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# Companies step up to fund basic research

**With government contributing less, corporate sponsors are collaborating with universities to further 'pure science'**

By Barbara Grady, BUSINESS WRITER

AROUND the periphery of the University of California, Berkeley campus, a new industry is emerging: Silicon Valley "lab-lets" for joint research between technology companies and university folks.

First, Intel Research at Berkeley opened a few years ago. Yahoo Research Berkeley opened last year, followed in the past six months by two more Berkeley ventures — the Center for Entrepreneurship and Technology funded by a dozen venture capitalists, and the Reliable Adaptive Distributed systems research lab put up by Google Inc., Sun Microsystems Inc. and Microsoft Corp.

Down the highway at Stanford University, collaboration between tech companies and university faculty and students also is in high gear. Since Stanford is geographically in the midst of Silicon Valley, no lab-lets need be opened. Researchers from surrounding tech firms visit easily and often while students and professors go off campus to nearby firms.
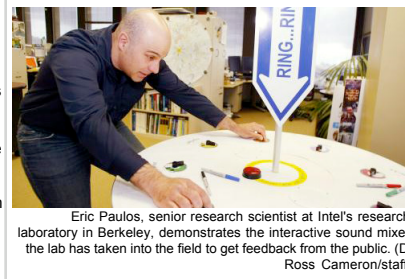

Eric Paulos, senior research scientist at Intel's research laboratory in Berkeley, demonstrates the interactive sound mixer the lab has taken into the field to get feedback from the public. (D. Ross Cameron/staff)

At any given time, a majority of professors in the computer science department are collaborating with private companies. William Dally, chair of the computer science department, is helping to form Stream Processors Inc., while professor Rajeev Motwani helped Simplyhired.com get off the ground.

And the revolving door through which Stanford professors and students come and go between academia and start-up companies is busy as ever; in fact, it is accelerating.

What's happening in these university-company collaborations is high-risk basic research into things that might — but might not — have a commercial application.

"Industrial labs are stymied by the profit cycle," said Intel's Kurt Brown, co-director of Intel Research at Berkeley. "This is keeping us abreast of new research" without extending the company too far into an area that may not have commercial payback.

Traditionally, basic research in the sciences has been funded mostly by the federal government, with funding for engineering and computer sciences coming from DARPA, the Defense Advanced Research Projects Agency. But each of about 10 professors and entrepreneurs commenting for this story mentioned a reduced amount of DARPA funding as a major catalyst for bigger ties between the universities and industry.

Yahoo Inc. co-founder and Stanford alumnus David Filo said, "We have our own research lab plus the one at Berkeley. But that couldn't compare with what we're talking about from DARPA and the government."

Filo added, however, that replacing that no-ties government funding for research is what Yahoo aims for at Berkeley.

"We in industry tend to invest in things that have a decent chance of mid-term payoff. Looking at the economic reality of being in any competitive industry, we have to invest in things that are going to let us survive for the next three to five years. While we do like to think long-term and invest in some of that, we cannot do what a university can do," he said, speaking as a panelist at the 40th anniversary celebration of Stanford's computer science department.

For example, Yahoo Research Berkeley is looking into the social media and search technologies.

David Patterson, head of the Reliable, Adaptive and Distributed Systems laboratory (RAD) Lab and a long-time UC Berkeley professor, said his project was turned down by DARPA. So, 80 percent of RAD Lab funding is coming from its corporate partners, with some dollars kicked in by the government and the university. That ratio is a reverse of past projects when 80 percent of money would come from DARPA and 10 or 20 percent from industry, he said.

Records from the U.S. Defense Department's DARPA agency indicate that overall DARPA funding has actually gone up over the past eight to 10 years. However, the amount appropriated to basic research has declined. Basic research refers to open-ended inquiry into how things work or might work — the kind of science done at universities. For example, DARPA funding for computer science research at universities declined to $123 million in 2004 from $207 million in 2002.

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Yet all involved in this emboldened world of company-funded university research and collaboration are aware of the potential mine fields.

"It is a delicate balance because you don't want academic values to be compromised by corporate" priorities, Stanford's Dally said. "A university is about creating knowledge while a company is about creating value."

He said Stanford is careful about striking a balance. "What we really want to do is have an impact" with the knowledge developed at the university, he said.

Stanford is accustomed to walking this balancing act.

"Stanford has always had an unusual relationship with industry," Dally said, that dates back to the 1930s when students William Hewlett and David Packard started their famed company and which continued with other students and professors founding Sun Microsystems Inc., Silicon Graphics Inc., Yahoo Inc. and Google Inc.

At Berkeley, they are working hard to strike those balances.

Eric Brewer, the Berkeley computer science professor who is the other director of Intel Research at Berkeley, said the only reason that lab is functioning well is "it is all open work with peer reviews, so the intellectual freedom remains."

The fact that Intel agreed that the research coming out of the lab would be open and not proprietary "was a big step for the university accepting it. The open intellectual property part is critical," Brewer said.

Academics are used to publishing papers and getting feedback from other academics on their work. Brewer wanted to make sure that happened at the lab.

And so, in the lab's Shattuck Avenue offices, researchers are working on things called Delay Tolerant Networking to allow Internet communications with remote places and Distributed Inference for Network Anomaly Detection to provide security to networks when firewalls don't work.

Asked Intel's point of view on not having any proprietary rights to the research it is funding, Brown, the Intel co-director, said, "We have access to leaders in the field and great students" who might be inclined to develop these ideas commercially upon graduation.

But the question of balance between academic freedom and intellectual property rights for the companies involved is important enough that Berkeley a year and a half ago opened an Office of Intellectual Property and Industry Alliances, whose staff helps negotiate the intellectual property rights in these deals.

At Stanford, professor Mark Horowitz, who left Stanford for a while to start Rambus Inc., said, "There always was concern about research being funded by industry. But I do think there are benefits to both sides. Stanford is unusual in that people who do go and start companies often come back — and that fosters new research areas."

But David Shaw, a former Stanford graduate student and a former Columbia University computer science professor who founded D.E. Shaw & Co., said whether compromises are made in research because of ties to industry is "a question I worry a lot about." He said the marketability of a research area could subliminally affect choices. "Are we going to pull away from scientifically interesting problems?" he asked when speaking at the Stanford 40th anniversary panel.

Shaw noted that there is another worry as university people leave to start up companies: "Who is going to be left to teach the next generation?"

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