

June 3, 2015

Alison Galloway, CPEVC
Chancellor's Office

RE: CPB Silicon Valley Pre-Proposal Recommendations

Dear Alison,

As requested, the Committee on Planning and Budget (CPB) has reviewed the Silicon Valley Call Pre-Proposals. These included submissions for Aeronautics, Computational Media (a three-part proposal), Data Science, Global Technology for Social Innovation, Nanotechnology, and Technology and Information Management. Our review was guided by the [Silicon Valley Pre-Proposal criteria](#), which are consistent with the criteria mentioned in your Call, but are broader in some respects.

In preparation for this review, a CPB subcommittee interviewed Silicon Valley stakeholders: the Dean of UCSC Extension, the acting Dean of Graduate Studies, chairs and graduate directors in four departments in the School of Engineering, and others with past or current administrative experience in Silicon Valley. The subcommittee prepared interview summaries as well as a brief historical timeline and summarized lessons learned that could be of use going forward, all of which are attached to this letter.

Recommendations:

CPB recommends that the pre-proposals from **Computational Media, Data Science** and **Aeronautics** be fully developed for market study. We also see value in the Global Technology for Social Innovation, Nanotechnology and Technology Management pre-proposals, and we hope to see some ideas from these pre-proposals incorporated into those that are moving forward.

After offering general comments that apply to the whole initiative, we provide specific feedback on each of the six pre-proposals in order of our ranking, and include a rationale for our recommendations and rankings. We plan to share the specific feedback with the faculty members who sponsored the pre-proposals.

General Comments:

The distilled experience of our interviewees suggests to us that the following three traits greatly improve the chances of Masters program success in Silicon Valley: (a) appeal to **international students** interested in gaining employment in Silicon Valley, (b) use of **lecturers** with strong industry credentials, and (c) a committed and effective **leader** who devotes time to marketing the program. Our top two choices clearly have all three traits. The Aeronautics program does not, but its strong connection with NAMS suggests that we should explore it carefully as well.

Our review of the pre-proposals brought to the foreground an important criterion that was only implicit in the Call and our published criteria: **resilience**. The initiative(s) we launch must be viable in downturns as

well as booms, and must not depend too strongly on a single partnership. We hope that resilience will figure prominently in the next stage of the planning process.

Revenue is already an explicit criterion, but so far remains a bit vague. Although the Silicon Valley initiative is not primarily a revenue-generating venture, it must be sustainable over time, which means that, after startup, it must not impose a significant financial burden on campus operations. For that reason we recommend that, in addition to the Senate's regular academic review of the programs, you require a **periodic financial review** of the whole Silicon Valley initiative. The review mechanism should be put in place before any programs start operating, and should include a sunset process for winding down investments if minimum financial goals are not met.

Although the Call emphasizes that the new programs must be located in the Silicon Valley Center, our research suggests that careful use of telecasting can enhance the curricular offerings. However, this requires access to appropriate facilities, reliable technology, appropriate staffing, and faculty who are willing (or are incentivized) to teach around half of the lectures from each side of the hill.

Your Call, and therefore the submitted pre-proposals, focus on Masters programs, but we should not lose sight of the underlying goal: to enable UCSC to build a durable presence in Silicon Valley that best furthers the **UC missions of research, teaching and service on both sides of the hill**. To achieve that goal, we need to leverage existing assets in SV --- UCSC Extension, the partnership with NASA, and numerous collaborations of individual faculty members with SV industry --- and to create a central hub of activity, where our faculty and students interact with members of the SV community.

Thus, to be successful, we need an attractive and accessible physical location where students in our SV-based Masters programs encounter students in other programs, and encounter UCSC-affiliated researchers (including faculty, PhD students and post-docs) and their industry partners. A busy schedule of seminars, open lectures and events will make our Masters programs much more attractive to potential students, lecturers, collaborators and donors. All interviews suggest that building such **intellectual critical mass** is the key to success.

Critical mass requires **resources**. Many of our previous attempts at entering into Silicon Valley have been unsuccessful because they have been underfunded. We recommend strongly that no Silicon Valley investment be made without clear plans for the provision of baseline accessibility and transportation (including SC Campus to SV Campus shuttle or other transportation vouchers), adequate staff support, options for student health care, etc.

Computational Media:

We considered all programs proposed by the CM department jointly, and support their staged implementation. In our opinion, this was the best written proposal, which clearly articulated the intellectual merit of the different programs and the potential program synergies. Furthermore, the fact that CM has already been successful at implementing a professional program in SV is a clear strength. However, it is apparent to the committee that the proposed timeline for implementation is too aggressive. Each one of the programs proposed will need at least two to three years to reach steady state, after which the original resources could be freed-up to be reallocated into the next program. We also have some concerns about the ability of a small department to handle four professional programs, essentially two undergraduate majors, and a regular M.S./Ph.D. program. On the programmatic side, we see the

possibility of offering all programs as either a one-year or a two-year program as an excellent option, and wonder why the same approach is not being followed in all cases.

Data Science

In our opinion this was the second strongest pre-proposal. Although it did not contain information about competitor programs or hard evidence about demand, the committee feels that this is an emerging area that leverages clear campus strengths, should be financially sustainable, and has clear links with many different industrial partners. We were also encouraged by their plan to establish a dialogue with industry through an advisory board. However, some concerns were raised about the draft budget. In particular, the proposal may have underestimated the cost of lecturers and the amount of staffing needed to run the program. Some members of the committee questioned whether a director with teaching responsibilities and a full-time staff member were enough to support the program. Finally, although CPB sees the use of internships as a great idea, we are concerned that the support structure necessary to implement and administer the process will be more resource-intensive than anticipated.

Aeronautics:

CPB sees this proposal as the type of venture UCSC might have engaged in back when the UARC contract was originally signed. It remains an attractive idea, assuming that the NAMS proposal is successful. However, it does differ from the other pre-proposals in that it involves both a M.S. (with no PDST) and a Ph.D. program, appears to have a stronger focus on hardware than on software, and emphasizes placement of graduates in government jobs. CPB wonders whether recruiting international students in this area would prove difficult, given the potential jobs for graduates are mainly with NASA or in NASA facilities. Also, the program might be difficult to scale up, although the proposed 20/20 split of Ph.D. to MS to begin with seems reasonable. This area, perhaps more than any other, requires a thorough market study to determine the realism of prospective partnerships. Another concern is the cost of the program. The proposal requests six FTE with the large space needs and expensive (\$600k-1M) start-ups, which might be unaffordable given the current cost envelope. Finally, the committee was not enthusiastic about the prospect of adding one more small department to BSOE that could potentially take faculty away from Computer Engineering.

Global Technology for Social Innovation:

CPB members found attractive the interdisciplinary nature of this program, which spans technology, diversity, social justice and sustainability. However, the ambitious scope unfortunately is not supported by a convincing plan to integrate the diverse foci. Indeed, the proposed short duration of the curriculum made the plan seem somewhat diffuse and scattered. The structure of the capstone projects is not fully fleshed out, and they are likely to be resource-intensive.

What CPB did like about this proposal was that it draws heavily on existing faculty and campus reputation. Perhaps the certificates proposed here could be independently developed as summer programs, and then leveraged into something larger in the future. We do see the possibility for summer programs in Santa Cruz for professionals who want to transition into the non-profit arena. Indeed, we believe that offering certificates could be a viable option for some of the other programs proposed for Silicon Valley. We encourage the CPEVC and proposing faculty to develop these ideas as a campus initiative with associated presence over the hill in parallel with the Silicon Valley initiative.

Nanotechnology:

Although nanomaterials is a field that spans multiple departments on our campus, the proposed program is an exclusive effort of Electrical Engineering. We feel that a program like this would be much more

successful with the involvement of faculty in PBS and BME. We also were concerned about the need (and cost!) of renting clean room space. Finally, Dean Konopelski has expressed his desire to see EE grow on campus first, and we concur.

It appears to us that nanotechnology is a discipline in high demand in the Valley that could attract a large number of potential students. Moreover, the EE department has had considerable experience in teaching M.S. students in Silicon Valley using telecasting. Hence, although the proposal is not yet ready to move forward, we believe that a revised version that incorporates faculty from across campus and presents a more integrated intellectual focus could eventually be successful.

Technology Management:

CPB struggled with the evaluation of this proposal, seeing it as different from the rest. Indeed, its goal is not to open a new program, but to enable the Technology Management (TM) department to relaunch their professional M.S. program in Silicon Valley, which was recently suspended after just one year of operation. Although we appreciate that resource constraints were the main reason for the suspension, since the professional program is an integral part of their existing academic plan, this Call is not the appropriate mechanism for securing the resources required for the relaunch. A related concern is the ability of a small but growing department whose culture is quickly changing to successfully manage the program at this time. Both Dean Konopelski and Graduate Council have expressed their desire to see TM grow their Ph.D. program before relaunching their professional M.S. program, and we concur. On the other hand, this M.S. program already has been approved, and may have some overlap with Data Science. There may be some way for the overall Silicon Valley initiative to exploit these advantages.

Sincerely,



Daniel Friedman, Chair
Committee on Planning and Budget

Enclosures

cc: Chancellor Blumenthal
VPAA Lee
VPDGS Miller
VCR Brandt
VCPB Delaney
Senate Chair Brenneis

Synopsis of the Interviews
Committee on Planning & Budget – June 2015

Programs Using Faculty Based in Silicon Valley

We met with **Brent Haddad**, the current **Chair of Technology Management (TM)**, who told us about his experiences with the **Technology and Information Management Master's Program (TIM)**. Brent worked in Silicon Valley before becoming an academic, and has research interests connected to the TM mission. He was brought in from Environmental Studies to chair the Department of Technology Management in 2013. The master's program ran during 2013-14 and then was suspended, due to what Brent and other faculty felt was a shortage of faculty. (TM currently has four full time faculty members, two 0 percent faculty members, including Brent, and an LSOE; a new faculty member will arrive next year.) Still, Brent felt that it was a success; the students finished within the timeframe and were satisfied with what they learned. There were **eight** of them, **virtually all of whom were international or had international backgrounds**. Three or four came directly from overseas two or three more were people from overseas already living in Silicon Valley; only two were working professionals.

There was market research undertaken in advance of the program's founding – a survey of 12,000 UCSC Extension alumni helped Brent and his colleagues gauge interest and set the price points. But this research didn't help them anticipate a big market: foreign students in China and India who want to work in Silicon Valley and were willing to make the investment to further their career. The TIM program is unique – it offers neither an MBA nor a master's in computer science, but a degree that combines the two – and should serve particularly appealing to working professionals who want to learn to bring innovative products to market. In addition to market research, the administration provided some funds for marketing the program – through presentations at companies, informational events at the Silicon Valley Center, an email blast to the survey participants, and an ad in the UCSC extension newsletter. Being able to post signs at Westgate Mall and San Jose Airport and purchase airtime on NPR would have helped. The lack of marketing was one problem; the bigger one was the challenge of staffing the program in a department responsible for two other degrees. The instructors were all ladder rank faculty, who had to trade off time for research and working with undergraduates and graduate students to teach in Silicon Valley. Classes were offered in the evening, which proved unnecessary, and made for a long day for the faculty involved. In the current round of preproposals, TM is asking for four of the fourteen FTEs, which they would monetize to provide \$320K administrative support for the program. This would cover the cost of hiring a distinguished lecturer to serve as the director of the program, a marketing staff assistant, and lecturers, plus buy-outs for Engineering faculty so they could teach in the program. Brent thinks there is a huge untapped market for this kind of program; although he couldn't estimate a break even point,

he felt that in the long run it has the potential to become a “cash cow.” There are good reasons for this program to be in Silicon Valley. Although Brent found teaching over the hill to be a challenge, there are ways of making it easier for faculty to teach in both campuses; a bus or shuttle with good wifi would help.

We met with **Michael Mateas**, the current **Chair of Computational Media (CM)**, to learn about the **Master’s Program in Games and Playable Media (GPM)**. CM, like TM, is relatively relatively small, with six faculty members with two approved hires on the way. Although the department only came into existence this year, the faculty and students involved are not: CM has operated as a self-standing major and graduate focus for a number of years. Michael and his colleagues decided to base the GPM program in Silicon Valley to take advantage of opportunities in the gaming industry, but also since this move was strongly incentivized and they understand there was little room for a new program on the main campus. During its inaugural year in **2013-14**, without any advertising at all, the program matriculated **eight students**. **This year** the program has matriculated **twenty-two students**, which is close to the twenty-five needed for the program to break even. **Roughly forty percent of the students in the program this year are international**. None are professionals working in Silicon Valley. The program’s main competitors are based at NYU and USC, where they exist in the company of strong film schools. As Michael explained it, professional master’s programs follow either the “executive model” or the “finishing school model”: they can provide a route to career advancement to individuals already working in an industry or help credential recent college graduates who want to find jobs in a particular industry. GPM is a “finishing school,” by this interpretation – and so are its counterparts at USC and NYU. UCSC’s advantage lies in the way it conceptualizes gaming not simply as a form of entertainment – war sport for young men – but as the basis for the production of new kinds of knowledge – that associated with “gameful computation” or “radically interactive computing” – finding new purposes for what game designers do well, which is combine “simulation based models with a nice UI.” The program would be perfect for engineers who want to take a more intellectual approach to what they are doing and to move into more managerial positions in a range of industries around Silicon Valley.

Challenges faced by GPM have less to do with marketing than with access. CM hired two industry stars to head up the program – John and Brenda Romero, the husband-wife team who invented the popular game *Doom*, a move which Michael and others involved in similar programs see as key to the success of professional programs of this sort. But they have found their work conditions less than ideal; they took the positions because they wanted to be part of a vibrant intellectual community; so far, they’ve felt isolated on the other side of the hill. Michael is going to try to encourage more of his colleagues to teach in the program – he’s leading by example – “eating his own dogfood” – but the commute is making it a hard sell. Like Brent, he felt that a shuttle or bus with wifi would really help. He also felt that better facilities for

teleconferencing would help with the challenges of integration, although nothing can substitute for face to face contact. CM is going to submit a proposal in the Silicon Valley Initiative competition, but Michael is concerned that the administration will not be able to devote the resources necessary to build the critical mass in Silicon Valley needed for programs to succeed. In their preproposal for the current competition, CM is seeking anchor faculty for four programs, including GPM, in areas with strong synergies among themselves. In addition to hires in Serious Games, Human Computer Interaction, and Human Language Media and Models, CM is requesting a recruitment to hire a senior faculty member to run the GPM program and two lectureships to staff it; equally important, the department is requesting an FTE to upgrade Brenda Romero to a tenure track position; she is currently a retention risk, and this will help, although the Romero's sense of isolation from the intellectual life of the department remains a concern. Another problem facing the program has to do with student services; the lack of any provision for health care and affordable housing has been a real problem for the students enrolled, who tend to rely on public transportation. As Michael sees it, the administration needs to go "all in" and build a true UCSC community in Silicon Valley to solve these logistical problems that any program launched under this initiative is likely to face.

Programs Using Distance Learning

We met with **Hamid Sadjadpour**, the **Graduate Director of Electrical Engineering (EE)**. Since 2010, EE has run a Silicon Valley based version of its **Academic Master's Program in Electrical Engineering** by telecasting their existing master's and doctoral level courses, supplemented by graduate courses taught by faculty in Computer Engineering, Computer Science, and, to a much lesser extent, Applied Mathematics and Statistics. Those in the Silicon Valley EE can attend classes on a full-time or part-time basis and can complete the program in one year; they can also try out the program by enrolling in individual courses through UCSC Silicon Valley Extension. (See below.) Students can choose among specializations: including **Wireless Communications and Networking, Signal and Image Processing, Adaptive and Applied Optics, Biomedical Instrumentation and Microelectronic Devices, Electronics and Photonics**, , and **VLSI, MEMS, and Nanotechnology**. EE encourages – but does not require -- faculty in charge of relevant courses to teach once a week from Silicon Valley and once a week from Santa Cruz. In addition to the heavy dependence on distance learning, the program is unique in offering rolling admissions and a part time option, which a small number of students take advantage of. The admissions criteria are as follows: applicants need good GRE and TOEFL scores, a minimum of 2.8 GPA (Hamid: We don't have any required GPA for doctorate degree). With this model, **the program has grown from five to seven students to around forty**. (The official number is thirty.) The program admits **mainly — international students**, few of whom take classes in Silicon Valley.

Hamid expressed concerns regarding the requirements of the current Silicon Valley call. If programs include PDST fees, students will be paying roughly \$40k per year; in Hamid's opinion, UCSC cannot charge as much as Stanford and Berkeley and still attract students. In order to conflict within departments, Hamid felt it would be better to have graduate directors, rather than department chairs, administer the incentive funds. Hamid was very emphatic that it will take more than fourteen faculty members for the initiative to succeed; successful programs will need resources to hire lecturers as well. Finally, he was very concerned about infrastructure: classroom space with telecasting facilities at little or no charge; staff for proctoring and exam collection in the Silicon Valley Center; high-speed internet; student housing; and student health care. Hamid also shared some lessons learned from EE's experience: students need to be made aware of the telecasting situation up front; doctoral growth in Silicon Valley should happen organically, rather than being forced; international students are easier to recruit, since they have fewer options than domestic students and are less likely to complain about the lack of courses offered in each quarter; those planning programs should proceed with caution when it comes to partnering with UCSC Extension, since it is run for profit and has different incentives from those of the main campus; professional master's programs could be useful in helping UCSC develop a strong alumni network in Silicon Valley, but academic master's programs have an important role to play as well. The EE preproposal is for an academic master's program in nano-engineering, which would rely heavily on lecturers; the target applicant pool would include foreign nationals and the spouses of international workers living in Silicon Valley (I

am not sure where you get that but I did not say that). Our overall sense is that while Hamid saw some advantages to being in Silicon Valley, since having a greater presence there might make it easier to reach certain groups of students and lecturers, Hamid does not see it as critical for the success of a program in his field given the current lack of resources. However, if enough resources are provided by school, the program can be more aggressive admitting students residing in Silicon Valley. Although Hamid did not mention UCSC sponsored shuttles or buses, he wondered about faculty travel costs. Is this something the administration could pick up?

We met with **Katia Obraczka, Graduate Director of Computer Engineering (CE)** to talk about the **Master's Program in Network Engineering (MSNE)** that CE began as an extension of the department's regular masters program. Technically, the MSNE program still exists, although it is currently inactive. The program provided a model for EE; it involved a heavy reliance on telecasting, which enabled students in the program to take courses with masters and doctoral students back in Santa Cruz, although students in Silicon Valley paid more in fees than their counterparts on campus. Katia joined the UCSC faculty in January 2001 from USC, which runs a quite large and profitable master's program using a combination of regular faculty and lecturers. During its first years of existence, the CE MSNE program was quite successful. Katia believes that one of the main reasons for its

early success was, not only the quality of the program but also the initial focused marketing campaign **targeted at companies, which in many cases would pay for their students to attend**. At one point in the mid 2000s, CE went so far as to run the program almost exclusively with Lockheed-Martin by telecasting to the company's sites not only in Silicon Valley, but also in Colorado and Nebraska. The marketing effort petered out over the 2000s, and so did enrollment in the program. By 2010-2011, the department was no longer admitting students for this degree.

Katia identified several lessons CE has learned from the experience of running this program. Technology, and in particular good telecasting facilities, are key. Marketing needs to be aggressive; programs may need a dedicated staff member playing this role. Marketing to companies has proven more useful than marketing to individuals; if a program targets a small number of large, specific companies are targeted, management can adapt the content of their program to the company's needs. It can be problematic to have regular graduate students and professional master's degree students sharing courses; professional students can have different expectations in terms of evaluation and possibly also a weaker background. A choice must be made: does a department want to run a "cash cow" MSc program like the USC master's program, or a selective prestigious program; if a program takes the latter route, it is unlikely to attract more than ten or fifteen students per year.

Katia briefly mentioned that CE is putting together a proposal for the current call focusing on control and robotics.

Earlier Renditions of the Silicon Valley Initiatives

We met with **Nirvikar Singh**, who was tasked in 2007 with exploring the possibility of opening a socially responsible **School of Management** in Silicon Valley. This idea never got off the ground, for a complex set of reasons. Earlier, he had worked with Ram Akella to prepare a detailed report on opportunities for technology management programs in Silicon Valley. Nirvikar shared some thoughts about the current call, which targets two constituencies: professionals already working in Silicon Valley who want to upgrade their skills and students from elsewhere who are want to begin a career in Silicon Valley. He thought that full time programs, even if they were only a year in length, were currently unlikely to prove successful in attracting people already in Silicon Valley. For that purpose, executive programs taught on evenings and weekends would be much more likely to succeed. He also pointed out that any program or activity of whatever sort needed a champion on the ground in Silicon Valley with industry experience and good contacts; that there was no way to create a presence in Silicon Valley on the cheap, but that success need not depend on huge investments; that finding the right staff was more important than attracting a large staff; and that smooth, transparent technology (for telecasting) was key. Part of the conversation focused on past history and the various personalities involved, but Nirvikar did follow up with an email with some clear

suggestions of promising leads to follow. In brief, he felt that UCSC could create a niche by developing programs that build on existing campus strengths (and deploy existing campus faculty) in three fields: data science for social good, innovation and entrepreneurship, and technology and creativity. Programs in this field could take advantage of UCSC's reputation for creative interdisciplinary research and its commitment to diversity and social justice. UCSC has female faculty in each of these fields with the skills and stature needed to direct these programs. Given women's relative lack of representation in Silicon Valley, this could be a draw.

We met with **Sue Carter**, who has been involved in Silicon Valley in several capacities: as a **collaborator in the University Affiliated Research Center (UARC)** run by UCSC for **NASA Ames**, as former **Chair of the Graduate Council** and author of a 2011 draft document offering **Graduate Council Guidelines for an Academic Plan for Silicon Valley**, and as **Acting Dean of the Graduate Division**, where she has been directly involved in shepherding the **current call for preproposals**. Sue has a lab at UARC and has collaborated with industry in the development of sustainable technologies.

Sue raised questions about the financial benefits of the PDST master's programs currently under discussion. The additional PDST fees go back to the program, but it's not clear that the professional programs really make more money for the campus or provide more money for doctoral support than academic masters programs given the lower return to aid (29% versus 48%). Thirty percent of the fees need to go back to students in the program in the form of financial aid, and given a lack of faculty expertise, the rest ends up paying for lecturers. There are no duplicate classes with our academic programs; those creating professional programs have to start from scratch to staff them. They can't use telecasting, say, or alternating locations for the lectures to build on the curriculum offered on the main campus.

That said, Sue doesn't think it's a bad idea for UCSC to start programs in Silicon Valley. Many of our graduates are from the area and could live with their family while attending the program; candidates already in the area could live at home instead of bearing the expense of moving to Santa Cruz. UCSC's profile suits us to occupy an important niche; people in Silicon Valley care about the environment, climate change, and social justice, and they are eager for innovation in all of these fields. But Sue has doubts about **the current call**. Under the model it puts forward, Silicon Valley faculty would only teach a course in Santa Cruz every three years; they would be isolated from the broader UCSC community. Did it make sense to focus all our growth in Silicon Valley, now that the facilities on Delaware are set to come on line? And there is little said in the call about how the proposed programs will integrate core campus values, like sustainability and social justice. All this has had an unfortunate effort. Just the people who should be doing it (proposing programs) are turned off. Meanwhile, people at NASA Ames and UCOP are getting impatient.

Sue shared a copy of the **Graduate Council's Guidelines**, which she felt provided a more balanced approach to Silicon Valley that jibes with campus priorities. This document (now outdated) recommended the establishment of master and doctoral programs in themed areas under **Technology Leadership, STEM Education and Informal Learning, Information Sciences and Networks, and Energy and the Environment**. Unfortunately, the budget cuts cut that conversation short.

The Rise of UCSC Extension

We spoke with Lynda Rogers, the **Dean of UCSC Extension**. UCSC Extension has succeeded in making the transition from a broad gauge smorgasbord approach to its offerings to a strategy based on market research concerning what skills be most desirable for both individuals and businesses in Silicon Valley. Key here has the offering of course sequences leading to **certificates** in a range of marketable areas, including **Web and Interactive Media Design, Enhanced Database and Data Analytics, Software Engineering and Quality, Information Technology, Human Resource Management, Personal Financial Planning, and Regulatory Affairs**, to name just a few. The courses are costly, but, by Lynda's account, UCSC Extension is having no problem with **enrollments**, which rose to **14,000** this year.

In moving in this direction, Lynda has been actively building partnerships with Silicon Valley corporations, in part with an eye to internship placements, in part with an eye to post-certificate jobs for students. She could offer no numbers, but she claimed that a fair proportion of students who complete particular sequences do find jobs in related fields. The fact that the same businesses have participated repeatedly in these programs seems to reflect their confidence that the Extension course sequences provide very good training. UCSC owes some of its success to its policy of hiring adjuncts and lecturers rather than relying on ladder-rank faculty. Lynda felt that this approach could provide Silicon Valley Initiative programs with a successful start-up strategy as well.

On the student life front, Lynda has learned how important it is to have good and inexpensive food options near the facilities. This is something she is very mindful of in looking for a new site. This really matters for her students and, she suggests, it will for Silicon Valley Initiative students as well.

All in all, Lynda has proven quite astute and energetic in reshaping UCSC Extension. She seems willing to help out as appropriate as the campus moves to expand its offering of degree programs in Silicon Valley. Still, somewhat in confidence, we must add that Lynda appears to believe that training programs other than master's programs or MBAs may well prove more suited to this context; it's worth reflecting on whether programs focused on more targeted areas might prove more attractive to today's employers.

A Successful Competitor

We met with Steven Rosenberg, the Interim Campus Manager of Carnegie Mellon University (CMU) Silicon Valley. Steven is a Carnegie Mellon alumnus with a doctorate in cognitive psychology, which at the time was part of GSIA. (GSIA = Graduate School of Industrial Administration (now renamed the Tepper School of Business). The psychology department is now part of the College of the Humanities and Social Science.) (CMU began as a trade school in 1900, although now it has programs in science and technology, the fine arts, liberal arts, and a business school.) His initial interest was in artificial intelligence and computational linguistics; this ended up steering him, after a sojourn in academia, towards a career in industry and eventually Silicon Valley, where he worked in Hewlett Packard Research Labs for many years. This background apparently has suited him well for leadership in CMU Silicon Valley, which is neither a research center nor a professional school, but has aspects of both.

The Silicon Valley Center is one of a number of satellite campus programs CMU runs around the world. These include Rwanda, China, Portugal, Japan, and Qatar. CMU Silicon Valley was founded eleven years ago, right before a recession. The School of Computer Science launched the project, which the College of Engineering subsequently took over. Both the School of Computer Science and subsequently the College of Engineering supported the initiative, which they saw as helping them establish footholds in Silicon Valley, close to where the money and action is; this way companies could gain access to students and students could gain access to careers. This kind of enterprise is recession proof; professionals tend to enroll in master's programs during downturns and during upturns, students are eager to enhance their career prospects. At first, CMU Silicon Valley targeted companies that might be willing to pay for part time and full time for their employees. The director received pledges of support from NASA and Lockheed Martin. But when the recession hit, the research funding evaporated, along with the prospects for corporate sponsorship, and CMU Silicon Valley had to adopt a different strategy. The first version they tried was a continuing education program in which working professionals could attend classes in the evenings or weekends to earn a master's degree in two or three years. From all reports, this model was not terribly robust. Then, five and a half years ago, when the College of Engineering took over from the School of Computer Science, CMU Silicon Valley switched to **full day programs**. Although there is a continuing successful evening program for working professionals, most of the programs are directed at full time students. CMU Silicon Valley also now offers a doctoral program as well.

With the founding of the doctoral program and the focus on building up the full time program, CMU Silicon Valley was able to grow the faculty, which is of a much higher caliber than it was before. There are now ~17 faculty members based in Silicon

Valley. Several are teaching professors, who handle the bulk of instruction; the rest are research professors, who teach a course or so a year. None are tenure track; from the start, the CMU administration felt it was a bad idea to move regular faculty lines from Pittsburgh, for fear of what would happen to these professors if the Silicon Valley campus closed. Instead, CMU Silicon Valley recruited locally. The research faculty has many entrepreneurial types who find a university setting an attractive place in which to pursue their work. Many are working on start-ups; one faculty member began a company that was recently bought by Facebook. Among the teaching faculty are recent doctorates who enjoy the stability and lack of committee work the program offers. Faculty at CMU Silicon Valley might have trouble getting tenure in Pittsburgh, but they would qualify to be hired.

A year and a half ago, CMU Silicon Valley merged its master's and doctoral programs with those offered at CMU's home campus in Pittsburgh. SV Faculty were also, except for a few cases, integrated into the relevant main campus department. Applicants interested in the Silicon Valley program apply to the same master's and doctoral programs as students who want to be based in Pittsburgh, and must meet the same criteria. Once a class is admitted, there is a further process to determine who gets to go to Silicon Valley; the competition is quite stiff, and some students don't get in. At the doctoral level, some students at the doctoral level are based in Silicon Valley but usually spend about year in Pittsburgh before they do their qualifying exams. There are also students in Pittsburgh who end up spending some in Silicon Valley at some point while pursuing their degree. Each Silicon Valley based doctoral student has a Silicon Valley based main advisor and a tenure track co-advisor at the program back home. This is easy to coordinate, the Silicon Valley faculty and the Pittsburgh faculty are housed in the same departments. CMU Silicon Valley handles many parts of its curriculum through distance learning, simulcasting courses offered in Pittsburgh to students in Silicon Valley and vice versa. The goal is to ensure that Silicon Valley based students graduate with a CMU degree and have the same high quality educational experience as their counterparts in the east.

This model has worked. There are now 35-42 doctoral students in residence and ~324 master's students, only 10 percent of whom are part time. These students are divided among three departments: Electrical and Computer Engineering (MS-ECE, MS-SE); the Information Networking Institute (MSIT-MOB, MSIT-IS, MSIT-SM) (the INI programs are two years, with the second year in silicon valley); and the Integrated Innovation Institute (CMU Silicon Valley does a program in Software Management associated with this institute). Virtually 100 percent of the full time students who come to CMU Silicon Valley are international, with the overwhelming majority coming from India and China. The students from India tend to be individuals with experience in high tech; the students from China are fresh from completing undergraduate degrees. All students admitted to these SV programs must be accepted by the home departments in Pittsburgh, and meet the same requirements as Pittsburgh-bound students. As a small campus, CMU Silicon Valley

cannot offer the full range of services to its students. For example, it doesn't offer ESL, but it does provide extensive career services courses, such as how to handle an interview and write a resume, along with a four to six week intensive orientation program, which students can enroll in for an extra fee. These courses utilize ESL specialists as part of the team to address specific ESL issues in the context of career services. Students have access to many of the same services as Pittsburgh – student and career services, VTA passes, health insurance, etc. The program has strong connections with industry; most students come because they want to work in Silicon Valley and the vast majority find employment there once they are through.

Silicon Valley Timeline

Committee on Planning & Budget - June 2015

1939 The Ames Aeronautical Laboratory opens in Moffatt Field. (Moffatt Field is founded in 1933 as the Sunnyvale Air Station to house the dirigible, USS Macon.) The laboratory is renamed the NASA Ames Research Center with the founding of NASA in 1958. It occupies 500 acres adjacent to the Naval Air Station at Moffatt Field. In 1994, when Moffatt Field is closed as a military base, NASA Ames acquires stewardship of the property, which becomes the NASA Research Park.

1970 Founding of UCSC Extension.

1980-1999 Janice Corriden serves as Dean of Extension. Enrollments rise under her tenure from 15,460 in 523 courses to 52,000 in 3,000 courses. The majority are in software and hardware technologies, followed by business, management, and art and design.

1997 UCSC Extension opens classroom facilities and multimedia and graphics labs in Cupertino, Santa Clara, Sunnyvale, and Marina.

1997 Establishment of Jack Baskin School of Engineering.

Circa 1999 First discussions of UCSC programming in Silicon Valley.

Circa 2000 The Department of Computer Engineering begins running a master's program in Network Engineering out of Silicon Valley. The program succeeds in securing corporate sponsorship, at one point simulcasting courses to CISCO locations around the country.

2002 Under Director Henry McDonald, NASA Ames initiates collaborations with academia, industry, and non-profits. In 2003, this effort culminates in the creation of the NASA Ames University Affiliated Research Center (UARC), a contractual vehicle designed to draw on the ability of universities to "attract, develop and retain top research talent." A model for later centers, UARC's aim is to "provide long-term continuity of top-tier research talent focused on NASA's multidisciplinary mission needs." Contributing to diversity among NASA researchers was also an objective. The center promotes collaborative research on areas of strategic importance, including information technology and computer science, nanotechnologies, astrobiology, and biotechnology.

2003 UCSC wins a ten-year contract to manage UARC. The research program is valued at \$330 million and brings an estimated \$3 million to campus per year in overhead. Along with the contract, UCSC wins the option of leasing a large tract of land adjacent to the NASA Ames site to open a research park. There is

discussion of collaborating with a corporate partner to create a work/live space; the idea of moving 2,000 undergraduates to Silicon Valley is discussed.

2004 As Vice Provost for Silicon Valley Initiatives, Carl Walsh proposes the establishment of a School of Management in Silicon Valley at the NASA Ames site. Acting Chancellor Martin M. Chemers assigns Nirvikar Singh the task of exploring the options.

2004 Carnegie Mellon develops plans to open a Silicon Valley campus with master's degree programs designed for corporations willing to cover their employees' tuition. A major portion of funding is slated to come from major donations from NASA Ames and Lockheed Martin. When the recession hits, these sponsors rescind their offers. Instead of an executive program, Carnegie Mellon begins offering part time master's degree programs designed for working professionals using locally hired lecturers.

2006 Carl Walsh takes over as interim leader of UCSC Extension.

2006 A graduate certificate program in Knowledge Services and Enterprise Management is offered by UCSC Extension and the Baskin School of Engineering. Based in Silicon Valley Center at NASA Ames, courses in the program are slated to count towards masters and doctoral degrees in Technology and Information Management, to be established 2008.

2008 Under Vice Provost for Extension Allison Galloway, UCSC Extension ends its operations in Santa Cruz, closing award winning certificate programs in English language training for international students and scientific illustration. This reorientation eliminates fourteen staff positions in Santa Cruz and moves six to Silicon Valley.

2009 UCSC Extension moves to the 2505 Augustine Drive Site. UCSC Extension operates exclusively in Silicon Valley. Enrollments are now roughly 20,000 annually in 400 courses that offer degree credit, professional credit, credentialing, and recertification programs staffed by practitioners.

2010 Lynda Rogers takes over as Dean of UCSC Santa Cruz Extension. Enrollments rise to 14,000 in 2015.

2010 Carnegie Mellon shifts focus from part time to full time master's degree programs and admits doctoral students to complete their studies primarily at the Silicon Valley campus. The Silicon Valley campus adds a new category of faculty to the pool of non-tenure tract instructors who staff the campus: research professors who only teach an occasional class.

- 2010 The Department of Electronic Engineering begins offering a Silicon Valley based version of its academic master's program in Electrical Engineering.
- 2011 Marketing efforts for the Department of Computer Engineering master's program in Network Engineering peter out, as do enrollments. No new students are admitted, and the program effectively closes.
- 2011 The Graduate Council issues Guidelines for an Academic Plan for Silicon Valley proposing the creation of masters and doctoral degree programs in areas covering technology leadership, STEM education and informal learning, information sciences and networks, and energy and the environment. Proposal is not considered due to budget crisis.
- 2012 Approval of a Technology Information Management professional master's program approved with Professional Degree Supplemental Tuition (PDST).
- 2012 Proposal for Silicon Valley-based Games and Playable Media professional master's degree program with PDST put forward by Computer Science and endorsed by Dean of Engineering.
- 2013 Carnegie Mellon merges its Silicon Valley programs with master's degree programs housed on CMU's main campus in Pittsburgh. Areas of study include masters programs offered by Electrical and Computer Engineering, the Information Networking Institute, and the Integrated Innovation Institute. Adjuncts teaching and research faculty still staff the program, but their appointments are now housed in departments based in Pittsburgh. Between 34 and 42 doctoral students are based in Silicon Valley, and there are 280 full time master's students in residence. Virtually all of them are international; most are individuals from China and India seeking to make careers in Silicon Valley. Faculty include five teaching professors and fourteen research professors and scientists.
- 2013-14 Inaugural year of Technology Information Management professional master's degree program. Eight students matriculate; virtually all of them are from overseas.
- 2013-14 Founding of the Department of Technology Management.
- 2013-2014 Inaugural year of Games and Playable Media master's degree program. Eight students matriculate.
- 2014-15 Founding of the Department of Computational Media.

2014-15 Games and Playable Media master's degree program begins its second year. Twenty-two students matriculate.

2014-15 The Department of Electronic Engineering academic master's program in Electrical Engineering grows to 40 students, the vast majority of whom are international.

CPB Silicon Valley “Oral History” Report April 23, 2015

Introduction

A CPB subcommittee of Don Brenneis (Anthropology), Abel Rodriguez (AMS), Danilyn Rutherford (Anthropology) and Bruce Schumm (Physics), met with a range of interlocutors with experience and an interest in Silicon Valley. Their goal was to conduct an oral history with an eye towards lessons learned that could be of use going forward. They spoke with the dean of extension, the acting dean of graduate studies, chairs and graduate directors in four departments in the School of Engineering, and others with past or current administrative experience in Silicon Valley. They felt as if they captured the thoughts of the key faculty and staff with background in Silicon Valley. The following is a short list of key findings and questions drawn from these discussions. Appended are a synopsis of the conversations and a timeline of key events.

Findings

*The individuals consulted all spoke of the challenges involved in creating a sense of unity between Silicon Valley-based faculty and their counterparts in Santa Cruz. A good approach for dealing with this problem remains to be found.

*Many programs will draw primarily on pools other than the Silicon Valley-based professionals originally anticipated in the initiative. Such an outcome could diminish, if not eliminate, the need for a program to be physically located in the Valley.

Questions

1. Can we get most of the way to critical mass by bolstering programs that have already manifested an affinity for being in Silicon Valley, and have a current presence in Silicon Valley and a compelling reason to remain there? These include TIM, EE, and Games and Playable Media.
2. With that beachhead established and shorn up, are there enough FTE to launch one or perhaps two new programs that would contribute to further establishing the critical mass in Silicon Valley, but in innovative interdisciplinary ways that are demonstrably connected to the campus mission?
3. Are there ways to draw on the administrative strengths, local knowledge, and contacts of UCSC extension?
4. Through the enhanced networks that result from this initiative, can UCSC broaden the network of constituencies on central campus with an involvement in Silicon Valley? Can Silicon Valley become a site for research and community engagement across divisions and departments, ranging from the Physical and Biological Sciences to the Arts?