



March 10, 2011

Great universities have the responsibility to address important problems as well as the means to deliver these solutions to society. We felt that this was an opportune time to evaluate our effectiveness in entrepreneurship. We commissioned Professor William Ouchi, the Sanford and Betty Sigoloff Chair in Corporate Renewal from the Anderson School of Management, to conduct a study of our current method of fostering entrepreneurship: our current successes, what is being done elsewhere, and what we might do or change to improve upon our current way of handling discoveries and inventions.

In putting together his assessment, Professor Ouchi interviewed seventy (70) individuals including faculty at UCLA, faculty at other leading research universities, external investors, and external licensees who have dealt with UCLA. The report is available at [www.vcr.ucla.edu/ucla-entrepreneur](http://www.vcr.ucla.edu/ucla-entrepreneur). Over the next few weeks, Professor Ouchi will be presenting an overview of his report to audiences including the Deans, ORU Directors, the Academic Senate, and representatives of undergraduate, graduate, and postdoctoral students.

From his report and recommendations, you will see that there are some modifications or enhancements that can be made relatively easily, and others that would require careful review and navigation before deciding to implement. Before proceeding, we ask for your opinions and suggestions. We are eager to begin implementation beginning in late Spring this year. We believe some changes can enhance our ability to support our faculty members and their research, in addition to broadening our offerings of programs for students at all stages in their education interested in entrepreneurship. Comments should be directed by April 15, 2011 to the following email address: [innovation@conet.ucla.edu](mailto:innovation@conet.ucla.edu).

After Professor Ouchi has had an opportunity to discuss the feedback with the Chancellor and us, and incorporated appropriate modifications, he will issue a final report that will be made publicly available.

Cordially,

Handwritten signature of James S. Economou in black ink.

James S. Economou, M.D., Ph.D.  
Vice Chancellor for Research

Handwritten signature of Kathryn A. Atchison in black ink.

Kathryn A. Atchison, D.D.S, M.P.H.  
Vice Provost, Intellectual Property & Industry Relations

# AN ECOSYSTEM FOR ENTREPRENEURS AT UCLA

## An Invitation for Campus-wide Input

### Thinking About UCLA's Research Mission

America's preeminent research universities have one unique responsibility that lies only with them among all institutions of higher learning: to address the great challenges of our time, be those disease, poverty, or the environment. These biggest problems will not be solved by government, the courts, or the private sector: the nation looks to us, the brightest students and most creative faculties working in our classrooms and laboratories, to discover innovative solutions. Universities command almost 80% of our nation's research and development expenditures and represent the greatest concentration of intellectual talent – across all of the disciplines of the arts and sciences – and thus it is within these universities that the great advances will continue to be made. But our work does not end with the creation of new knowledge – we must persevere until our discoveries are embodied in real-world implementations that deliver tangible benefits to our society. The people of California and of America who fund our world-leading engines of discovery expect nothing less.

These great challenges of the 21<sup>st</sup> century are multifaceted and demand from us non-traditional strategies. Because none of the major problems fits entirely within the traditional boundaries of academic disciplines, we must adopt multi-disciplinary teaching and scholarship as part of our everyday routine, we must create new structures that bridge the gaps from one discipline to another, and we must embrace a culture that encourages and rewards team research. We must achieve a new understanding that our enterprise requires both curiosity-driven scholarship and problem-driven scholarship, and that each prospers only in partnership with the other. Believing as we do that our primary method of transferring our new knowledge to the larger world is through our graduates, we must devise new instructional approaches that will encourage a problem-solving entrepreneurial spirit among our students and among those of us who teach them. Indeed, we must develop a new spirit that encourages us all to discovery and creativity and that honors those who go on to solve the often devilish problems that attend the transformation of a brilliant idea into a practical solution to a great problem or opportunity.

Entrepreneurship is not and cannot be synonymous with commercialization. Reality suggests a more nuanced definition: that entrepreneurship is the passionate determination to translate a vision into reality for the greater good of society - the creation of new knowledge for practical benefit. This kind of scholarly work is demanding, risky, and often requires unusual courage and determination on the part of the scholar-entrepreneur. We cannot undercut those efforts by throwing bureaucratic roadblocks thoughtlessly in their way. While we must safeguard

the public interest, we must not obsessively hold up the stop sign of “conflict of interest” without suggesting alternate solutions, so that an innovative project can continue to move forward.

We believe that a balanced campus-wide culture of entrepreneurship and innovation will be a necessary requirement for any research university to remain preeminent. In one sense, we already acknowledge the importance of the entrepreneur-scholar. Our finest scientists and scholars are inherently entrepreneurial – they want their work to have an impact and they are attracted to a university that allows them wide creative breadth. Many of these scholars practice “basic” research, and their work is infused with and elevated by their independent spirit. The best students will always be attracted to work with these research scholars. In another sense, we have more to do in developing our culture of entrepreneurship. Our paymasters – federal, private, and philanthropic – increasingly expect a return on their investment for the common good; they want to see a contribution made to solving a major social problem or opening up a major new opportunity. Careful attention to the business of delivering research scholarship to society can also benefit universities financially, thus allowing reinvestment of these resources in other worthy activities. But as we attend to this second aspect of entrepreneurship, we will retain our sense of balance. Our students are served well in being taught to think clearly, to express themselves clearly, and to develop a sense of social responsibility. These activities may or may not require problem-directed scholarship. In addition, some of our research is aimed at developing solutions to basic questions that have no apparent short-term connection to the social problems of the world, but these inquiries are often more important for their timelessness and fundamental nature. We must do more to build up our entrepreneurial culture, and we must do so in a balanced way, one in which all of us continue to respect many forms of scholarship.

An entrepreneurial university can reinvigorate faculty, students, and staff; it can be an engine to stimulate new jobs, and it can encourage us all to address the major issues of our nation. This report, and the research that lies behind it, are meant to stimulate a dialogue at UCLA that will engage all of us in thinking through how best to more fully engage our enterprise in this part of our mission.

### **Scholarship at UCLA Today**

UCLA has the largest research budget of any U.S. university at nearly \$1.2 billion per year (a few additional universities can make a similar claim using different metrics). UCLA also enjoys other important advantages among its peers. Overall, about 70% of university patents come from the life sciences, with most of the remainder from engineering and the physical sciences. Increasingly, major innovations in the life sciences come about through close collaboration between life science, engineering, and physical science scholars. Many interviewees asserted the necessity of close physical proximity among these allied fields as a precondition for successful innovation. At UCLA, the medical, life science, engineering, dentistry, public health, nursing, and physical science faculties are literally next door to one another, cheek by jowl, along with the modern, research-focused UCLA hospital with its

affiliated hospitals and clinics nearby. Perhaps no other U.S. university possesses this combination of scale and scope: M.I.T., Caltech, and UC Berkeley have no medical school nor hospital, for example, while UCSF has no school of engineering nor of management. While Columbia University includes all of those disciplines, they are not located next door to one another. Other universities also have all of these disciplines but do not have their own research hospitals that generate the large patient flow to which UCLA's scholars have access. Successful innovation in some fields such as the health sciences is increasingly dependent upon both scope and scale, and virtually no other U.S. university can match UCLA on those dimensions. Our goals should now include making the most of these great advantages on our campus.

During FY2009, UCLA received 333 disclosures of inventions, filed 179 new U.S. patent applications, and completed 37 license or option agreements. The Office of Intellectual Property (OIP) estimates that UCLA numbers among its faculty approximately 2,000 inventors. While this is a positive record, it is only a start on our full mission to be a university of entrepreneurs.

In 1980, the Bayh-Dole Act transferred to universities the control of their inventions that had previously resided in some twenty-six disparate federal agencies. Only 5% of the inventions held by the government had ever been licensed. In the thirty years since, the major research universities have experimented with a variety of methods that might improve their production of invention and their ability to bring about the transfer of university inventions to real-world applications, typically through licensing of the intellectual property to established companies or through licenses to new start-up companies.

Every university measures the effectiveness of its entrepreneurial and technology transfer activities in a different way, one that fits its unique situation. Some universities place the creation of positive relationships between faculty and the technology transfer staff first among their priorities. Others value most highly the movement of inventions into the outside world, while yet others measure their success by their revenues from licenses and equity holdings. Among these many goals are two that stand out as nearly universal but that to some of us will be surprising or even debatable: (1) "The work of a research university isn't finished until the discoveries are out into the marketplace and are actually doing something that's useful for people" (Stanford, 10/7/2010). (2) "Our faculty should always be in situations of conflicts of interest, and we should help manage them" (UCLA, 8/17/2010).

Like other research universities, UCLA has improved its patenting and licensing processes over the past thirty years, and it is now ready to continue that progress through an energetic conversation that engages all parts of our university.

### **Why Consider Changes at UCLA?**

The simplest answer to this question is that, among the 70 interviews in this study (33 UCLA faculty and senior staff, 21 from other universities and research institutes, and 16 investors and licensees), most were of the view that state and federal support of university

research will decline over the coming years, and UCLA like other universities must use every avenue to locate new sources of revenue to support its research, both basic and translational.

We evaluated data on sixteen major research universities and found that their three-year average annual licensing revenues (2006-2008) ranged from less than \$5 million per year (Johns Hopkins, Univ. Illinois) to more than \$150 million annually (Columbia University). UCLA averaged \$24 million per year over the period. Had UCLA (3.27% return), with twice Columbia's total sponsored research budget, returned the same licensing revenues per million dollars of research as Columbia (21.42% return), UCLA would have earned more than \$257 million per year. In another comparison, we combined the licensing revenues for Berkeley and UCSF (since that combination approximates UCLA's composition with both medical and engineering schools, plus the liberal arts) and computed the ratio of licensing revenues to total research spending for the combined campuses. If UCLA had performed at the UCB/UCSF level, it would have earned \$46 million per year.

In another analysis, we found that whereas UCLA's licensing revenues amounted to 3.27% of its total research expenditures, UCSD produced a 3.35% return, the UC system as a whole yielded 3.82%, and the UCSF/UCB combination produced a 6.26% return. The lowest percentages in the University of California system are those of UCSC at 0.06% and UCR at 0.91%. MIT yielded a rate of 5.18%, Stanford 8.32%, and Columbia University returned 21.42% on its research. What really interests us, of course, is how Columbia has done it, and whether UCLA can apply Columbia's methods.

### **How Columbia Does It**

Columbia is slightly more efficient at converting research dollars into disclosures, producing one disclosure for every \$2,000,000 of research, v. \$2,500,000 for UCLA. It's difficult to know exactly what that means, since Columbia might have a higher proportion of engineering and physical sciences disclosures, and these typically take fewer research dollars per disclosure than do health science disclosures. There is a bigger difference in the cost of achieving an issued U.S. patent, at nearly \$18 million per patent for UCLA compared to about \$10 million per issued patent at Columbia. Caltech, which has no medical school, has an average cost of about \$2,500,000 per issued patent. Again, we cannot know how the health science v. engineering/physical science mix differs between UCLA and Columbia.

Another notable difference is that 20% of disclosures at Columbia resulted in issued U.S. Patents, v. about 13.5% at UCLA (UCB, with no medical school, had a rate of about 31%). What catches one's attention, though, is that for the UC system as a whole (individual campus data are not available) 60% of the patenting legal fees incurred by the university are reimbursed by a licensee, while at Columbia, only 25% of those fees are reimbursed. At Wisconsin-Madison, only 11% are reimbursed. That means that Columbia, like Wisconsin, is investing a great deal in filing for patents at risk, with no immediate prospect of reimbursement. The Columbia Executive

Director and Vice President of Intellectual Property and Technology Transfer is a person who has a business background and has not ever been an academic. He and his staff, most of whom also have business experience (like those at WARF), make informed decisions to invest in some inventions by undertaking the legal cost of patenting on an at-risk basis. In addition, Columbia (like Stanford and Caltech) has a relatively high rate of accepting equity in lieu of cash reimbursement from start-up companies, which typically lack cash. Every university that makes similar investments, whether in patenting fees or in proof-of-concept grants to some inventions, made clear that these investment decisions should not be made by academics but by a board of businesspeople who have appropriate experience.

Columbia is much smaller than UCLA, with an annual research budget of \$604,000,000 in 2009. Yet Columbia produced in that year 302 invention disclosures and \$154,000,000 of licensing income, compared to 333 disclosures and nearly \$29,000,000 in licensing income for UCLA in 2009. Had UCLA performed at Columbia's level in 2009 (which was well above the previously reported years of 2006-2008), UCLA would have realized nearly \$308,000,000 in licensing income.

Columbia has not always been as successful as it is now. Until 1996, the university had less than \$40,000,000 per year in licensing revenues, about the same level as UCLA. However, the technology transfer team analyzed their data on licensing and found, to their surprise, that most of their inventions take years to conclude a license: three years after invention, 39% have been licensed, eight years after invention 66% have been licensed, and 20 years after invention, 99% of those that are eventually licensed will have achieved that goal.

Columbia also found that most of their licensing revenues come from a few, rare "blockbusters". Those big winners often take time to develop, though. Often, a breakthrough invention is not immediately appreciated due to its very novelty. Considering their four top revenue producers, the time from invention to significant revenue was 4 years, 8 years, 10 years, and 10 years (one of these blockbuster projects is the invention of UCLA Professor Sherie Morrison, who was then at Columbia). Moreover, waiting takes capital: the total patent cost after 1 year averages \$4,000, after 3 years averages \$22,000, and after 5 years averages \$77,000. Thus, it is essential to have working capital in order to successfully develop the income-producing potential of university inventions. It is also essential to have adequate capital if the university is to accept equity in lieu of cash from a startup company, and several interviewees noted that to demand cash from a cash-poor startup is to damage the prospects of the licensee for success. Some of UCLA's faculty inventors feel that their startup companies are substantially disadvantaged by their obligation to reimburse UCLA for these patent expenses.

Several interviewees reported that UCLA's Office of Intellectual Property (OIP) is under such tight budgetary pressure that UCLA is sometimes reluctant to incur the approximately \$20,000 in legal fees to pursue a U.S. patent, unless a potential licensee who is willing to reimburse those fees in cash is ready at hand. One UCLA staff member described the typical

process this way: “First we file a provisional, which is good for 12 months. Then, we file a PCT (Patent Cooperation Treaty) on 50% of the provisionals, good for another 18 months. The result is that the inventor has a total of 30 months to find a company (that will license the invention).” (OIP Staff) After the 30 months have lapsed (or after 12 months if a PCT has not been filed), the university will have no active patent protection for the invention. UCLA should continue to aggressively file provisionals, as it now does, in order to provide the necessary time for the inventor get sufficient data in place for a strong U.S. patent. Once the invention has passed this stage, UCLA needs the resources to take prudent patent risks more often and to stay the course, absent challenges to the patent.

As a result, it appears that some UCLA inventors instead take early stage research projects off campus and locate their own investors who will pursue patents, while other UCLA inventions are superseded by inventions elsewhere while they await a licensee who will reimburse patent expenses. In both cases, UCLA fails to benefit financially from its own inventions. More importantly, some UCLA inventors lose heart in the entrepreneurial capabilities of the university, thus harming the inventive spirit of the campus. If UCLA is to succeed in becoming successful at entrepreneurship, it must provide adequate working capital to be able to sustain “at risk” patents for as long as ten or fifteen years, when in its business judgment such an investment is wise.

We cannot know if Columbia’s inventions are similar to UCLA’s inventions, but the Columbia staff estimates that out of every 1,000 disclosures they produce one blockbuster. At that rate, UCLA could have one blockbuster every three years. The summary of Columbia’s strategy, according to them, is that “size matters”. UCLA has more size than any other U.S. university and should be taking advantage of that size.

In addition to the example of Columbia University, we were struck by several additional innovations in university approaches to entrepreneurship. We would like to briefly describe three of these: the Gladstone Institutes that are affiliated with UCSF, the QB3 Project at UCSF/UCB/UCSC, and the Wisconsin Alumni Research Foundation, or WARF. These examples may serve to give concreteness to our own deliberations about what would best serve UCLA.

## **Independent, Affiliated Research Institutes**

### **1. The Gladstone Institutes**

The Gladstone Institutes are a special type of operating foundation that conducts its own research and must be a legal affiliate of a hospital. Under the IRS Code, it is 170 (b) 1a (iii). Orange County developer J. David Gladstone left a trust of \$7 million in the hands of three trustees, who offered their foundation first to UCLA. When UCLA expressed no interest, they approached UCSF, where the institutes are now located. Today, thirty years later, the institutes have an annual budget of about \$68 million and employ about 25 Principal Investigators – of

whom about 15 hold faculty appointments at UCSF - and a total of about 350 employees. Gladstone's staff conducts research largely in cardiovascular disease, neuroscience, and in immunology/virology. The institute receives revenues from NIH and other grants and from licensing fees on its inventions.

Gladstone's goal is to identify and hire brilliant young scientists (e.g. Yamanaka, known for his work on adult stem cells) before they become well known. After Gladstone has brought them to San Francisco, UCSF may appoint them to its faculty. Gladstone pays the full salaries of all staff, funds all of its own research, and holds title to all of its IP. Gladstone has never received a major gift since the original grant of \$7 million but has prospered and contributes materially to the research community at UCSF. It is currently in a growth mode, moving to 30 PIs. UCLA already is richly endowed with brilliant health scientists, so the Gladstone approach is not exactly what we need. Nonetheless, we can learn from the example of this successful institution.

Gladstone has an Industry Council composed of businesspeople who provide advice on whether to invest in one or another invention. Scientists present their work to the Council, which decides whether a patent application should be prosecuted, whether further research should be funded, or whether in some cases a partner should be sought. The objective of this process is to find the point at which the institutes can maximize the financial value of each invention.

On licensing, the institutes believe that, "It takes a business development guy to make outside deals...It also has to be an MD or a PhD. He has to be recognized as having technical skills and business skills. That is a unique individual." (8/31/2010). The institutes believe that their independence in setting the compensation of their staff is an essential part of their success.

Postdoctoral fellows, graduate students, and most faculty at UCSF interact as freely with the Gladstone staff as they do with UCSF employees, and most students are not even aware of the Gladstone as an independent entity. As far as they are concerned, the neighborhood around UCSF is rich with top scientists and with research projects, and they want to be in that milieu. Gladstone is sometimes referred to as the #1 choice in the world for a postdoctoral fellowship.

## **2. QB3**

The California Institute for Quantitative Biosciences is a joint venture among three UC campuses – UCB, UCSF, and UCSC, thus the acronym QB3. QB3 was created out of the same state legislation that gave birth to UCLA's CNSI.

QB3 operates two "garage" locations that house a total of 9 companies in university buildings and another 26 companies through the QB3 Mission Bay Incubator Network, a public-private partnership of QB3/UCSF, QB3/UCB, The City of San Francisco, The San Francisco Center for Economic Development/Chamber of Commerce, FebroGen Inc., and Alexandria Real Estate. In all, QB3 has 35 startup companies and 7 alumni companies. Among the alumni

companies, 6 have received venture funding and one was acquired for \$25 million. The incubator network makes available space in various locations in the Bay Area. Anyone may apply for space in an incubator, whether affiliated with the university or not. The incubators must charge market rates for space but will lease a space as small as 250 sq. ft., much smaller than a commercial landlord will typically provide. All incubator participants have access to a series of entrepreneurial services. All intellectual property created in any QB3 space is owned exclusively by the inventors, not by the university, though University of California employees are not insulated from the UC employment agreement. Garage companies have not had significant participation from UC employees.

QB3 has created a private investment fund, Mission Bay Partners, a \$9 million venture fund that exists apart from the university and has no obligation to invest in any QB3 projects. The university receives a 20% carried interest in the investments of the fund. The university personnel who serve on the venture fund board do so without any compensation or reimbursement, in order to comply with the university's conflict of interest policies.

UCOP has provided \$5 million in start-up funds for QB3. Of this amount, \$1 million supports four faculty who are devoted full-time to creating connections between scientists across campuses and departments. The remaining \$4 million is spent by the three campuses. QB3 has also given rise to new instructional programs, including a Master's in Translational Medicine, intended for engineers to learn enough about medicine and biology to be able to function as entrepreneurs in the bioengineering domain. According to QB3, to succeed in a venture like this, "You need a little bit of money and someone with a lot of passion" (9/9/2010).

What UCLA needs is a set of programs that embody the entrepreneurial spirit and the flexibility of QB3 but that will meet the needs of UCLA faculty, postdoctoral fellows, other staff, and students. Fortunately, we have in place a few such centers of activity, including CNSI and the Institute for Technology Advancement (ITA) at the Samueli School of Engineering and Applied Sciences. Other academic units can learn from their experience.

### **3. WARF**

The Wisconsin Alumni Research Foundation serves the Madison campus of the University of Wisconsin. In 2009, the research budget of the Madison campus was \$1.1 billion, and the faculty filed 333 disclosures of new inventions. WARF is the granddaddy of independent, university affiliated research institutions. Founded in 1925, WARF holds title to university inventions. All faculty must disclose their inventions to WARF. WARF selects about 60-70% of those for the filing of provisional patent applications, and the faculty may assign their invention to WARF or may choose to retain title themselves. WARF spends as much on a provisional as on a permanent U.S. patent application but controls its legal costs by directing most of its work to a few law firms who charge fees of \$200-\$300 per hour (the same strategy is used by Caltech, with the same fee range).

WARF also runs an accelerator program that has about twelve startup companies at any one time. The inventors meet four times each year with a panel of experienced entrepreneurs who give feedback and advice to the inventors. A new company typically remains in the accelerator program for about two years, and each may apply for a WARF development grant of about \$150,000. WARF does not provide incubator space.

WARF prizes its independence and protects it. Each of the 16 board members serves for up to 20 years or until age 75, in renewable 5-year terms. Board members must be alumni of the Madison campus and all are successful in their own careers. WARF says of its board members, “Because of their success they drive us to success” (9/8/2010). On two occasions, state auditors have called on WARF, but “I tell them we are not public and they don’t have a right to audit us” (9/8/2010).

WARF also actively seeks to launch entrepreneurial companies based on university inventions. If WARF is licensing inventions to a typically cash-poor startup, it will take an equity position in the range of 5-10%. On occasion, WARF will also make a cash investment in a startup and has taken an equity position as large as 30%.

WARF’s mission is to support scientific investigation at the University of Wisconsin-Madison. 70% of WARF’s revenues come from its patents on Vitamin D, which is now in its third and fourth generation of analogs. WARF, like the staff at Columbia University, places a high priority on its ability to continue its investments in research through good times and bad. Each year, WARF pays to the Madison campus a negotiated amount, typically \$60-\$80 million, which the university may use for any research purpose. The payment comes from a blend of current income and avail from WARF’s endowment, which is currently \$1.9 billion.

WARF employs about 75 staff, including 5 investment management staff, 4 patent agents (two in engineering and 2 in life sciences), and licensing specialists (“Salesmen have to understand deal structure.” (9/8/2010)). WARF pays somewhat, but not greatly, above university salaries and has very low turnover. It attracts staff who love the university and the mission of WARF.

## **Summary**

Several of our interviewees expressed strong interest in having an on-campus accelerator, incubator, and/or entrepreneurial assistance center. Said one, “We need a fund of \$20 million, with a committee that accelerates x, z, and z. We need a one-stop shop that says, ‘We can take it from here’ – with business advice, funding, etc. that takes companies into an incubator and takes 20%” (9/20/2010). CNSI does play a similar role, but has laboratory facilities that are incomplete for the needs of many life scientists, as one observed: “There is a lack of an incubator environment around here – an incubator with a great wet lab.” (8/27/2010)

Any such institute or center has the role of being a bridge between academia and the business community. However, an institute or center can succeed in this role only if the university has created around it a campus-wide ecosystem that is supportive of entrepreneurs: One UCLA professor observed that, “We are in the Middle Ages in IP – how we manage and transfer it. We are too restrictive and too vague...Industry is very unhappy with UCLA.” (8/20/2010), while another argued that, “Getting a material transfer agreement here is like trying to take over Microsoft!” (8/13/2010). But some faculty have compliments for UCLA’s existing processes, as one said, “My experience has been very positive!” (8/27/10)

An independent affiliate is a natural location for a staff of specialists and a home base for volunteers who can provide a wide range of advice, coaching, and reassurance to UCLA’s inventors, most of whom will be undertaking entrepreneurial efforts for their first time. Currently, deans and inventors at UCLA have to make all of the connections for themselves. Although some do it, they would appreciate some assistance, as in this example, from the physical sciences/applied mathematics area: “I’ve just had the head of XXXX Research. We spent a couple of hours with him...you know, to advance the state of the art in animation, but also robotics. I actually went out to talk to him about four months ago, and he finally came out today. And he actually said that today was the highlight of his month! Because he has people working – we have a guy in applied mathematics who works actually on projects on very sophisticated animations – and the math department gave him an office for people who collaborate with this guy. He got very excited! But it really looks like we are going to get XXXX Research associated with this campus! One of the things that we have overlooked, you know, in the sciences, this is a company town. And we have ignored the company. We should know how to make connections with them.” (10/28/2010)

Another major unmet need at UCLA is a staff with experience in making business investments and with the personal disposition and compensation system suited to making risk-based decisions. An independent affiliate typically fills this need effectively. The existing technology transfer staff at UCLA, by comparison, would not be comfortable in that role: “We are not paid to take risks and should not be paid in such a way”. (OIP Staff, 7/28/2010). Another UCLA professor said, “We haven’t had a sufficiently robust mechanism...you know, OIP process to be able to see which of all these ideas could be real business concepts and therefore of commercial value.” (9/13/2010). The Gladstone Institutes, by comparison, said this: “We established an industry council. We use that council. We use them to tell us what this IP is really worth... We (the board of directors) are personally responsible for everything that happens.” (8/31/2010). A thoughtfully arranged interface between the university and the business world, mediated in part through an affiliated but independent entity, deserves serious consideration at UCLA.

The enthusiasm that many have for an independent affiliate must, however, be matched with a robust process and set of policies for managing conflicts of interest. As one non-UCLA university interviewee said, “We try and be really flexible with respect to our faculty having time

with companies and giving our students leeway to do things like that, but at the end of the day, you really – you have to be very careful about conflicts of interest...Where a faculty member is involved in starting a company...they continue doing the kind of research in his or her lab that led to the creation of the company. So, our usual management process for something like that is to recognize that the research that was in the back of the faculty member's lab that led to the creation of the company typically can't be instantly moved off campus because it's often subject to an externally funded research contract, there are student dissertations that are, you know, you can't change their topics and so on. So, we generally try to manage these through a transition period where there are other faculty who are put in place to help advise the students. We don't allow the students to be both a student here and to work at the startup company...they've got to make a choice. Sometimes there's even longer transition periods that unwind all of this stuff, but that's what we do. I think to not do that is just too risky...all it takes is a few really bad examples of pipelining a research project from the Federal Government to a research lab here to a startup company...lining their pockets with the results of that research. And that doesn't make a very good story when it shows up on the front page of the newspaper. So, you really do need to manage these things." (10/07/2010). If UCLA does not have in place an adequate set of processes to manage entrepreneurial research, it has little choice but to rely instead on rigid, top-down prohibitions that will prevent conflicts but will also prevent entrepreneurship. It must ultimately be the responsibility of each dean to be that manager.

At the same time that it investigates the creation of an independent affiliate, UCLA should examine the possibility of establishing new structures and procedures within the university that might produce many of the benefits that a new entity can provide. The internal solution and the independent affiliate each offers a different set of advantages and disadvantages, and both paths (as well as others yet to be uncovered) deserve close study.

## **Instructional Strategies**

Every university believes that the primary mechanism for the transfer of university-created intellectual property to the outside world is through its graduates. We've discovered some creative new instructional approaches aimed at future entrepreneurs. Two of the most innovative of these, both from Stanford University, are summarized here.

### **1. The Program in Biodesign**

Every August 1 for the past ten years, eight U.S. fellows have arrived at Stanford for a year of training. The fellows are typically postdocs in medicine, M.S. or Ph.D. degree graduates in mechanical or electrical engineering, or M.B.A. graduates in business. They are formed into two teams of four persons, and each team will spend the next two months living at the hospital, adopted by a specialty, perhaps throat or ophthalmology. Each team must come up with a list of 200 unmet needs that could be satisfied with a new device. Out of this list, each team chooses its twelve best needs and develops them further, relying on faculty mentors, venture capital mentors,

and other advisors for input. That takes another two months. “So, that takes us into the fifth month. Nobody has invented anything until the fifth month. So, this is another part of our religion is that, you know, you don’t think about solutions until you really have the need well characterized. We say a well-characterized need is the DNA of a good invention.” (9/7/2010).

Each team then picks the top four needs from their dozen and keeps those to pursue on their own. The remaining eight needs each team gives to a 70 student class drawn from graduate students in business, engineering, and medicine (residents or fellows). The class is organized into diverse student teams of four or five per team, and each team selects one of the sixteen needs, revalidates it, invents a device to meet the need, creates an implementation plan, and files an application for a provisional patent. The course runs for two quarters, the eight U.S. fellows serve as Teaching Assistants, and there are regular lectures from start-up and I.P. lawyers, venture capital firms, and Stanford faculty. At the end of the course, the student teams present to a panel of venture capital firms and business people, and one or two of the teams will receive an implementation grant of \$50,000 to \$100,000. Each named fellow is supported by a namesake corporate sponsor (e.g. Niveus Medical, Miret, Orpheus Medical). The program now has 79 alumni, and “It’s a powerful group. They identify strongly with the program”. (9/7/2010)

Starting more recently, allied programs have been started by Stanford in Delhi and in Singapore, with university and hospital cooperation. Each of those locations sends a four-person team that brings its top needs with it and participates in the two-quarter long course as students. Eleven other U.S. universities have studied the Stanford program and have implemented versions of their own (e.g. UCSF/UCB, Johns Hopkins, Univ. Michigan, Northwestern).

Stanford also sends four students each year to intern for six months at the F.D.A. in Washington, D.C. “It has kind of opened up the door, so the F.D.A. considers us to be a kind of Switzerland” (9/7/2010). The Program in Biodesign also offers every two or three years a two-day refresher course for emerging entrepreneurs in the community: “We get a lot of applications. We pick 200 people. The venture capitalists and the industry guys all want to meet these people, so we use them as faculty. And it’s another mixing option” (9/7/2010). The School of Engineering offers an online, four-course Graduate Certificate in Biodesign for those who want entrepreneurial training.

The Program in Biodesign takes great pains to put the right people together in the same programs: “One of our articles of faith here is that technology translation is quite domain-specific, technology domain-specific. And I believe a mistake a lot of universities make is to go as broadly as ‘life sciences’ and say, you know, it’s just basically all the same. And there are very profound differences in the way you invent and the way those technologies go forward. Biotech, bio-pharma is actually profoundly different from med tech...the kind of people who invent medical devices are mechanical engineers, electrical engineers, and clinicians who are in the trenches with the surgeons and docs. On the bio-pharma side, it’s chemical engineers, computer scientists, geneticists, biologists, you know. So it’s quite different.” (9/7/2010)

The Program in Biodesign is housed neither in the School of Medicine nor the School of Engineering: “We’re housed in the university. So, we were very careful to be neutral. Q: So, does it mean you don’t have a boss? A: Yes.” (9/7/2010) The creator of the Program in Biodesign has assisted several universities in implementing their own versions of this program and would be more than happy to assist UCLA in doing the same.

## **2. SPARK**

Now in its fifth year, SPARK is a graduate course in entrepreneurship in therapeutic and diagnostic medical products. Each year, the staff identifies with the assistance of the Office of Technology Licensing approximately 150 faculty invention disclosures from the past years that have been “passed over”. Some of these may have a provisional patent, and others will not. The staff circulates a one-paragraph summary of each invention to a panel of 10 academic and 10 industry members, who identify their favorite 10 inventions. From these ratings, the top 50 inventors are invited to give a 10-minute summary to the panel, which meets for several afternoons over a three week period in the fall. From this process, approximately five projects are chosen to participate in SPARK. An invention may remain in the program for two or, in some cases, up to three years.

The course meets every Wednesday, from 5:30-7:30 p.m. for three quarters (“5:30 to 7:30, sometimes 8:00, and I feed them...Every time we walk out the room, we say ‘We love Wednesdays! It’s just tremendous fun.’” (9/7/2010). Each project may apply for a grant of up to \$50,000, funded by the School of Medicine. “First discovery, which was absolutely astounding for me, was that instead of having post- or graduate students, it was the faculty that show up! Now, I’m starting my fifth year – faculty show up on Wednesday night week in and week out. That’s the biggest surprise!” (9/7/2010). Classes alternate topics: an inventor presents his or her most recent data one week, and an expert lectures on venture capital, creating a corporate board of directors, or another topic the following week. Once a project becomes a company, it must drop out of SPARK, but the individuals may still attend the weekly sessions. In fact, all 23 of the current and alumni projects are welcome to attend all of the activities of SPARK. And any faculty and students who are interested are welcome, too.

Inventors are told four weeks in advance that they will be presenting a project update. “The best tool we have is project update because nobody wants to stand up there and say they have made no progress. It’s amazing how much an inventor can accomplish in four weeks!” (9/7/2010) On a project update evening, typically three or four projects will present in the two-hour class. One iron rule is that as each person enters the classroom, each must sign in, with a declaration that everything that they learn will be confidential.

The creator of SPARK, who was recruited to Stanford from UCSF, would be more than happy to assist UCLA in implementing its own version of the course.

## **Summary**

What is the role of entrepreneurial instruction in creating entrepreneurial scholars at Stanford? One interviewee put it this way, “The big picture, I think, is it takes an ecosystem. And it’s really important that the main components of that all be reasonably functional...Our focus is actually not on technology transfer, it’s on training for technology transfer – we need training: the faculty needs training, the students certainly need training. ..When you focus on training and you hit it at the right levels, it turns out that you catalyze technology transfer anyway.” (10/08/2010).

Another characterized the Stanford ecosystem as follows: “I would begin by saying we foster an entrepreneurial spirit. Many of our faculty have founded companies. We have...among the strictest rules around regarding conflicts of interest, but we seem to be able to manage that pretty well without in any way neutralizing the entrepreneurial spirit. So, I think we see that as a good thing to do for the right reasons...The overarching umbrella for us was for the Medical School Center to have a broad vision, which we called ‘translating discoveries’. And by definition, that means drawing connections between basic and the clinical sciences. And then we rebased all of our mission relationships. We rebased our education programs to focus on training physician scientists, primarily...The building that you’re in today...brings medical and graduate students together...it’s kind of an incubator, a blending for putting people together with the idea of spreading some of the entrepreneurial focus. The students are interested in entrepreneurship, and so we have a number of courses and programs and then the business school is related to that, too.” (10/07/2010)

Instructional strategies can include not only courses for would-be entrepreneurs, but the design of those courses can also have the intention of engaging faculty who want to learn about entrepreneurship but who would normally avoid direct attempts at engagement. Entrepreneurial instruction at its deepest levels can be reflected in the missions and budgets of traditional disciplines, in the criteria for selecting students, and in the physical spaces that can encourage faculty and students to be cross-disciplinary and problem-focused.

## **Recommendations**

It may be premature to offer concrete recommendations, but taken in a spirit of dialogue, these proposals may help to bring focus and clarity to our own deliberations. Surely, the discussion that will follow will unearth many more fresh and creative ideas. Some of ideas suggested below are already ongoing in some campus locations but not others.

### **I. Administrative Infrastructure**

- a. The university should create a new position of Associate Vice Chancellor for Entrepreneurship (AVCE), reporting to the Vice Chancellor for Research (VCR) and to the Vice Provost. The mission of this office should be to stimulate and encourage both translational research and the transfer of the resulting I.P. into real-world applications. This person would assist in the establishment of Business

Advisory Boards at the request of the deans, establish a close working relationship with the Office of Intellectual Property and its staff, assist in the establishment of entrepreneurial programs of study for undergraduate, graduate, and postgraduate students, and liaise with the board of the independent affiliated research institute, with the Conflict of Interest Committee, and with CNSI and any other UCLA research accelerators or incubators, and engage in other activities that will stimulate the creation and maintenance of an entrepreneurial research culture at UCLA.

- b. The Chancellor ought to appoint a campus-wide Committee on Research and Entrepreneurship to create policies to govern patenting, licensing, incubators, conflicts of interest and other matters related to technology transfer and campus entrepreneurship. The mission of this committee should be to actively encourage the translation of UCLA faculty inventions into real-world applications, whether through commercial or other means, and to actively seek to recommend policy solutions to conflict of interest concerns, patenting and licensing issues, and other related concerns.
  - c. Publish an annual report from the VCR to widely publicize the volume and impact of UCLA inventions, both current and past. This publication might be jointly published with OIP but will not supplant the existing annual report, *UCLA Invents*, published by OIP.
- II. Affiliated Institute
- a. Following the models of the Gladstone Institutes at UCSF and the Wisconsin Alumni Research Foundation (WARF), UCLA would benefit by establishing an independent, not-for-profit entity that is a legal affiliate of UCLA. This entity would be owned by UCLA, would have a board appointed by the Chancellor, and would give its surplus funds only to UCLA. It would have a board and leadership that have experience in the business of invention and would have flexibility in staffing and staff compensation.
  - b. The purposes of this affiliate would be as follows:
    - 1. Raise capital gifts or investments in the range of \$50-\$100 million to be employed in the translation of UCLA inventions into external applications, whether commercial, nonprofit, or otherwise. The initial goal might be in the range of \$20,000,000, enough to cover two to three years of patent prosecutions. If it performs well, the affiliate should be able to raise sufficient additional funds to continue until it becomes self-financing as its patents become commercially valuable.
    - 2. Make investments, whether in the form of patent prosecution, translational research, proof-of-concept research, or otherwise, in selected UCLA inventions that, in their business judgment, are warranted.
    - 3. Manage institutional partnerships with external companies, government agencies, and others with whom UCLA seeks to develop joint research relationships, and do so in close coordination with the Vice Provost and the

Office of Intellectual Property. Manage the patenting, licensing, and all other aspects of inventions selected by the affiliate from among UCLA faculty disclosures and maintain close coordination with OIP on these matters.

4. Once it achieves a net surplus, the institute should pay to UCLA each year an agreed-upon sum and should retain the balance of its net income each year so as to be able to fund in perpetuity its investments in UCLA inventions.

### III. Business Advisory Boards

- a. Other universities make good use of volunteer Business Advisory Boards (E.g. UCSF, Stanford, Wisconsin, Caltech, USC). Some UCLA deans already have begun to develop these boards (at ITA and CNSI) or have indicated a desire to have such a board. They should be provided with assistance in establishing these BABs, upon their request. These boards, which now lack adequate support from university staffs, should be supported, embraced, and celebrated.
- b. The purpose of the BABs would be to provide business experience to benefit the translation of faculty inventions through a variety of forms of interaction. The experience of other universities suggests that each dean should be free to configure their BABs in a way that precisely fits their situation.
- c. Each BAB should assist its dean in raising a Proof of Concept and Patenting fund that can make investments in the range of \$50,000-\$150,000 in selected inventions. The BABs should play an active role in making these investment decisions. The school sponsoring these investments should receive a financial interest in any resulting revenues, and in time the BABs should be able to become self-financing.

### IV. Multidisciplinary Instructional Programs in Entrepreneurship

- a. Several universities have developed effective instructional programs that bring the world of business to the inventors within the university. Even universities that are widely thought of as having well-established entrepreneurial cultures are allocating substantial resources to these instructional programs. UCLA has some exemplary programs of this kind, including those in the Geffen School of Medicine and in the Anderson School of Management. UCLA should encourage more of this kind of instructional experimentation by making available start-up resources that will bring new entrepreneurship courses to undergraduate, graduate, and postdoctoral students.
- b. Some of the most innovative instructional programs achieve their impact in part through close collaboration with their OIP equivalents, as do some of the existing programs at UCLA. This collaboration ought to be encouraged.

### V. Financial Arrangements

UCLA's current division of licensing revenues deserves a review.

1. Among a comparison set of seven universities (Caltech, Columbia, MIT, Stanford, UCLA, UCSF, and UW-Madison), two allocate none of their net license revenues to the university, two allocate 33% or less to the university, and three (UCLA, UCSF, and Caltech) allocate 50% or more to the university. Some of the universities deduct the expenses of operating their technology transfer staffs from gross licensing revenues in order arrive at net license revenues, which would be appropriate for UCLA. In some cases, the university sets a limit of no more than 15% of gross license revenues for the budgets of the technology transfer/OIP office. That should be UCLA's goal.
2. It is not clear why the University of California (UCOP) should take a percentage of the gross licensing revenues generated by the campuses. However, if it is determined that UCOP must continue to fulfill a legal review function for intellectual property transactions and/or a clerical records function, then those activities should be shared by the campuses pro rata. It would be preferable to establish the policy that each campus may choose to become self-sufficient with respect to taking title to its own I.P. and bearing the liabilities and expenses associated with that position. The portion of net licensing revenues that UCLA (standard among all UC campuses) allocates to the inventor is within the normal range for our comparison set. However, some research finds that total university licensing revenues are positively associated with higher inventor shares in a multivariate analysis. UCLA should consider whether an increase of the inventor's share of net licensing revenues above the current 35% is in the best interests of the university.
3. UCLA should allocate up to 15% of gross licensing revenues to support the OIP and AVCE staffs. However, UCLA will have to subsidize those staffs until licensing revenues rise sufficiently. After deducting these staff expenses, the 50% of net licensing revenues that is now allocated to Murphy Hall should be reallocated to the school and department or laboratory of the inventor. If an independent affiliated institute is established to hold certain patent licensing rights, then that institute would be obligated to a plan for sharing its net revenues with UCLA.

## VI. National Laboratories

Several of the interviewees responded very favorably to the idea that UCLA should make an attempt to secure one or two on-campus commitments for long-term, multi-project partnerships with National Laboratories. Among the universities that were included in our analysis, several have on-campus national laboratories. We estimate that the annual research budgets of these range from about \$1.5 billion (MIT/Draper and Lincoln Labs, Caltech/JPL) to a few hundred million (Univ. Wisconsin/Forestry Lab, Stanford/SLAC). Several interviewees, both at UCLA

and at other universities, expressed the opinion that the affiliations bring important advantages to the host campus. Among these are the availability of a critical mass of investigators in certain fields, scientific equipment and facilities, laboratory space, and improved ability to compete for federal research funds. These interviewees also acknowledge that national laboratories can pose complex policy issues for a university but note that the existing host campuses (including UCB/Lawrence Berkeley Lab) have managed to find solutions.

UCLA has relatively near at hand several major laboratories, including LANL, Sandia, the Air Force research center in Palmdale, the Los Angeles Air Force Base and its neighbor The Aerospace Corporation, and others. Each of these has at least some historic university research relationships, including some with UCLA. The possibility that excites many UCLA respondents is that of a relatively permanent national laboratory branch located on the UCLA campus. Interviewees suggested a “Sustainable Technologies Laboratory” and a “Disease Prevention Laboratory” as possibilities. Although there are many candidates for the 800,000 sq. ft. of former UCLA hospital space, a national laboratory should at least be in contention as a tenant.

## **Final Comments**

The interviews for this report included 16 outside investors and licensees. All of them expressed enthusiasm for the kinds of recommendations presented above.

Many people have expressed doubt that Los Angeles has an adequate number of venture capital investors to support a much increased flow of entrepreneurs from UCLA. These interviews found a somewhat more optimistic result. We are now conducting a series of meetings with three “angel” investor networks based in Los Angeles, with two “seed” capital investment firms that have representatives in Los Angeles, and with several venture capital and private equity firms that are either based in Los Angeles or that have representatives here.

UCLA has more than its share of entrepreneurial inventors. They are ready and waiting for an ecosystem that will respect and support them. When the change process begins, it seems likely that a new generation of entrepreneurs will find their way to UCLA and its environs.

Los Angeles will benefit as UCLA becomes a vital ecosystem for entrepreneurs. The creation of new industries in the San Francisco Bay Area has become part of the taken-for-granted “wallpaper” of life, but an outside observer sees that the style of inventiveness that propels that economy was shaped and even defined by UC Berkeley, UC San Francisco, and Stanford. The agricultural industry of California is the largest of any state, and it too has developed in a unique way, defined by the decisive role played there by UC Davis. In like manner, the entrepreneurial spirit of Austin, Texas has as its center of gravity UT Austin, just as the inventive vitality of Route 128 outside of Boston was given life by M.I.T. and Harvard. The vibrant Research Triangle of North Carolina can be said to be the child of UNC and Duke.

Southern California awaits a leader that will give definition and self-awareness to its destiny as perhaps the greatest foundry of entrepreneurship in the United States. Nobel Laureate and labor economist Gary S. Becker has estimated that of all of the productive capital in the United States, over 70% is human capital. The productive potential of the intellectual capital resident in Caltech, USC, UC Irvine, UCLA, UC Riverside, UC San Diego, and UC Santa Barbara, along with a large host of undergraduate institutions has yet to be realized. Among these institutions, it is unarguable that UCLA is the largest source of academic invention, and it will therefore be the example of UCLA that will begin the process that will eventuate in a new definition of the Southern California region as the crucible of new inventions, new jobs, and new solutions that will lift the spirits and the prospects of tens of millions of Californians and of those beyond.

Submitted to Vice Chancellor for Research Dr. James Economou and Vice Provost Dr. Kathryn Atchison by:

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