

**UNIVERSITY COMMITTEE ON INFORMATION TECHNOLOGY AND  
TELECOMMUNICATIONS POLICY (ITTP)**

**Ten Grand Challenges**

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In reviewing the Information Technology Guidance Committee's (ITGC) "[Recommendations from Working Groups](#)," ITTP developed a list of "Ten Grand Challenges" to UC in the information-technology realm, which was informally shared with ITGC. This list of the ten grand challenges is listed below with the intention that other interested individuals can see possible "broad and long-term goals".

Specifically, the Working Group reports emphasize *what* we should be doing, but we believe there is not enough emphasis on *why* we are doing them. One way to address the "why" questions on behalf of faculty and students is in terms of a set of *grand challenges*. These describe new and enhanced capabilities that could emerge over the next three to ten years or so as a result of IT initiatives stemming from the ITGC process. Further, these could be used to guide and test concrete actionable and near-term recommendations. Questions that could be asked in the latter category include: Are the actionable recommendations comprehensive in addressing the grand challenges, or are other actions needed? Are the actionable recommendations the best and most effective ways to address the grand challenges? What are ways to prioritize and stage the recommendations so as to achieve the highest priority grand challenge goals most quickly and cost effectively?

**Ten Grand Challenges**

The following is a list of ten ideas that describe new and enhanced capabilities that could emerge over the next three to ten years or so within the University. We have not attempted to prioritize them, nor have we considered their resource or budget implications. They are divided into three categories: foundations, teaching and learning, and research.

**Foundations**

**1. Well-supported instruction**

All classroom instructors (ladder faculty, lecturers, and graduate student instructors) have available a rich set of software applications widely used in teaching, modern facilities and equipment supporting these applications. Information, training and administrative and technical support empower instructors to use these capabilities effectively, and students and general-assignment classrooms are comparably equipped. Instructors don't have to dip into their own pockets or research funds to acquire equipment and software used in teaching and they spend less time dealing with administrative and technical obstacles.

## **2. Collaboration everywhere**

Faculty and students use multi-way video conferencing and an integrated set of ubiquitous collaborative tools requiring no “setup” or technical support (like today’s telephone). As one possible result, the Systemwide Academic Senate committees may individually consider no longer conducting physical meetings (or meeting less frequently) in Oakland, and the same is true of many teaching, administrative and research activities in UC. The time and dollars devoted to travel would be reduced, and the level of interaction and collaboration greatly increased across geographical and disciplinary boundaries in the context of teaching, research, and service.

## **3. Shared application responsibility**

Cooperation and sharing of resources among UC campuses in developing and maintaining common applications (while accommodating local needs for differentiation or extension) becomes a standard and widespread practice. Both application quality and cost effectiveness are improved through the sharing of development and maintenance responsibilities. The resulting applications reduce the time that faculty spend on grades, course approval, student admissions, academic personnel, other administrative tasks, and as a result the efficacy and efficiency of the academic administrative processes are continuously improved. Other application categories include all those listed below.

## **Teaching and learning**

### **4. Inter-campus learning**

A course team-taught by faculty from several campuses with students enrolled at ten UC campuses is easy and pleasant to teach, and the educational experience for students is effective and enriching. As a result, campuses share teaching resources in specialized areas, both within and without UC, and students on all campuses have unfettered access to educational opportunities across the UC system and externally.

### **5. Learning communities**

Because of the opportunity for rich collaboration and interaction with a diverse peer group (which might be termed a “learning community”), and because improved pedagogy enabled in part by IT imparts a “small-enrollment experience”, students seek and appreciate large-enrollment courses. Small-enrollment courses also create learning communities among multiple courses with complementary subject matter, whether on the same campus, at other UC campuses, or at other universities. As a result, the student’s educational experience reflects the expertise and diversity across the UC system and beyond.

### **6. Virtual instructional laboratories**

Laboratory and project experiences are vastly expanded through “virtual labs”. These group-based collaborative experiences are based on modeling and simulation, access to remote and shared instrumentation, and draw upon scientific data collected in the research mission of the University. As a result, laboratory and project experiences are more extensive, richer educationally, more cost effective and require less space. UC’s

research and education are more closely integrated, contributing to a superior education.

#### **7. Friendly online experience**

Students, as they roam across degree programs and classes, find a consistent and coherent set of tools and interfaces so that UC presents a friendly and homogeneous online presence. Students, as well as instructors and staff, access all relevant educational and administrative resources through a single unified and integrated view. As a result, they can concentrate on teaching and learning, not “fighting” context switches and heterogeneous environments.

### **Research**

#### **8. Preservation of our research heritage**

Virtually all scientific data and software artifacts collected and created within the University (past, present, and future) are captured, organized, and stewarded in ways that require little time or attention on the part of individual researchers. Applications can easily access and integrate preserved data. As a result, any such data or software can be identified, located and used by researchers in the fourth and fifth millennia, making data gathered at considerable expense available to future generations of researchers, not to mention in today’s class projects and by researchers around the world.

#### **9. Geographically distributed mega-projects**

Large interdisciplinary, inter-campus and inter-university research projects can be organized and initiated in a matter of weeks, without geographic constraints and without the need for physical relocation. As a result, many of society’s most vexing challenges, both short- and long-term, are increasingly the targets and beneficiaries of opportunistic academic research drawing upon the multi-disciplinary expertise of the academic community at large.

#### **10. Research without borders**

The UC research community is transformed from a largely campus activity to a systemwide, nationwide and worldwide activity. No matter where a researcher physically resides, he or she feels an awareness and partnership in research on all UC campuses and beyond. Researchers are informed of relevant research and interests within and without UC, and alert to opportunities for collaboration. Projects are determined by affinity, expertise, and facilities and without regard to physical proximity. As in instruction, virtual laboratories and access to remote instrumentation become routine. Extramural grant proposals and grant administration are paperless and conducted exclusively online. There is no apparent difference to principle investigators when grants and projects cross institutional boundaries. As a result, interdisciplinary and inter-campus research is expanded and UC becomes far stronger than the sum of its parts.