

University of Hawai'i

Strategic Plan for Information Technology 2000

Executive Summary

This Strategic Plan for Information Technology outlines the vision and planning context for moving forward with information technology for the University of Hawai'i system.

All members of the University of Hawai'i community will have access to a first-class information technology infrastructure consisting of the tools, services and support that will enable them to be the most effective they can be.

In order to achieve this vision there are seven strategic objectives to be met. They begin with the key application areas for information technology and continue to the areas of concern in infrastructure, management and funding. In each area specific actions are presented to achieve the objective.

Teaching, Learning and Students: The University will effectively use technology to extend its instructional activities throughout the State and beyond, while applying technology to improve the quality of instruction and services delivered to students both on and off campus.

- 1) Enhance Instructional Technology Support
- 2) Upgrade Classroom Technology
- 3) Assess / Enhance Campus Information Technology Labs
- 4) Connect Student Housing
- 5) Address Student Access Issues
- 6) Expand Technical Infrastructure for Distance Learning
- 7) Develop Policies that Support Teaching with Technology

Research: University researchers will have access to state-of-the-art information technology tools and support.

- 8) Emphasize and Develop High-Speed Internet Access
- 9) Provide Access to High Performance Computing Initiatives

Administrative Services: Modern administrative information systems will provide every member and customer of the University community with integrated access to appropriate administrative information and services in a reduced paper environment.

- 10) Develop Integrated Access to Administrative Services
- 11) Implement Integrated Data Warehouse

Communications and Network Services: The University will provide all members of its community with ubiquitous, standardized, secure, reliable communications services of appropriate capacity to support instruction, research, and administration on a 24-hour-a-day, 7-day-a-week basis.

- 12) Upgrade Campus Networks
- 13) Continuously Enhance Intercampus Network
- 14) Monitor Emerging Networking Technologies
- 15) Facilitate Off-Campus Access
- 16) Leverage Network for Improved Interisland Collaboration
- 17) Develop Network Operations Center
- 18) Implement Universitywide Directory, Filesharing and Calendar Services
- 19) Enhance Information Security Capability

Space and Facilities: All University campuses and facilities will be information technology friendly, with a reliable modern technical infrastructure equipped for services appropriate to their use.

- 20) Develop, Apply and Maintain Construction Standards
- 21) Construct ITS Building at Manoa

Faculty and Staff Support: The University community will be able to use information technologies appropriately and effectively with the assistance of an able and committed information technology support staff.

- 22) Provide Staff with Up-to-Date Networked Computers
- 23) Increase Technical Support Staff
- 24) Increase Professional Development Opportunities
- 25) Improve HR Practices for IT Professionals

Information Technology Management and Funding: The University will effectively manage the converging and rapidly advancing technologies of computing and communications across the University system and at each campus or college by employing sound fiscal practices.

- 26) Reinvigorate IT Advisory Committees and IT Planning
- 27) Budget IT Costs as Ongoing Operational Expenses

The most critical action is the last one, that the University implement funding mechanisms to treat all aspects of information technology as recurring costs that include stable budgets for computers, software, maintenance, training and replacement of obsolete technology on a regularly scheduled basis.

As a whole, these actions are neither speculative nor aggressive. Rather, this is a set of fairly conservative actions that will establish and continue to provide a reliable, up-to-date and well-managed technology infrastructure to enable contemporary teaching, learning, research and administrative planning and

operations to flourish. Information technology itself cannot guarantee that any of these desired outcomes will occur. But the failure of the University of Hawai'i to provide an adequate information technology infrastructure and support will almost certainly guarantee that teaching, learning, research and administration will not develop in a manner commensurate with current and necessary practices in higher education today.

Once this plan is adopted, the next step will be the development of more detailed costs for each action and the assignment of budget responsibility at each level of the institution. Details can only be developed through decentralized planning processes that are driven by the unique needs and cultures of each unit and program, as no systemwide document can capture the full complexity of what must take place in each classroom and lab on every campus. Finally, this plan must be monitored and updated on a regular basis. The Systemwide Information Technology Advisory Committee should take primary responsibility for this activity.

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Information Technology Planning Context

The University of Hawai'i's mission is to

“...Provide an environment in which faculty and students can discover, examine critically, preserve and transmit the knowledge, wisdom and values that will ensure the survival of the present and future generations with improvement in the quality of life” [University of Hawai'i Mission, 1996].

In the year 2000 there is little need to describe in detail the impact of information technologies on every aspect of the mission and operations of the University. Suffice it to say that information technology presents exciting and significant new opportunities in teaching, learning, research, service and administration. A first-class information technology environment enables the University to enhance its overall quality, extend access to its programs and services, and improve its efficiency and effectiveness. While technology alone cannot turn a weak institution into a strong one, inadequate information technology facilities, services or support will limit the ability of a knowledge-based institution like a university to flourish in the 21st century.

The University of Hawai'i's vision for information technology is straightforward.

All members of the University of Hawai'i community will have access to a first-class information technology infrastructure consisting of the tools, services and support that will enable them to be the most effective they can be.

Achieving this vision requires concerted action across a number of dimensions and in each of these dimensions the challenges to success are formidable. Access for every member of the University community requires compliance with federal, state and University mandates for equal access, particularly for persons with disabilities. Expectations of what constitutes “first-class” in information technology change on a constant basis as the technologies become more powerful, complex and, unfortunately, more difficult to adequately sustain and support. Unlike in other areas where five or even ten-year action plans are feasible, the pace of change in information technology means that only strategies and general directions can be usefully prescribed for the long term. And the dynamism and creativity of the University community in finding, devising and implementing powerful applications of new information technologies means that new tools and support services are continually in demand, even as customers of older services expect continuing if not improving support.

Although recent years of shrinking financial resources have resulted in neglect of support services in general, the University of Hawai'i has made tremendous strides in some areas of information technology. For example, when the Progress & Freedom Foundation studied each state's use of digital technologies across a number of application areas, Hawai'i was ranked #2 in the higher education category. However, not surprisingly, the University has failed to keep up in a number of important areas. These include, among others, support for instructional uses of information technologies, general support for faculty and staff use of information technology, physical infrastructure (buildings and networks), administrative information systems, and financing. A more thorough assessment in key areas is provided in the next section, followed by specific actions to address shortcomings.

This plan is designed to build on the University's successes and remedy its deficiencies within the new institutional environment that has emerged over the past several years of financial constraint. The most fundamental changes at the University are the result of the new financial relationship between the University and the State as the University now retains its tuition and struggles with the complex issues of implementing greater autonomy. Individual units must incorporate this revenue stream into their financial planning and, as a result, entrepreneurship is more critically required and highly valued. Students are increasingly viewed as important customers in the University's new economy. The University is no longer subject to the State Procurement Code for purchasing and has been given greater flexibility across most administrative areas. The University System is seeking a new set of equilibria that balance the unique missions and characteristics of each campus with the need for systemwide collaboration to provide improved service to a statewide student population in a cost-effective manner.

Strategic Objectives and Specific Actions

The basis of the strategic objectives and specific actions is a frank assessment of progress in specific aspects of technology infrastructure, management, support and use. Meeting the objectives through these actions will enable the University to achieve its vision for information technology. For each of the seven strategic objectives the plan identifies specific actions required to achieve objective followed by a discussion of the University's successes and most significant current concerns that provide the context and justification for that action. In some cases the actions are systemwide in nature, and in others, responsibility is assigned to units to address in a manner consistent with their mission and culture. In all cases the responsibility for action is clearly assigned. And although not necessarily restated in each area, equal access and legal compliance must be addressed as each action proceeds.

These actions are neither speculative nor aggressive. Rather, they are a set of fairly conservative actions that will establish and continue to provide a reliable, up-to-date and well-managed technology infrastructure that can enable contemporary teaching, learning, research and administrative planning and operations to flourish. The plan addresses those issues identified as being of greatest concern in the nationwide 1999 Campus Computing Survey – integrating information technology into instruction, providing adequate user support, and financing the replacement of aging information technology resources.

Of course, a superb information technology infrastructure and excellent support cannot guarantee excellence. But the failure of the University of Hawai'i to provide an adequate information technology infrastructure and support will almost certainly guarantee that teaching, learning, research and administration can not develop in a manner commensurate with current practices in higher education today.

Finally, in spite of their importance to the University and State of Hawai'i, this plan does not address the many issues the University faces in the areas of formal information technology education or students' information technology competency. These matters are left to the institution's academic and curricular planning processes rather than included in this strategic plan for information technology.

Teaching, Learning and Students

Objective: The University will effectively use technology to extend its instructional activities throughout the State and beyond, while applying technology to improve the quality of instruction and services delivered to students both on and off campus.

Action 1) Enhance Instructional Technology Support

The University must identify and expend additional resources at both the systemwide and campus levels to enhance support for the use of information technologies in instruction for both distant and campus-based students. Expanded activities must include additional opportunities for faculty development and assistance with creation of accessible instructional content.

Responsibility: ITS, Campuses

The University has enjoyed considerable success with its distance learning programs over the past decade. Thousands of neighbor island students have

been provided with access to higher education through the use of information technologies, primarily video-based to date, and hundreds have obtained degrees or credentials previously unavailable to them. The University has made extensive use of its access to cable television channels on each island to provide formal and informal learning opportunities for its students and the public-at-large.

Initial distance learning activities based on interactive and instructional television technologies are now being actively supplemented by more widespread adoption of Internet technologies. For years the University has offered full courses over the Internet and the next step to delivery of full programs online is now underway. The Telecommunications and Information Resource Management (TIRM) graduate certificate program has completed its first full cycle of online delivery. Several full credential programs in computer science are being developed on a systemwide basis for online delivery through the Sloan Foundation grant to the UH-Manoa Outreach College. And the Community Colleges have cooperatively developed integrated online course offerings as part of the Distance Delivered Associate of Arts degree program that has used cable television and interactive video technologies for years. While full Internet delivery of courses via the Internet attracts the most notice, Internet-based instructional technologies are currently more commonly applied by University faculty to improve the quality of their on-campus instruction and to enhance courses delivered to distant learners via other technologies. Unlike at other institutions, where instructional use of the Internet has been driven by campus executives, University of Hawai'i units and faculty have aggressively adopted Internet technologies to meet their programmatic and individual teaching goals.

The most significant barrier to even greater success has been the lack of adequate support to assist faculty in applying technologies to improve and extend access to instruction. The selection by systemwide faculty of a specific web-based course management package, WebCT, has optimized the effectiveness of scarce technical support staff and encouraged mutual faculty assistance of one another. The University's TALENT (Teaching And Learning with Electronic Networking Technologies) faculty development program, developed by ITS with initial support from the National Science Foundation, has been quite successful. Each year more faculty than can be accommodated apply to attend the intensive TALENT summer institute. With limited resources the focus to date has been on the few programs identified by the distance learning master scheduling group as being of highest priority to the University system.

The adoption of the Internet for teaching and learning explicitly blurs the lines between distance learning and instructional technology. The same strategies and technologies that are used to enhance campus-based instruction can be employed with students who matriculate at a distance. There are a number of very important differences in student support and policy when entire courses and

programs are delivered on-line. However, many of the faculty development initiatives, tools and support requirements are identical for faculty whether teaching distant students or using the same technologies on campus. This is a positive development in both directions since it will lead to increased faculty readiness to teach at a distance, as well as significant enhancement of campus-based teaching by faculty who are experienced with distance delivery.

To nurture the successes the University has enjoyed will require improving support for faculty engaged in teaching with technology. Faculty members need opportunities to learn about how information technologies can be utilized with attention to the quality of instruction, which must remain paramount. This requires attention to both pedagogical issues as well as specific technologies. Then faculty members who engage in teaching with technology must be provided with assistance in developing instructional content. In addition to issues of instructional design and technology, the Americans with Disability Act (ADA) mandates that instructional content delivered via technology be accessible to students with disabilities. So even faculty members who have expertise with instructional technology materials development may need assistance to ensure that the content they create is accessible. And ongoing support is required for both faculty and students to address the technical problems or questions that inevitably arise during technology-assisted classes.

Action 2) Upgrade Classroom Technology

The University must develop technical models for acceptable levels of classroom technology. Campuses should develop financial plans to bring all classrooms up to these levels on a systematic and ongoing basis over time. This is a continuous process rather than a one-time requirement, since technology requirements will continue to change over time. Colleges or departments should enhance any minimum standards with additional discipline-specific or technology-intensive requirements where appropriate.

Responsibility: Campuses, ITS

Information technologies can be used in on-campus classrooms in a variety of ways to improve the quality of instruction. A networked computer with a projector can not only simplify the presentation of up-to-the-minute information and lecture notes, but can facilitate much more powerful instructional experiences. Current and dynamic data can be projected from the Internet. Simulations and models can be run in real time based on student questions or class discussions. Faculty can model real-life research strategies in response to classroom inquiries. Additionally, guest lecturers or experts can be included in classroom discussions and presentations by “chat” or videoconferencing.

However, a significant barrier to these activities is the condition and support of classrooms and their capability to support technology. Faculty members who wish to make intensive use of technology in the classroom are often faced with obstacles that may include a lack of adequate computers (or any computer) in the classroom. On most campuses a limited number of classrooms have fixed projection equipment. Many classrooms lack a network connection. As the use of information technology in the classroom continues to increase, the institution must provide the required support for every faculty member to be able to use advanced information technologies. This support should make information technology as easy to use as the blackboard that is in almost every classroom. Teachers should be able to walk into their classrooms and begin teaching without having to haul equipment, spend 10 minutes on setup, and then have to break it down after class while their students are trying to ask them questions and the next class is filing in. As more and more students bring their own computers to campus, additional provision will need to be made for network connectivity (wired and/or wireless) in the classroom for students, as well consideration of electrical power requirements.

Action 3) Assess / Enhance Campus Information Technology Labs

Each campus must assess whether its dedicated information technology lab and classroom facilities are adequate for its instructional programs and accessible in accordance with ADA requirements. Each campus must develop plans for the space needed and budget processes must recognize the support, maintenance and regular equipment replacement for these labs as an ongoing operating cost.

Responsibility: Campuses

While many students already own their own computers or have access at home, there continues to be a need for campus-based computer lab facilities. Some students with low-speed modem access at home will require convenient high-speed network access for their studies. Computer labs may be the only affordable means of providing students with access to specialized information technology hardware, software and facilities such as the advanced resources used in video and media production. Labs and networked classrooms can be used to support the hands-on components of classroom teaching and learning opportunities. For example, faculty may have instructional strategies that require synchronous on-line collaboration, group writing activities, or hands-on training in specialized tools or activities. When not in use for entire classes to work together during scheduled periods, computer lab facilities can be used on a walk-in basis by students.

Over time, more public spaces may be equipped with laptop “docking” stations for high-speed network access or power recharging. As campuses take

advantage of advances in wireless networking technology electrical power may become even more important than wired network access for mobile students who are working around campus all day.

Departmental labs with specialized capabilities are needed in some units, but these are not a substitute for larger, more accessible campus-based facilities that are widely available to entire campus constituencies. ADA requirements for the accessibility of both hardware and software for people with disabilities must be considered in the design of all labs.

In the past, many campuses were able to provide new computer labs for students as a part of construction projects. But equipment has often not been adequately maintained or upgraded as needed. As in other areas, it is critical that the financing of labs be treated as an operational expense with equipment scheduled for regular replacement based on its useful lifetime.

Action 4) Connect Student Housing

Each campus with student housing must develop a plan and identify financing to provide network connectivity in all student residences.

Responsibility: Campuses

The availability of network connections in student residence facilities is not only an educational requirement but also a competitive necessity. While student housing at the University of Hawai'i is self-financing through its revenue streams, student expectations dictate that every dorm room must have network connectivity. In order to accommodate financial realities, this may need to be accomplished through multi-year plans that involve the provision of computer clusters in residence halls while still working toward connectivity in every individual dorm room. Experience at other institutions indicates that by providing a gathering place for students to learn and work together, such shared public clusters can be a valuable aspect of the student residence experience. New public/private partnerships may offer attractive opportunities for financing this action.

Action 5) Address Student Access Issues

Campuses should engage in dialogs that consider appropriate means of addressing student access to information technology. This should include the viability of student computer ownership requirements, the possible use of student information technology fees to enhance campus-based resources, and the readiness of the campus faculty and

administration to fully embrace the use of technology when student access is universal.

Responsibility: Campuses, ITS

An increasing national focus on “The Digital Divide” has created a realization that there are really many different types of barriers to access to information technology. As the sole public institution of higher education in Hawai‘i, the University must consider how to ensure that students have adequate access to computers and networked information resources. Prior actions will address the issue for the campus environment, but student learning takes place at home and other locations as well. An increasing number of University students have access to a computer at home upon enrollment, including many with laptops. Many U.S. universities now require computer ownership of all incoming students, and some provide each student with a standard laptop upon enrollment by using tuition or special fee revenue. There are a number of closely inter-related issues and opportunities associated with ensuring that students have appropriate access to technology. These issues are even more complex for an institution such as the University of Hawai‘i that prides itself on its low financial barriers to matriculation.

Discussion of student computer ownership requirements must be balanced with the discussions regarding potential student technology fees, both of which would impact students’ cost of education. It should also be noted that to the extent some of these costs are implicit, making them explicit might actually benefit students. For example, the cost of a computer ownership requirement or mandatory technology fee might be included in financial aid packages, while the informal expectation that each student have access to a computer at home is not. Such questions and tradeoffs may be more appropriately considered at the unit level rather than with a single systemwide decision since students at different campuses and in different academic programs have differing needs. In considering student ownership requirements or fees, campuses and programs should be aware that students would have a greater expectation that faculty and administrators will embrace the use of technology in teaching, learning and support activities commensurate with any such requirement. Finally, before any student information technology fee could be adopted, an enabling systemwide BOR policy is needed to establish the framework under which campuses could develop and consider such proposals.

Action 6) Expand Technical Infrastructure for Distance Learning

With the statewide network upgrade underway in 2000, the University must plan for and fund the technical infrastructure to permit an increased level of network-supported learning opportunities around the state and beyond.

Responsibility: ITS, Campuses

The University of Hawai'i enjoys a robust and highly successful capability for distance learning via interactive video. Due to current network limitations, each year the University is unable to meet prime time demand for interactive video time within the State. With the digitization of the HITS and Skybridge networks underway to create a seamless statewide Internet-based interactive video environment, there will be additional capacity to support more interactive video learning opportunities as well as other Internet-based teaching methodologies. For some campuses and programs, interactive video provides an advantageous means of increasing access to higher education through a mode of instruction that is relatively familiar to many faculty and students. Additional interactive television classrooms using new video technologies may be appropriate for some campuses and education centers to help meet this need.

As noted previously, the University is also enjoying substantial growth in the use of Internet-based technologies for distance learning and the enhancement of campus-based instruction. These technologies offer the promise of shattering not just the barriers of place by offering instruction anywhere a networked computer is available. But these technologies can also provide asynchronous learning opportunities in which students can actively engage in learning at times that fit their own schedule and constraints. These asynchronous Internet technologies also require a technical infrastructure -- an infrastructure that includes items such as servers for course management, discussions and testing; digital media development capability; and on-demand media servers.

Action 7) Develop Policies that Support Teaching with Technology

The University shall adopt a set of policies and practices that support and encourage faculty involvement in distance learning and the use of information technologies to qualitatively enhance university instruction.

Responsibility: SAAC, Faculty Leadership, General Counsel

The University's systemwide coordination of distance learning activities has proven quite effective and is guided by a sophisticated and mature policy base. In particular, the suite of policies in the area of distance learning (BORP 5.2(d), BORP 5.2(g), E5.204) provides a clear statement of the institution's commitment to instructional quality, its basis for prioritizing programs for access to shared systemwide resources, and for understanding how the University works together as a system to increase access to higher education within the State of Hawai'i.

However, one important area where the adoption of applicable policy and procedure has seriously lagged is in faculty-related issues. This lack of detailed policy has not yet been a major operational obstacle to progress, but it may

become more significant over time. The University has yet to develop reward structures or specifically recognize faculty members' work with instructional technologies in the tenure and promotion process. Absent support and recognition, such work can actually have negative impacts on teaching and time for research. Addressing the thorny issues associated with developing content will require a sensitive review of workload practices, intellectual property ownership policies and potential revenue sharing that fairly addresses the knowledge and experience of our faculty, the creativity of our support staff and the contributions of the institution.

Finally, no unique action is included in this section to improve the quality and accessibility of student services through the use of information technologies. This is not due to any lack of concern about this area. The University must move forward to provide students with fast, integrated self-service access to the institution and its services in a manner commensurate with best practices elsewhere in higher education and in the technology-intensive world in which 21st century students have grown up. However, since this requirement cuts across all members of the University community and is closely interrelated to other institutional information systems student services are addressed as a critical component of the integrated information system discussion and action in the section on "Administration".

Research

Objective: University researchers will have access to state-of-the-art information technology tools and support.

Action 8) Emphasize and Develop High-Speed Internet Access

The University's commitment to excellent Internet connectivity must continue to be among the highest priorities of centralized support for research. The University should continue to enhance this connectivity domestically and internationally wherever possible and position itself as a Pacific Rim leader and hub of advanced next-generation networking.

Responsibility: ITS

The most important information technology resource that supports across-the-board research is high-speed Internet access and connection to the national and international research network fabric. The University has made great strides in this area over the past three years. The procurement of a high-speed Internet connection at favorable prices and the connection to Internet2 with the support of NSF and a cooperative arrangement with the Department of Defense have provided Hawai'i with connectivity exceeded only by the foremost of mainland

research universities. The purchase of capacity on the next trans-Pacific fiber optic system should help the University maintain this position over the next years of anticipated growth in demand. It may also permit Hawai'i to play a more active role in international next-generation Internet activities.

Action 9) Provide Access to High Performance Computing Initiatives

The University should continue to stay abreast of advances and events in high performance computing and maximize the access of University researchers to national and international computational resources such as the emerging grid.

Responsibility: ITS and SVPR/DGE

External Internet connectivity must be accompanied by continuing investment in advanced campus networks that deliver internal University connectivity and Internet capacity to the desktops of researchers (and others) who require such capabilities in the course of their work. This matter is addressed in a later section on communications and network services.

While investment in network infrastructure to support research is obviously a matter of systemwide and campus responsibility, over the past 10 years the need for centralized computational support for research has become much less clear. Relatively affordable workstations can handle the computational needs of most researchers, modest sized servers can accommodate many research groups, and national or international high performance computing facilities, such as on Maui, are available to University researchers via the Internet. Furthermore, the computational requirements of applications in different disciplines are so diverse that the economies of scale weigh heavily in favor of large national and international facilities with specialized disciplinary support teams. Earlier thinking that every University should have its own supercomputer has been replaced by the belief that every researcher who has an intense computational requirement should have access to a high performance computing facility. National and international initiatives have emerged that are attempting to construct a computational "grid" that interconnects high performance computing and related resources to provide researchers with seamless access to the information technologies they require regardless of location.

Administrative Services

Objective: Modern administrative information systems will provide every member and customer of the University community with integrated access

to appropriate administrative information and services in a reduced paper environment.

Action 10) Implement Modern Integrated Administrative Information Systems

The University shall implement advanced administrative application services in the student, finance and human resource areas using modern information technologies that provide members and customers of the institution with convenient access to the information and services for which they are authorized. This must include significant process reengineering that incorporates state-of-the-art business practices to streamline procedures, integrate across functional areas, introduce a greater focus on the end-user and increase self-service processing.

Responsibility: OSVPA, ITS, OVPSA, OHR, Financial Mgmt Office

The University successfully weathered Y2K with no interruption in services. Unfortunately, the necessary updates, remediation and testing were a major focus of administrative information support staff over the past several years. Without supplemental resources to handle Y2K, progress on improving on-line information services to the University has been slower than would otherwise be expected.

The current terminal-based library management system no longer meets the needs of the University community. With strong support from the University administration, an RFP was issued and a new integrated web-based system selected. Project implementation is now underway, and promises to provide improved support for both instruction and research.

Over the past 10 years a new systemwide Financial Management Information System and two new systemwide Human Resource information systems have been implemented. The University's commitment of resources to these projects has been both parsimonious and piecemeal. Projects have generally been implemented on time and within budget, unlike the spectacular high-cost problems and failures now being reported at major universities around the country. Unfortunately however, the institutional commitment to these projects was less than ambitious vis-à-vis the scope required to realize information technology's potential to transform the way a University does business today. This has been due to both a lack of resources and University organizational structures in which administrative computing was viewed through functional "stovepipes" in each area.

Unlike Finance and HR systems, which are operated systemwide, student information systems have been managed independently for Manoa, the Community Colleges, UH-Hilo and UH-West Oahu. There are currently four different software systems in use, none of which talk to each other for integrating

service to students who attend multiple campuses, and only one of which, UH-Hilo's, is perceived to be meeting the needs of its users. With higher levels of cross-registration by students, the lack of integration across the UH system is increasingly problematic for students, especially those involved in distance learning. And there has been inadequate progress toward the kind of electronic "one-stop shop" World Wide Web portal for student services that is emerging as a competitive advantage in leading institutions of higher education. Such developments not only improve service to students, but they also increase the cost-effectiveness of student services by providing unmediated access to information and services electronically.

The University contracted in 1997 with a new software startup, Buzzeo, for an open, web-based systemwide student information system written completely in Java. A major objective of this project is to provide improved integrated services to students across the many functional areas with which they interact including admissions, registration, records, financial aid, cashiering and academic advisement and for all campuses of the University system. It is also intended to provide improved student information services at all levels of the institution, from individual faculty to systemwide. Buzzeo encountered severe financial difficulties during 1998 and 1999 that resulted in massive layoffs and almost no meaningful progress. While the University has endured painful delays during this period, it should be noted that large institutions that adopted what appeared to be a less risky strategy by purchasing software from the market leader have endured even more expensive implementation problems and are no farther along than UH. It now appears that Buzzeo has achieved financial stability, rebuilt their technical staff, and will be issuing their first releases of application software modules in late 2000 at which point the project can re-engage.

Generally speaking, the University's current information systems suffer from two major problems. First, they have been developed and implemented with a primary focus on "doing the business" of the institution rather than on providing excellent service to all end users. The work of the UH-Manoa Outreach College on Pa'e demonstrates the feasibility of creating friendly front-ends to legacy systems, but much more would need to be done to address the needs of all customers of all functional areas at all campuses. And this would not address the second major problem: the lack of integration among the major information systems (Finance, Student and Human Resources). In almost every area the business of the University and its customers relies on multiple sources of information. For example, fully informed decisions about adding course sections to meet student expectations during enrollment periods should be based on accurate information about up-to-the-minute student enrollments from the Student system coupled with faculty workload and salary information from the Human Resources system and budgetary information from the Financial system. Right now this would involve manual retrieval from each different system. Each of

the University's current applications are based on a completely different software technology, most of which are proprietary or obsolete. This inhibits cost-effective opportunities for significant enhancement or integration. The University, like its peers in the public sector, has been much slower to adopt E-Commerce techniques than other types of enterprises. The end result of these deficiencies is that, across the full range of functions and users, customers are not receiving the quality of services now possible with modern technology.

It is clear that the University needs a new generation of administrative services that provide every customer of the institution with the access to the information business transactions for which they are authorized. Access should be provided through web-based online systems as well as through streamlined interfaces (touchtone telephone, kiosks, etc.) for those who do not use desktop computers or have other access considerations. Part of this process must be a comprehensive review and revision of business processes rather than automation of what is done today ("paving of the cowpaths"). The new automated processes must include a workflow component that reduces duplicative layers of review and approval in order to extend to the unit level the flexibility – as well as the accountability – that have been granted to the University as a whole. The University needs to employ e-commerce practices – both Business-to-Business (B2B) and business-to-consumer (B2C) – to provide one-stop self-service for end-users and "paperless office" techniques to improve customer service and improve the efficiency of the University's internal and external processing activities. Whether through a fully integrated suite of applications or sophisticated software interfaces that link applications and databases, university information systems must be fully integrated across all functional areas to provide seamless services and information to customers at all levels.

Action 11) Implement Integrated Data Warehouse

The University shall implement a data warehousing application that provides managers and executives with web-based access to integrated information in a manner that encourages decentralized analysis and facilities monitoring, planning, assessment and informed decision-making throughout the institution.

Responsibility: ITS, IRO, Support Offices

In addition to modern and flexible operational systems, institutional decision-makers at every level need better access to information about activities and finance within their areas of purview. For example, the University does not currently have available in one place consolidated information about a department such as: the courses offered, the number of majors, student semester hours taught, faculty positions, support staff, square feet of space used, total salary outlay, other expenditures and revenue generated. This type of

information needs to be readily available in standard reports and for ad-hoc queries and “what-if” scenario analysis using readily available desktop tools for information management, e.g., spreadsheets and graphing programs.

The University has taken a major step forward with the planning, design and partial implementation of its Student Information Management System (SIMS) which will be the definitive systemwide repository of student information for analytical purposes. However, completion of SIMS was delayed by Y2K compliance activities. SIMS needs to be completed and similar work is needed in the other functional areas and on integration across all information sources.

Communications and Network Services

Objective: The University will provide all members of its community with ubiquitous, standardized, secure, reliable communications services of appropriate capacity to support instruction, research, and administration on a 24-hour-a-day, 7-day-a-week basis.

Action 12) Upgrade Campus Networks

Each campus shall develop a plan to implement a modern telecommunications infrastructure that permits the provision of high-speed networking services to all locations, whether by fixed and/or wireless technologies. Funding for network operations must be provided on an ongoing basis to ensure a constant program of maintenance and renewal of networks.

Responsibility: Campuses, with assistance from ITS

In the mid-1990s the University began to standardize data networking on the TCP/IP protocol suite, the technology that underlies the Internet. Consolidation on this single protocol has permitted access to both academic and administrative information and services through a single network connection at any location on any campus, or in fact, anywhere on the Internet. Network implementation and management has been simplified, and the rapid advance of Internet technologies has reduced costs for increasing capabilities. Asynchronous terminal connections have been replaced in nearly all offices with standard ethernet connections providing access to the Internet and TCP/IP services.

This successful initial deployment was financed with a variety of one-time funding schemes. As higher capacity links begin to be required in locations that are making extensive use of multimedia, large data archives or other advanced services, the University is having more difficulty funding campus network upgrades that can provide these services to every office, classroom, laboratory

and library. This need for higher speed connections in a few locations is a harbinger of what will soon be required in every office and classroom – secure, reliable, broadband access at speeds appropriate for even the most demanding network tasks.

Action 13) Continuously Enhance Intercampus Network

The University will actively monitor opportunities to obtain higher capacity interisland telecommunications services to connect its campuses and education centers in a manner that will permit flexible and cost-effective expansion of capabilities and services to meet projected growth in demand throughout the State.

Responsibility: ITS

As noted in the Research section above, the University has been quite successful in maintaining an acceptable level of external Internet connectivity through a variety of financial initiatives and business relationships. Between the external connections that extend beyond Hawai'i and the campus networks needed to deliver services between buildings and rooms, the University of Hawai'i requires an advanced intercampus network that permits all its students, faculty and staff to collaborate and access resources anywhere in the state. The transfer of the HITS network from the Hawai'i Public Broadcasting Authority to UH in 1996 was a major step forward. With funds appropriated by the legislature and with additional funding from an FCC-mandated spectrum relocation, a complete upgrade of HITS and Skybridge is now underway. Combined with high-speed fiber links made available through the State's cable television franchise agreements, by 2001 the University should have an integrated TCP/IP network that can support its data requirements as well as high-quality interactive video services for distance learning. However, with projected rates of growth in network demand – increases of 100% per year are typical – the University needs to be vigilant for any opportunities for interisland fiber optic capacity that may support its next generation intercampus network.

Action 14) Monitor Emerging Networking Technologies

The University will actively monitor emerging technologies, such as wireless networking, voice-over-IP and smart cards, through a process of pilot-tests and evaluation with interested units. The objective of this effort will be to maintain an understanding of leading edge technologies as well as current best practices that can be applied to short-term and long-term project planning where appropriate.

Responsibility: ITS

The early adoption of TCP/IP as the University's networking protocol has been a major reason for the extensive penetration of network services on all campuses. As the next-generation TCP/IP networking technologies mature, this will also permit the University to benefit from Internet quality-of-service and multicast capabilities to support advanced network applications including distance learning, videoconferencing, and streaming media. While in many cases the University's basic network infrastructure is still catching up to current requirements, planning must always have an eye to the future since networking technology is the most rapidly changing aspect of information technology. While overly aggressive plans face the danger of betting on the "wrong" technology, conservative plans may be rendered obsolete even before project completion. The only solution is to aggressively monitor changing technologies to ensure that technical plans contain an appropriate balance of prudence and prescience. To some extent this can be achieved by learning from others. But the University should also maintain its technology edge through a modest program of active experimentation in at least some areas. Expansive visions such as the creation of universitywide learning environments with students working electronically in teams in campus libraries and malls throughout the State can drive the implementation of key underlying technologies such as wireless networking, dynamic access to networks and advanced network security.

Action 15) Facilitate Off-Campus Access

The University should ensure that excellent network connection options are available to students, faculty and staff off-campus through both dialup and broadband services. Partnerships with traditional Internet Service Providers, cable modem service providers, DSL providers and the emerging generation of broadband wireless providers should be developed to increase options and decrease costs for all members of the University of Hawai'i wherever they may be.

Responsibility: ITS

Students, faculty and staff increasingly work at learning, teaching and research from off-campus locations such as home, the workplace, and while travelling. While funding has not been available to upgrade the free dialup modem service commensurate with essentially unlimited demand, the current educational dialup arrangement negotiated by the Hawai'i Educational Networking Consortium (HENC) provides discounted dialup access on every island as well as a roaming "800" number service. The Hawai'i Internet Exchange provides good connectivity between University resources and all the major local Internet Service Providers, including the cable modem provider. The University may continue to maintain limited free dialup services as a last resort "lifeline" service, but the primary efforts to support excellent connectivity from off-campus for the entire University community should be developed through private sector partnerships that include

a range of options and services. In particular, the University needs strategies for making broadband access affordable from the homes of its students, faculty and staff.

Action 16) Leverage Network for Improved Interisland Collaboration

The University shall plan and implement a cost-effective suite of tools for interisland collaboration including computer conferencing, long-distance phone and fax, and videoconferencing to support ad-hoc and informal collaboration among faculty, staff and students without impacting scheduled distance learning activities. This work should be done in a manner that extends seamlessly outside Hawai'i by leveraging the advanced Internet development work being done by the Internet2 group, among others, so that all members of the university community can collaborate around the state, nationally and internationally.

Responsibility: ITS

While the primary applications of wide area networks at the University have been distance learning and academic access to data networks and information services, other application areas that could provide cost-savings should not be neglected. For example, the University continues to rely on the public switched telephone network for intercampus telephony and pays per-minute charges when members of the University community talk with one another by telephone or send faxes between islands. There is limited use of established computer conferencing techniques to support administrative collaboration or decision-making. And the extensive use of interactive television facilities for their highest priority use – distance learning – has meant that these facilities have been largely unavailable to support videoconferencing for meetings between campuses. As a result, the University community continues to expend too much time and money on inter-island travel for meetings and discussions that could be conducted electronically. Major interisland network upgrades will provide enabling capacity for synchronous applications, but additional networking engineering, campus network upgrades, equipment, software and support are required to make these time- and money-saving applications a reality.

Action 17) Develop Network Operations Center

The University must develop a Network Operations Center capability that monitors critical networks, systems and services, detects problems, initiates resolution, and provides status updates and incident data management for both operational requirements and overall management and decision-making.

Responsibility: ITS

Students today expect to be able to engage in learning activities any time of the day or night through electronic means. An increasing number of scientific experiments generate or access data on a continuous basis. And the institution's knowledge workers – both faculty and staff – now expect the networked systems to be up and running any time they want to work on campus, from home, or during their travels. The entire university community has come to rely on the availability of communications and network services 24-hours-a-day 7-days-a-week (24x7), and many faculty and staff now consider the network to be more vital to their work over the course of the day than the telephone.

Unfortunately, the University has never invested in the kind of Network Operations Center that characterizes other information-intensive enterprises of our complexity. Recent work within ITS has provided monitoring systems that permit Computer Operators to detect common system and network outages and initiate problem resolution. However, much more needs to be done, including extending monitoring capability out to critical resources (e.g., servers and routers) on all campuses.

Action 18) Implement Universitywide Directory, Filesharing and Calendar Services

The University must implement a more robust electronic directory service that includes capability to support uniform personal authentication for information and services deployed at the system, unit, college or department level. The directory service should also integrate with name-based email addressing, an institution-wide file sharing capability and an enterprise calendar service.

Responsibility: ITS

The University was early to adopt an “access for all” strategy to provide every faculty member, staff member and student enrolled in credit courses with an Internet. This provides access to friendly and robust email service that is available to the entire University community on a 7x24 basis including through a web-based interface. And in addition to browsing the World Wide Web, every member of the University community with a UH Internet ID can create their own personal home page. While some campuses choose to provide their students with a campus-based ID, most UH students now have “uhunix” IDs that provide these services and are increasingly the basis for access control to other services such as online registration and site-licensed software distribution.

But there is much more to be done to deploy enterprise network services to the entire University community. The software technologies currently used to store names and passwords and provide “phone book” services are unwieldy for

widespread use and not compatible with emerging industry and academic standards. Modern network directory software can provide a wealth of useful capabilities if implemented and managed appropriately such as the use of first name and last name as email addresses and consolidation to a single ID and password for access to all systems and services. Electronic mailing lists could easily be generated for students in a particular class, faculty in a particular college, all faculty and staff at a particular campus, all fiscal officers across the university system, or any other clearly articulated criteria for which data is available. This could also permit termination of access when an employee leaves the University or “rollover” to an alumnus ID when a student graduates. In addition, there is no institution-wide mechanism for convenient sharing of files on a workgroup or project basis. Still another important emerging enterprise network application is calendar services to schedule meetings and events that involve people and other resources (e.g., rooms or equipment).

Some departmental servers support unique department applications that are best served at the departmental level and are maintained regularly and well by professional staff. But many departments struggle mightily with out-of-date and poorly supported servers that have inadequate security and no backup simply to support basic applications like email, file-sharing and calendar management that can be provided more cost-effectively and with greater benefits at the University level.

Action 19) Enhance Information Security Capability

The University must establish an information security capability that monitors and manages security of institutional systems while also providing information and secondary support to system and network managers throughout the University system who are accountable for the resources they manage.

Responsibility: ITS

Explosive growth in the use of information technologies as the basis for institutional communications, information processing and data exchange comes at a time when there are an increasing number of security vulnerabilities in a variety of computer and network technologies. Vulnerabilities include increasingly destructive viruses and worms that have been designed to propagate aggressively. Well-informed hackers are able to break in to servers and other systems that are not aggressively maintained with the latest updates and security patches. Additionally, compromised systems can be used to launch a variety of attacks that threaten the integrity and usability of the Internet.

The University's policy on use and management of information technologies places clear responsibility for proper management of systems and networks with

the administrator of each unit. The University cannot permit poorly managed resources to maintain institutional connections where they can compromise the University. However the pace of discovery and change in this area requires that the entire University community be well-supported with current, accurate and user-friendly information to permit system managers to apply appropriate security measures in a timely manner. Intrusion detection must be taken seriously, security tools must be updated on a regular basis and logs and reports must be monitored and acted upon.

Space and Facilities

Objective: All University campuses and facilities will be information technology friendly, with a modern and reliable technical infrastructure that is adequate for current and planned uses.

Action 20) Develop, Apply and Maintain Construction Standards

Construction standards must be developed to ensure that all new construction projects result in buildings and spaces that can support the intensive use of information technologies in an ADA-compliant manner. These standards must be monitored and reviewed on a regular basis as technology advances

Responsibility: Facilities Planners with support from ITS

New construction on some University campuses has produced a number of modern buildings that are well equipped to support their users. Unfortunately this is not the case in many older buildings where it is difficult to install telecommunications wiring or where there is inadequate electrical power to support the use of computers by staff and students. The current and future needs of the institution for information technology services require that almost all institutional facilities be capable of supporting the intensive use of technology in an ADA-compliant manner.

The University must aggressively monitor best practices in construction as they relate to infrastructure that supports information technology to ensure that all new building and renovation projects prepare the facilities for current and foreseeable technologies. Standards are needed that address the need for appropriately spaced and equipped telecom rooms, internal and external wiring infrastructure, provisions for electrical power to support intensive use of technology, flexible lighting controls and related matters. When new buildings are constructed or renovations take place, then-current standards should be systematically incorporated in planning and design. As best practices change, so must the University's construction standards.

Action 21) Construct ITS Building at Manoa

Construction of the Information Technology Services building, as included on the Manoa LRDP, must be given a high priority for CIP Budget planning.

Responsibility: Administration and Board of Regents

Campuses that have been recently redeveloped include new information technology centers that support the campuswide use of information technologies. Most of the systemwide information technology resources are housed on the UH-Manoa campus, but there are no facilities appropriate to house this critical infrastructure. The major institutional computers and servers are housed on the first floor of a classroom building in a facility that was renovated for mainframe technology in the early 1970s. The statewide and campus data communication hub is in a converted classroom on the second floor that was renovated as a timesharing machine room in the 1980s. The telephone system, which serves over 9000 phone lines and must handle any intercampus voice plans, is on the 5th floor of the Chemistry Building and is served by just one unreliable passenger elevator. And the campus and systemwide video hubs are split between the top floor of Sinclair Library, the 2nd floor of the English Building and the Public Television building. None of these critical facilities have dual building entrances for telecommunications as would be standard practice today, most have inadequate primary electrical power or air-conditioning and none have backup power or air conditioning capability for the increasingly common utility outages suffered in aging buildings. The lack of appropriate facilities to support a modern information technology infrastructure is directly responsible for inefficiencies in network design and management that increase costs, increase exposure to outages, reduce physical security, and cause a reduced level of service to the entire University system.

Faculty and Staff Support

Objective: The University community will be able to use information technologies appropriately and effectively with the assistance of an able and committed information technology support staff.

Action 22) Provide Staff with Up-to-Date Networked Computers

The University must provide every information worker – faculty, staff, administrators and secretaries -- with an up-to-date networked personal computer (or laptop) equipped with a web browser, email, appropriate

productivity software and anti-virus software. This computer should have access to a printer and provision for regular backups. Funding must be provided through a lifecycle-funding model that accounts for required upgrades, maintenance and replacement on a regular basis.
Responsibility: Campus Administrators

An up-to-date networked personal computer is the primary tool of today's knowledge worker. This applies to the entire faculty and most staff of the University – secretaries, executives, administrators and technical support staff. All of these individuals are information professionals in today's world. While nearly all of the University's information professionals have a networked computer on their desk, many of these computers are inadequately configured for current requirements and have not been upgraded or replaced for years – since equipment replacement funds were curtailed. It makes no sense to employ a talented work force and not provide them with the tools they need to do their jobs effectively.

ITS now issues and regularly updates specifications for both recommended and minimum PC and Macintosh configurations that are capable of supporting current requirements at the University. A variety of systemwide volume discount agreements, site licenses, hardware and maintenance contracts make it easier and less expensive for units to acquire and maintain technology. Additionally, with the new procurement environment, use of these contracts is optional and encouraged through more readily available support (“carrots”) rather than decree (“sticks”). But with the current decentralized funding model that places responsibility for purchasing and maintaining desktop hardware and software primarily at the colleges, the level of information technology available on desktops varies widely across the University.

Action 23) Increase Technical Support Staff

University administrators must give priority to funding a level of support staff commensurate with the needs of their units, even when this may result in a reduction of direct services. While the numbers will vary, senior administrators must recognize that, for example, having 50 faculty with no technical support is less effective than 49 faculty with 1 support staff and a maintenance budget. At the same time, creative approaches to the support crisis must be employed including more formal training and greater use of student help.

Responsibility: Campus Administrators, Support Staff

Over the past six years of declining budgets not only has investment in hardware and software technology decreased, but investment in support staff and services has also decreased. While penetration of personal computers has increased from

just 10% or 20% to nearly 100% of the information workers, the number of support staff has been stable at best. The problem is even more severe since the underlying personal computer and networking technologies have grown more complex and they are increasingly relied upon by technically less sophisticated users than when computing was primarily a tool for scientists and researchers. This problem is so prevalent nationally that it has been named the “technology support crisis”.

The University of Hawaii has evolved with the kind of hybrid support staffing model typical of large institutions of higher education. ITS provides centralized support for the University system and Manoa campus. All other campuses, Manoa schools and colleges, and even some departments also have their own information technology support staff. This model permits a certain level of economies of scale through the availability of a larger support organization, but still provides for discipline-specific and readily available localized technical support for individuals. As is commonplace, ITS provides direct support to end-users as well as certain kinds of backup assistance to college and department support staff.

While the model is perfectly reasonable, the provision of excellent service requires having an adequate number of staff. Rigorous nationwide data is unavailable and there is no uniform formula that applies across institutions. However, the comparative data that is available indicates that the University of Hawai'i tends to underfund and understaff centralized technology support relative to its peers. While this must be remedied, the University also needs to track best practices in dealing with the support crisis. Particularly promising are strategies to increase and improve the involvement of students in providing information technology support. This is both cost-effective for the institution and it provides student help with invaluable professional and technical skills and experiences that are needed in the workplace.

Action 24) Increase Professional Development Opportunities

The University must fund ongoing professional development for all workers who use and support information technology. Centralized information about training and professional development opportunities should be maintained and actively promulgated. And more opportunities must be created for information technology professionals throughout the University to work together, learn together and advance their mutual capacity to support the University's faculty, staff and students.

Responsibility: Campuses, ITS, OHR

It is easy to focus on information technology support staff when thinking about human resource needs in information technology. But creating an environment in which information technology can improve the overall efficiency and effectiveness of the institution requires that all support staff have adequate technology skills to be successful. This includes clerical workers, administrative staff and other support professionals. Professional development for many of their tools (basic computer usage, word processing, spreadsheets) may best be outsourced to professional training institutes such as the continuing education units on University campuses. The use of Computer Based Training (CBT) and other flexible training methodologies should also be advanced. In addition to any generic training, ongoing professional development in applications unique to the University must be provided. Many employers mandate a certain level of required professional development for each employee each year.

Information technology professionals in support areas need to not only keep up with the end-users they support, but with the rapidly changing technologies on which information services are deployed. While training on core technologies such as networking and system administration is offered through standard courses or packaged instructional materials, developmental opportunities regarding the unique challenges of information technology in higher education are less readily available. And UH does not fund any of this professional development adequately to support the professionals who support the institution's use of technology. The new UH Information Technology Coordinators (UHITC) program has made a start at providing a mutual support environment for the institution's decentralized information technology staff. However, this group meets only twice per year and offers no formal education and training. In larger centralized information technology units at other universities there are sometimes whole groups dedicated to helping decentralized support staff. Given the structure of information technology staffing at the University of Hawai'i and the sparseness of support staff, this type of activity is even more important.

Action 25) Improve HR Practices for IT Professionals

The promising reforms under consideration by the Technical Advisory Committee established and led by the Office of Human Resources must be supported through the difficult process of implementation. The success of this program should be monitored and adjustments made as needed to ensure that compensation and HR practices permit the University to recruit and retain the highest levels of competence in information technology.

Responsibility: OHR and Administration

As is the case throughout the country, with the explosion of the information technology economy it has become increasingly difficult for the University to

recruit and retain the highest caliber of information technology staff. Universities do not offer stock options, pay is generally lower than in local industry and much lower than on the mainland. While few highly competent people work in higher education solely for the compensation, current hiring and compensation practices do not reward or encourage the kinds of innovation, creativity and merit-based advancement the University needs in a dynamic area like information technology. The current classification process is cumbersome with outdated and narrow class descriptions, and there is inadequate upward mobility for employees who apply advanced skills to address institutional problems. The declaration of a shortage category for certain classes of information technology workers in 1999 helped, but the shortage stipends were uneven and applied independent of merit.

To be able to benefit from a dynamic high-quality information technology environment, the University needs a dynamic and high-quality professional staff to design, create and maintain that environment. Creation of such an environment is not a one-time task that can be outsourced, but the result of a continuous process that changes with almost daily advances in information technology, shifting institutional needs, and the creativity of the faculty who constantly generate new ideas. The Office of Human Resources has initiated a process for the reform of certain practices associated with classification, assessment and compensation of professional information technology workers. This effort is intended to serve as a model for other professional classes.

Information Technology Management and Funding

Objective: The University will effectively manage the converging and rapidly advancing technologies of computing and communications across the University system and at each campus or college by employing sound fiscal practices.

Action 26) Reinvigorate IT Advisory Committees and IT Planning

Reappoint, recharge and support the activities of a Systemwide Information Technology Advisory Committee. Ensure that unit and/or college IT planning engages campuses in implementation of this strategic plan and other local initiatives and issues.

Responsibility: University Executives and ITS

There have been a number of reorganizations at the system and campus levels that follow national trends toward combining disparate technology support units. The most significant of these was the 1994 creation of Information Technology Services (ITS) at the system level as recommended in the 1992 plan. Many

campuses have also unified management of some or all of their telecommunications, networking, academic computing, media and administrative computing support.

One concern is the inaction of the Information Technology Advisory Committee over the past several years and the lack of systemic IT planning during the last financially difficult years. Reinvigoration of the systemwide advisory committee is required to continue to ensure that systemwide constituencies are engaged in information technology planning and policy issues. A systemwide advisory committee, with representation across campuses, constituencies and perspectives, should provide advice and counsel on an ongoing basis to both information technology service providers and senior executives. It should focus on matters of systemwide concern, identify new systemwide initiatives and assist in resolving issues relating to information technology that cross organizational boundaries. This group should monitor the University's progress in implementing this strategic plan for information technology and recommend updates when required. It must have the ability and credibility to assist the senior management of the University in sustaining and supporting critical actions.

Many colleges have IT committees that advise the Dean or other administrator, and UH-Manoa recently established a new Information Technology Committee to address its campus issues. This systemwide strategic plan for information technology leaves many implementation issues to be resolved at the unit or college level in accord with specific local needs and culture, so advisory committees at these levels may be especially critical in moving forward. Each unit will need to develop and monitor its own action plans that, at a minimum, address areas where systemwide uniformity is not appropriate. Unit-level plans may also be helpful in addressing specific issues that have not been included in this systemwide plan.

Action 27) Budget IT Costs as Ongoing Operational Expenses

Establish stable operating budgets to provide, maintain and replace an up-to-date networked computer on every knowledge worker's desk, information technology facilities in student labs, appropriate instructional technology in every classroom, and modern telecommunications networks to support all required devices and services.

Responsibility: Campus Executives

This plan closes with an action to address the University's greatest challenge today. It is an issue that has been raised in nearly every section of this plan, since it pervades information technology infrastructure and support. It is important enough to stand alone here as well.

For both centralized and decentralized expenditures, the University must implement stable lifecycle funding for the ongoing maintenance, support and replacement of information technology throughout the system. There are certain “guarantees” that are needed for the University to be able to function effectively. Faculty and staff must have a current networked computer that is properly maintained and licensed with appropriate software. Classrooms and labs must be similarly equipped with stable funding for renewal. For many years the University has funded technology with various kinds of “one-time” money, and these sources are increasingly problematic. The use of CIP funds to purchase information technology for new buildings permitted initial deployment only, but even this practice is no longer possible under new State regulations. The special equipment replacement funds that used to support college-level computer replacement were early casualties of the budget tightening of the 1990s. And the formerly ubiquitous “end-of-year funds” have become scarce and limited, if available at all.

Almost every aspect of information technology today needs to be treated as a recurring cost. Equipment replacement cycles for most kinds of information technologies must be established (generally from 2 to 5 years depending on the item and its use) and fully funded along with appropriate maintenance costs. Funding for technology could be “skimmed” off the top at the system level, at the campus or college level, or left to each department to fund. While UH West Oahu has implemented lifecycle funding for faculty computers, most of the institution currently lacks this kind of prudent financial planning that is now emerging as standard practice elsewhere. The technique in use at many institutions is to establish a standard amount that covers the estimated annual lifecycle cost of a desktop computer for stable funding in the operational budget.

For example, if it is determined that the cost of a typical computer with maintenance, network access, printing, training, supplies and software (including updates) for a standard personal computer is \$3000, and that computer will last 3 years, then the University should budget a minimum of \$1000 per information worker per year for this purpose. This would provide enough funds to gradually put the entire university on a lifecycle-funding plan in which 1/3 of the computers could be replaced each year. Of course, this equipment may be usable for other purposes, but a formula such as this one offers institutional discipline that may be otherwise lacking.

This is by no means a problem that solely impacts computers for faculty and staff. As noted throughout this plan, nearly every aspect of technology must be funded on a lifecycle basis rather than through the ad-hoc approaches that are most common today. Similar calculations can be made for classroom technology, student computer labs, advanced digital media labs, network hardware and other

expenses that need to be treated as operating rather than capital costs. In some cases it may be appropriate to use lease agreements (e.g., if a large amount of equipment is needed in one year), but whether or not the funds are used for leasing or purchase of replacement equipment as scheduled, the key is to have a set funding base. This approach does not fully allocate the costs of technology, especially the support costs discussed in prior sections of this plan, which may actually exceed the cost of information technology itself. But lifecycle funding for information technologies in faculty/staff offices, student labs and classrooms would be an important first step forward. Evidence of this kind of financial planning and commitment will be increasingly expected by accreditation agencies such as WASC.

Next Steps

After this plan is adopted, the next step will be the development of more detailed costs for each action and the assignment of budget responsibility at each level of the institution. The drafters of this plan are keenly aware that the question of where the funding will come from will be on every reader's mind. However, the committed believes it is most important to first develop a systemwide consensus and mandate on what needs to be done before moving forward with the more contentious questions of how it will all be funded. In addition, as the University of Hawaii continues to evolve it seems clear there will be different funding strategies within the different units of the institution.

One thing is clear: unless there is a dramatic change in the University's internal and/or external financial environment, simply preparing Program Change Requests to submit to the legislature will not be adequate. Critical actions must be funded through reallocation if necessary and that is never easy. But there seem to be few alternatives if the University of Hawai'i is to take its rightful place in the 21st century.

Appendix

Strategic Plan for Information Technology Committee Members

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