DESIGN PHASE BUSINESS CASE

OE–Information Technology Design Initiative

University of California, Berkeley

OVERVIEW

DESCRIPTION	Comprehensive document summarizing the Design phase findings and Implementation phase recommendations *In some instances, initiatives may be comprised of distinct projects which may be proposed before the Design phase is complete. In those cases, a preliminary business case will be required to set the context for the proposal.*
OWNER AND AUDIENCE	Owned by Initiative and Functional Sponsor and presented to the Executive Committee for approval before the Initiative can move into Implementation
TIMING	To be completed by the end of the Design stage

NOTES

- Template includes a PowerPoint file (OE Design Phase Business Case.ppt) and an Excel file (OE Design Phase Business Case_Financial Analysis.xls)
- A signed hard copy of the Business Case should be submitted to the OE Program Office with electronic copies of both files
- Additional detail may be included by adding additional slides in each section or in back-up

SPONSORSHIP

Initiative

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Notes			

SUMMARY OF RECOMMENDATIONS

The Need for Change in IT

We are a world-class research and teaching University served by a fragmented IT environment. Despite the efforts of hard-working and talented technical staff and because of redundant and often conflicting processes, lack of automation, counterproductive funding practices, the isolation of IT staff, and a general lack of integration and sharing of resources, our community is hampered.

Unless we change our current operating and funding model for IT services, Berkeley will pay ever-larger IT costs for increasingly inadequate service. Eventually, we risk undermining our teaching and research missions.

The current budget crisis is alarming, but the Operational Excellence process presents an opportunity to revise our service delivery model and re-imagine IT at Berkeley.

Saving money is important, but we can simultaneously cut costs and improve campus IT support. Some straightforward reforms can leverage the University's buying power, provide useful and reliable services, track current performance, and ensure a minimum level of support to every user.

Our vision of Information Technology at UC Berkeley is a 'connected' IT organization that provides customer-focused services through the integration of people, process, and technology. These services will be delivered through collaborative engagement with those we serve. Innovation will be harnessed through an environment that encourages creativity, supported by organizational agility, strong governance and strategic alignment tied to the mission of the University.

Our recommendations are centered on five foundational priorities with specific deliverables, starting with IT Governance and anchored by accountability metrics and training needs outlined in our resource requests. The CIO's office will sponsor additional "IT Foundational" proposals identified from review of other OE resource requests with high dependencies on IT including data warehousing (already submitted), identity and access management, calendaring, messaging service bus, service oriented architecture, web services registry and data center energy efforts.

IT Governance

Our governance recommendations are focused on establishing the framework needed to help us answer the following questions:

- What decisions must be made?
- Who should make these decisions?
- How will decisions be made?

"IT Governance is specifying the decisions, rights, and accountability framework to encourage desirable behavior in the use of IT." *(Weill & Ross, 1999)*

While UC Berkeley currently has a framework for addressing some components of IT governance, our governance structure is incomplete and constrained in a number of ways. Existing governance and oversight bodies on campus provide some of what we need at the technical, project, funding, and strategic levels, but their domains of responsibility and authority are limited and their relationships to each other too unclear to enable them to influence overall IT strategy and investment.

Creation and adoption of an institution-wide governance model with clearly articulated decision rights and accountability are critical for all OE initiatives and beyond. Technical solutions must be designed with the user experience and needs in mind, with all technology initiatives vetted at the appropriate levels for interoperability.

Substantive progress towards any IT recommendation can only be achieved by fully implementing the proposed governance changes. This applies to all major OE-sponsored initiatives as well as post-OE initiatives.

IT Governance recommendations:

- Establish Cabinet-level IT decision-making and policy body (council) that combines the Academic Senate and executive administration.
- Drive the campus toward a future IT strategy and program that serves the entire campus, and particularly one with far fewer autonomous IT organizations.
- Publish a campus-wide 'process map' of IT Governance inclusive of operations, new investments, and project activities, including how IT investments, divestments and architectural strategies are vetted.
- Establish decision rights based on governance instead of organizational models or funding sources to encourage behavior consistent with campus standards in managing and using technology.
- Establish a financial model to buy out local staff time spent working on campus IT Governance structures to recognize the impact on local departments.

Business Analysis and User Experience (BA/UX)

Software applications represent significant investments for the campus, especially when their costs are measured over their full life cycles, from problem identification to final decommission. Yet these investments rarely produce the high-quality experience the campus community requires and too often cause as many operational problems as they look to solve. The campus spends too much of its resources on building or buying isolated applications and far too little on up-front business analysis, user experience design, integration, and quality control.

Creating and adopting a demand, design, and delivery framework where business analysis and solution design are the basis for any technological offering is key to successful IT. This will require us to shift technical staff resources from a dominant skill set based on delivery of IT services to the earlier phases of demand and design. The Business Analyst is the liaison between the business and technical community and must be seen as the central figure on project teams and considered "bi-lingual" – i.e., speaks both business and technical languages.

BA/UX recommendations:

- Establish policy defining BA/UX activities and the types of projects where they will be required.
- Analyze and report on immediate and long-term demand for BA/UX FTE based on the new BA/UX policy, the existing application portfolio, and approved OE initiatives.
- Permanent funding to make BA/UX expertise available.
- Hire or reassign existing staff to meet immediate demand.
- Develop specifications for a skills development program and develop and/or procure the program.
- Formalize student hiring, training & involvement practices based on existing best-in-class models at UC Berkeley.
- Document the roadmap, implementation plan, and execution of the overall solutions and recommendations in phased approach over the next two to three years.

End User Provisioning and Support

UC Berkeley IT has evolved into a bifurcated system of "haves" and "have not's," in which our world-class research and teaching are not supported adequately. The campus has no required or recommended backup plan and no clear designation of responsibility for end user desktops or laptops. We fail to leverage our purchasing power with key hardware and software vendors and lack basic data on the real nature and cost of end-user support and provisioning.

The design and development of a standardized package and platform of support available to all campus users as a Common Good, including hardware procurement, automated initial set-up with typical software, campus wide software license management, networked file storage and backup, and ongoing assistance is crucial for long-term success. Well-managed IT service centers will consolidate our currently unevenly distributed service delivery teams into IT service centers, with a common approach and consistent funding model, as well as the flexibility to enable units to procure more advanced configurations or higher levels of services as needed.

End User Provisioning and Support recommendations:

- Establish IT Service Center(s) that take on responsibility for all phases of acquisition, provisioning, deployment, and removal of hardware and software for campus administrative staff.
- Establish Software Licensing Group or contract with service provider to oversee purchase, tracking and disposition of campus software licenses.
- Identify defined lifecycles for hardware and software purchases.
- Identify tools for a campus trouble-ticket system, inventory management system, desktop management system, and optimal imaging profiles for administrative staff.
- In concert with OE-FIT, establish a Common Good funding model that prioritizes the acquisition and deployment of IT solutions across campus in a uniform way.
- Work with Finance and Administration to change chart of accounts to standardize IT purchases and costs so we can accurately identify what we spend on campus IT, including staff salary and benefits costs for IT services.
- Develop a robust customer service and IT training program for student employees that frees up experienced and senior campus staff to work on more complicated projects.

Application Lifecycle Management:

As highlighted above, software applications represent a significant cost for the University. We have a limited IT governance structure to prioritize business needs or guide decisions about application selection, building or buying, and open source or proprietary source code, or using services in lieu of locally-run software. There is no campus inventory to which developers and managers can refer when contemplating the building of new, the purchase of commercial, or the enhancement of existing applications.

There is also widespread concern about the health of some campuswide software applications -- their stability, aging infrastructure, room for growth, interoperability or integration, supportability, and even basic effectiveness. Many of these systems have been in operation for as many as 20 years with no plans for replacement, and many were designed to meet the specific needs of central business units without considering the needs of the campuswide population of users or designs that support cross-organizational business processes. The result is that we lose opportunities for scalability and even effectiveness for the campus as a whole.

We must establish ongoing health-checks for critical campus applications to determine which pose the greatest and most immediate risk of degraded performance, security breaches, and excessive support costs, and recommend the improvements or replacements needed to ensure uninterrupted services. The development and implementation of a centralized application registry for all departmental, central, and campus-endorsed applications, along with a roster of functional owners who sponsor those functional areas, is recommended. We also suggest that establishing a training program for developers on campus – from orientation to a certification program including participation in workshops, conferences, and classes – will improve individual skills, collegiality and communication among developer staff and improve overall quality of solution design and delivery.

Application Lifecycle Management recommendations:

- Implement an Application Registry/Repository (or application portfolio tool).
- Publish health check guidelines.
- Publish new application checklist and process.
- Compile target list of health check candidate applications, and populate portfolio.
- Complete campus application risk profile and document campus mitigation plan for at-risk applications.
- Publish implementation plan, and execute the solutions and recommendations identified from the health check.
- Creation of a UC Berkeley Application Developer Tool Kit, which includes a source code management system and bug-tracking environment.
- Establish middleware and developer architecture standards for campus application development.
- Implement accessibility test suite to confirm all applications are built to the highest accessibility standards practical.
- Implement performance test suite to do full quality assurance testing against known benchmarks.
- Establish formal security review process by which all applications that collect or access sensitive data are validated.
- Identify orientation, training (on-site or off-), conference, and workshop opportunities for developers.
- Establish certification program for application developers.

Server Virtualization and Data Center Optimization:

Based on self-reporting, the campus has approximately fifty data centers, server rooms, or similar facilities that house computation and storage systems. These vary widely in quality and security, from state-of-the-art data centers to aging single machines stored in closets or under desks. Each site requires management of both its systems and its environment. Rooms housing servers require physical security, air filtration, temperature control, and power provision and management. There is significant risk in the mere fact that, without a physical search of the campus, we cannot identify the total number, locations, scale, or quality of server environments. Management of each small server or data center represents a significant time commitment for distributed IT staff, many of whom perform server administration as only a small part of their jobs.

Although difficult to quantify with available data, functional redundancies, unmitigated business risks, underutilized hardware, and unnecessary power consumption undoubtedly add significant costs across the campus. The requirements, resources, and capacity planning for data center services must be more closely aligned.

We urge campus to establish, define, and allocate appropriate data center space for overall campus needs while reducing the number of physical spaces used for servers, emphasizing the provision of lower-tier but fully managed spaces. This would include avoiding long-term capital expense by emphasizing off-site options in conjunction with co-location with other UCs or commercial providers. We also recommend that we expand server virtualization to increase capacity and efficiency while reducing spending, energy and improving the management of server environments.

Server Virtualization and Data Center Optimization recommendations:

- Deliver a strategic development plan for allocating appropriate space for a tiered set of distributed data centers to accommodate the full range of campus server management needs including outsourcing options.
- Develop and implement a plan for the expansion of server virtualization.
- Define the external sourcing strategy for data center services in partnership with other UC campuses.
- Establish a subsidized transition plan from local to shared data centers and from physical to virtual servers when one-time transition costs are a barrier to greater campus savings.

FINANCIAL ANALYSIS

- Year by year breakdown of savings and costs
- Key assumptions
- Metrics

Total IT spending across campus is ~$160M annually[1]. Approximately 70% of the total spending is on staff salaries and benefits (where there are 781 staff, not including some support staff who have not yet been categorized in the Career Compass process). The remaining 30% is identified as 'technology' spending - hardware and computing equipment, software, computing services, and communications. While direct comparison with industry is challenging due to the unique nature of research universities, by most benchmarks Berkeley's IT staff costs as a percentage of total spending are nearly 50% higher than the most efficient organizations. The 2008-2009 IT staff-related spending of 70% of total tracked IT spending grew from 58.3% in 2001-2002. Over the coming five years, left unchecked, the cost of benefits for IT staff will increase by an estimated $15M, driving staff-related spending as a percentage of total IT spending even higher unless we make sweeping changes.

In addition to savings in staffing, general technology cost avoidance is also a significant opportunity for Berkeley. A Business Analysis Benchmark Study by IAG Consulting concluded that, as a result of gaps between business needs and delivered functionality, most organizations waste more than one of every three dollars spent in IT development and implementation. Three recent Berkeley examples - CADS, BFS Reimplementation, and the Graduate Division online letters of reference rollout - had original forecasts that were limited to just the technology build. The project sponsors, in each case, substantially underestimated total costs by not including the significant expenses associated with process design, training, or rollout costs. In some cases, process changes could have eliminated technology costs all together. When common business practices are implemented, substantial savings can be achieved. After moving to a Common Good IT services delivery model, the University of Minnesota found that for every $1 invested, campus departments saved an average of $2.62 over a three-year period[2].

We believe that savings of approximately $12M can be obtained over a period of three years through improvements in the following areas: hardware and software procurement, consolidation of fragmented services into a campus-wide delivery of IT services and funding model, greater reliance on (and availability of) business analysis, and adherence to a campuswide IT governance structure.

- Improvements in procurement, including hardware and software standards, bulk purchase programs, improved Common Good license management, software distribution programs, and online purchasing could deliver the campus ~$2.5M - $3.0M in annual savings.

- We estimate that Berkeley could realize substantial savings (8% to 12%) in IT staff related expense once the following improvements are fully realized: elimination of redundant services, implementation of business process analysis practices and subsequent process improvements, adherence to a campus-wide IT governance structure, data center consolidation, server virtualization, application consolidation and rationalization, and adoption of end user support standardized operating model. These savings do not include the rather significant potential for soft opportunity savings that will come from the implementation of adequate demand and design practices.

[1] FY 2008-2009 IT spend study: http://technology.berkeley.edu/cio/fptis/fp/
[2] University of Minnesota study: http://www.oit.umn.edu/external-review/

Financial breakdown for all OE-IT Projects:

Total Initiatives OE-IT Projects		FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	TOTAL	Run Rate
	Centrally Recapturable Savings	$85,000	$765,000	$710,000	$3,455,000	$3,110,000	$8,125,000	$2,980,000
	+ All Other Funding	$305,000	$8,533,000	$10,371,000	$13,316,000	$3,524,000	$36,049,000	$(697,000)
	- Expenses	$(390,000)	$(9,580,000)	$(12,805,000)	$(15,650,000)	$(5,468,000)	$(43,893,000)	$(4,182,000)
	= NET	$0	$(282,000)	$(1,724,000)	$1,121,000	$1,166,000	$281,000	$(1,899,000)
	+ Other savings	$0	$3,860,000	$12,732,000	$13,307,000	$12,842,000	$42,741,000	$9,943,000
	= Total impact to UCB	$0	$3,578,000	$11,008,000	$14,428,000	$14,008,000	$43,022,000	$8,044,000

Financial breakdown for each OE-IT project:

Total Initiative (all projects) Application Lifecycle Management		FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	TOTAL	Run Rate
	Centrally Recapturable Savings	$85,000	$720,000	$620,000	$520,000	$130,000	$2,075,000	$0
	+ All Other Funding	$83,000	$440,000	$340,000	$214,000	$175,000	$1,252,000	$0
	- Expenses	$(168,000)	$(1,160,000)	$(960,000)	$(734,000)	$(305,000)	$(3,327,000)	$(175,000)
	= NET	$0	$0	$0	$0	$0	$0	$(175,000)
	+ Other savings	$0	$0	$0	$0	$0	$0	$0
	= Total impact to UCB	$0	$0	$0	$0	$0	$0	$(175,000)

Total Initiative (all projects) BA/UX		FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	TOTAL	Run Rate
	Centrally Recapturable Savings	$0	$0	$0	$2,800,000	$2,800,000	$5,600,000	$2,800,000
	+ All Other Funding	$181,000	$403,000	$403,000	$222,000	$222,000	$1,431,000	$0
	- Expenses	$(181,000)	$(625,000)	$(2,102,000)	$(1,921,000)	$(1,921,000)	$(6,750,000)	$(1,975,000)
	= NET	$0	$(222,000)	$(1,699,000)	$1,101,000	$1,101,000	$281,000	$825,000
	+ Other savings	$0	$40,000	$8,788,000	$9,036,000	$9,284,000	$27,148,000	$9,332,000
	= Total impact to UCB	$0	$(182,000)	$7,089,000	$10,137,000	$10,385,000	$27,429,000	$10,157,000

Total Initiative (all projects) End User Support & Provisioning		FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	TOTAL	Run Rate
	Centrally Recapturable Savings	$0	$0	$0	$0	$0	$0	$0
	+ All Other Funding	$0	$5,981,000	$8,165,000	$11,524,000	$1,770,000	$27,440,000	$0
	- Expenses	$0	$(5,981,000)	$(8,165,000)	$(11,524,000)	$(1,770,000)	$(27,440,000)	$(922,000)
	= NET	$0	$0	$0	$0	$0	$0	$(922,000)
	+ Other savings	$0	$3,498,000	$3,290,000	$3,290,000	$2,250,000	$12,328,000	$0
	= Total impact to UCB	$0	$3,498,000	$3,290,000	$3,290,000	$2,250,000	$12,328,000	$(922,000)

Total Initiative (all projects) IT Governance		FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	TOTAL	Run Rate
	Centrally Recapturable Savings	$0	$0	$0	$0	$0	$0	$0
	+ All Other Funding	$41,000	$1,162,000	$1,039,000	$1,058,000	$1,059,000	$4,359,000	$(697,000)
	- Expenses	$(41,000)	$(1,162,000)	$(1,039,000)	$(1,058,000)	$(1,059,000)	$(4,359,000)	$(823,000)
	= NET	$0	$0	$0	$0	$0	$0	$(1,520,000)
	+ Other savings	$0	$0	$0	$0	$0	$0	$(697,000)
	= Total impact to UCB	$0	$0	$0	$0	$0	$0	$(2,217,000)

Total Initiative (all projects) Server Virtualizaiton and Data Centers		FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	TOTAL	Run Rate
	Centrally Recapturable Savings	$0	$45,000	$90,000	$135,000	$180,000	$450,000	$180,000
	+ All Other Funding	$0	$547,000	$424,000	$298,000	$298,000	$1,567,000	$0
	- Expenses	$0	$(652,000)	$(539,000)	$(413,000)	$(413,000)	$(2,017,000)	$(287,000)
	= NET	$0	$(60,000)	$(25,000)	$20,000	$65,000	$0	$(107,000)
	+ Other savings	$0	$322,000	$654,000	$981,000	$1,308,000	$3,265,000	$1,308,000
	= Total impact to UCB	$0	$262,000	$629,000	$1,001,000	$1,373,000	$3,265,000	$1,201,000

Metrics

For each IT case study or project, a catalog of potential metrics has been organized. The metrics are divided into three groups: those that facilitate decision-making about moving ahead with a project; those used during a project; and those used to evaluate an on-going operation or activity.

Metric selection is a key part of the implementation process. While there are numerous possible metrics for each IT service area, the rule of thumb is that a single-page presentation of no more than five to eight metrics collected on a regular basis is most useful. Depending on one's perspective, different metrics will have value. For example, a high-level manager will require metrics with a different level of detail than the help desk manager or server manager.

The process of selecting which metrics provide useful information is a collaborative one, beginning with the identification of stakeholders and goals. Specific information needs must be identified, along with which data are currently available and which sources need to be developed. Metric and data evaluation and refinement should be an on-going and collaborative process.

An example of possible metrics that may be used in the area of overall IT Governance is shown below. A complete set of possible metrics for each case study can be found in the appendix section.

Metric	Project proposal	Active project	On-going operations/ activity	Suggested tool/representation for the dashboard
Financials: How well are we utilizing our financial resources?				
Distribution of IT spend				
• Invest vs. enhance vs. run	x	x	x	$%, pie chart
• Central IT vs. rest of the campus IT		x	x	$%, pie chart
• IT activity		x	x	$%, pie chart
IT spend/total campus spend		x	x	$%, pie chart
Change in IT operational budget			x	%
Change in IT operational spend			x	%
IT spend/person				
• IT spend/total campus employee FTE			x	$
• IT spend/total campus employee headcount			x	$
• IT spend/student FTE			x	$
• IT employee FTE/total campus employee FTE			x	%
• IT employee headcount/total campus employee headcount			x	%
IT staff spend				
• IT staff spend/total staff spend			x	#/# = %
• IT staff spend by activity		x	x	$%, Pie chart
• IT staff (career vs. student) by activity		x	x	$% and/or #%, pie chart or column graph
Budgeted vs. spend (or actuals)				
• Budgeted-to-date vs. spend-to-date		x	x	Spreadsheet Σ
• Projected budgeted vs. projected spend		x	x	Spreadsheet Σ
Level of spend adequate to meet needs	x	x	x	1-4 Likert scale
TCO or Total Cost of Ownership				
• TCO of a desktop or laptop	x	x	x	$
• TCO of a printer	x	x	x	$

• TCO of an end user device (not a desktop or laptop)	x	x	x	$
Recharge/other spend – a measure of self-support			x	#/# = %
Staffing/skills profile: What are the staffing/skills required?				
In-house skills vs. contract skills required	x			Pie chart + list of skills not on campus
Centralized vs. distributed IT staff	x	x	x	Pie chart
In-house staff vs. outside contractors		x	x	Pie chart
Training budget or spend/IT staff member	x	x	x	$
Alignment with operational goals – both service level and organizational meta-goals: How well does this project/activity align with IT/campus operational goals?				
Ratio of effort to impact	x	x	x	#/# = %
VOI or Value of Investment	x	x	x	List top three-five
Customer satisfaction – the "right" fit with the business process	x	x	x	1-4 Likert scale
Applications that are shared and standard			x	%

PROBLEM STATEMENT/NEEDS ASSESSMENT

- Objectives
- Situation
- Opportunity
-

OE-IT design initiative goals, approach and expectations

The OE-IT initiative design team was tasked with three specific goals: improve the overall quality of IT service across campus, reduce information technology spending by $12 to $15 million per year, and identify metrics to measure future performance.

In our vision for UC Berkeley's future, IT solutions and services are fully integrated with common business processes and provide a seamless experience for faculty, staff, and students. We wish to build a highly connected and engaged IT organization, which will deliver high-quality, integrated, and efficient IT services to the entire campus.

Our approach focused on the development of six case studies targeted at identifying IT services recommendations that will result in improvements and/or savings for most (80%) of the administrative staff. Case studies were selected based on highest probability of achieving both savings and service improvements using the initial data obtained during the diagnostic phase of OE, coupled with team member experience and additional research.

Each case study was developed through a multi-phase process, starting with staff analysts creating detailed briefing papers on each topic, including industry standards, campus data, and interviews with other UCs and universities across the country that were known for their Best Practices. Team members reviewed and discussed the briefing materials and composed an initial case study, which was distributed across campus. Community feedback was invited through heavily advertised email, outreach, and feedback forums; all was reviewed and incorporated into the final case studies. This OE IT Business Case represents a summation and aggregation of our findings and recommendations to the OE Executive Committee for approval, prioritization, and implementation. The complete case studies and briefing materials re available upon request.

The case studies completed include six studies related to IT services: End User Support, Servers and Data Centers, Storage and Backup, Software Licensing, Application Life Cycle Management; and one focused on the broader topic of how IT operates - IT Governance. There is also a briefing paper on Metrics.

Unbalanced approach to the demand, design and delivery of IT Services

At UC Berkeley, technology has historically been perceived as the solution of choice regardless of the specific problem being addressed. Functional requirements, process design, user experience, training, and change management are often neglected in favor of building or purchasing the latest technical solution. Unfortunately, rather than lowering operating costs by improving productivity (something most technical solutions should be striving to accomplish), one technical solution on campus often begets additional expenditures in yet more technology. For example, because campus-wide human resource solutions never included automated workflow, many local technical workarounds and solutions were created to fill service gaps. As a result, departments have staffed technical positions to support these many local solutions, while end users in a department are often left to navigate a very disjointed system requiring separate accounts and passwords, duplicate data entry, and overlapping functionality.

The IT spending profile at UC Berkeley shows that central IT accounts for approximately $60M annually, funding 50% of its services through recharge. Most of these services, however, were designed to meet the needs of large-scale systems or campus-wide needs, rather than the needs of individual departments. The result is widely distributed and duplicated IT spending, with the majority ($90-$100M) of it occurring locally, and staff building local systems to fill the gaps. Most units, however, do not have the scale or the staff to provide sufficient coverage during peak periods. Nor do they have the depth of expertise to handle appropriate demand planning and detailed design. The result is staff time consumed in technology fire fighting that resolves similar individual problems across the campus over and over again.

Of the approximately 781 campus technology staff identified in Career Compass (not including ~25-30 who have not yet been reclassified, e.g., help desk staff), 696 are categorized in positions that focus on skills for technology service delivery, while 86 are categorized as demand and design staff. We have 19 times as many systems administrators as we have user experience designers (112 vs. 6). Equally striking, we have 234 application programmers and only 10 quality assurance/release management analysts. The result is a significant number of staff who are asked to do work far outside their core skill areas, creating conditions that may actually increase long-term costs (i.e., it takes longer to accomplish certain tasks due to an overwhelming workload, or a lack of skills or deep knowledge needed to solve a problem).

IT Governance

IT governance, oversight, and the strategic management of Berkeley's IT assets are critical for the campus to achieve its mission. Although we have a good framework for addressing some dimensions of IT governance, the two main aspects of decision making -- (1) what the requirements will be for a potential solution, and (2) what technology will be used to deliver on those requirements -- are highly fragmented, incomplete, and constrained. With limited funding and further financial challenges in our future, we will need to plan our IT investment and technology strategies carefully. Currently, organizational design (who reports to whom) and funding (who is paying) are the primary mechanisms driving our decision-making. As a result, we do not coordinate our many local IT needs and investments strategically. Nor do key oversight bodies have authority over major IT decisions. Individual units or functional owners instead fund decisions and resource allocations.

Governance is often misunderstood. We have "IT governance" bodies that function as local project oversight groups, steering committees, or communities of practice. As in many other areas of life on campus, we try to solve these problems by creating additional committees that only increase the fragmentation. Governing bodies must be given appropriate responsibility and authority to make technology decisions, including the ability to link technology governance with data and business process decision rights. The three areas must work in concert for effective and sustainable solutions to emerge. Effective IT governance must be aligned with campus and IT operational goals, include clear lines of responsibility and authority, rely on objective metrics, be transparent, and be easily understood and

described by campus leadership.

Every OE initiative team is moving forward with recommendations for investment in IT systems and technologies, but there is currently no governance structure in place with sufficient responsibility and authority to help the Program Office assess technology proposals, prioritize them, or coordinate them with our ongoing projects, processes, and operations. These IT governance and oversight bodies currently have confusing or conflicting reporting relationships; their memberships, while diverse, are not always appropriate; and they are inadequately staffed and supported. While they do provide some of what we need at the technical, project, and strategic levels, they oversee a very limited portion of the overall funding (~3.65% of total IT spending), and their authority is currently too fragmented and operational responsibilities too diffuse to enable them to influence IT investment from a strategic campus-wide perspective.

Our best IT governance groups are "advisory," providing input and recommendations to either the campus CIO or the Deputy CIO of Information Services and Technology (IST). Nor do groups such as the IT Architecture Committee and Campus Technology Council have formal reporting or communication processes with each other.

Our decision-making structures have proven to be ineffective at enforcement. We do a good job with some issues -- security and privacy in particular -- but our "advisory" bodies cannot enforce their decisions. The word "mandatory" is rarely used and, even when it is, enforcement is difficult. There are few consequences to units that choose to act independently, even if their actions are counterproductive for the overall campus IT vision.

End User Support

Inefficiencies and frustrations regarding the campus technology environments begin with the fragmented and uneven service for the end user community. Many faculty and staff suffer from uneven service levels, with their support providers using antiquated methods and duplicating effort. At the same time, the institution as a whole suffers from counterproductive funding structures and wasted resources. Some units provide excellent service with advanced technology, while others endure with minimal professional staff, few or no resources, and high levels of risk. This situation produces widespread frustration, excessive spending, and a lack of integration across campus. Great service models have been developed in the islands of excellence that can deploy resources unavailable to most departments, but these models cannot be replicated without some level of campus support and organization.

At the core of the problem is our inability, in many units, to automate the delivery of routine services, such as the set-up of new computers and installation of software patches and upgrades. This is often a byproduct of supporting complete autonomy for all individuals in selecting their preferred operating environment – including selection of hardware, operating systems, productivity applications, web browsers, and personal client applications. Each of these then must be supported either directly by the end user or in a costly way from a technical staff member. Other failures are predictable results of this. We miss out on bulk purchasing and other cost-saving arrangements, we fail to provide responsive personalized service when it is needed, and we chain creative and highly-motivated staff to the maintenance of aging systems and increasingly less viable services. Further, we lack basic data on the real nature and cost of end-user support, leaving us unable to manage current services, plan for inevitable changes, and spread innovation.

Software Licensing

While some groups on campus determine and effectively fulfill some commodity software needs, such as operating systems, security, and productivity suites, we typically obtain software on a less-coordinated basis. The result is high administrative costs, productivity loss, overspending per license, unmet needs, and missing metrics for managing the process and improving performance.

Detailed input on requirements from individual users and owners must be a feature of selection and procurement, but

we must aggregate demands to create savings. There are currently no effective incentives to reward departments for coordinating purchases. Although the campus has not experienced widespread problems with use of unlicensed software, the current approach increases barriers for users to utilize fully licensed copies of appropriate and updated software.

When user-buyers try to act in the best interests of the campus as a whole, they cannot find organized information describing where else on campus similar needs have surfaced, and certainly not whether perfectly good unused licenses are available. Because only local policies and procedures, where they exist, control how software licenses are managed, the inventory and distribution processes that should support smart buying for the campus do not. Current reporting does not fully reveal true software and licensing purchases because purchasing is distributed and codes in our financial system are not used in a useful or consistent way.

The lack of information about true campus demand is especially damaging to the sourcing and procurement functions. Data expressing existing and potential demand are vital to successful negotiation, yet our professional procurement staff often have to resort to asking around to discover the demand in the midst of their negotiations. In some instances (e.g., with SHI), our buyers find that the vendor has more reliable data about campus purchases than we do, and use those data to their advantage in negotiations. Nor is the very large student demand considered in our negotiations for group purchases. We are pursuing inappropriate licenses and missing group purchase savings.

Users and their IT support professionals are unaware of the breadth of choice available or of the collective experience of their peers. Haphazard software license tracking and management are too isolated from procurement professionals who, in turn, are too distant from user needs to be valuable partners in the acquisition process. The campus suffers from missed opportunities to save money and undue friction at every administrative step in the process.

Storage and Backup

Storage and backup are critical to the security of campus information from intrusion and accidental loss. While we cannot know the exact price of each individual data loss, we know that it can be extremely costly in lost user and technical staff time, expensive when we must secure the services of an outside data recovery vendor (at least $3,000 each incident), and, in the worst cases, result in the complete destruction or corruption of irreplaceable information and liability for data privacy losses (hundreds of thousands of dollars per breach incident).

There is now neither a required or a recommended backup plan for the campus, nor are there clear designations of responsibility. UCBackup, a central backup service, is used primarily for servers and large administrative data sets and is widely viewed as not meeting the end user backup needs.

Most units (and in many cases individuals) now bear the responsibility for data backup and storage locally, with approaches ranging from thorough and consistent to sporadic or even nonexistent. We can and should manage costs and mitigate risks for the entire community more effectively.

The current storage and backup services provided by central campus do not account for the needs of users with varying budgets, various degrees of technical sophistication, different kinds of data, and the increasing use of disparate mobile devices.

Servers and Data Centers

Based on self-reporting in the Bain diagnostic report, the campus has approximately 50 data centers, server rooms, or similar facilities that are currently used to house computation and storage systems. Few of these locations were originally designed with optimal electrical or cooling infrastructure, but all require some level of management of the

environmental systems and the technology components (including server administration, software and operating system patching, systems configuration, etc.). These rooms tend to be highly inefficient; in addition to systems management, they require physical security oversight, environmental systems upkeep, cooling, and augmented power, all while consuming valuable campus space.

Although difficult to quantify based on the data that are available, it seems certain that the current *ad hoc* approach results in considerable redundancy, excess cost and resources, significant business risk, underutilized servers, and unmanaged power consumption. There is significant risk in the mere fact that, without a physical search of the campus, we cannot identify the total number, locations, scale, or quality of server environments across the campus. In addition, management of each small server or data center represents a significant time commitment for IT staff, many of whom perform server administration as only a small part of their jobs. Even in situations where well-managed environments exist, growth of computing environments on campus present significant capital risks associated with the campus electrical infrastructure. A more centrally managed server system with local applications management is a better use of our IT skills on campus.

Application Life Cycle Management

Software applications represent a significant cost for the University, especially when their Total Cost of Ownership is considered over their entire lifecycle. Our outlays for application development are rarely producing the high-quality experience that campus users have a right to expect.

Many units across campus do their own internal application development, understandably focused on specific local goals. There is no campus inventory to which developers and managers can refer when contemplating the building of new, the buying of commercial, or the enhancement of existing applications, often resulting in multiple units solving the same problem from scratch.

The campus does not define best practices for coding or architecture, provide access to commonly used data held by various campus units, or plan support for applications beyond their initial launch. Financial disincentives make collaboration across units difficult or impossible.

The result is a fragmented and overwhelmingly localized approach to problem-solving with predictable results: uneven provision, redundant efforts, untapped talent and experience, and increased risk.

Many of the large, shared applications, e.g., BFS, HCM, CARS, Telebears, Bearfacts, CSIR, etc., were built with requirements driven primarily by central functional units. As long as they met those needs, they were deemed sufficient. Although these applications are in varying stages of their development life cycles, there is widespread concern about their effectiveness, as units whose needs are not met decide that their only option is to build separate stand-alone applications. Beyond functionality, the campus faces serious risks in terms of the supportability, stability, aging infrastructure, room for growth, and interoperability or integration, of applications developed under the previous centrally focused and siloed model.

Communication and Training

Robust communication and training programs will be critical to success as we negotiate the significant changes that will take place over the next two to three years.

We must be diligent about orienting end users of technical services to newly available services and procedures – particularly in understanding their selection, options, and use. The advantages of a standard service menu will be significantly diminished if only a minority percentage of campus units participate. Ongoing success will require

deliberate and well-managed communications with regular updates on progress based on the defined metrics as described in the specific OE Resource Requests.

In addition, we have an obligation to our dedicated, professional IT staff to provide job training and career mobility. One way to meet that obligation is with an integrated and robust training path for IT professionals who want to sharpen and update their skill sets. The current lack of such a program once again speaks to the reactive nature of our IT enterprise, lacking a strategic framework. When training becomes a core value on our campus, we will have increased training dates, robust and adaptive service offerings, and high retention and promotion rates amongst our IT staff.

RECOMMENDATIONS (Extended; summary above.)

- Deliverables
- Rationale
- Costs/Benefits/Risks
- Key assumptions

Please see detailed OE Resource Requests for additional specifics, deliverables, cost information and assumptions for each of the specific projects.

ALTERNATIVES CONSIDERED (including status quo)

- Costs/Benefits/Risks
- Key assumptions

The alternatives for the recommended projects are outlined within each of the specific OE Resource Requests.

IMPLEMENTATION PLAN

- Implementation activities
- Functional ownership
- Timeline

The specific timeline estimates for the recommended projects are outlined in each of the specific OE Resource Requests.