JMU IGNITE!

This grant supports the pilot and launch of James Madison University (JMU) IGNITE, a one-year immersive experience for undergraduate seniors to live and work together in San Francisco with their professors, developing entrepreneurial solutions to pressing social problems leveraging intelligent software, data mining and emergent technologies. Administered by the JMU Integrated Science and Technology Department (ISAT), this course sequence unites students from inherently multidisciplinary areas such as biotechnology, environmental science, and alternative energy. Through IGNITE, **E-Teams will serve as the nexus for senior year coursework, an internship, and a senior capstone project, aiming to commercialize developments while embracing social responsibility.** With over $13B in annual venture capital activity (Florida 2013), San Francisco is an ideal location to leverage established coworking spaces, embed with existing technology startups, and model the attitudes and behaviors needed to launch successful ventures (especially for attracting women into careers in technology). The program's long-term goals are to: 1) transition at least one new venture to market each year, 2) become financially self-sustaining by reinvesting profit from the launched ventures, and 3) expand to include students, particularly women, from other institutions. **IGNITE directly supports JMU President Jonathan Alger's goal of becoming the "national model for the engaged university"** and the JMU mission of "preparing students to be educated and enlightened citizens who lead productive and meaningful lives."

1. Proposed Program Description

The IGNITE curriculum consists of 24-30 credits selected from the following:

Existing Courses (15-18 credits): ● ISAT 340--Software Development (3) ● ISAT 341--Simulation and Modeling (3) ● ISAT 344--Intelligent Systems (3) ● ISAT 345--Software Engineering (3) ● ISAT 348--The Multimedia Industry (3) ● ISAT 480--Statistical Computation (3) ● ISAT 480--Mobile App Development (3)	**New Course (3 credits):** ● ISAT 44x--Quality and Innovation in Agile Venture Creation (3) **Experiential Education (11 credits):** ● ISAT 44x/44x--Internship in Venture Creation (3/3) ● ISAT 492/493--Senior Capstone Project (2/3)

One new course will be developed for this sequence--**ISAT 44x, Quality and Innovation in Agile Venture Creation**--covering topics such as Lean Startup (Ries 2011), agile processes in technology development, corporate social responsibility and the ISO 26000 Guidance for Social Responsibility, formulating and financing new "sharing economy" ventures, fundamentals of quality systems for startups, and approaches to structured innovation. This new course will be "test driven" through the JMU Honors Program in Spring 2015, based on the successful ISAT 680/HON 300 course (Quality and Process Improvement in Action) developed by Radziwill in 2011 and delivered in Spring 2012 and Spring 2013.

Pedagogy: Passion to make meaningful contributions to society forms the heart of our pedagogy. Our core assumption is that given the time, freedom, structure, support, and guidance that they need, students' innate talent and drive will flourish to yield success. Our approach (Benton & Radziwill 2011, Radziwill & Benton 2013) is informed by recent work in motivation (Deci et al. 1991, Deci et al. 2001), positive psychology (Fredrickson 2009), mindfulness (Langer 1998), pull-based systems (Hagel et al. 2012), peer learning (Rheingold 2012), and value systems for radical innovation (Radziwill & Benton 2013). Guided by these principles, multidisciplinary E-Teams will coalesce around projects that aim to bring the the latest technologies into the service of solving some of society's most pressing problems.

Precedents and Structure for Program Funding: Once the planning year is complete and partnerships in San Francisco are formalized, administration of the program will be straightforward. Funding will be based on the successful model of the "JMU in Washington" program, which has been offered by the JMU Department of Political Science since 1996. Dr. David Jones, director of this program since 2000, has agreed to advise IGNITE based on his experiences. Based on the successful history of the D.C. program, the School of Media Arts & Design (SMAD) at JMU has also recently piloted a semester-long immersion program in Los Angeles, and will begin their regular program in 2014-2015. Because of these precedents, JMU administrators are familiar with managing and sustaining such programs. For both, students pay tuition and fees for a full-time course load, a program fee, and a housing supplement when they enroll in the program.

2. History and Context

The Integrated Science and Technology (ISAT) program at James Madison University (JMU) is an undergraduate, interdisciplinary, applied science degree program accredited by ABET. At the lower level, students get a strong foundation in critical thinking, social context analysis, biology, chemistry, physics, calculus, statistics, and computer programming. At the upper level, students combine these foundational elements in interdisciplinary areas such as biotechnology, environmental science, alternative energy, green manufacturing, telecommunications, and computer application development. All ISAT graduates complete a capstone project during their senior year in which they are required to carefully examine the social, political, economic, and environmental ramifications of their projects. The product of the ISAT program is a technologically and scientifically literate, versatile problem-solver who embodies what we in ISAT refer to as Problem-Centric Habits of Mind (PCHOM) (Brent et al. 2013).

Background and Accomplishments of Program Directors: The IGNITE program will be led by Dr. Morgan Benton, Associate Professor of ISAT, and Dr. Nicole Radziwill, Assistant Professor of ISAT. Benton and Radziwill are uniquely qualified to co-create and deliver this one-year immersion experience: Benton has a Ph.D. in information systems, over a decade of experience developing software and web-based technologies for clients and startups, and studies

learning and creating productive learning environments. Radziwill has a Ph.D. in technology management and quality systems, has 15 years experience as a software development manager and national lab executive, and researches how to balance quality systems with transformational cultures to stimulate innovation. Together, Drs. Benton and Radziwill have hosted weekly "hacking sessions" at JMU for over 5 years, developed active learning communities that cut across course boundaries, supervised over 30 technology development projects, and spent two years immersed in the innovative arts and technology scene of San Francisco. Based on these experiences, their pedagogy combines agile principles with the culture of radical innovation, encouraging students to find and share their gifts to better society. IGNITE will provide the platform for Benton and Radziwill to share the spirit of these experiences with their students.

Gaps in the ISAT Capstone Experience: The traditional university setting suppresses the marketplace viability of ISAT capstone projects in several important ways. First, few (if any) students are free to focus their time and energy exclusively on their project, as they are still busy taking other courses necessary for graduation and hunting for jobs. Second, students typically spend a great deal of their capstone time developing basic knowledge and skills necessary to conduct the project. Third, students tend to choose "traditional jobs" over finishing and commercializing their product. By situating them in a vibrant location where innovation is a way of life, IGNITE will help to close these gaps. For example, during 2012-2013, a team of four students supervised by Benton and Radziwill developed a prototype, web-based, audience-response system called SmartClickr. While this project has clear market potential, the students have settled into traditional jobs and development has stalled. One of the first E-Teams will be encouraged to adopt, refine, and commercialize SmartClickr.

Gaps Between Industry Teams and University Group Project Teams: In some ways, the work environment of a modern technology company already mirrors the university. Flexible schedules, telecommuting, and requirement for physical presence only at specific meetings mirror student class meetings, late night study sessions, and online learning. However, important differences between these environments make it extremely difficult to give students a realistic understanding of the day-to-day life and attitudes of a technology developer and entrepreneur (see Table 1).

University group projects face many challenges. Most projects, which are designed to *singularly* serve as a vehicle for individual student learning, can be contrived or artificial. Narrow, instructor-defined learning objectives force students to develop uniform skillsets, rather than diverse, individual, and complementary ones. The project is only one assignment in one course, and therefore not able to demand students' full attention and commitment; nor is it fully integrated into their daily schedule. Consequences for failure are low, and proximity to the cutting edge is typically bounded by the instructor, who may have little or no recent actual exposure to the latest technologies and processes. Achieving (graded) milestones is

overemphasized. Limited time means instructors must emphasize content over teaching (agile) process. ***Industry teams***, in contrast, work on real projects where failure can be costly. Team process forms the foundation of a culture of enthusiasm and commitment. Members are naturally drawn to find their niche and develop complementary talents. Achieving intermediate milestones is less important than delivering a high-quality product. Competitive pressure keeps projects near the cutting edge and forces team members to develop the ability to evaluate the soundness of emerging technologies. Industry projects don't end each semester, providing (perhaps ironically) a much more fertile environment for learning and personal growth than any traditional classroom. IGNITE will close this gap by creating an environment analogous to modern industry teams.

Dimension	Industry	University
Focus/Motivation	Final Contribution	Individual learning/Grades
Duration	Ongoing	(Very) Short-term
Proportion of Daily Effort	High	Low
Impact of Failure	Company fails	Bad project grade
Skillset Development	Complementary	Duplicate
Level of Realism	100%	Highly Variable
Focus on Process	Integral/Foundational	Rarely addressed
Leadership/Management	Professional Leader/Champion	Instructor
Member Commitment	Typically High	Varies
Audience	Customers/Clients	Instructor
Proximity to Cutting Edge	Close	Varies

Table 1: Comparison of Industry and University Group Project Teams

3. Team and Partners

IGNITE naturally extends the work Drs. Benton and Radziwill have been doing independently since the mid 1990's, and over the past five years as partners. It combines courses they regularly teach, pedagogy they have developed, their extensive network of professional contacts and friends, and San Francisco to create an extraordinary experience for students. **Administration Roles**: Radziwill will prepare work plans and report progress, leveraging her decade of experience as an executive level manager at a national lab; Benton will develop and administer the budget with JMU administration, leveraging his experience as Director of JMU study abroad programs in Japan and the Philippines. **Teaching Roles**: Benton will teach programming-intensive courses (ISAT 340, 345, 348); Radziwill will teach data analysis and mining intensive courses (ISAT 341, 344, 480); Benton and Radziwill will team-teach the new ISAT 44x venture creation course. **Experiential Learning Roles**: Benton and Radziwill will co-advise all E-Team/Senior Capstone teams, and jointly oversee internship placements. **Local Partners and Institutional Support:** IGNITE will receive logistical and administrative support from several institutional structures at JMU. These include the ISAT Department, where IGNITE

will reside; the JMU Office of International Programs (OIP), which manages the "SMAD in Los Angeles" program; the JMU Office of Technology Transfer (OTT), which manages the intellectual property (IP) assets of JMU including inventions, copyrights for software and printed materials, and outgoing Material Transfer Agreements for biological materials, and James Madison Innovations (JMI), a non-profit affiliated with JMU for managing intellectual property and commercialization efforts for undergraduates.

4. Work Plan and Outcomes

Funding is requested for: 1) faculty travel and course development to ensure readiness for the pilot in Year 1 and active engagement of additional JMU faculty, 2) workstations and travel to support the pilot in Year 2, and 3) travel grants for the first cohort of students. Program fees collected by JMU will support other requirements (e.g. salaries, student housing) using the "JMU in Washington" model.

	Year 1 (Aug '14 - Jul'15)	**Year 2** (Aug '15 - Jul'16)	**Year 3** (Aug '16-Jul'17)
Activities	**Planning**	**Planning & Pilot Program**	**Pilot Assessment, Transition to Sustainable Model**
Funds Requested	**2014-Fall:** Planning trip to SFO for directors ($2500) **2015-Spring:** Planning trip to SFO for directors ($2500) **2015-Summer:** Personnel costs to develop new ISAT 44x course ($5K) **2015-Summer:** Procure workstations for 6 E-Teams ($2500 x 6 = $15K)	**2015:** Directors' SFO-JMU airfare ($500 x 2 = $1K) **2015-Fall:** Travel for students ($600-750 x 20-25 = $15K) **2015-Fall:** Travel for other JMU faculty to participate in pilot ($500 airfare+ $1K subsistence x 3 trips = $4500) **2016-Spring:** Travel for other JMU faculty to participate in pilot ($500 airfare+ $1K subsistence x 4 trips = $6000)	**None requested.** Program Directors will make transition to self-sustaining model during this period.
Milestones	**2014-Oct:** Begin recruiting for pilot program cohort **2014-Dec:** SFO cowork space partner secured **2014-Dec:** Full business plan for JMU completed **2015-Jul:** Agile Venture Creation course created	**2015-Feb:** 50 applications for pilot received **2015-Mar:** 20-25 students accepted into pilot, ideally 20-ISAT/5 Non-ISAT **2015-Apr:** Housing for first cohort secured **2015-May:** ~6 E-Teams formed onsite at JMU	**2016-Summer:** PCHOM assessment completed; identify opportunities for improvement **2016-July:** Revise plan for continuing

			program based on lessons learned

5. Beyond the Grant

We plan to continue this program beyond the period of the NCIIA grant. After the pilot ends, we will analyze data collected from the PCHOM assessments to identify strengths and opportunities for improvement that directly align with ISAT Program Educational Objectives (PEOs) from ABET. In Year 3, IGNITE will be funded by program fees collected from students. We envision that IGNITE will become **financially self-sustaining** as a portion of the revenue from new products, services, or ventures are reinvested back into the program. James Madison Innovations (JMI) will help us form the appropriate structures to manage this. Ultimately, through reinvestment, we intend that housing (and perhaps even full tuition) can be provided as a **scholarship** for all students who successfully apply to this program. The business model, program structure, and new course (Quality and Innovation in Agile Venture Creation) will be replicable and could be shared with or recreated at other member institutions.