DRAFT

For Discussion Purposes Only

Interim Report of the Information Technology Guidance Committee

May 8, 2007

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I. Vision

As California's public research university, with roots deep in the land-grant mission of its founding, the University of California of 2025 will be dedicated to nurturing the talent of California's people, pushing the boundaries of global innovation and discovery, and creating solutions for the social, economic, and health challenges of California that are at the heart of the University's work.

Yet the University of California of 2007, despite its current strengths and contributions, is at a crossroads. Faced with the shifting external challenges and demands confronting modern society, the University must not only respond, but also anticipate and proactively prepare for the future. At stake is UC's continuing excellence, its place on the cutting edge of knowledge and creativity, and its relevance to the pressing needs facing California and its people.

Information technology (IT) is critical to UC's continued excellence in this future. It is no longer possible to conceive of the University of California without ubiquitous access to IT. Wherever and whenever we happen to be, IT has become an integral part of all our academic and professional lives. Further, IT is no longer merely the box of tools like electronic mail, the World Wide Web, electronic calendars, word processors, spreadsheets, *etc*., which we all take for granted. In a growing number of areas, IT is a primary vehicle for intellectual pursuit in an global, connected environment that thrives on autonomy, independence and academic freedom but is also publicly accountable, socially committed, internationally-oriented and community dependent (based on Frank Rhodes, *University of the Future*).

For example,

- Research computing grids make it possible to collect data from remote experimental equipment over sensor nets, move that data through multiple analysis tools running on specialized compute clusters around the world, and deliver it to researchers' desktops. These capabilities increase the efficiency and effectiveness of research activities and facilitate collaborations among research groups around the world.
- Learning is no longer bound by the constraints of the classroom. Internet-based collaboration and multimedia tools enable students to access learning materials from anywhere, at anytime, while enabling interaction and discussion among students and faculty.
- The University's administrative transactions can increasingly be conducted by self-service, automated processes. Purchasing, for example, can now be accomplished by online applications that automatically place orders with lowest-cost vendors, specifying delivery to the initiator's office. Human interaction is necessary only when preassigned authorizations are exceeded.

Perhaps the clearest imperative to embrace IT is that the scale of societal problems has increased beyond individual and isolated pursuits to have regional, state, national and global scopes. These problems include national and global supply chain management, whole person drug effect prediction, disaster preparedness, social impacts of policy, energy management, climate/environmental planning, and zero incident manufacturing. **Academic communities are global in nature and geographically dispersed.** They need to act in concert and develop and benefit from shared common foundational solutions. **Researchers, instructors, and students require tools** to model very complex phenomena at different scales, and to predict events through manipulation and analysis of data. Increasingly, their work covers larger geographical regions, and depends upon greater and greater numbers of data sets to reduce uncertainty.

Large communities need to act in concert to benefit from shared foundational solutions. There are rapidly growing requirements to model more complex phenomena, utilizing coupled models at different scales to reflect this increased complexity. There is an increased need for end-to-end prediction systems that encompass data assimilation and manipulation for emergencies. There are demands for increased experimental coverage across larger geographical regions.

UC must change in order to achieve this level of collaboration. In addition to new technology and services, new models are needed for service delivery, governance, funding, and innovation that recognize the strategic difference between utility-like IT services and those technology investments that give the University or its campus a competitive advantage. This "above the line, below the line" concept is illustrated below.
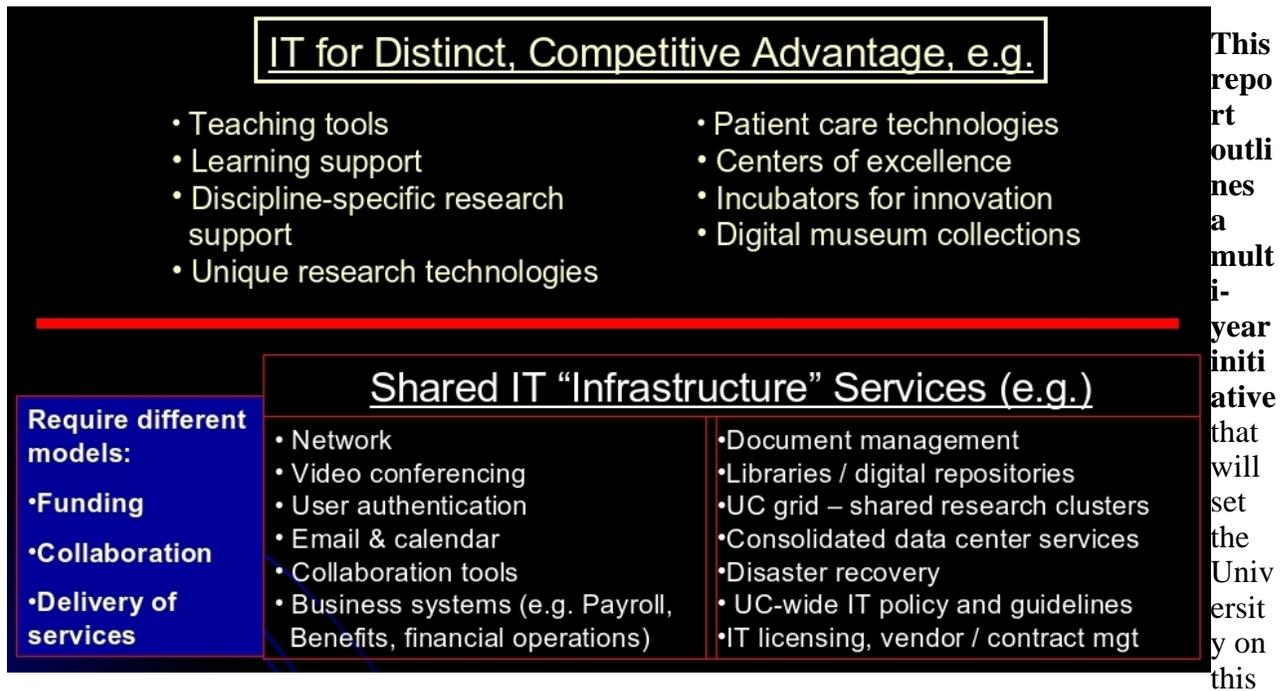
This report outlines a multi-year initiative that will set the University on this path. It also, however, represents the beginning of a new **commitment to collaborate** within the University to create an **information technology ecosystem** that will implement, deliver, and support IT-based services at the University of California to:

- **further the University mission** through the deployment of IT-based services,
- ensure the **robustness**, **security**, **effectiveness**, and **financial viability** of IT-based services,
- achieve **maximum leverage** of campus and University-wide resources.

The University has achieved successful collaborations of this sort. For example:

- Since the early days of the Internet, UC's campuses have collaborated to implement the inter-campus network. This collaboration was expanded to included the California State University and other universities in California to create the Corporation for Education Network Initiatives in California (CENIC), a world-class regional optical network for all of California.
- UC's libraries have a decades-long tradition of collaboration that has resulted in the Melvyl® union catalog, UC's eScholarship program, and many other services of the California Digital Library.

- There is a growing list of administrative applications that are being implemented and/or operated collaboratively, including At Your Service Online (AYSO), the Payroll Personnel System (PPS), and the Effort Reporting System (ERS).
- The University currently saves millions of dollars per year by aggregating its high-volume IT-related purchases through the IT Strategic Sourcing program.

Drawing on the lessons of these successes, as well as the lessons of less successful UC collaborations, we propose the creation of this ecosystem - leveraging the strengths of the entire UC system: campuses, national labs, medical centers, and the Office of the President - consisting of hardware, software, services, support organizations, governance and funding that enables UC's continued eminence. This ecosystem will be closely aligned with and support campus and UC-wide goals in all areas, including research, teaching, student life, faculty and student recruitment and retention, development, public service, and administration.

> "We know that we must hold true to our mission of teaching, research, and public service. We must maintain a world-class faculty. We must preserve access for students and continue to offer them the highest-quality education. We must expand our reach into California's communities, bringing the work of the University into people's everyday lives.
>
> "We know that we must adapt to the emerging new realities of the 21st century. That means becoming even more nimble and even more responsive to new societal problems as they emerge; and ensuring that we operate efficiently as a system, rather than 'doing things 10 times,' as President Dynes often says.
>
> "More fundamentally we know that we must embrace a new **vision** to guide our activities in the coming years."
>
> - Wyatt R. Hume, Provost and Senior Vice President - Academic Affairs

II. Planning Assumptions and Principles

In charting a future course for information technology at UC, it is necessary to predict the future course of the University. In particular, the Information Technology Guidance Committee has identified the following assumptions about UC's future:

[The following will be revised in the future to align with current work on the University's Long Range Guidance Team and Academic Planning efforts.]

- **The University.**
  - UC will expand and enhance its global presence and partnerships.
  - UC will foster institutional and academic diversity to achieve greater institutional flexibility and responsiveness to global changes and market factors.
  - The strategic importance of academic and administrative information will continue to grow, calling for active management.
- **The Academic Environment.**
  - UC will invest in and facilitate academic growth in interdisciplinary areas.
  - UC campus and lab research strengths will position the University as a leader in computationally-enabled research and the innovative uses of computation for discovery and insight.
  - Research and instruction are likely to become increasingly integrated and interdependent.
  - Scholarly collaboration will grow in importance across all disciplines, requiring highly collaborative physical and digital environments where scholarly information is readily accessible and easily exchanged.
  - UC will provide broad access to the information developed in pursuit of the teaching and research mission.
  - Classroom learning environments will change, requiring flexible and adaptable facilities and systems to support a variety of pedagogical approaches.
- **The University-wide Role.** To support the campuses, the University will plan and act collaboratively to:
  - Identify and support scalable common infrastructure and shared services that can leverage campus investments and improve cost-effectiveness for the University and its campuses.
  - Develop collaborative investment models to ensure the sustainability of common infrastructure and services.
- **The Promise and Power of Ten.** The University will leverage the promise and power of its ten campuses to achieve goals that would otherwise be unattainable by any of its parts.

> "What does 'the promise and the power of 10' mean? This concept refers to the University of California working as a single university, bringing together the complementary strengths of its ten campuses in a creative, interconnected, focused approach that summons the total impact of the UC system to address the public's needs. We have tremendous size, scale, and scope - and if we draw on our individual strengths to make the total impact more than the sum of its individual parts, we can do incredible things for California and for the world." - Wyatt R. Hume, Provost and Senior Vice President - Academic Affairs

Unfortunately, the University is not well positioned to make the kind of systemwide strategic decisions that are needed to achieve the potential offered by information technology. Historically, there has been no common governance structure to set strategic directions and allocate resources for IT within the University to ensure alignment with University priorities.

There has been ongoing communication among the "central" IT organizations at the campuses, medical centers, national labs, and the Office of the President that have resulted in significant successes for the University, such as CENIC, the IT Strategic Sourcing program, and collaboratively-built applications like the Effort Reporting System. With the distribution of responsibility for information technology over the two decades, however, most decisions regarding information technology are now made without the involvement of those central IT organizations. This has resulted in decisions that have not always fully engaged the academic and administrative leaders most concerned with institutional and academic needs and priorities. In many cases, this is appropriate, but the lack of any overarching structure has caused the University to miss important opportunities and to spend its resources sub-optimally.

We believe a new information technology ecosystem, based on the following principles, can address the these issues.

- **Collaboration.** Information technology should support the work that people do with each other.
- **User Focus.** Information technology must focus on user needs. IT's emphasis must be on services delivered to people, as opposed to the hardware and software used to implement those services.
- **Openness.** Information technology systems should be interoperable and provide broad access to information and services.
- **Knowledge-Based Organization.** Information is a critical resource to, and product of, UC and must be treated as such.
- **Leadership.** Leadership is essential to the strategic deployment of IT and will be shared within the University and among its campuses.
- **Culture of Creative Partnership.** To realize the promise of information technology, we must develop the collective wisdom to be "common where we can, custom where it counts."
- **Strategic Investment.** UC must identify which IT activities are "above the line," directly enhancing the University; which are "below the line," required but not directly enhancing the University; and invest its resources accordingly.
- **Critical Infrastructure.** The infrastructure that supports information technology services is as important to the University as "bricks and mortar" buildings. Also, as with buildings, information technology must be robust and secure, with architectural and financial accommodation for future growth.

III. Recommendations

The recommendations in this section are categorized by the segments of the University that are most directly served by those recommendations:

- Research and Scholarship
- Teaching, Learning, and Student Experience
- University-wide Administrative and Business Systems

In addition, we identify critical success factors with recommendations to ensure their success.

Research and Scholarship

"With some of the world's finest universities and research institutions, the Golden State has more scientists, engineers and researchers and invests more on research and development than any other state. As a leader in developing new technologies, California will reap tremendous rewards for our economy and environment from this investment in our innovation infrastructure." - Governor Arnold Schwarzenegger

The University of California is one of the leading research institutions in the world. UC researchers are pioneers in a host of basic and applied fields, including agriculture, medicine, technology and the environment. As one of the nation's preeminent research institutions, the University provides a unique environment in which leading scholars and promising students seek to expand fundamental knowledge of the physical world, human nature, and society. The University's research mission also is central to the foundation of the University's educational programs because new research programs lead to new knowledge, which in turn infuses educational programs with state-of-the-art information and technology at both the graduate and undergraduate levels. Finally, thousands of California jobs, billions of dollars in revenues, and countless everyday household items - from more plentiful fruits and vegetables to compact fluorescent light bulbs - can be traced back to UC discoveries. Similarly, many of the state's leading businesses have connections to UC. Those companies were either based on technology developed by the university, were founded by our faculty or alumni, or are headed by UC graduates.

UC's current proposal to create the National Petascale Applications Resource identifies the following key applications of high-end computing as being critical to California's economy and future competitiveness. *[This list is not representative of all UC research and scholarship. We need more examples.]*

Societal and Scientific Focus	Key Areas	Potential California Benefit(s)
Biology/Medicine	Genomics, drug design, organ research, protein structure	Better healthcare for less CA expenditures
Earthquake, Analysis/Safety	Earth motion dynamics, structural safety of buildings, levees	Reduce CA earthquake disruption, loss of life, and cost of repair
Climate and Natural Resources	Climate change effects on air quality, agriculture, wildfires, water, other natural resources	Predictive mitigation scenarios for policy makers

Societal and Scientific Focus	Key Areas	Potential California Benefit(s)
Energy Production and Conservation	Bio-fuels, solar cells, and renewable energy, turbulent combustion prediction of fuel efficiency	Less dependence on foreign oil; accelerate CA alternative energy industry
Nanoscience	Understanding and design of new materials	Faster, lower power semiconductors; drug development; fuel cells, better airport screening
Astronomy, Astrophysics	Understanding the formation of universe, dark matter	International leadership in science

Historically, UC has been an international leader in the development of networks and computational resources in support of research, but **UC is now losing that lead**; other universities are pulling ahead. Through consultations with a wide spectrum of UC academic researchers, Vice Chancellors for Research, and Chief Information Officers, as well as government and industrial partners, we have learned that UC is falling behind with respect to competitiveness in cyberinfrastructure-supported and IT-enabled research, threatening the loss of research funding. For example:

- In 2002, UC operated 4 out of the top 10 supercomputers in the world, and 7 out of the top 25. In 2006, UC operated 2 out of the top 10, and 3 out of the top 25.
- Nationally and internationally, research networks are implementing higher bandwidth capacities that surpass UC's current capabilities. In addition, these networks are deploying application-driven services that can reconfigure world-wide research networks based on the needs of specific research projects, such as the Large Hadron Collider at CERN. In addition, the networking requirements of UC's research communities continue to grow rapidly.

UC must act now to ensure its continued leadership. The following premises describe potential areas for UC leadership and international competitiveness:

- There is a set of state, national, and global **problems challenging society that UC should be playing a leadership role in helping to solve**. These include energy development, use and management, homeland security, environmental impact and management, infectious disease management, food and water supply, health management and earthquake preparedness.
- Our state and national value in the global market will turn dramatically toward application of **knowledge and information that can be applied in highly targeted and specific ways**. This encompasses applications like use-specific product designs, just-in-time product production, assembly and/or delivery, highly refined social and economic analyses, just-in-time community analysis, substantially shortened product life cycles incorporating highly refined technologies and processes, and data and information integration on macro scales.
- The impact of **knowledge and information for use at macro system levels will stem from understandings and technologies at micro levels** (*i.e.*, the cell, the molecule or the individual). There will be greatly escalated amounts of data and information used to conduct the research and development.
- Sophisticated understanding and practical development at the micro level used at the macro level requires increasingly sophisticated **computational resources approaching petascale**

capabilities, as well as the **mathematical and computer science expertise** to achieve new plateaus of application code.

- **Operational balances among automation, decision support, and human involvement will need to shift in a coherent manner** that depends concurrently on technology development, operational and regulatory trust of automation and education, and human factors development and training.
- **Multiple analysis tools are needed** (*e.g.*, modeling, simulation, parametric analysis, concurrent evaluations, and data analysis) to shorten product life-cycles, achieve next generation products, and develop processes for just-in-time, targeted-use products and services.
- A transition to global management (*e.g.*, global supply chains and smart manufacturing sites, more tightly tuned socioeconomic decision making, and environment impact management) will require much greater understanding of the processes, more expansive use of data and data interpretation, and a new generation workforce that is trained and oriented toward a knowledge and information mind share. Across these, there are significant roles for simulation, modeling, optimization, design, ubiquitous sensing, spatially wide area data aggregation and interpretation and large scale data management, visualization and analysis but in significantly evolving ways that are supported by a **cyberinfrastructure**.

Implications for UC's Cyberinfrastructure

- **All UC faculty and researchers require access** to an internationally-connected cyberinfrastructure of supported resources and services that enhance the University's academic mission.
- Data need to be collected, mined and interpreted in increasingly sophisticated ways that demand increasing numbers and/or larger coverage of sensors to achieve more refined understanding of the models and information. **Massive increases in the need for data storage, management, shared access, standards and security** loom large for the near future.
- Multi-scale modeling and simulation is required to achieve sophisticated understanding and practical development at the micro level applied at the macro level. Dynamic and stochastic behaviors are inherent, requiring **increasingly sophisticated computation resources**.
- Large-scale optimization is needed to address large-scale planning at the strategic, tactical and operational levels, specifically when addressing management decision-making and micro-scale models such as molecular design. There is an escalating requirement to anticipate the effect of uncertainties in these models through stochastic programming, robust optimization, flexibility/sensitivity analysis techniques and simulation-based optimization methods. The sheer problem of scale, combined with the issue of uncertainty, quickly causes **large-scale models to become computationally expensive**.
- The ability to manage and communicate electronic data between collaborating groups becomes important. **Interoperability problems are serious** and stem from the fragmented nature of the data definitions and the data itself in different areas.
- Many problems depend on increasingly larger numbers of collection points, connected to **more extensive sensor networks**. Additionally, the demands on **sensor networks are increasingly multipurpose** - data communications, automated control systems, long and short term planning, predictive modeling, optimization, environment, health and safety management, *etc*.
- **Data, information and intellectual property need to be shared strategically** to address global, macro-scale considerations at the plant, multi-plant, multi-company, state, national and global levels.

[Scenario of the use of an integrated cyberinfrastructure, similar to "An Illustrative Example of the Uses and Capabilities of a UCSF Research Data Environment" by Jon Showstack]

Recommendations

The recommendations in this section assume the existence of the Academic Cyberinfrastructure described in the Critical Success Factors section of this report. This cyberinfrastructure will provide ubiquitous access to UC Grid, collaboration tools, electronic publishing and preservation services, grant administration services, *etc*.

- **Substantially enhance UC's advanced network services**
  - **Complete the intercampus optical network** by extending a connection to UCSC.
  - **Upgrade every campus's primary connection** to 10 Gbps Ethernet.
  - **Satisfy short-term needs and explore long-term requirements for advanced network services** within UC:
    - Implement a 10 Gbps switched (not routed) Ethernet backbone connecting to every UC campus.
    - Implement a 10 Gbps optical ("lightpath") backbone connecting to every UC campus.
  - **Enhance UC's support for end-to-end network performance issues**.
    - Deploy **standard performance measurement and diagnostic tools** in strategic locations on their campuses. UC should also work with CENIC and other critical network providers, such as Internet2 and NLR, to do the same.
    - Enhance UC's **inter-campus support infrastructure** for addressing end-to-end network issues that span multiple campuses.
    - Establish **common firewall standards** among the campuses to facilitate network-based applications among the campuses.

- **Create and Position the UC Grid for Research Competitiveness**
  - **Build** UC Grid
    - **Set a schedule** for each UC campus to commit staff and resources and join the UC grid. All UC campuses should have grid access infrastructure in place for contributing to and accessing computational, data storage and visualization resources located at the campuses, the labs and through the major national and international grids, such as TeraGrid and the Open Science Grid.
    - **Invest in a system of large-scale, secure data storage services** that support collaboration, long-term preservation, and large-scale computation and that position UC as a national center of data resources.
    - Work with the SDSC and CalIT2 to form strategies to shape and **draw upon national grid resources** like the TeraGrid.
  - **Sustain and Enhance** UC Grid
    - In collaboration with research faculty, establish the **standards, incentive models and administrative approaches for aggregating computational resources** that make unused computational cycles available throughout the grid. This will enable the aggregation of individual processor and software purchases into a collective world-class UC computational capacity.

- Develop a **strategy for, and invest in, shared UC research and administrative data centers** that can accommodate growth growth for the future and support shared administrative services.
- Establish an **investment/funding strategy for computational support, storage services and data center resources** that can provide a competitive institutional match for grant funds.
- Construct a UC Grid and grid resource **system administration strategy** that leverages staff expertise at all campuses.
- Promote the development of **grid infrastructure research** grant funding.
  - **Promote** UC Grid
    - Through the Vice Chancellors for Research, sponsor workshops to **stimulate the formation of UC research communities around grand challenge problems.**
    - Develop **UC communities that advocate strengths with granting agencies** and foundations to seek funding.

Teaching, Learning and Student Experience

> "In most of the world, higher education is mired in a crisis of access, cost, and flexibility. The dominant forms of higher education in developed nations -- campus based, high cost, limited use of technology -- seem ill-suited to address global education needs of the billions of young people who will require it in the decades ahead. - Sir John Daniels, President and CEO of the Commonwealth of Learning in Canada, and formerly Vice-chancellor of the Open University, UK. http://www.col.org/colweb/site/pid/2833

Information technology introduces dramatically new possibilities for teaching and learning. On UC campuses and universities around the world, IT is successfully being used to:

- Actively engage students in the learning process
- Provide highly interactive activities in large enrollment courses
- Enable students to participate directly with faculty in research, interacting with data and simulations, and discovering new areas of interdisciplinary inquiry
- Provide greater access to learning opportunities across traditional boundaries and outside of formal courses
- Prepare students with a range of problem solving, critical thinking, and information skills required in an information-based society

While the UC campuses are doing excellent work to support faculty and students in these ways, **an enormous amount of potential remains untapped**, especially in how IT could be used to meet UC's strategic educational goals. A UC-wide coordinated approach offers the potential for leveraging one campus's efforts for the benefit of all, as well as developing new programs and activities that no single campus could create or sustain on its own. Examples include:

- Providing services to offer UC courses across campuses, for example, in subjects not feasibly taught on a single campus because of low enrollments or lack of instructors
- Making UC's exceptional educational materials accessible to K-12 teachers, students, and citizens of California (and indeed the world) who wish to supplement existing curricula or embark on new self-directed journeys of discovery
- Continuing UC's tradition of offering a distinctive and campus-based education to students while also making strategic use of information technology to offer a seamless, integrated experience across departments, service units, and campuses

The University suffers from a relative lack of UC-wide collaboration in support of instruction.
While there are existing organizations that support instructional technology (*e.g.*, the campus Media
Center Directors, Learning Management Systems managers, and campus liaisons of the UC Teaching,
Learning & technology Center), their purposes are primarily information exchange. No major
systemwide or multi-campus initiatives have resulted from their efforts.
The University will benefit from a more coordinated and strategic alliance of campus instructional
technology efforts, providing eligible students access to the best possible educational experience. With
state funding continuing to decline, it's imperative that UC find creative approaches to meeting these
demands, and IT offers many opportunities for doing so.

In support of these broader aims, the IT Guidance Committee offers a set of proposals and critical
success factors to build the IT foundation needed for UC to work together to support teaching and
learning with technology, building on the innovative efforts of the campuses, individual University
faculty, instructional programs and service units, and balancing the strategic imperatives of developing
common UC solutions, where appropriate, and enabling campus distinctiveness, where important.

Recommendations

[This needs to be restructured to align better in terms of style with the other sections.]

As observed above, UC needs a greater degree of systemwide coordination to advance the deployment
of technology in support of instruction. As a result, the following recommendations presume the
existence of an Office of Educational and Student Technology (OEST), as described at the end of this
section.

Also presumed is the existence of the Academic Cyberinfrastructure described in the Critical Success
Factors section of this report in order to deploy collaboration services, as well as services that support
the creation, dissemination, discovery, and preservation of information. There is also a significant
dependence on student information systems and other administrative systems.

Courses without Borders

Courses without Borders is envisioned as a comprehensive program to provide the IT infrastructure,
services, systems, and support necessary to provide interested faculty with the flexibility to offer, and
students to take, courses at any UC campus. This will, for example, enable the University to offer
courses when there is not sufficient enrollment on a single campus, by enrolling students across the UC.
Courses without Borders will also provide opportunities for students to take specialized courses and
enable UC faculty to team teach inter-disciplinary courses.

An example of where this is being done at UC is the less commonly taught languages. Projects like the
Distance Learning Initiative among UCLA, UCB, and UCSD used videoconferencing technology to
enroll students across the campuses in courses in Danish, Swedish, and Finnish. In addition to the real-
time interaction among instructor and students during class meetings, course websites provided forums
for communicating, exchanging materials and exploring additional resources. (For more information, see
http://www.uctltc.org/news/2003/04/language.php.)

> The Advanced Learning Technology group in the University System of Georgia provides systemwide support and
> an array of development models to its institutions that wish to collaborate to provide online degrees. And at the
> University of Texas's Telecampus, which was established by the Board of Regents in 1997 to support student
> success across the system, funding flows directly to the UT campuses to develop online courses, and the Telecampus
> serves as a utility that provides facilitation, technical review, delivery and support services.

Working with faculty, staff and students, the Office of Educational & Student Technology (OEST) will lead a UC initiative to identify, and coordinate the implementation of, and the IT investments needed for, Courses without Borders. This exploratory activity will include research into the needs and opportunities for, and barriers to, the offering of UC courses, including programmatic, policy and distinct campus issues (such as alignment of campus academic calendars, faculty reward, etc.).

Open Access

UC faculty produce an enormous and impressive cache of educational materials. However, those materials are largely locked away in "shoe boxes," such as restricted-access learning management systems, rendering them accessible to only those faculty who create them or students enrolled in a particular course. Faculty who wish to make their course materials openly accessible to other faculty, high school teachers, or students across University boundaries, face significant technical, service and cultural obstacles in doing so.

Institutions such as MIT that have provided the services and infrastructure for its faculty to make learning materials openly accessible (through its OpenCourseWare program) have been praised for providing individuals all over the world with high quality learning materials. An additional benefit, however has been to give its own faculty a tool for connecting their curriculum, for example, as described by Vijay Kumar, Assistant Provost and Director of Academic Computing, faculty can refer back to what students should have learned in another course and how they might be expected to apply concepts in future courses.

> MIT and other institutions have formed the OpenCourseWare Consortium, which UC Irvine Extension joined in 2007. Gary Matkin, Dean of Continuing Education at UCI, points out: the true value of OCW is that it provides a compelling mechanism for ensuring the continued use and refinement of course materials by a much broader group of faculty and students than just those involved in the individual course for which the materials were developed. Institutions that actively contribute to and use OCW have the opportunity to leverage their development investment not in any direct financial sense, but rather by showcasing the quality of instruction provided by their faculty and by openly sharing knowledge, ways of knowing, and ways of learning in the manner in which universities have traditionally embraced - but amplified many-fold through the use of technology.

UC will encourage, by making it easy for faculty who wish to do so, the sharing of instructional content to benefit UC students and faculty as well as California's K-12 community and general public. For example, learning activities produced in support of an introductory chemistry class at Santa Barbara may be used in support of teacher professional development in California's Science and Math Initiative. Podcast lectures delivered by world-class physicists would be available for adult learners in continuing education courses as well as for high-school science classes.

We propose implementing a UC open access publishing program for course materials and instructional software, akin to MIT's OpenCourseWare program, by leveraging the campuses' faculty content and instructional technologist expertise in a coordinated effort (and one that is built upon the University's proposed academic cyberinfrastructure). The program would include funding campus-based services that enable faculty to publish instructional materials in a UC educational repository and that make these materials openly accessible. These materials would be developed based on open standards to make them available for use and modification by K-12 and other providers of formal instruction.

Improve the Student Experience

Instruction is but one of the aspects of the student experience that is being greatly impacted by Information Technology. Student services - from enrollment, to course advising, to residential life - are

dramatically changing because of IT. Universities across the country are struggling - while budgets are shrinking -- with how to meet increasing student expectations of integrated, 24/7 access and support.

The Net Generation, which comprises the current generation of students and the next generation of faculty, wants integrated and convenient services. Technology has the power to integrate the delivery of support services, create new opportunities, and deliver world-class levels of service. Many colleges and universities, such as the University of Michigan and University of Texas, now use the Web to organize, present, and deliver support services.

> UC San Diego has made great progress in meeting student service needs as well as enabling discussion across functional groups by implementing a student portal called Triton Link. UC Berkeley is actively exploring how to meet student demands and provide more integrated services, and has published a report entitled "Information Technology at UC Berkeley: The Student Experience" (sponsored by CIO/AVC-IST Shel Waggener and AVC Susie Castillo Robson, and found at http://hrweb.berkeley.eduedu/ldp/07infotechnology.pdf).

> The UC community at large is building on these efforts and actively discussing how they might work on and across campuses to address these issues together. They are moving toward identifying mechanisms to implement solutions that can leverage their efforts for benefit of students across the system. For example, in October 2006, the UC campuses held their first joint conference to discuss IT in Enrollment Services; conference proceedings and presentations can be found at http://studentaffairs.ucdavis.edu/sa_tech/enrollment_conf/index.cfm.

The University must adequately fund collaborations, facilitated by the Office of Educational and Student Technology, to:

- promote student expertise in the use of information technology in their academic disciplines,
- identify common needs and solutions to develop strategies to address our students' expectations, and
- encourage multi-campus demonstration projects that show potential for improving IT in the student experience across the system

Office of Educational & Student Technology

As mentioned above, the creation of a UC Office of Educational & Student Technology (OEST) is of critical importance to the success of the recommendations in this section. This office would provide the leadership for coordinating initiatives resulting in:

- strategic IT systems and services that advance UC's educational goals,
- improved service and cost effectiveness in the use of IT for teaching, learning and student services, and
- extension of UC's instructional innovation to all of California.

A fundamental characteristic shared by the Universities that are successful in how they use information technology for teaching and learning (e.g, University System of Georgia) is that they have put in place an organizational structure, including executive leadership, that supports collaborative discussion of and decisions on strategic directions as well as collaborative development and implementation of common solutions.

Such a structure holds the potential as a University and as campuses of building a cohesive vision and direction for UC in the innovative use of existing technology, as well as the discovery and development of new technology to improve instruction. It also readies UC to respond to new opportunities and challenges quickly, and provide leadership in those areas in which it is uniquely positioned to do so.

The Office of Educational & Student Technology is envisioned as a coordinating hub -- led by the campuses -- for strategic efforts for using IT to support teaching, learning and the student experience. The OEST will be staffed by an executive and senior staff, but it is envisioned that decision-making will follow a variety of collaborative and distributed models. The OEST staff will partner with a distributed network of faculty and campus leaders in instruction, instructional technology, and student services to identify and implement collaborative solutions to common campus needs, develop strategic approaches to new opportunities as they emerge, and lead projects that leverage UC instructional innovation for benefit of California (and beyond).

The OEST will:

- Provide a locus for coordinating and supporting UC collaborative instructional technology efforts
- Coordinate the identification and implementation of common solutions that result in enhanced service and support to faculty, students and staff in their use of instructional tools and systems
- Build agreement around and encourage adoption of standards essential to information interchange, interoperability and re-use
- Foster information sharing and community building key to both innovation in instructional applications of technology and their effective appropriate adoption
- Coordinate the development and delivery, and promote the use of, UC instructional content made openly available to the public
- Support UC-wide initiatives in developing corporate partnerships and attracting external grant and other funding
- Provide leadership in the ongoing debate and discussion about innovative and appropriate uses of IT for teaching and learning
- In collaboration with Student Services units, explore how best to utilize technology to improve the student experience, enhance the student community, and improve student services

University-wide Administrative and Business Systems

"The Regents are steadfast in our determination to establish the University of California as a national leader in business practices, in order that they might support, and not further distract us from, our primary mission to provide quality teaching, research and public service to the people of California." - Gerald Parsky, Chair, Regents of the University of California, March 16, 2006, http://www.universityofcalifornia.edu/news/2006/parsky031606.pdf

A complex world-class academic enterprise depends upon efficient and effective administrative processes and systems to accomplish its mission. The University of California is challenged by a proliferation of disparate systems, processes and standards in a decentralized environment and a historical lack of a coherent strategy and funding for University-wide administrative systems. Both have inhibited the University's flexibility and access to the systems and data that will drive greater efficiencies in the business and financial operations of the University. Recently, the University has lost credibility in the public arena due to our inability to produce accurate and timely employee data, such as senior management compensation.

In the absence of a coherent systemwide approach to critical administrative systems, UC today navigates a number of significant hurdles, including: multiple, incompatible financial systems; a complex and decentralized payroll system in need of replacement; limited human resources information systems to provide accurate employee-related data and reporting. As business complexity and information security demands grow, and we continue to deliver more business transactions via the Web, the University must begin to simplify and standardize our business processes and systems in order to be

able to deliver the services needed by our community in the future. The University requires a business systems architecture which optimizes both centrally managed and decentralized business functions working together to meet the needs of the University.

Multiple studies have assessed UC's IT needs in payroll, human resources, and other administrative areas. *UC 2010: A New Business Architecture for the University of California (July 2000)*, proposed a road map to redesign UC's core business processes to enable the University to manage growth, control costs, improve the work environment, and implement best practices. Information technology was viewed as a critical tool to transform UC's administrative support infrastructure. The effective use of information technology is more critical than ever today; **we must act now**.

Targeted University-wide information technology investments in business systems offer significant opportunity to:

- enhance support for the core academic activities of the University
- standardize business processes
- increase productivity
- eliminate duplication of effort
- lower costs and business risk
- enable more informed decision-making, and
- ensure greater flexibility to respond to the ever-changing landscape of the competitive environment.

University-wide investments in business systems should be implemented in a manner that:

- Exploits the economies of scale and collaboration opportunities inherent in the UC system environment and selects the most cost effective and flexible delivery model, including outsourcing the service where feasible
- Positions the University to address critical infrastructure challenges in such areas as security, disaster recovery, data storage and stewardship, and the consolidation of redundant technology platforms to return significant financial benefits to the University
- Adopts approaches based on open standards and non-proprietary architectures and builds upon and enhances existing IT investments, emphasizing system reuse and redeployment within the new architectural framework. We must require compliance with University-wide IT standards and guidelines to promote system interoperability and better sharing of systems and data among our institutions.
- Includes a federated identity management framework ("UCTrust") to facilitate secure business operations and transactions among UC institutions and with key stakeholder organizations such as the federal government
- Represents the state-of-the-art in effective deployment of IT-based systems in higher education

Existing Systems

The following chart shows some of the primary administrative systems within UC. Also shown is the number of unique instances of those systems that exist at UC's 17 locations (10 campuses + 5 medical centers + LBNL + UCOP), whether those instances operate common software or not.

System	Affected Locations	Unique Instances
Payroll	Campuses, LBNL,	10 (UCLA, UCM, and UCOP

System	Affected Locations	Unique Instances
	UCOP	share)
Human Resources	All	17
Employee Self Service and Benefits	All	1
Student Application to UC	Campuses	1
Student Information Systems	Campuses	10
Financial Systems	Campuses, LBNL, UCOP	10 (UCLA, UCM, and UCOP share)
Purchasing	Campuses, LBNL, UCOP	10 (UCLA, UCM, and UCOP share)
Patient Care	Medical Centers	5

There are clearly significant opportunities for shared applications or platforms, utilizing the inter-campus network to deliver services. UC's multiplicity of similar systems often reflects the uniquely tailored business functions of UC institutions.

The following UC-wide initiatives demonstrate progress, but many are in need of greater sponsorship.

- A **Human Resources Support Systems** initiative is underway to improve the quality of employee data and provide a broad range of payroll and human resources services to UC locations. The strategy includes three specific project focus areas:
    - **Improve the Quality of and Access to Employee Data:** Develop a standard version of the Payroll Personnel System and uniform data definitions to improve the accuracy of UC employee data. Collect new data elements via HR applications and develop a comprehensive data warehouse with tools for analysis and reporting
    - **Develop an HR/Payroll Service Architecture:** Create an IT architecture and standards for business applications which integrates new and existing HRIS solution components as services
    - **Provide New Human Resources Applications to Address UC-wide Needs:** Develop or source human resources applications to deploy for UC-wide use in a web environment.
- A three-campus partnership (with UCOP support) is implementing the **Kuali Financial System (KFS)**, a non-proprietary financial system that is being built in conjunction with higher education partners. It will be made available to other UC campuses.
- The Information Technology Leadership Council (ITLC) has created an **Information Technology Architecture Group (ITAG)** to develop and communicate University-wide standards and guidelines to promote system interoperability and enhance sharing of systems and data.
- **UCTrust**, a federated identity management framework, facilitates secure business operations and transactions among UC institutions and with key stakeholder organizations such as the federal government.
- **Effort Reporting System,** a five campus partnership (with UCOP) to develop a system to report effort on contracts and grants in compliance with current federal government reporting standards
- **IT Strategic Sourcing**: UC's program to coordinate procurement of IT hardware, software and services returned $12M to the campuses in 2006

Recommendations

- **Develop the blueprint** for next-generation, shared administrative and business systems and practices.
- **Adopt and promote innovative shared service delivery models** that address critical infrastructure challenges which could return significant financial benefits to the University while enhancing quality of service.
- **Extend current inter-campus disaster recovery partnerships** to create a well-architected and managed University-wide disaster recovery services framework.
- **Identify opportunities for technology platform consolidation** and streamlining of operations: leverage UC's advanced network resources to merge, consolidate, virtualize UC's computing infrastructure to reduce central IT expenditures and increase the quality and reliability of IT "utility-like" services to the community
- **Ensure secure IT systems, data and infrastructure** to safeguard personal data and protect the University's information assets

Of critical importance to these recommendations is the Information Technology Architecture Group, as described in the *Common Architecture for a Robust, Agile, and Secure Environment* section of this report. It is through this group that UC can establish the common standards and architectural principles that enable deployments that meet the elements of this blueprint.

Critical Success Factors

As stated at the beginning of this report, this report represents a new commitment to implementing, delivering, and supporting IT-based services at the University of California through a strong emphasis on **common solutions** and **collaboration** among UC's IT communities. It is a universal theme throughout this report and must occur at many stages in the implementation of the recommendations. These collaborations will involve numerous subsets of the University's diverse organization, within individual campuses, within functional units on multiple campuses, and across functional units on multiple campuses. They may or may not involve the Office of the President. In many instances, we will need to identify new collaboration models for UC, but the collaboration must occur. **If we fail to collaborate in the execution of the recommendations in this report, we will not succeed.**

This section outlines the collaborations required for the execution of the recommendations in this report, as well as the mechanisms we will need to enable this collaboration.

Governance

If UC is to rise to the challenge of **responding rapidly and coherently** as a system to today's challenges and opportunities, and to position it's IT infrastructure to support this, then the methods by which UC makes decisions, prioritizes initiatives and investments, and ensures successful implementation and management of IT systems and services must be up to the task. **It is crucial that UC implement a governance system** for IT guidance and decision-making that supports and integrates with those of the campuses and embodies the following essential principles (based on Jack McCredie, *Improving IT Governance in Higher Education*):

- Develop **clear, transparent, and widely communicated** governance structures.
- Foster **true partnerships** and coordination between UC-wide and campus IT units.

- Recognize the **substantial differences between UC-wide IT issues and services deployed locally at each campus** - while many priorities should be set centrally or collaboratively, many decisions about how these priorities can best be achieved should be made locally.
- **Clarify and enable the positions of the UC-wide CIO and campus CIOs** (on their own campuses and with respect to each other and the system as a whole).
- **Clarify IT decision-making roles and responsibilities** of other UC-wide and campus leaders.
- **Simplify committee structures, define clear roles**, and define clear "sunsetting" provisions.
- **Connect analysis and technical decisions to the budgeting process** and rationalize the funding processes for instructional, research, and administrative computing.
- Develop structures that **produce incentives** rather than prescriptions and constraints
- Ensure that the IT governance structure and processes are **consistent with the overall governance** and management cultures of the organization.
- Ensure that representatives of key **stakeholder groups are meaningfully and appropriately engaged and consulted** in IT governance processes and decisions that significantly affect their interests.

> **Question:** How do most research universities govern the large and rapidly evolving set of information technology (IT) activities and initiatives that take place on their campuses?
> **Answer 1**: In much the same way they manage other important activities that involve every department and almost every individual on the campus. There is usually a complex committee structure and a mix of decentralized, independent decision makers who are responsible for most local issues, with the responsibility for certain major activities, such as data and voice networks, assigned to a campus-wide IT organization.
> **Answer 2:** Inefficiently, ineffectively, and not as well as they should.
> - McCredie, Jack, *Improving IT Governance in Higher Education*, EDUCAUSE Center for Applied Research, Research Bulletin, August 29, 2006, (available to EDUCAUSE member institutions at http://www.educause.edu/ir/library/pdf/ecar_so/erb/ERB0618.pdf).

Funding

Over the last 30 years, while **the scope and importance of information and communication technologies has grown and the level of investment has increased many fold**, the University's strategy for **funding and managing this investment has remained fragmented and disorganized**. Influenced by the University's traditional decentralized structure for decision-making and budgeting, and accelerated by the expanded delegation to campuses of responsibility for budget management in the 1990s, the system for funding the ITC infrastructure can be characterized as a patchwork of funding sources and decision-making responsibilities. Fund sources have included:

- **Limited funding support from the State**, primarily focused on instructional computing and instructional equipment.
- **Discretionary funding from departments or schools**, used to support local area networks, workstation purchase and replacement, and first-line technical staff to support departmental systems and users.
- **Research funds**, to support the computing needs of specific extramurally-funded projects, and some departments, laboratories, and organized research units.
- **Grants, contracts and cooperative projects** with state and federal agencies, particularly to develop wide area networking facilities and services
- **Debt funding**, particularly to support deployment and upgrading of campuswide networking facilities and connection to wide-area networks.

Typically, the decisions resulting from these piecemeal investments have addressed the immediate needs of those controlling the funds; the resulting systems and services may have been tactically sound from the perspective of the funder, but strategically counterproductive for the University as a whole.

An IT infrastructure must be reliable, and it must support the academic and administrative needs of UC in a sustainable and cost-effective manner. To put such an infrastructure in place requires that we fundamentally rethink the methods by which the University acquires, manages and invests the financial resources needed for its provision. We believe that any effective funding model will meet the following essential criteria, and strongly recommend that the University implement IT funding strategies consistent with these principles:

- Funding that is **stable and predictable** in the long term.
- A **coordinated planning and decision-making regime** that effectively and strategically balances both competing needs (e.g., as between programs, operations, and infrastructure) and available funding sources.
- Provisions to **ensure renewal of essential components** of infrastructure as they depreciate over time. This would focus primarily on the replacement of physical assets which wear out or require replacement due to obsolescence. Software related to such assets might require replacement or upgrade as well.
- Money to **maintain existing infrastructure components**, such as network hardware and software, directories and infrastructural cement of physical assets which wear out or require replacement due to obsolescence. Software related to such assets might require replacement or upgrade as well.
- Money to fund the **information technology infrastructure component of capital projects**. The IT requirements of new buildings must be considered in the same light as other utilities such as electricity, natural gas, etc. The IT components of a physical structure which is being constructed or renovated should be considered as part of the overall cost of the project.
- **Program improvement money** to enable the University to derive ongoing benefits from initial investments in IT infrastructure. The need for program improvements may be driven by:
  - Program content and the implications of innovative content for technology support, or
  - Quantum changes in technology which offer new capabilities or make obsolete existing hardware or software.

In addition, UC's funding strategies for IT should address the following specific issues that arise from a fundamental misalignment between the need for reliable and sustainable IT budgetary support and current budget policies and practices:

- Recognize that UC needs not only to increase instructional technology support from State, but also expand technology funding to accommodate direct support for research and administrative systems requirements. This can be accomplished by devoting a more substantial share of new core State funding support each year to an overall technology program that all three systems needs.
- In addition to increasing core State support, recognize and add network technology infrastructure as a component of the Operation & Maintenance of Physical Plant (OMP) funding formulas to create meet future incremental growth in maintenance requirements for these complex "new utility" systems.
- Target a portion of new core State funding to adjust the OMP base over time for to fund technology infrastructure maintenance and renewal.

- Develop an equitable funding allocation model for all UC campuses that is tied to the broader research and network support requirements, rather than just enrollment growth.

A Common Infrastructure in Support of Collaboration

Collaboration is at the core of nearly every University endeavor. Research, instruction, and administration all rely heavily on an open exchange of information and ideas. The ability to collaborate effectively is a critical success factor for virtually all members of the UC community, individuals and groups who share common problems, objectives, needs and interests to work effectively together. Unfortunately, the University has not had wide adoption of modern collaboration technologies beyond telephones and electronic mail.

> "We humans have built a creativity machine. It's the sum of three things: a few hundred million computers, a communication system connecting those computers, and some millions of human beings using those computers and communications." - *2020 Computing - The Creativity Machine*, Nature Web Focus, Vernor Vinge - http://www.nature.com/nature/journal/v440/n7083/full/440411a.html

Effective collaboration requires planning and investment. In order to fully exploit UC's "power of 10" and actively foster the cooperation and collaboration that is inherent in a geographically diverse, multi-campus environment, the University of California should deploy an integrated, comprehensive set of online tools and services to support collaboration both within the University community and with external partners.

- Researchers require access to real-time collaboration tools such as web conferencing, desktop video conferencing, and high-definition, studio-based video conferencing, as well as electronic forums and workspaces such as wikis, blogs and shared document repositories and applications. Of particular interest are tools and technologies to create, host, manage, preserve and share research data and publications and services for archiving large research collections and data sets.
- Faculty need tools for mediated academic collaboration, communicating with students and sharing information with colleagues. As the University commits to open standards and content sharing, it will need to develop the secure and robust infrastructure to support it.
- Students are natural collaborators and savvy users of social networking and communication tools such as instant messaging and MySpace. UC should provide student-centered services that encourage students to participate in the UC cyber-community.
- For managers and staff in both academic and administrative organizations, more effective collaboration tools such as desktop videoconferencing, wiki's, networked document sharing and workflow management tools hold great promise for lowering the cost of collaboration and significantly improving productivity. Document creation, management, and retention can all benefit from appropriate use of collaboration tools.

Currently, there is significant use of collaboration tools, but projects and other collaborations must spend a significant "start up" period to identify the tools they will use to work together and often default to teleconference and in-person meetings because the technology-mediated options are not reliable or available. The vision here is to provide the breadth of these tools to all collaborating groups of people within the University, as soon as the leaders and members of those groups have been identified, without requiring extended administrative processes or specialized training.

Tasks:

- **Identify and deploy a set of integrated collaboration tools and services** to address the broad needs of the University community. The tools should implement standards and guidelines for interoperability with services both inside and outside the University. A related service and support model is required to ensure broad user acceptance and long-term sustainability of the collaboration environment.
- **Implement a robust network and desktop video conferencing infrastructure** as a flexible complement to UC's current studio-based videoconferencing facilities. This infrastructure should be extended to include conference rooms that are not studios. Critical components include adoption of standards and guidelines, and development of an associated service and support model.

Academic Cyberinfrastructure in Support of Research, Scholarship, and Instruction

Underlining the goals enumerated in the *Research and Scholarship* and *Teaching, Learning, and Student Experience* sections of this report, is an assumption of ubiquitous access to UC Grid, collaboration tools, electronic publishing and preservation tools, course materials, *etc.* Currently, many faculty do not have access to such resources, or funding to purchase such access. Deployment of this infrastructure must be accomplished in such a manner that University-wide and campus resources can be integrated in a natural way for the users of this cyberinfrastructure.

Tasks:

- Create an academic cyberinfrastructure for all of UC's researchers, instructors, and students that provides access to:
  - UC Grid
  - Collaboration tools and services, such as video conferencing, wikis, and blogs, in addition to electronic mail and telephones
  - Electronic publishing tools and services that assist in the creation and dissemination of information in electronic form
  - Substantial, high quality research data sets
  - Course materials and course management systems
  - Digital preservation services that ensure availability of information in the future
  - Federal and University services related to grant application and administration
- Provide end-user support services to those served by the cyberinfrastructure.

Common Architecture for a Robust, Agile, and Secure Environment

Currently, a small number of applications are shared among UC's campuses (PPS, Benefits, Student Application); most are deployed and operated on individual campuses with mandatory feeds or reports to UCOP. Substantial financial resources go towards deploying, supporting, and operating these applications. Some of the local instances or aspects of applications provide unique or strategic value to the campuses; others provide pure commodity functionality (e.g., general ledger).

At the same time, campuses are embracing portal technology, with the goal of integrating applications, be they local or central, into a locally controlled and "branded" site. UCTrust is beginning to allow campuses to access UC-wide and each others' applications using local ids and passwords (access to At Your Service Online is an example). These applications potentially include research facilities such as

grid computing, visualization labs, etc. The sharing of facilities and applications is fostered by the availability of high speed networks and emerging standards for interoperability.

The push towards integration across applications is accelerating due to demand for usability and to provide functionality that spans multiple application areas. IT organizations are challenged to keep up with the ever increasing demands on them, and are looking for opportunities to share costs across the system.

Current technologies give us the opportunity to fundamentally reconsider the central vs. campus implementation dichotomy. We can deploy hybrid applications that have components sourced in different locations. That would allow us to centralize commodity components while campuses focus on components that are strategic or unique to them. It could also greatly simplify the data interchanges, and ultimately, reporting requirements between the campuses and UCOP.

Clearly identified standards and architectural principles are essential to enabling these kinds of deployments. Those same standards will also foster the sharing of applications and online content developed on the various campuses.

Tasks:

- **Create an Advisory Group for Ongoing Oversight of UC Architectural Standards.**
    - Complete the creation of the ITAG, providing it with appropriate resources (hardware, software, and staff) to be an effective standards body.
- Establish policies and guidelines for system implementation groups and the ITAG to achieve an appropriate level of consultation between the ITAG and those implementation groups.
- Articulate standards and guidelines for the following:
    - The availability, consistency, and timeliness of UC-wide data particularly entertaining data warehouse and integration broker technology.
- Architectural principles that enhance disaster recovery and business continuity for the University's critical applications.
- In collaboration with the HRIS and other major implementation groups, architectural standards for critical applications.
- **Endorse a "Hybrid" Deployment Model for UC-wide Applications.**
    - Adoption of the PPS "SOA wrapper" proposal,
- Continued emphasis on and exploration of SOA solutions by the HRIS working group in partnership with the ITAG,
- Portal architectural standards by the ITAG.
- **Endorse UCTrust as the Preferred Authentication System for UC-wide Applications.**

A Collaborative Virtual Organization for End-User Support

We have done a much better job at distributing IT tools and services to the University community than we have in helping the members of the community make effective use of those tools. The departmental computing support professionals who are best situated to provide direct end-user support are often so occupied with keeping their technology functioning that they have little time to help the members of their departments in the use of that technology, let alone the IT services offered by other departments within their campus and the rest of the University. **This is true despite the fact that the University currently devotes a significant segment of its staff resources to end-user support for**

information technology, primarily desktop computing. For example, in 2002 it was determined that approximately 2.5% of UCOP's total FTE were devoted to desktop computing support.

We must leverage these resources to provide support for significant growth in IT services that are and will be offered for all University faculty and knowledge workers. Accommodating to that growth will require a support infrastructure for those local personnel, as well as a significant reduction in the effort expended on desktop computing support in order to avoid very large staff increases.

Tasks:

- **Establish a hierarchical support framework** that provides tools, services, and other resources for end-user IT support personnel, empowering them to support new services without sacrificing existing services. This framework should include:
    - **A federated knowledge base** for documentation of services, including FAQs, contact information, hours of operation, service commitments, *etc*.
    - **A federated ticketing system** for problems, suggestions, *etc*.
    - **A strategy to accommodate end-user support for new services**, emphasizing a reduction in the effort required to support legacy services, as well as targeted staff increases.

IV. Implementation Strategies (to be provided in a later draft)

V. Appendices

- *To be included in future drafts: Work group reports, white papers and recommendations that were not included in this report*

ITGC Overview

Charge
UC Provost Rory Hume launched the UC-wide IT Guidance Committee in February 2006 to meet the following charge:
- o Identify strategic directions for IT investments that enable campuses to meet their distinctive needs more effectively while supporting the University's broader mission, academic programs and strategic goals.
- o Promote the deployment of information technology services to support innovation and the enhancement of academic quality and institutional competitiveness.
- o Leverage IT investment and expertise to fully exploit collective and campus specific IT capabilities.

Why?
There are good reasons to do UC-wide IT planning:
- o Position for competitive advantage - because increasingly innovation in research and teaching will be tied to innovation in cyberinfrastructure
- o Improve business processes, reduce risks, gain efficiencies (in cost and space)
- o Minimize irrational diversity & redundancy (of systems and information)
- o Upgrade basic IT and systems infrastructure capability. Acting independently, the costs and development efforts are enormous
- o Attract great talent – good cyberinfrastructure will become like good labs and grad students – a selling point for recruitment and retention of great faculty
- o Working together is our future – but there are challenges, such as how to:
  - o Leverage the benefits of collective action without losing local distinctiveness
  - o Balance collective needs and local imperatives
  - o Develop decision-making mechanisms that facilitate meaningful UC-wide action but are also responsive to campus needs

ITGC Timetable

Launch the ITGC	February 2006
Campus visits	Summer 2006
Work Group reports	December 2006
ITGC draft recommendations	January-May 2007
Campus consultations	May-June 2007
Consultations with University-wide governing bodies	April-June 2007
Summary report to Provost	July 2007
Review and comment	July-August 2007
Presentations to President, COC, Regents, Academic Council	September 2007

ITGC Members
Jim Davis, *Chief Information Officer, UCLA*
Daniel Greenstein*, Vice Provost, Academic Information and Strategic Services, UCOP*
Kristine Hafner*, Associate Vice President & Chief Information Officer, IR&C, UCOP*
Rory Hume, *Provost, UCOP; Chair, ITGC*
David Kaplan*, Professor, Philosophy, UCLA*
Larry Merkley*, Chief Information Officer, UCSC*
David Messerschmitt*, Chair, ITTP; Professor, UCB*
Gerry Munoff*, University Librarian, UCI*
Steve Relyea*, Vice Chancellor, Business Affairs, UCSD*
John Oakley*, Professor, UCD Law School; Chair, Academic Senate*
Jim Sandoval*, Vice Chancellor, Student Affairs, UCR*
AnnaLee Saxenian*, Dean, School of Information, UCB*
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Eric Vermillion*, Associate Vice Chancellor, Finance, UCSF*
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Resources & More Information
ITGC web site: http://www.universityofcalifornia.edu/itgc/
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