

The Technology and Information Management (TIM) M.S. Program in Silicon Valley

Proposed by the Technology Management Department, BSOE, 3-1-15

The TIM MS Degree is a vetted, approved, and externally-reviewed degree program established in 2009. It has approval for Professional Degree Supplemental Tuition (PDST) for its Silicon Valley-based program. Intellectual merit and relevance to Silicon Valley were affirmed in its approval process, and reaffirmed by a 2014 external review. The review was very supportive of the program's direction and scope. In 2013-4, the TIM MS was offered on a pilot basis in Silicon Valley. On short notice, and with minimal marketing, it attracted a credible cohort of students who completed the MS degree. Students gave positive feedback about the quality of the program, and they had success of finding employment in Silicon Valley companies (see Table 1).

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| <ul style="list-style-type: none">• Data Scientist, Citrix (3 grads)• Manager GRC Solutions, MetricStream• Information Systems Analyst, PG&E | <ul style="list-style-type: none">• Web Software Engineer, Suning Commerce R&D Center• Technical Account Manager, eGain• Intern Software Engineer (offer), MetricStream |
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Table 1: Job Outcomes of 8 graduates of TIM MS Pilot 2014-15

Evaluating the program, one graduating student writes, "The knowledge and training I have gained within the last year has helped me to contribute more to my company and bridge a skills gap as we build up a new Data and Information organization at Adobe." A graduate writes, "the campus location is perfect, in the center of Silicon Valley." Another writes: "I'd recommend this program to others." A student who had to leave mid-year for health reasons wrote: "I love the TIM program and can't wait to return and continue taking classes." And to quote an about-to-graduate student:

I also learned the core of technology management. I am sure that what I learned in this program will help me in my future career in information technology and data analytics. I always tell my friends in China that studying abroad is not such difficult as you thought; in TIM program you can learn everything you would like to know in both information technology and management.

Due to a lack of resources, admissions to the MS in Silicon Valley were suspended in 2014. Up to that point, nearly all the Department's faculty were engaged in MS teaching, administration, marketing, and student advising. We therefore know our program well, including its strengths, needs, and potential. **We propose to reopen our TIM MS program using four Silicon Valley Initiative FTEs.**

TIM is an engineering program in which enterprises provide the context for our program's courses. TIM's industries are data / information based industries. Company examples with significant presence in Silicon Valley include: Google, Yahoo, Amazon, Cisco, SAP, LinkedIn, Facebook, Microsoft, eBay, Netflix, and Adobe. Common themes in these companies are their real-time dependence on data and information as a product in itself, to deliver a product, and to support other products. Data primarily derived from business operations are transformed into essential information via analytic tools. General fields that develop these tools include operations, product and organizational planning, strategy, and optimization.

The closest program to the TIM MS is the Management Science and Engineering program in Stanford's School of Engineering. MSNE grew out of the merger of earlier programs in systems engineering, Industrial Engineering, and Operations Research. At UCSC, these have been complemented with our added emphasis on information systems, management science, and decision support.

The program is synergistic with the research of TM faculty, who have sponsored research from companies/agencies with a Silicon Valley presence including Google, Yahoo, Cisco, Microsoft, Bosch, Nokia, IBM, HP Labs, Xerox PARC, NativeX, NEC, SAP, AOL, TCS, NASA-Ames and Infosys.

Background and Positioning In today's economy it is not enough to design a new search technology, a new social networking technology, or a new networked game. The best engineers should also conceptualize the business environment and use that knowledge to craft the technology and business strategy in concert.

Remarkably, there is a dearth of educational programs that impart this skill set. A large portion of the people who have developed this skill set have done so by studying a traditional engineering discipline, and then acquiring business or entrepreneurial experience over many years. It is also rare that traditional MBA graduates develop this mix of skills. The trickle of people that emerge from pathways such as these is simply not enough to fill the enormous demand.

The TIM Masters program is designed to fill this need. The curriculum teaches the most important areas of innovation in Silicon Valley today, such as information retrieval. The curriculum also the economics of information technology that shape the business environment in which these technologies operate. The curriculum is underpinned with courses on fundamental modeling and analysis, tools essential to designing systems and understanding their interaction with the marketplace.

Research Synergies and Building on Strengths The engineering-economics boundary is not only important for the training of Silicon Valley professionals, but it is also a domain rich with exciting research problems. A number of deep research questions arise when one simultaneously considers the design of a system with the incentives of those that use, own, operate, or even those that look to maliciously exploit various parts of that system. With the rise of new networked technologies and business models -- such as social networks, cloud computing, advertising networks, and the internet itself -- the importance of accounting for incentives in engineering is more important than ever.

Operating the TIM SVC MS is synergistic with the goal of growing UCSC's research at the engineering-economics intersection. Part-time students who work at Silicon Valley companies can come to the classroom with "tales from the field" and give fodder to new research problem formulations. Graduates placed in companies can help exchange ideas in a similar way. The opportunity to attract guest lecturers from industry also helps build ties and encourage the exchange of ideas. Over time, this building of relationships may lead to more industry sponsorships of research projects and student educational fees.

Synergies with other UCSC Silicon Valley Programs In 2011, the TIM program hired a consulting firm to characterize the potential in Silicon Valley for a new graduate program like the TIM MS. The firm conducted analyses and surveys and reported that a large market exists for the TIM MS program. In building its Silicon Valley Center, UCSC is competing with other programs in the region such as Santa Clara University, San Jose State, and Carnegie Mellon West. There also are Stanford and Berkeley, likely choices of the many elite students for full-time study. By contrast, our MS in TIM is intended for working professionals in Silicon Valley, who will most often pursue this degree on a part-time basis. We also unexpectedly encountered extensive international interest in the TIM MS pilot program and anticipate large enrollments of non-US residents going forward.

Other academic programs in Silicon Valley are embedded in a portfolio of related programs offered by their institution, and thus they offer shared pools of elective courses and administrative resources. UCSC also needs a synergistic program portfolio in order to compete in the Valley. The TIM MS program is highly synergistic with the Data Science program currently under development. A Data Science program can train students with the analytical toolkit to leverage large amounts of data, while TIM imparts the

complementary but distinct expertise of the business side of information technology. Students with different interests and career goals may choose different points on the spectrum between the programs (e.g. a Data Science student might take some electives from TIM on topics such as e-business strategy; a TIM student might take a machine learning elective from Data Science).

The TIM MS is also synergistic with the Game Design program that currently exists at Silicon Valley Center. Many game designers with an eye toward advancing their careers will want to develop a deeper understanding of the business of information technology and in particular the different revenue models and network-economic effects that pervade the game industry – topics covered in TIM classes.

Plan Our resource request of 4 FTE is based on our original graduate degree proposal, MS Planning consultant’s report, PDST proposal, self-study and ERC report, Senate feedback, earlier detailed resource plans, and two years of experience building and running the MS program. To summarize: 2 FTE provided at the beginning of year 1 (calculated as Econ/Eng Asst III cost equivalent) will cover the Program Director’s salary and some marketing costs. Two additional FTE provided at the beginning of year 2 will cover lecturer and course buy-out costs. The TM Department has carefully shepherded program funds and we believe we can cover the \$79,000 re-start costs of the program (to be confirmed). The proposed program is cash-flow positive at the end of year two. At the end of five years, we anticipate annual program revenue sufficient to convert an FTE into a full time faculty member.

	15/16	16/17	17/18	18/19	19/20	20/21
ENROLLMENT PROJECTION	0	20	35	50	60	65
RESOURCE CONSUMPTION - Courses						
Lecturers (\$13,000/course)	0	3	6	9	11	12
Distinguished Lecturers (\$15,000/course)	0	1	2	2	2	2
MS Director Teaching (cost added below under Admin)	0	3	3	3	3	3
Buyouts for Campus Faculty to Teach at SVC (\$13,000/course)	0	3	3	3	3	3
Total cost for courses (less Director’s courses, \$ 000)	\$0	\$93	\$147	\$186	\$212	\$225
RESOURCE CONSUMPTION - Administration/marketing						
MS Director salary/benefits (15-16 [partial year])	\$158	\$210	\$210	\$210	\$210	\$210
MS Staff Assistant (15-16 partial year)	\$45	\$60	\$60	\$60	\$60	\$60
Marketing	\$40	\$40	\$40	\$40	\$40	\$40
Total Admin and Marketing	\$243	\$310	\$310	\$310	\$310	\$310
TOTAL PROGRAM COST (\$ 000)	\$243	\$403	\$457	\$496	\$522	\$535
FTE CONTRIBUTION FROM CAMPUS	2	4	4	4	4	4
FTE-equivalent value (\$82,000)	\$164	\$328	\$328	\$328	\$328	\$328
RESOURCE CONTRIBUTION FROM TM DEPARTMENT						
PDST Revenue (assumes 25/75 split of resident/non-resident)	\$0	\$85	\$148	\$211	\$254	\$275
Existing TM Department Financial Resources (to be confirmed)	\$79	\$0	\$0	\$0	\$0	\$0
REVENUE (\$ 000)		\$10	\$19	\$43	\$60	\$68