FY 07-08 IT Budget Proposal  
[Architecture: CAD/CAM & Computing Laboratories]  
ABBA Category One: Institutional Effectiveness  
ABBA Category Two: Information Technology

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Architecture/design education involves hands-on use of several types of equipment: cameras, darkroom, scanning, computer drawing/drafting in 2-D and 3-D, cutting/drilling/building/sculpting models using paper/fiberboard/plastic/wood/metal, and increasingly CAD/CAM equipment. The Architecture Department runs a Photolab, a Wood Shop, a CAD/CAM lab, and several Computing Labs all of which are open to students on a user fee basis. The Photolab is open to all UC students and the Wood Shop and CAD/CAM lab are available to CED students. The user fees cover student technical support and miscellaneous supplies – they do not cover the costs of managing the operations nor of replacement equipment or more than minimal maintenance.

Computing Laboratories Architecture’s Computing Labs and CED wireless services in Wurster Hall are managed by the Architecture Department with no permanent budget funding other than 1.6 FTE staff. The wireless services are available to all of CED and the research units associated with CED. Students access software and printers, plotters and other devices either wirelessly or in six laboratories in disparate areas in the building. The computer workstations in the main computer lab (479 Wurster) are over three years in age and are woefully inadequate due to their slow performance. Others range from 3-6 years in age. Most computers are loaded with AutoCAD, Maya and FormZ software, with annual costs of approximately $10,000. Scanners, both film and small flatbed are over 3 years in age (so resolution is not up to current standards) and a large format flatbed (24” x 36” at minimum) scanner is desperately needed. Output equipment is the most heavily used, 24 hours per day seven days a week. This heavy use, often by impatient unsupervised students, requires a lot of routine attention for repair and media replacement. Though the department has tried to add one or two new plotters each year (at about $15,000 per year), this has not met the need and the oldest equipment is needing replacement. In addition, the network itself needs to be upgraded for performance to support new web, rendering and display technology. It goes without saying that an architecture and design department cannot compete without up-to-date rendering and visualization capability and that this is a key factor in architecture/design school selection. Berkeley Architecture is sadly behind almost all of our competition in the efficiency and capabilities of our systems.

CAD/CAM Laboratories The Architecture Department began what is now referred to as the CAD/CAM Laboratory and opened it up for student use in Spring 2005. The lab allows students to cut and mill materials as well as perform 3-D modeling in plastic with high precision, using computer-controlled mills and molding machines (“3-D printers”). What in the past was done in a wood/metal shop with saws, drills, etc. is now done by computer-controlled machinery with 3-D design software. This technology is used by all the top Architecture and Design schools in the country and by increasing numbers of artists and design firms. Berkeley’s existing equipment includes five computer workstations purchased between 2001 and 2004, a lasercutter, a Z-Corp 3-D printer, an FDM 3-D machine, and a CNC router, located in three rooms on two floors in Wurster Hall. The equipment was purchased with various faculty research and startup funds.

Since Spring 2005, the department has been trying out various use models for the CAD/CAM lab similar to the user-fee supported Wood Shop and Computer Labs. For the CAD/CAM lab, the user fees mainly support the employment of student technicians who train and monitor student equipment use and provide general clean-up and maintenance, under the direction of two faculty. Additional fees are charged based
on actual 3-D powder/plastic compound use. Student and instructor interest has skyrocketed because of
the unprecedented precision in results, and such experience is valuable for both undergraduate and
graduate students in their job searches. We had 34 users during Fall 2005 and have approximately 80
users signed up in Spring 2007. In addition, other College of Environmental Design (CED) faculty and
students are interested in the equipment use. Our fee model can support less than .5 FTE in student
technicians and minimal maintenance. We have no CAD/CAM equipment expertise among our regular
staff. In addition, our aging equipment is no longer state-of-the-art and has increased maintenance costs.

In comparison, our peer institutions have increased investment in CAD/CAM technology and provide
significant space for such equipment use. Such investment is key to preparing students for the
visualization and fabrication requirements of the modern architectural practice. UCLA, by contrast, has
twice the equipment Berkeley has, and two technology shop supervisors and six technicians. Other public
university competitors for our students, such as UT Austin, Universities of Virginia, Michigan and
Minnesota, provide at minimum the equipment Berkeley has but are expanding quickly. In contrast, our
private school competition (mainly Harvard and Yale) has exponentially more equipment and staffing
than provided at Berkeley. In order to stay competitive in our undergraduate and graduate programs,
Berkeley has got to expand our CAD/CAM resources and provide for continuing development and
growth.

1. Alignment with IT Strategic Plan

All funds identified in this proposal are directed mainly at instructional support. Most architecture and
design studio projects involve 3-D computer modeling and/or 3-D physical models to be produced by the
students. Students use software in our labs (and/or software purchased outside for their own use) to
produce these images on paper. Much of this work is done in studio class sections and also outside of
class time. Physical models are produced, usually by hand- or machine- cut materials in one or more of
our labs. Further development of the tools students use for their work is necessary to prepare them for the
design technology expectations in professional practice. We also must provide the tools in many cases in
a 24/7 environment to meet course goals. Many graduate students use the same shops and labs in
generating their thesis work. At a lesser level, faculty research uses the same resources.

2. Impact

Due to budget constraints, the Architecture Department and the CED as a whole, cannot provide
sufficient and reliable equipment, lab/shop hours, to provide these services for the number of interested
students we support (currently 550 undergraduates and 140 graduates) in Architecture, let alone the other
CED departments (which use many of the same resources). All of our Architecture students who are
pursuing pre-professional (B.A.), professional (M.Arch or the CED M.Urban Design) degrees or the non-
professional graduate degrees (M.A. Design or M.S. Architecture) – virtually 98% of our
Architecture/Design students - eventually use modeling resources available in the Architecture computing
labs, wood shop or CAD/CAM labs. At any given point, a minimum of 62% of our students are using at
least one of these resources. Other CED majors in the Department of City and Regional Planning and the
Department of Landscape Architecture and Environmental Planning also use these same or similar
resources (currently, each of the three departments provides one or more computer labs for their own
students). Updating our computer labs would provide our students the capabilities they need. Expanding
our CAD/CAM resources would allow more students in all three departments to participate in the lab.

3. Risk assessment
The greatest risk if this proposal is not funded, is that the Berkeley Architecture program will cease to be competitive and our students will not be properly prepared for professional practice, or even entry level positions in architectural or design firms. Berkeley’s large undergraduate program has traditionally been amongst the highest rated for pre-professional programs and our professional programs rank among the top fifteen. However, in recent years, technology has had increased importance in the instructional requirements of the major and Berkeley has had much difficulty in maintaining a competitive program, both because of budget cuts and a shrinking faculty. We have lost significant instructional support funding as well as suffered from retirements and competition for our faculty and faculty prospects. We have a significant opportunity to meet our teaching goals by being able to recruit top faculty and students if we can bring our technical instructional support in line with that of our peer institutions.

Our current CAD/CAM lab management structure does not allow much unmonitored use of CAD/CAM equipment, other than the lasercutter, due to safety considerations for the users and the equipment. However, permanent staffing of the facilities would allow an expansion of use beyond our current model and would allow further development planning and more efficient operation.

4. Innovation

Berkeley Architecture has always sought to provide tools for innovation for our faculty and students and, to the extent our resources have allowed, the Architecture Department and CED have supported new area development. Our intention here is to create a resource to many users at a low cost.

5. Funding model

Architecture’s computer labs could benefit from campus-wide donor development of high performance computing workstations. In the absence of donated equipment, the Department needs additional investment from the campus to keep our facilities from falling behind those of our peer institutions.

Though the CAD/CAM lab is still quite in its infancy as a student resource, the Department has endeavored to explore various funding models. Since its inception, the CAD/CAM lab has succeeded in providing new learning opportunities for our students with a very modest funding model ($9-12K per year in user fees and $15K in department funding). User fees, backed by limited Departmental funds, have provided a minimal level of support, though not at a long-term sustainable level. What we hope to do is gain university support for staffing and maintenance (as well as one piece of immediately needed equipment), which will allow us to develop additional expertise in this area. Our plan is to then market this model to manufacturers and professional practitioners to gain additional donated equipment and funding for sustainability. It is our hope that university support at this critical stage will provide seed money and minimal staff to create an efficient lab that can be further developed with external funding to provide our students with the necessary skills to compete in the workplace.