

Collaborative Tools Strategy

University of California, Berkeley

Spotlight: Collaboration and World Issues

Some compelling reasons for supporting a collaborative culture at UC Berkeley

Malaria – almost unheard of in the United States – is one of the world’s great killers:

“The World Health Organization estimates that each year 300-500 million cases of malaria occur [i.e. affecting an average of 1 out of every 15 people worldwide] and more than 1 million people die of malaria ... Most deaths occur in young children. For example, in Africa, a child dies from malaria every 30 seconds.

“Symptoms include fever and flu-like illness, including shaking chills Nausea, vomiting, and diarrhea may also occur. ... Infection with one type of malaria ... if not promptly treated, may cause kidney failure, seizures, mental confusion, coma, and death.”¹

In December 2004, UC Berkeley announced that the campus was collaborating with an East Bay biotech firm and a nonprofit institute, under the sponsorship of the Gates Foundation, “to use biotechnology to mass produce a drug” – artemisinin – “which cures malaria.”² UC Berkeley Professor Jay Keasling began work on creating a microbial ‘drug factory,’ while the biotech firm, Amyris, focused on solving related engineering challenges. The nonprofit Institute for One World Health, in turn, performed regulatory work to demonstrate the bioequivalency of the microbially-produced drug.

In March 2008, slightly over three years later, their work had identified a way to inexpensively synthesize artemisinin. This research will be used toward the goal of starting mass production by 2010, and then to treat 200 million malaria sufferers worldwide with the drug each year. “This collaboration enables us to reach a goal that some scientists only dream of,” said Jack Newman, founder and Senior Vice President of Amyris, in that March 2008 press release.³

Collaborative work similar to this example, and the high impact that such work frequently produces, is rapidly becoming the norm. While the final outcome of this particular collaboration still lies in the future, and, furthermore, not all collaborations result in success – much less world-changing success – it is now taken for granted that many important problems can only be effectively tackled in this way.

This viewpoint was given special recognition by the UC Berkeley campus when, in July 2001, it hired Thomas Kalil as a special adviser to the Chancellor. Kalil, who had previously served as the science and technology adviser to

President Clinton, was brought to the campus to help address national-level priorities by initiating collaborative “partnerships with government agencies, the private sector and community-based organizations.”⁴

Since that time, the campus has entered into a number of high-profile collaborations, both with off-campus partners and within the campus. A few representative examples include:

- Two national-scale partnerships – the Joint Bioenergy Institute, sponsored by the US Department of Energy, and the Energy Biosciences Institute, sponsored by BP Global, a multinational energy company – to work toward such goals as the commercialization of biofuels from sustainable crops.⁵
- Cal Climate Action Partnership (CalCAP), “a collaboration of faculty, administration, staff, and students to reduce greenhouse-gas emissions at Berkeley” to 1990 levels by 2014.
- Policy Analysis for California Education (PACE), itself a collaboration among UC Berkeley, Stanford, and USC, worked with leading education scholars across California to produce a report in October 2008 that identified how significant problems affecting the state's public schools – inconsistent test results, looming teacher shortages, and persistent achievement gaps among African American, Latino, and Native American students – “all can be addressed, at least in part, without infusions of new money.”

In addition to formal partnerships and initiatives, the campus also recognizes that day-to-day collaboration among its own faculty and researchers, working across disciplines, may yield tremendous benefits. For instance, in announcing the groundbreaking for the new Stanley Biosciences and Bioengineering Facility in May 2003, the author of a *Berkeleyan* article wrote:

“Here, scientists in structural biology, bioengineering, chemical biology, computational biology, magnetic imaging, tissue engineering and other disciplines will work side by side to solve some of humanity's most vexing health issues.”⁶

Finally, everyday collaborations among campus staff are the means by which a great deal of critical campus business is conducted. For instance, staff of the Graduate Division and staff in many academic departments – regardless of their job titles or unit affiliations – routinely work collaboratively toward common goals: to recruit promising graduate students to the campus; to connect them with faculty; to locate and obtain sources of funding for their studies and research work; and to retain them at Berkeley by assisting them in many other ways. This group considers itself a community, and shares best practices and advice.

As the University of California Information Technology Leadership Council has stated, in the interim draft *IT Guidance Report* of September 2007:

“... collaboration is critical to UC's future success. Research and learning are increasingly collaborative, and institutionally we need to collaborate more to remain efficient and competitive. We need to enhance the ability of UC's faculty, students, and staff to work with each other and their colleagues throughout the state and the world.”

Enormous global challenges require ‘working together in shared information spaces’

Several of the challenges tackled today by members of the Berkeley campus community may ultimately prove to be among the most significant mankind has ever faced. While all are to varying degrees the subject of controversy, each has the potential for far-reaching impact.

Each one of these challenges – and others of similar magnitude – can only be solved through far-reaching collaborative work over many years, taking place not only at UC Berkeley but throughout the higher education community and in partnership with many others in industry, government, and other organizations:

- **Global climate change.** There is concern among many in the scientific community that the accumulation of gases such as carbon dioxide and methane in the Earth’s atmosphere, in part from burning fossil fuels and other human activity, is resulting in a rise in global temperatures. Potential outcomes of an overall rise in average global temperature of just 3.5 to 6 degrees C include changes in rainfall patterns and acidification of oceans that could considerably reduce global food production on both land and sea, as well as rising sea levels that may threaten to flood many of the world’s largest cities. ⁷ –

Of particular concern are several “wildcards,” not well addressed by current modeling, with the potential to rapidly tip the Earth toward accelerated flooding or warming. These include rapid breakup of large ice sheets in the West Antarctic and in Greenland, as well as the release of vast quantities of methane gas – over 20 times more potent a greenhouse gas than carbon dioxide – from the melting of the permafrost that covers large areas of Arctic tundra from Siberia to northern Canada. ⁸ –

- **Peak oil.** Ten years ago, in 1998, the inflation-adjusted price of a benchmark barrel of crude oil was around \$15. Its price rose to \$30 by 2004. Notwithstanding a short-lived peak, during which oil prices reached triple digits, the price of a barrel of oil is around \$45, as of this writing, despite a 'glut' of oil resulting from a global recession-induced drop in demand.

While this price rise may be due in part to many factors, such as currency fluctuation and speculation in world oil markets, one contributing factor appears to be that, in the face of growing global demand, production from some of the world’s largest, mature oil fields has begun to level out or decline. A minority, albeit growing, number of analysts is now concerned that a “production collapse” of certain large fields may lie ahead, outstripping expected contributions from new fields and resulting in an actual reduction in world oil production – and an imbalance with demand – within just 12 years, by 2020. ⁹ – Any potential shortages and concomitant price increases in oil would have profound implications for the world economy, as well as in the political and military spheres.

- **Pandemic and drug-resistant diseases.** At various times and places from the early 1300s to the early 1700s, the Black Death – a succession of pandemics whose causes, whether from bubonic plague or otherwise, are even today still not fully understood – swept across parts of the world. During certain horrible periods, an estimated 30% of the population of China and 30 to 60% of the population of Europe were estimated to have died from this disease. ¹⁰ –

Today, thanks to air travel and the frequency of other forms of travel and migration, infectious diseases can spread rapidly. There are a number of diseases that could lay claim to becoming a source of future pandemics, while others pose new, particularly difficult medical challenges. One concern is related to avian influenza and other diseases that have the potential to cross over from various animal species to humans. Another is the growing number of mutating diseases that are becoming highly resistant to treatment via most antibiotics and other antimicrobial drugs. An extremely drug resistant form of tuberculosis, for instance, has been encountered in several patients in hospitals within just 15 miles of the Berkeley campus.

Because working collaboratively is the only way that mankind will be able to successfully address these and other problems of similar magnitude, this may well be the reason that Microsoft's Jon Udell wrote in 2006:

“The augmentation of human capability [through collaborative tools and architecture ...] **is nothing less than a survival issue for our species**. We face some really serious challenges. The only way we're going to be able to tackle them is to figure out how to work together in shared information spaces.”¹¹ —

Supporting collaboration through IT

There is a long and valued tradition of collaboration through working side by side in an office or lab; engaging in face-to-face meetings, hallway conversations, or discussions at symposia and conferences; and corresponding via inter-office memos, written correspondence delivered via the mail, and in notes and articles in scholarly journals.

However, today it is likely not an exaggeration to suggest that a great deal of the collaborative work carried out on the UC Berkeley campus today, as well as with the campus's outside partners, is directly facilitated by information technology. Increasingly, academic and administrative collaborations are supported by tools that allow people to communicate and work together online, and by the services, data repositories, networks, and other foundational pieces that in turn support those tools.

Collaborative tools range from widely used tools like email, shared file storage, and online calendars for scheduling common meeting times, to tools that allow people to work together in new ways. The latter span the gamut from virtual instrumentation for scientific experiments; to conferencing tools that allow people to meet online and share their work across vast distances; to content authoring tools that make it possible for people to write, edit, and comment together in shared spaces. New tools are also continually emerging in this space, driven during recent years by the rapid pace of innovation in the so-called “Web 2.0” space.

Because of the important results that often result from collaborative work, and the central role of information technology in supporting that work, the University of California's draft *IT Guidance Report* declared this objective:

“The University of California should develop a model for [... a] set of online tools and services to support collaboration both within the University community and with external partners.”

That is the core purpose of the Campus Collaborative Tools Strategy document: to provide guidance to the UC Berkeley campus – to the Office of the CIO and the Campus Technology Council, and to managers and IT providers in campus units – on ways to approach investments of IT funds in online tools and services that can help support collaboration.

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- 4 Robert Sanders, "President Clinton's former science and technology advisor, Thomas Kalil, takes up post at UC Berkeley," *The Berkeleyan*, July 31, 2001, http://www.berkeley.edu/news/media/releases/2001/07/31_kalil.html
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- 6 D. Lyn Hunter, “A ‘field of dreams’ for health sciences,” *The Berkeleyan*, May 30, 2003, http://berkeley.edu/news/media/releases/2003/05/30_groundbreaking.shtml
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- 10 Robert S. Holzman, M.D., New York School of Medicine, Center for Health Information Preparedness, *Course: Plague*, <http://chip.med.nyu.edu/course/view.php?id=13?topic=1>
- 11 "A conversation with Jon Udell about his new job with Microsoft", *InfoWorld* blog, December 8, 2006 <http://weblog.infoworld.com/udell/2006/12/08.html>

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