessons learned included (1) project ownership provides critical incentives to practice entrepreneurship, (2) structure in the form of goal-directed learning and required deliverables improves the chances for student success, and (3) coaching and mentoring enable students to navigate the entrepreneurial and product development process. Although ITIN 2220 provides an interesting approach to embedding software entrepreneurship into the curriculum, those considering adopting such a strategy need to realize that according to the most recent university catalog (University of Nebraska, 2016), the course is a continuation of ITIN 1110 *Intro to IT Innovation*. Realistic implementation would require a two-course sequence or a single course with considerable front-loading of entrepreneurship basics (e.g., Lean Startup Method with attention to Minimum Viable Product (Ries, 2011), Customer Development (Blank, 2013), Business Model Canvas

(Osterwalder and Pigneur, 2013)) and a reduction in project scope given the duration constraint of a single course.

Järvi, Taajamaa, and Hyrynsalmi (2015) describe a recent attempt to incorporate the Lean Startup approach (Ries, 2011) into a 15-16 week, two-part software entrepreneurship series. The five credit-hour course is targeted to software engineers and business students and meets program requirements for the B.S. Information Technology. The course is designed to provide a "realistic and hands-on experience on creating a software-based product/service in a high growth startup context" (University of Turku, 2017). DTEK 1063 *Lean Software Startup* includes a series of lectures on the Lean Startup Method (Ries, 2011), Customer Development (Blank, 2013), and the Business Model Canvas (Osterwalder and Pigneur, 2013). The course then quickly transitions to a project-development format. Students self-form into teams to produce four deliverables which the authors called "gates." The course instructor, an experienced entrepreneur with an academic background in information technology, mentors the teams in weekly, one-hour sessions. The first deliverable, due in week five, is a presentation on how the team organized and the team's business idea. The second deliverable (week nine) is a demonstration on the minimal viable product along with a plan for customer acquisition. In week 13, students present the third deliverable, a refined MVP along with customer feedback. The fourth deliverable is due in Week 16 and consists of a full-scale demonstration and a 5-minute product pitch. In week 17, the teams conduct a course debriefing through a project retrospective moderated by the instructor.

At the end of the course (Week 18), students submit three logs – a course-long learning log, a daily diary, and a compendium of weekly team logs. The learning log is designed to capture weekly insights into what the student has learned and is submitted for review by the instructor. The daily diary is for purposes of tracking student hours on project activity. Finally, the weekly team log facilitates student reflection on the team and project process. At the time the paper was written, the course had been offered 3 times with an average of approximately 25 students. The first offering (Fall 2011) consisted solely of technology students. In the other two offerings (Fall 2012 and Spring 2014), business students comprised approximately one-third of the class. The course is still currently being taught (University of Turku, 2016). The authors reported a positive experience with all three offerings concluding that the course is "inspiring" for the students and "fun" to teach. Major challenges were the (a) Teaching Load – the effort required to host a multidisciplinary course spanning several disciplines and the need to provide serious mentoring to the teams, (b) Mindset Shift – the difficulty students had transitioning from clearly defined course assignments to unstructured problem solving, and (c) Team Composition – often the teams had insufficient technical experience to complement the skills brought to bear by the business students (Järvi, Taajamaa, and Hyrynsalmi, 2015).

3. AN APPROACH TO TEACHING SOFTWARE ENTREPRENEURSHIP

What do the course profiles described in the previous section have in common? Software and IT solutions entrepreneurship can be successfully integrated into an information systems

curriculum. What is needed are additional models for how this integration should take place. This section details a seven-year effort at California State University – Northridge, a large, urban university on the U.S. west coast, to develop a stand-alone, high tech startup elective for undergraduate IS majors. Recent developments to extend the reach of the course to an interdisciplinary student audience will also be discussed.

3.1 The Genesis of the Tech Startup Entrepreneurship Course

Much as we would like to say the launch of the Tech Startup Entrepreneurship course was the result of a comprehensive curriculum review and student demand surveys showing strong interest in IT entrepreneurship, we cannot. The reality is much less analytical and more entrepreneurial.

3.1.1 The invitation: Seven years ago the accounting and information systems department chair asked one of the authors to stop by his office to discuss the upcoming fall teaching schedule. "We have room to introduce a new course next Fall," he said. "What would you like to teach?"

Identifying opportunities is the hallmark of a good entrepreneur. Here was an opportunity just waiting to be seized – the opportunity to teach students to transcend their role of simply solving business problems with information technology to actually creating a new business with that same technology. Because the class was a senior-level, special topics course, IS majors would have completed most of their business and information systems core courses.

3.1.2 Course objectives: From the outset, the course objectives were ambitious but realistic. Students would be introduced to the entrepreneurship process in the context of an information technology startup. As students worked through the steps in developing a viable business idea, they would be exposed to the obstacles to success and strategies for addressing those obstacles. Students would have the opportunity to hear from a spectrum of entrepreneurs and get feedback on their own business models. By the conclusion of the course, students would be better mentally prepared for the tough journey ahead should they pursue a career involving the launch of a new IT venture. The following course objective from the syllabus provides a complete description of the cognitive and affective goals of the course:

> This course is intended to help students gain knowledge and skills that are the foundation to becoming a successful entrepreneur in a business that revolves around technology. The course provides aspiring entrepreneurs a preview of the startup journey, beginning with an idea and running all the way through the initial phases of a business venture. Students learn about business plan formation, early-stage capital, small business market development and sales, small business operation and planning, and software life cycles. Students will acquire or enhance problem identification/definition aptitude, self-help ability, solution development know-how, as well as communication and collaboration skills.

3.1.3 Original course design: In order to create a learning environment to achieve the course objectives, several factors were considered: (a) student preparation, (b) depth of entrepreneurship coverage in existing curriculum, (c) course duration, (d) access to subject matter experts, and (e) class size.

3.1.3.1 Student preparation: In our Information Systems program, the standard prerequisite courses for any IS elective, including *Special Topics – Information Systems*, are the major core. These includes information systems for business, systems analysis and design, database management systems, and business data communication/networking. In addition, most IS students have completed a fundamentals of programming series. Of these prerequisite IS courses, we found the IS survey course (information systems for business) to be essential in providing a foundation for technology-based entrepreneurship.

As business majors, Information Systems students will have also completed the lower division business core which includes financial and managerial accounting, business law, micro- and macroeconomics, business applications: spreadsheets and databases, and business communication. In addition, they will have completed a junior-level business gateway course which focuses on case analysis, effective teams, and additional skill building in written and oral communication. While some students taking the IT Entrepreneurship course may have begun the upper division business core, student preparation varies in the areas of finance, management and organizational behavior, marketing, operations management, and business strategy.

With the strong emphasis in the IT Entrepreneurship course on creating a working business plan (see Section 3.1.4), the prerequisite courses in accounting and spreadsheets provide the foundation for teaching financial projections and pro forma financial statements. The business communication and business gateway courses give the students practice in writing business prose, working in groups, and making professional presentations. Because many students taking the IT Entrepreneurship course may not have completed the business core in Marketing or Finance, these topics required special attention in the design of the course.

3.1.3.2 Depth of entrepreneurship coverage: As is true in many business programs, the context for the foundational coursework focuses on large corporations offering little exposure to the operational nuances of small and medium sized-enterprises (SMEs). Although there are several courses in the business school with entrepreneurship content available for students, most are offered at the senior-level and none are required for graduation in information systems. For purposes of course design, it was clear that additional content exclusive to the entrepreneurial process would form the basic architecture of the Tech Startup Entrepreneurship course.

3.1.3.3 Course duration: The Special Topics course is offered during a regular semester which is 16 weeks in length. Given this duration constraint, the following topics were selected:

- Lean business model and business model canvas
- Business analysis (market vs. industry; SWOT)

- Writing a business plan
- Coming up with credible numbers (top down vs. bottom up)
- Role of the rainmaker and the sales process
- Marketing (partnering, branding, and intellectual property)
- Product, services, and operations
- Alternatives to and process of obtaining startup capital

3.1.3.4 Access to subject matter experts: With such a breadth of topics to cover, no one faculty member had the depth of knowledge to deliver content at the level needed to meet course objectives. For this reason, it was decided to turn to subject matter experts that could dive deeper into some of the topics and ensure complete coverage of the course curriculum. To supplement the structured material on entrepreneurship provided by the instructor, working entrepreneurs were invited to guest lecture. In terms of the selection of guest speakers, the objective was to expose the students to a spectrum of possible lecturers ranging from newly-minted to seasoned entrepreneurs, small to large-scale venture executives, and from young to mature practitioners. Topics ranged from hot trends (social, mobile, and cloud) to traditional technology sectors, low- to high-tech sectors, and from startup marketing to entrepreneurship finance. Thirty business professionals and entrepreneurs have participated in the guest lecture series, with many opting to come back year after year. Most of the guests (82%) were founders of their business. A little under half were alumni of the campus or sister campuses in the state university system.

3.1.3.5 Class size: The final factor critical to the initial course design was class size. With the support of the department chair, the number of students was kept to 30 or less. This was by design. We are strong believers in experiential education, what John Dewey (1916) popularized as "Learn by Doing." In this hands-on course, students were not only expected to learn entrepreneurship fundamentals, but to experiment and reflect on them until they had developed a minimum viable product (Ries, 2011). The smaller class size made it possible to mentor a manageable number of student teams.

3.1.4 Course requirements: Like many of the software entrepreneurship exemplars from the literature (Björkqvist et al., 2012; Järvi, Taajamaa, and Hyrynsalmi, 2015; Kussmaul, 2000; Read, Derrick, and Ligon, 2014), by the end of the course, students were expected to have identified a business opportunity and developed their idea into some kind of business model. Twenty percent of the student grade was based on a business analysis presentation including need validation, market analysis, and industry overview. During this phase of the course students were to develop "elevator pitches" (30-second promotions for their business idea) and present their pitches to the guest lecturers for feedback. By the last month of the course, students were to have fleshed out a business plan and presented it. Grade weighting for this assignment was 20% and included a business model; pro forma financials and projections; and marketing, sales, and operations plans. At the end of the course, students turned in a final written business plan (20%). Attendance and participation in the guest lecture series were each worth 20%

of the grade. To assess individual involvement in the team process, another 20% of the grade was awarded based on team member evaluations.

3.2 Evolving the Tech Startup Entrepreneurship Course
As each successive year progressed, the guest speakers took on the additional role of "sounding board" to hone students' business ideas and business plans. Before the class session in which the speaker was scheduled to lecture, each guest was forwarded the business model canvas and elevator pitch script for each student team. During class, the students then presented their elevator pitches to guest lecturers to solicit reaction and feedback. These live pitch sessions helped students refine their 30-second speeches as well as the business ideas themselves. By the end of the semester, the praxis and feedback exercise made it possible for students to better grasp what practicing entrepreneurs were looking for in a successful pitch presentation. By week 15, students were fairly comfortable explaining their ideas and business models in clear and concise terms.

This evolution of guest speaker role in the student learning experience took subject matter expert lecturer/student interaction to a whole new level – far beyond the traditional invited guest speaker norm. The back and forth discussion between the guests and the students and the impromptu brainstorming that ensued engendered a creative process that both sides actively engaged in and enjoyed as well. To date, 113 students have completed the Tech Startup Entrepreneurship course (Table 1). Students have developed a wide range of business ideas in a variety of information technology sectors. Sample projects include:

- **Exchange/Auction:** *SkyVision* – an exchange for film projects and drone pilots
- **IT Services:** *INN3R Vox* – computer-aided production of voice/speech for the disabled
- **Mobile:** *Fasbite* – on-demand food delivery service on or near campus
- **Social Media:** *Guzzle* – ride sharing to save gas in the metropolitan cities
- **Web/Cloud:** *ClockIt* – shift swapping to enable employees to cover each other's work shift
- **Other:** *Evercare* – on-demand access to non-medical care services

The intent of the project was for students to develop a viable business plan. With regards to the technical content of these sample projects, students were expected to demonstrate just enough technology to allow investors to determine if the business ideas were technically and financially feasible. Often, this translated into having the students explain the "what" and "how" of their project. Students are not expected to build prototypes in this course.

In Fall 2016, the grade weightings were adjusted slightly. To reinforce material covered in the guest lectures, pop quizzes worth 20% of the course grade were added. Participation was reduced to 5%, as well as was attendance (5%). Instead of two team presentations at 20% each, the Team Presentation component was consolidated into a single final presentation worth 30% of the grade. The Final Business Plan (20%) and Group Participation (20%) grade components

	Students			Number of Student Projects by Information Technology Sector					
Year	Enrollment	Percent Male	Percent Female	Exchange/ Auction	IT Services	Mobile	Social Media	Web/ Cloud	Other
2010	17	82%	18%	1	3		1		
2011	22	82%	18%			2	2	1	
2012	17	76%	24%			2		2	
2013	19	89%	11%	1				1	2
2014	11	73%	27%	2				2	
2015	15	80%	20%		1		3		2
2016	12	83%	17%		1	3			

Table 1. Course Enrollment and Gender Composition/Student Projects by Information Technology Sector

and weighting remained unchanged. For a complete sample syllabus for the Tech Startup Entrepreneurship course, see Appendix A.

3.3 Lessons Learned
The Tech Startup Entrepreneurship course has been offered seven times over the last seven years, usually in the fall semester, on a Saturday. Over time the course has evolved to address several lessons we have learned in delivering what has been the only entrepreneurship education on our campus targeted directly to IS majors.

3.3.1 Guest speakers like Saturdays: Trying to get guest speakers to class during the business week can be challenging. Entrepreneurs are willing to guest lecture on Saturdays – 9:00 a.m. is not too early. An experiment one semester with a Friday evening class schedule resulted in some negative feedback from the guests as to the class meeting time and reluctance to fight heavy traffic on the freeways and surface roads.

3.3.2 Outside judges uncomfortable with giving grades: Using external judges for assessing term projects provides an expert perspective on the quality of the course outcomes, but asking those judges to assign a letter grade makes them uncomfortable. Our experience is that outside judges would much rather provide verbal feedback to students regarding their entrepreneurship final presentation than provide input for course grades. Judges see their role as offering developmental advice in a positive learning climate. Rating student presentations and projects interjects what could be perceived as negative messages; guests see that as the instructor's responsibility.

3.3.3 Guest speakers add interest but are difficult to scale: One of the biggest challenges to teaching entrepreneurship is to avoid turning it into a "teach-from-the-textbook" course. The passion drains, and the course quickly becomes lifeless. Guest speakers add interest, provide "real world" credibility, but require significant planning and coordination, not to mention arranging for free parking on campus. Our course relies on 10 or more outside experts per semester. The logistics and time commitment for the speakers becomes difficult to scale if offering multiple sections. In the future, we

plan to experiment with lecture capture to see if this approach would yield equal (if not at least acceptable) student results.

3.3.4 Students like to pick their own project: No surprise here. It is easier to get excited about your own ideas rather than someone else's even if experts generate the ideas. We experimented with pre-selected topics for those students who could not come up with any viable business ideas. The pre-selected projects came from existing real world startups from a previous semester. Although the data collection process was easier for the students since the companies could provide most of the general environmental data and the operational specifics, the students' inability to leverage that advantage into a superior project was disappointing. This confirmed our belief that when the ideas are not theirs, students are much less engaged with their project.

3.3.5 A good idea is NOT all you need: Students often come into class on day one thinking that one "killer" idea is all you need for a successful software startup. We have found that the instructor needs to set suitable expectations. Startups require a viable idea, the right people, proper positioning of the business, and generally, a way to solve "the chicken and the egg" problem (two-sided market) when it comes to a mediated service offering. Software platforms are a unique business in that instead of a single customer, they require acquiring two or more distinct customer groups and keeping them on board in order to succeed (Evans, 2003). Social media apps, for example, require both content producers and content consumers to be viable. Solving "the chicken and the egg" dilemma often involves multiple strategies (Salminen, 2014).

3.3.6 Effective idea development cannot be rushed: A boot camp approach with its short time frame and intensity can help flesh out a product idea. However, we have found anything less than a traditional semester timeframe (15+ weeks) is insufficient in order to do adequate market research and business analysis. During the course students are asked to give elevator pitches to the various guest speakers to solicit feedback. As the semester progresses, student ideas are refined by the comments of the guest speakers. By the end of the semester, students have heard just about all the questions that an interested investor might ask and are able to provide a

reasonable explanation as to their chosen approach to the startup.

3.3.7 Guest speakers serve a dual function: Not only do guest speakers provide topical coverage on key facets of high-tech entrepreneurship, they act as invaluable sounding boards for student product pitches. By the end of the course, students have typically received feedback regarding their business ideas from 10 to 12 entrepreneurs.

3.4 Suggestions for Future Improvements
The Tech Startup Entrepreneur course continues to be adapted to better meet the needs of information systems and technology students. The following recommendations reflect plans we have for improving the offering and better integrate it with a major curricular effort in our college and across campus to expand entrepreneurship education:

- *Remove the Temptation to Text during Guest Lectures* – Guest speakers volunteer their valuable time – time they could be out promoting the "Next Big Thing." We owe it to them to create a classroom climate free from unnecessary distractions. Before the lecture begins, have students turn off their mobile devices. Then collect the phones for return after class. Consider pop quizzes to reinforce lecture content.
- *Arrange for More Female Entrepreneur Guest Speakers* – The current cadre of guest speakers is over-weighted toward males making it look like entrepreneurship is "too much of a guy thing." We need more female role models for the students.
- *Wearable Tech Deserves More Attention* – Some of our guest speakers discussed new product developments in wearable tech but it was happenstance rather than planned. Wearable is the next step in pervasive computing. We recommend wearable tech become a programmatic component of any elective course on IT entrepreneurship. Early on, we envision at least one guest lecture on the topic with opportunities for IS majors. The focus would not be so much on creating the product but how IS majors could use APIs to build pervasive computing solutions that integrate wearable with organizational information needs.
- *Information Technology Students Lack Fundraising Skills* – Coursework in financial and managerial accounting required as part of the business core ensures that students know what balance sheets, profit-and-loss statements, and cash flow statements are. What is missing is an understanding of the investor mindset. This can be in part due to a lack of preparatory coursework in Finance (this upper division business core is not a prerequisite for IT Entrepreneurship, although some students will have completed it). This poses a challenge for us. Students need more experience in pitching to investors and thinking like an angel investor, high net-worth individual, or venture capitalist. We plan on strengthening the existing course with additional material on new venture finance to overcome this preparatory deficit.

- *Self-Formed Student Teams Often are No Better than a Clique* – When asked to create project teams, students often gravitate to their friends. Unfortunately, "like attracts like" means that the resulting team ends up with all members having the same skill set. Further, the "choose your friend" approach often creates a cliquish social dynamic that excludes the kind of diversity needed for success. We recommend exploring other alternatives to team formation that require skill-balancing. A possible no-cost, automated solution is to use team formation software such as CATME Team Maker. This web-based package takes into consideration demographics, student performance metrics, and team meeting schedule constraints to better balance team composition (Simmons, 2015).
- *Marketing Bits is Not the Same as Selling Traditional Products* – Just as conventional distribution channels ill-serve software delivery logistics, traditional product marketing is a poor fit for selling tech products. The adoption cycle is different as is the advertising medium mix (Moore, 1991).
- *Engage Students with Entrepreneurship Novels* – For some students the excitement of creating a high-tech startup can be easily diminished by an unfamiliar vocabulary and new venture concepts foreign to mainstream business education with its corporate focus. A novel approach to business education through didactic fiction has proven successful as a gentle introduction to what can seem like overwhelming new content (Jones and Dosanjh-Zucker, 2014). One suggestion for easing students into the foundational concepts of entrepreneurship would be to assign book-length fiction such as *All In Startup: Launching a New Idea When Everything Is on the Line* by Kander (2014).
- *Open the Course to Other Business Majors* – During the development process for the college's entrepreneurship minor, the IT Entrepreneurship course was included as an elective under the experiential component. The prerequisites were retained. This limits the ability for non-MIS majors to participate. Going forward, we expect to relax the prerequisites so that non-MIS majors can take the course. This will help provide more "balance" in the teams and allow us to shore up the areas where MIS majors may not have the financial/accounting/marketing expertise.

4. RECOMMENDATIONS FOR INCORPORATING ENTREPRENEURSHIP INTO THE IS CURRICULUM

As mentioned earlier in the literature review subsection 2.1 *IT Entrepreneurship in Software Engineering and Computer Science Programs*, there are several common strategies for incorporating new elements into a curriculum. These include but are not limited to: (a) adding new content to an existing course; (b) exploring the new content in a special topics course or senior seminar (c) redesigning an existing course using the new content as a structuring framework; (d) integrating the new content into the capstone or projects course; (e) developing a new course, series of courses, or program based on the new content; and (f) integrating the new content across the entire curriculum for the major. The extent

and timing of the integration is largely a function of the flexibility in the university's curriculum development protocol and constraints on degree programs (e.g., maximum number of units for graduation).

The 2010 IS Model Curriculum for undergraduate programs (Topi et al., 2010) sponsored by the Association for Information Systems (AIS) and the Association for Computing Machinery (ACM) introduced a flexible degree design with a seven-course core for a total of 21 semester units (42 ECTs). For a typical AACSB-accredited program offered in a North American business school (Figure 1), the model suggested an eight-course IS major complemented with an eight-course business core. This model allowed for a four-course business minor.
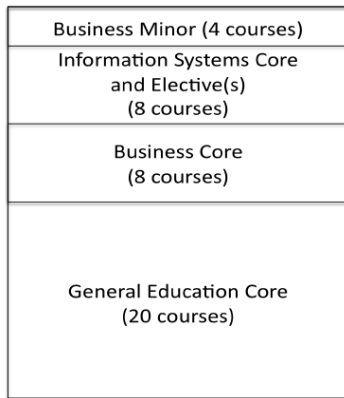
Business Minor (4 courses)

Information Systems Core
and Elective(s)
(8 courses)

Business Core
(8 courses)

General Education Core
(20 courses)

Figure 1. Undergraduate IS Degree in a Typical AACSB-accredited North American Business School (Source: IS 2010 Model Curriculum, Fig. 8, p. 29)

One way of depicting IS 2010 is as follows (Figure 2) [adapted from IS 2010 Model Curriculum, Fig. 7 (Topi et al., 2010)], assuming the courses available for a business minor can be applied to the IS major.

The sample IS 2010 Curriculum for a *non*-business school environment in North America is even more generous in terms of the number of courses available. The sample allocates 15 courses to the IS major, providing the option for up to 8

elective courses (Topi et al., 2010). Clearly, it is structurally possible to introduce a new course into a program patterned after IS 2010 without displacing any core requirements. The approach taken at our institution (see Figure 3) involved developing a new three-unit elective course (Tech Startup Entrepreneur) that could be applied toward meeting the IS program degree requirements.

Morris, Kuratko, and Cornwall (2013) discussed the common progression of entrepreneurship education as it develops into a full-fledged program. Typically, the chronology begins with a course or two promoted by faculty with research and practitioner interest in entrepreneurship. Often these experimental topics or new elective courses are offered in a business school. From there the one-off entrepreneurship course generally evolves into a course series or specialization. With enough momentum, the courses are structured into an entrepreneurship program such as a minor or an entire baccalaureate in entrepreneurship. As discussed in the literature review, some universities offer a dedicated major (often at the Master's level) in software entrepreneurship.

At our institution, several entrepreneurship-related courses were developed independently by faculty across multiple disciplines, both at the undergraduate and graduate levels. In 2013, with impetus from a sizeable college naming donation from a local entrepreneur, increased emphasis was placed on the role of entrepreneurship and innovation in the college. The solo course offerings from our faculty-entrepreneurs were woven into a new 18-unit interdisciplinary minor in entrepreneurship. The minor includes a three-course business foundation (nine units), followed by a three-course entrepreneurship series (nine units).

The three-course entrepreneurship series includes a fundamentals course patterned after the model introductory course detailed in Morris, Kuratko, and Cornwall (2013, pp. 64-66). This entrepreneurship survey course is followed by a course that focuses on business development and operations for entrepreneurs. The final course moves beyond the business canvas model with a focus on entrepreneurship experience. Courses fulfilling the experiential capstone were drawn from existing campus entrepreneurship offerings including the *Tech Starup Entrepreneur* course explored in this paper. For those students ready to take their product to market, a new
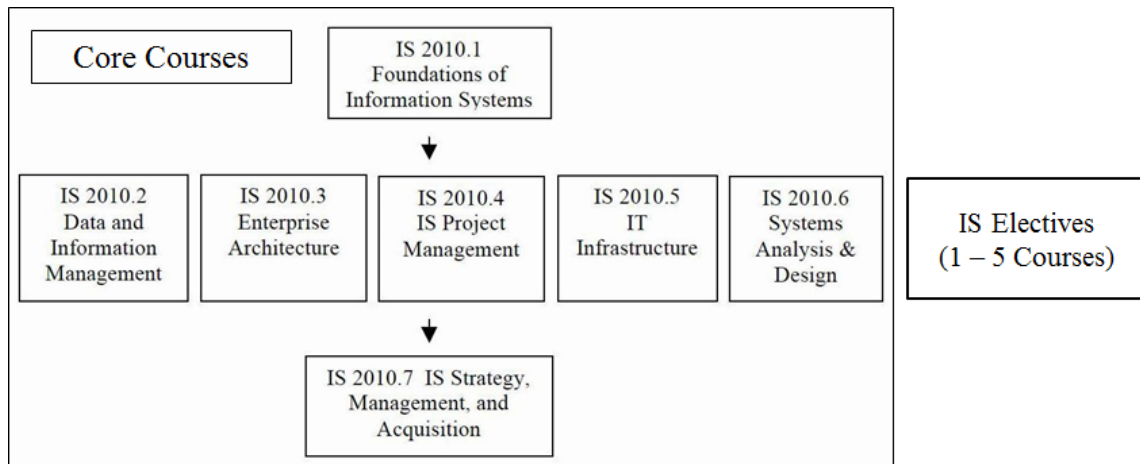
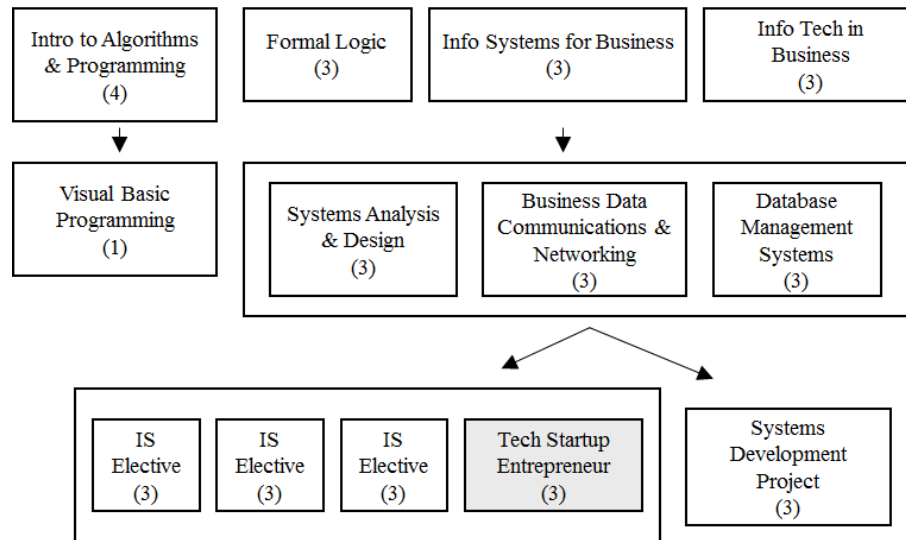**Figure 2. IS 2010 Model Curriculum with Optional Electives**

Figure 3. Sample Approach to Integrating Entrepreneurship Education into an Undergraduate IS Program

experiential course entitled *New Venture Launch* was added. At the graduate level, a three-course entrepreneurship concentration was added to the MBA. To support the new programs, an entrepreneurship director was hired to establish co-curricular offerings, such as pitch competitions, entrepreneurship lectures series, new venture competitions, and an entrepreneurship club. The college's existing small business and entrepreneurship center joined forces with the engineering college innovation and entrepreneurship center to sponsor an annual innovation conference. Finally, the entrepreneurship director engaged the campus clean tech incubator in a collaboration to foster technology transfer from the new venture competition.

Based on the literature and given our experience, we believe there is a place for entrepreneurship, innovation, and design thinking in the Information Systems Curriculum. As discussed earlier in this section, the IS 2010 model, though packed with foundational requirements, still has room for an elective or two. For programs constrained to 8-10 semester classes (24-30 SCH), we see three viable strategies for integrating entrepreneurship education into the IS major: (a) embedding content into a selected topics course or senior seminar, (b) designing an entrepreneurship experience into the projects or capstone class (IS 2010.7 Strategy, Management, and Acquisition), or (c) adding a stand-alone IT entrepreneurship elective as detailed in this paper.

Regardless of the strategy adopted, we envision an approach that is activity based with emphasis on the startup phase. Students would develop a minimum viable product (MVP) and solicit feedback from target customers. The focus would be on planning and fund raising. Operational (management) aspects would be peripheral. Students interested in transitioning from startup planning to entrepreneurship operations would need to take additional coursework, something like "Business Development and Operation for Entrepreneurs" available in our Entrepreneurship Minor.

Curricular change can be a long and involved process. For those that want to provide an entrepreneurship experience for their majors before the curriculum is eventually modified, we suggest tapping into co-curricular entrepreneurship activities on campus or in the community. IS majors with their technology and business expertise are often keen to participate in Mobile App design competitions or business plan contests, especially when there is prize money for the winners. Most campuses have some type of entrepreneurship club already. Faculty champions can mentor students in spotting and seizing entrepreneurship opportunities

5. CONCLUSION

The focus of our research has been to explore current strategies for teaching IS majors the necessary entrepreneurial skills for succeeding in an IT startup. We conducted a thorough review of the literature, isolating the course components suggested by research in the related disciplines of software engineering and computer science. We examined the findings from pioneers in entrepreneurship education in information systems. From this vantage point, we described what we consider the primary contribution of this research – a class-room tested approach for a one-course elective in software and IT entrepreneurship. We provided an experience report for the seven years the course has been offered, complete with lessons learned and suggestions for improvement. We concluded with recommendations for how software entrepreneurship can be integrated into the information systems curriculum and offered suggestions for cross-disciplinary collaboration both within a college of business and across campus.

In addition to the ongoing popularity of the *Tech Startup Entrepreneurship* course, there is anecdotal evidence that our evolved approach to teaching software entrepreneurship to IS majors yields positive results. Some of our student teams have gone on to participate in an annual campus mobile app development competition.

Recently, the college started a university wide "Shark Tank"-style entrepreneurship competition. Over 40 teams have competed each year. One student from the IT

Entrepreneurship class entered the competition last year and went on to be a finalist. A few others have pursued their business idea beyond the class project. One such student came back as a guest speaker to talk about his cash flow positive venture that he started after the class. Below are some comments showing student attitude toward the class and our approach to IT entrepreneurship:

"Great mix between self-work and learning from speakers. Very interesting speakers. I'd strongly say this was most helpful and useful course offered here. Thank you!"

"One of the best courses I've taken so far. Great networking & entrepreneurship education."

"Make this class available year round! Best IS class!"

"Best class offered at [this university] for IS major!"

"Class is unique. Was pretty awesome."

"The quizzes were not helpful, but overall this class gave most insight into what I want to do."

"I love the class! Best class I've had at [this university] so far!!!"

Future research will take us beyond anecdotes. We plan to conduct a mixed mode, follow-up study (quantitative with scaled response and qualitative with free response) of all students having completed the course. Such a study would not only provide systematic evidence of meeting course learning objectives but also measure the impact of the course by analyzing subsequent project commercialization. It would also provide valuable feedback about IS students who choose to pursue a career as software and IT entrepreneurs. Because the IT Entrepreneurship course emphasizes early stage startup planning, product prototyping happens in the follow-on stage. The college has an administrative relationship with a very successful campus-located, high-tech incubator. Students with viable projects can seek help on product development with the incubator which works with colleges across campus to tap expertise in engineering and product development. As part of our mixed-mode study, we plan to survey pathways to product development, whether through the campus incubator or other community resources.

In conclusion, we reiterate our belief that there is a place for entrepreneurship, innovation, and design thinking in the Information Systems Curriculum. To paraphrase renown entrepreneurship educators and researchers Morris, Kuratko, and Cornwall: "The at-risk [*Information Systems*] student is the one not prepared for this entrepreneurial age" (2013, p. xi). By finding ways to integrate entrepreneurship education into the Information Systems curriculum we can mitigate the risk of missed opportunities. We can increase the adaptiveness of our students in the face of an increasingly global economy subject to shorter and shorter cycles of disruptive innovations and technological upheaval. IS students have the potential to leverage their technology expertise, their business knowledge, and their software development and IT solutions training to create new products and services. It is our hope this research will inform the conversation about how to better prepare IS majors for the pace of change in the 21st century including how to seize opportunities to create business and social value through innovation.

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AUTHOR BIOGRAPHIES

Christopher G. Jones, recently retired as Professor of Accounting and Information Systems in the David Nazarian College of Business and Economics at California State University – Northridge. He earned his Ph.D. in Education (Business Information Systems Education emphasis) from Utah State University in 1995. He is the author of several business texts (*Technology and Customer Service* and *Accosting the Golden Spire: An Accounting Novel [3rd ed.]*) and journal articles on contemporary software development practices, accounting education, and professional communications. His current research interests are in mobile app development, software entrepreneurship, and information systems education. He has over 15 years industry experience in accounting and information technology. In 2016, he received the Computer Educator of the Year Award from the International Association for Computer Information Systems.

David Liu is a Professor of Information Systems and Associate Chair of the Department of Accounting and Information Systems in the David Nazarian College of Business and Economics at California State University – Northridge (CSUN). He earned his Ph.D. in Engineering from UCLA in 1987. While at CSUN, he has served as Chief Information Officer (CIO) for the campus. Prior to joining CSUN, he was a Professor of Information Systems at California State University – Los Angeles where he served as Chair of the Information Systems Department. Liu has held C-level positions in both the public and private sectors across several industries. In business, he is recognized as both a seasoned executive and a serial entrepreneur.

APPENDIX A

Sample Syllabus
Tech Startup Entrepreneurship — Fall 2016
Updated on 09/02/2016

Instructor:	Tech Startup Instructor
Class:	Friday 7:00-9:45p.m. in the IS Lab
E-mail:	instructor@stateuniversity.edu
Web:	http://www.stateuniversity.edu/~instructor
Office:	101 University Hall
Office Hours:	Thursday: 4:00-6:00pm. Also can be by appointment at mutually convenient time, if possible.

Textbooks (optional):
> *ReWork: Change the Way You Work Forever* by Jason Fried & David Heinemeier Hansson (2010).
> *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses* by Eric Ries (2011).
> *The Startup Owner's Manual* by Stephen Bank & Bob Dorf (2012).

Objective:
This course is intended to help students gain knowledge and skills that are the foundation to becoming a successful entrepreneur in a business that revolves around technology. The course provides aspiring entrepreneurs a preview of the startup journey, beginning with an idea and running all the way through the initial phases of a business venture. Students learn about business plan formation, early-stage capital, small business market development and sales, small business operation and planning, and software life cycles. Students will acquire or enhance problem identification/definition aptitude, self-help ability, solution development know-how, as well as communication and collaboration skills.

Class Schedule:

Date	Week	Start	Lecture Topic
Sep 02	01	7:00 p.m.	Instructor – Overview and group formation
Sep 09	02	7:00 p.m.	Instructor – Lean business model and business model canvas
		7:30 p.m.	Guest Speaker 01 – Serial Entrepreneurship
Sep 16	03	7:00 p.m.	Instructor – Business analysis and writing a business plan
		7:30 p.m.	Guest Speaker 02 – New Grad: Start up? Or Join a company?
Sep 23	04	7:00 p.m.	Instructor – Inspection of market and industry numbers from each group
		7:30 p.m.	Guest Speaker 03 – Life of a female entrepreneur, raising capital, and navigating the unknown
Sep 30	05	7:00 p.m.	Instructor – Coming up with credible numbers (top-down vs. bottom-up)
		7:30 p.m.	Guest Speaker 04 – Entrepreneurship in Biotechnology
Oct 07	06		No Class – Instructor presenting at conference. Work in your project teams.
Oct 14	07	7:00 p.m.	Instructor – Rainmaking and sales
		7:30 p.m.	Guest Speaker 05 – Understanding Product Management lifecycles and technology hype vs. real customer value
Oct 21	08	7:00 p.m.	Instructor – Inspection of business model canvas
		7:30 p.m.	Guest Speaker 06 – Essence of Networking in Entrepreneurship
Oct 28	09	7:00 p.m.	Instructor – Partnering, branding and intellectual property
		7:30 p.m.	Guest Speaker 07 – The Ultimate Balancing Act: How to manage a two-job life
Nov 04	10	7:00 p.m.	Instructor – Product, services and operation
		7:30 p.m.	Guest Speaker 08 – How to Build Your App Business in 60 Days or Less. (***Note:*** This speaker was a counter message to the rest of the guest speakers who spoke on their more elaborate startup process. In the course, we make it very clear that software development is more than a 60-day process.)
Nov 11	11		Holiday: Veterans' Day
Nov 18	12	7:00 p.m.	Instructor – Alternatives to and process of obtaining startup capital
		7:30 p.m.	Guest Speaker 09 – Launch of a Web-based Athletic Community
Nov 25	13		Holiday: Thanksgiving Break
Dec 02	14	7:00 p.m.	Instructor – Inspection of operational details of each group
		7:30 p.m.	Guest Speaker 10 – Empire Building: Challenges at Every Level
Dec 09	15	7:00 p.m.	Instructor – Process/grading clarification and instruction
			Group Presentations – Complete business plan (expect to be in class as late as 11 p.m. that evening)

The above schedule and topics are subjected to change (at discretion of the guest speakers) during the semester.

Software Requirements:
You will need access to an IBM-compatible computer, Microsoft Office 2013 (Excel, Word, PowerPoint, Project, etc.) or Office 365 to create your deliverables. To be clear, do NOT turn in PDFs for deliverables that you generate, i.e. PDFs are only acceptable for the supporting information that you have gathered.

Academic Honesty Expectations:
Any form of Academic Dishonesty (e.g., plagiarism) will not be tolerated, especially bidding out your group project to a third party. If you are caught cheating (on pop quizzes or the group project), you will be given a grade of "F" for this course and you will be subject to disciplinary action, which could include suspension and/or expulsion from the department, college or university. Please read the Academic Honesty Policy in the University Schedule of Classes.

Grading:

Participation/	10%	For meaningful and consistent contributions to class discussion; Attendance but on the other hand, negative points for surfing the web, playing with cell phone and/or other disruptive/disrespectful behaviors. Do remember that we have guest speakers! Note that your grade will be lowered for every two absences. >=10 minutes late counts as an absence.
Pop quizzes	20%	On guest lectures
Group participation	20%	Peer evaluation for meaningful and consistent contributions to group project.
Class Presentations	30%	Peer evaluation - inclusive of substance, style, audience appeal and scholarship
Final Business Plan	20%	

Notes:
1. Turn off cell phones and computers (except for group assignment work), i.e. go outside if you want to browse the Internet, check your e-mail, text message, talk, etc.
2. When we have guest speakers, place all your electronics at a place to be designated by the instructor, and retrieve them immediately after the guest speaker dismisses you.
3. Office hours and e-mails will not be used to repeat information given in class or to repeat or to summarize lectures for those who missed class.
4. Except for rare cases, the plus/minus grading system will not be used.
5. There will be no make-up presentations except for those who have obtained prior approval from instructor. Verifiable, authoritative documentation for extenuating circumstances is a prerequisite for approval consideration.
6. Projects:
   - Electronic copies are due *prior* to the beginning of class on the specified date.
   - Hard copies are due at the *beginning* of class on the specified date. Do NOT hand in inkjet copies.
   - Hand out abbreviated versions of your deliverables to the rest of the class just before your presentation.
   - Late projects will not be accepted.
7. To assure a response to your e-mail, be sure to identify your e-mails with the class name "Tech Startup Entr" in the Subject line along with your first and last name.

Information Systems & Computing
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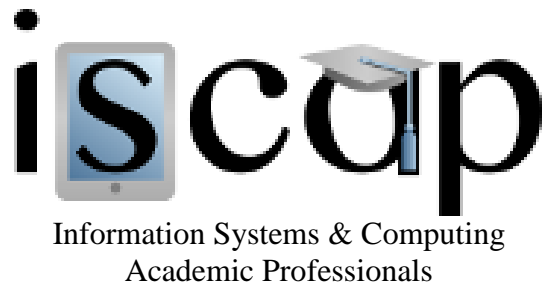
STATEMENT OF PEER REVIEW INTEGRITY

All papers published in the Journal of Information Systems Education have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.