Central Michigan University

Information Technology Review

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Edutech International
Information Technology Services for Higher Education
120 Mountain Ave, Bloomfield, CT 06002; 860.242.3356
www.edutech-int.com
Consultants: Linda Fleit ● John Savarese

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Introduction

Note that throughout this report, we use the terms “information technology” and “IT” to denote technology at Central Michigan University broadly, including all of its various tools, components, and manifestations all over campus. We use the term “OIT” to refer specifically to the central Office of Information Technology department.

Central Michigan University (CMU) engaged Edutech International in January 2005 to do an assessment and evaluation of its information technology. We believe that such a review is a very healthy and necessary step that every educational institution should take on a regular basis. As stated in the RFP for this project, CMU has a “commitment to become a nationally prominent university,” and “realizes that the use of technology should enhance its quest for prominence. With the rapid changes in technology, the continuing decline of state funding, and the growing need for faculty and student engagement with technology, CMU will benefit from an external assessment and long-term planning in the technology arena.”

Every consulting assignment carries with it the preconceived ideas of the consultants. While always trying to remain as objective as possible, we do bring to every consulting project a very strong bias toward the importance of information technology in education, and toward the need for every institution to have a strong, effective, and well-run information technology environment. We are strongly committed to the idea that virtually every one of a school’s goals and objectives can be affected in positive ways by information technology. Whether it is using computers and networking to strengthen current and new educational programs, to provide individualized learning experiences for students, to attract and retain students best able to benefit from the school’s educational experience, to enhance the quality of student life, or to emphasize sound planning and increased financial strength, information technology has an important, substantive role to play. Our consulting strategy for this project at CMU, therefore, has been to enhance and strengthen the potential for an excellent technology environment.

It is important to emphasize that our intent in review projects is never to criticize or condemn past decisions. We are in no position to second-guess others after the fact, nor would it be productive to do so. Our goal at CMU was to take a look at the situation today and to come to some judgments about how well IT is serving the University now and, most importantly, is likely to serve it in the future. As the world's understanding increases about how to make the best use of technology and systems to serve the needs of educational institutions, as those needs change and as new technology approaches emerge, CMU should have both the basis and the flexibility to put that new understanding to work. It is in that spirit that we make our observations, comments, and analysis.

The first step in the process was for us to learn as much as possible about CMU. Before and during the course of the project, we were given a wealth of materials and had very productive and informative meetings on campus. We learned about CMU's overall goals and objectives through written materials being generated now through the institutional visioning process. We also discussed these issues with the institution's leaders and others who are involved in major University-wide initiatives. Information about what the users want and need came through the many interviews and meetings we had on campus with faculty, staff, administrators, and students. We learned about the infrastructure and support services from the Office of Information Technology (OIT) staff and the IT staff in the colleges and many administrative offices.

Another major component that factors into our assessment of IT is knowledge of "best practices." Although information technology in higher education is still relatively new, it has been in place long enough to benefit from the development of a growing set of commonly accepted practices; these have been field tested in hundreds of different educational environments, and are generally thought to represent the best thinking in the field thus far. These practices generally fall into the following categories:

- **Governance of IT**: Institutional leadership, advisory committees, priority setting, fitting IT mission to institutional mission, shared responsibility for IT success, strategic planning for IT.

- **Policies, procedures, and standards**: Professional computing practices, hardware and software standards, acceptable use policies, monitoring of resources, reporting to the community, quality management and assurance.

- **Computing and telecommunications facilities**: The types and quantity of computing resources relative to the size of the institution, usage growth rates, technical productivity tools, use of proven core technologies, specific software products and their uses among the user community, reliability and robustness, use of outsourcing.

- **Support services, both centralized and decentralized**: IT staffing, organization, staff preparedness relative to the tasks they are expected to do, types of services provided, quantity of services provided, decentralized and department-based support.

- **Relationships between the central and local technology services organization and the rest of the institution:** User expectations, degree of user satisfaction, management perceptions, reporting levels, overall technology organizational structure, service orientation, accountability.

- **Funding for information technology**: Levels of funding relative to similar institutions, the breakdown of allocated funds to particular areas, technology replacement strategies, relationships between central funding and department-based funding for technology, sources of funding.

All of these areas and issues are discussed in this report. The final section contains our recommendations for moving forward.

We want to thank everyone for a really wonderful visit to campus. During our three days at CMU, we had the opportunity to meet with many terrific folks from all parts of the campus and to enjoy the surroundings. In addition to many meetings, we also observed the impressive IT facilities in the College of Health Professions, the College of Communication and Fine Arts, and the College of Science and Technology. We also want to acknowledge all the preparation that people all over campus did for this study. We were sent an enormous amount of very helpful material to prepare for our visit. It is clear that many faculty, administrators, and staff members have given a good deal of thought to what needs to happen at CMU with information technology, and in many cases, have already participated in important efforts to make IT a vital resource of the University. Many of their thoughts, comments, and recommendations are incorporated into this report.

Overview of CMU's IT Environment

Since its earliest days on campus, information technology has caused a great deal of commotion at most colleges and universities. IT is generally thought to be a very difficult area to deal with, certainly because of its newness relative to the rest of higher education, but also because it is expensive, changes rapidly, and touches nearly everyone in one way or another. It is very common for a university today to be profoundly uncomfortable with its information technology environment (how many times have we read in *The Chronicle of Higher Education* just in the past few years about IT projects that were both massively expensive and total failures?), appropriately concerned about spending too much with too little in return.

As at many institutions, CMU has its IT fans and its IT detractors. However, for the most part, our judgment is that information technology is serving the University well in important and significant ways. The more we talked with folks on campus and the more we learned about the environment, the more impressed we became with what has already been achieved. Not that everything is perfect, to be sure, but it must be acknowledged – and appreciated – that CMU is doing many things in IT very well, and has a wide range of accomplishments to show for it. A great deal of very interesting, creative, and vital work is being done in various areas of the University, on both the academic and administrative sides. We observed, for example:

- a very solid and reliable network; the University has weathered the recent waves of network assaults remarkably well;
- nearly 100 percent mediated classrooms – a far higher percentage than at most similar institutions;
- rapid growth in the last two years in the percentage of faculty considered "tech-savvy"; that is, using technology for substantive instructional purposes (now at about 30 percent);
- over half the faculty using the course management system, Blackboard;
- extraordinary use of technology in certain colleges, such as Health Professions;
- modern financial and human resources information systems which are running well in the core administrative offices;
- a professional, well-qualified, and well-trained staff in the central OIT department;
- a good relationship, for the most part, between the OIT service providers and the users, characterized by mutual respect and friendliness (end users took many opportunities during our visit to point out how much they appreciate the OIT department and to compliment individual staff members); and

- the development in several individual Colleges and departments of internal IT staff who successfully support their own specialized facilities and programs. There is some controversy at CMU about how much decentralization is a good thing, but these dispersed resources are doing good work and keeping users satisfied, and should be counted among the assets that the University currently possesses.

These are no small feats, especially at a time when many institutions are experiencing great difficulties with IT, and have not seen the progress that CMU has been able to make.

There is no question that there have been good intentions by everyone involved in and with IT, and a tremendous amount of hard work has been done. While there certainly are some challenges in IT at the moment, these very positive features will serve as a foundation for further progress.

Facilities

In general, CMU's technology facilities overall are very impressive. Technology is everywhere on campus, a very clearly visible and important part of the landscape. The ubiquity of mediated classrooms is unmatched in our experience – this is more than one would expect to find at an institution like CMU, especially with limited resources. Other observations include:

- The network has been laid out with great attention to flexibility, expandability, capacity, avoiding single points of failure, and it is being frequently upgraded. There are about 19,000 active network ports currently. A single node backbone is being installed. All of the major campus buildings will be connected through 1 Gbps connections by the end of next year. It appears that all of the necessary security precautions are being taken, including the use of Virtual Private Network for full off-campus access and a network registration and remediation system for the residence halls and apartments. A Network Management System is in place and is used routinely by OIT to monitor and adjust network traffic. Network reliability is very high and performance is good.

- OIT is mostly Microsoft-based; there are other parts of campus that are Unix-based.

- The campus is moving very quickly toward Active Directory Solution and it is in most places across campus already.

- The use of thin clients is concentrated in Residence Life.

- CMU owns its 6,000-line telephone switch.

One area in the facilities category does need attention; we would expect wireless networking to have gained a greater foothold on campus by this time. According to the *2004 Campus Computing Survey*, 67 percent of public universities already have a wireless network (with currently about 35 percent of the campus covered, on average) and another 28 percent are currently preparing a plan for one. On a scale of 1 (not important) to 7 (very important), wireless networking scored a 6.5 on the importance of future issues for public universities. Wireless is not merely a new gadget or a replacement for an older technology, but a way to understand how mobility can change the way faculty and students use computers in their teaching, learning, and research. This does not mean that every campus must roll out extensive connectivity clouds, as some institutions have begun to do. But the place of mobile connectivity should be under active discussion on every campus. Many institutions have significant projects underway so that they can learn firsthand how the availability of wireless connectivity might enhance their academic program.[1]

Software

Faculty are making good use of CMU's course management system, Blackboard, and technology is being used well in various parts of the curriculum. Faculty members in some colleges and departments are making great strides forward with instructional software, such as the ones found on the website for the Faculty Center for Innovative Teaching (FaCIT):

- Two Art faculty members are developing three-dimensional, interactive models to help students better understand color theory, color spaces, and color management.
- A Math department faculty member is building a test bank of practice exam questions (statistical reasoning and computation) to be shared with other statistics teachers and implemented online via the Blackboard course management system.
- A Music faculty member is developing a database of video examples of good methods/interactions in teaching early childhood music and movement.
- Two faculty members in the Department of Communication Disorders are recording (digital video) clinical sessions dealing with motor speech disorders and augmentative/alternative communication. These videos will be placed on a video server, retrievable by keyword, for use in classes and individual study.

[1] A thoughtful piece exploring the unanswered questions about "M-learning" is "Going Nomadic: Mobile Learning in Higher Education" by Bryan Alexander, the codirector of the Center for Educational Technology at Middlebury College (*EDUCAUSE Review*, vol. 39, no. 5, September/October 2004: 28-35).

- An Athletic Training faculty member is developing methods of using PowerPoint, Blackboard, and the Classroom Performance System in the Athletic Training Education Program in ways that encourage critical thinking and problem solving.
- A faculty member in Education is assessing which aspects of his course, Educational Technology for Administrators, can be best taught online and which require face-to-face contact. He is also incorporating the use of electronic portfolios into the course.

In terms of software for administrators, SAP applications appear to be serving the finance and human resources areas very well. We do have some concerns about the student system, Campus Management, which we discuss later in this report.

The University does not seem to be doing as much with open-source software yet as we have observed on other campuses, although there are pockets of it here and there. The Windows-centric approach of OIT likely has had an effect on this. We suspect that as budget pressures grow, more opportunities for open-source software will be pursued. Although certainly not a panacea, an open-source strategy has the advantages of both saving money and being vendor independent.

Services

IT support services are provided, especially to faculty and students, through a combination of centralized and decentralized units. This appears to be working well in terms of end users acquiring what they need, although concerns have been raised about the cost-effectiveness of such an arrangement. We discuss this issue later in the report.

We were very glad to see that CMU has a dedicated faculty-support area, the Faculty Center for Innovative Teaching (FaCIT), for the use of IT in instruction. On every campus, there are faculty who are the “early adopters” – the ones who are able to achieve wonderful things with technology without much help, and certainly there are these faculty at CMU. The mainstream faculty, however (usually the great majority), require a different, more helpful approach to support. FaCIT is providing that and will no doubt continue to be a critical factor in helping CMU achieve a full range of educational benefits.

But there is no question that everyone is feeling the pressure of the limited supply of IT service providers, both centrally and decentrally. This situation is putting a more serious strain on both the OIT staff and local IT staff than many at CMU realize. Most people at CMU, on both sides of the support/user divide, are generally cooperative and kind, so the tension does not often surface in outright friction. But the kind of stress that the IT providers are working under, and the frustration

of inadequate support that many users are experiencing, cannot continue for long without beginning to impair CMU's effectiveness. While it is true that most, if not all, of CMU's offices are understaffed, the situation with IT is very serious. We discuss this in more detail later in the report.

Although more IT staff are needed, more staff alone will not solve the problem. Part of the solution is to institute more joint decision-making and priority-setting, preferably through a formal, standing body with real authority (see the next section on "Vision and Planning") to decide important trade-offs and to shoulder the responsibility for the results of those trade-offs. This body should have a well-formulated set of University strategic goals for IT staff to base their work on.

In the meantime, the IT staff continues to make heroic efforts to meet the needs of the University. However, we see from other institutions' experiences that heroic efforts are not sustainable for the long-term, even with the best of will.

Overall

Our overall sense is that in general, CMU is doing quite well.

- The facilities are very good; there has been good use of technology fee money and other investments
- CMU faculty are at about the same point as faculty at other institutions in incorporating technology into the learning process
- The University is quite a bit behind in student administrative systems, but is taking significant steps to catch up
- This has all been done in a budget-cutting environment, making it even more outstanding.

However, although the IT environment at CMU is, to a great extent, an effective one that is helping the University move in the right direction, the University does have some difficult issues to address, as well as a need to meet the demands of an evolving future. CMU has to make sure that it is prepared to meet all kinds of new challenges as its faculty members become more eager and prepared to use IT in the classroom and more adept at doing so, as the students continue to grow in their use of IT, and as administrators and staff see more of the benefits of modern technology. Because of this, we have identified four major areas of concentration, each of which should become important planning elements for the future:

1. Vision and planning
2. Centralization and decentralization
3. Funding and resources
4. The SAP Campus Management project

We discuss each of these issues in the following sections. The final section contains our recommendations for moving forward. The challenge for Central Michigan University now is how best to build on its accomplishments, keep the momentum going, and continue on into the future with a record of success.

Area 1: Vision and Planning

> "Vision is a mental image of the ideal. It is derived from an organization's sense of purpose and values, and describes what the organization should look like as it successfully implements its strategies and achieves its full potential. The purpose of an Information Technology Vision Statement is to present a vivid and compelling direction for the college's use of information technology."
>
> Ulster County Community College website

The institutional context in which IT exists is critical, and our experience suggests that technology without a guiding vision makes it much harder to link technology initiatives and activities to genuine value for the institution. As we discuss in the Funding and Resources section of this report, doubts about whether the institution is receiving the right kind and the right amount of benefit from its large IT investments are much more likely to be asked at institutions that have not yet fully articulated what their expectations are.

IT stakeholders at CMU, be they users (students, faculty, staff) or service providers (OIT and local support staff), perform their work now without the benefit of an institutional vision for technology. Key questions such as the role of technology in the creation of knowledge and/or in the teaching/learning process, as well as in its role in helping the University be more efficient and effective, remain outside the collective dialogue of the CMU community. As a result, IT actions, resources and services, whether from faculty, students, or staff, are often fragmented and without focus. It is little wonder that so many folks at CMU are concerned about the issues of centralization and decentralization of IT support; so much of the IT activity is happening in an uncoordinated, uncollaborative, and unfocused way.

This is not to say that there is no visioning at all for IT. Many of the colleges and some of the administrative units have given a great deal of thought to the role that IT should play in their endeavors. One outstanding example is the document, "A Learning Initiative for the Incoming Class of 2002."[1] This document articulated not just a vision, but a plan as well, and

[1] A Report of the Faculty Technology Planning Committee, June 2000

a great deal of the progress that CMU has made in academic computing can clearly be traced to these ideas. (We were also told the good news that this is being updated now for the entering Class of 2006.) Other examples include the remarkable faculty-support initiatives that accompanied the construction of the new Health Professions building and the successful implementations of the SAP financial and human resources systems. All of these were challenging and expensive projects, and therefore, needed to rely on inspired visions in order to come to fruition.

However, this forging of a vision is not yet happening at the institutional level. Again, this is not to say that CMU's leaders individually do not have a vision for IT; from our discussions, we can see that many of them do. It's that those separate visions are not coming together to create the University-wide inspiration that CMU needs to move forward in this critical area.

For example,

- On the academic side, technology is not being integrated into the overall curriculum in any systematic or rational manner. While certain departments and colleges have moved forward aggressively, there is no CMU-wide standard in place for the basic IT skills and knowledge that all students should have by the time they graduate. There are no specific goals for the incorporation of technology by the faculty into their teaching, nor is there much discussion about whether such goals would even be appropriate for CMU.

- On the administrative side, while a great deal of work has been put into implementing separate systems, there is nothing at the moment that could be called the University's "ERP" – an integrated, smoothly running system that ties all of CMU's functions together in a cohesive manner. Nor is there a University-wide view of data management. There is no articulated overview of what an administrative information system could be doing for CMU, nor how to construct one. We heard of many examples of software being acquired that never worked, software that was never used before its warranty expired, software acquired from a source that no longer exists and therefore cannot provide support, and software that stands alone without an appropriate interface to other systems. There is a great deal of untapped potential here in helping CMU become both more efficient and more effective.[1]

The principle antidote for this overarching problem is for senior-level leadership to take a more active and engaged role in the shaping of a shared vision for IT – a set of guiding principles that will provide cohesiveness, clarity, and guidance to the wide spectrum of everyday and long-term choices involved in the use and management of technology. We are not

[1] A Title III Program Evaluation has recently been completed at CMU, noting a number of similar issues.

suggesting that a “top down” approach is what is needed here. Nor are we suggesting that uniformity should be the goal – that would clearly be both undesirable and unacceptable at CMU. Clearly, colleges, programs, and departments have unique contributions to make to the overall excellence of the University, and this must always be taken into account. But the University is more than a collection of programs. When we asked the Council of Deans whether information technology is a strategic resource of the institution (is it vital to the institution’s mission and is it required to get to the next level of excellence?), the general answer was, yes, at the program and college level, but not necessarily at the institutional level. We believe that the University’s leadership needs to engage the entire community, in ways that are consistent with the culture of CMU, more intensely and more authentically in considering and ultimately defining, with some level of specificity, the strategic role of technology in actualizing the institution’s educational mission.

All members of the community need an image of the desired future for technology in a CMU education. The sharper the image, and the more broadly embraced, the more effective it will be as the principal reference point for decision-making, allocation of human and financial resources, and creative energy. Senior management needs to move from its current place on the sidelines of this conversation to the center of the community dialogue, showing leadership in the creation of a dynamic vision for technology at CMU, one that is richly detailed and creatively compelling.

Specifically,

- At the highest management levels of the University, there needs to be a *shared* awareness of, and an appreciation for, the magnitude and the complexity of the transformation well underway. This transformation is changing the manner in which faculty are and can be integrating technology into their educational work, involving the very core of what they do. Equally important, that awareness needs to extend to the ways in which a high-quality institution today must leverage IT to provide services to its students, faculty, staff, and alumni.

  A new publication, “The Key to Competitiveness: Understanding the Next Generation Learner,” (http://www.aascu.org/book/ktc.pdf) documenting a conference held in June 2004 that was sponsored by the American Association of State Colleges and Universities (AASCU), EDUCAUSE, and Microsoft, describes the new student:

  > *Each morning, Jason Keene wakes up in his dorm room at the University of Central Florida and peers over at his PC monitor to see how many IMs arrived while he slept. Sometimes more than 15 attempts to reach him are visible on the screen, along with various postings to the blog he’s been following since the semester began in January. After a quick trip to the shower, the*

sophomore computer science major pulls up an eclectic mix of news, weather, sports, and information on the home page he customized using Google. He then logs onto his campus account to see if the previous day's sociology lecture is posted. He notices a reminder that there will be a quiz that day as well as another one letting him know that the paper he's writing needs to be e-mailed to a professor by midnight the next day. With a cup of instant coffee on the desk next to him, Jason IMs a few friends and then pulls up a wiki to review progress a teammate has made on a project they're doing for their computer science class.

An important question for CMU's leadership is whether Jason Keene would receive the education he wants and needs if he were a student at CMU. Student expectations for what they can do with technology are expanding rapidly and are being shaped by their IT experiences outside their colleges and universities: buying books at Amazon.com, paying bills online through their bank, seeing and hearing the latest news on the CNN website. An important symbolic transition that many students have already made and that the rest of us are making more slowly is the simple act of looking up a word in an online dictionary rather than pulling a "regular" dictionary off the shelf. Students are increasingly bringing their comfort and ease with technology to their educational institutions, expecting to find that their fellow students, their faculty, and their administrators have the same comfort levels.

- Decisions about the broad allocation of resources, controls, and priorities need to be made in the right place and for the right reasons. Some upper-level decision-makers at CMU may feel they don't know enough about technology itself to make decisions about it. Much of this has been left therefore, by default, to the OIT department, and in trying to fill the void, it has become the lightning rod for dissatisfaction within the user community, especially with some of the faculty. We want to emphasize that expertise in technology is not a requirement for upper-level decision-making, just as a degree in architecture is not required to make decisions about the institution's master building plan. Decisions about how technology is to be used at CMU, for what purposes and why, and with what degree of urgency need to be made in a more institutional way. In the May/June 2004 issue of *The EDUCAUSE Review*, Brian Hawkins, president of EDUCAUSE, co-wrote an article entitled, "Presidential Leadership For Information Technology" (http://www.educause.edu/ir/library/pdf/erm0332.pdf), in which he delineates the six decisions that institutional leaders should be actively engaged in making:
    1. How much should we spend on IT?
    2. Which processes should receive IT funds?
    3. Which IT capabilities need to be institution-wide?
    4. How good do our IT services need to be?
    5. What security/privacy risks should we accept?

6. Whom do we blame if an IT initiative fails?

- CMU's leadership needs to create a more vibrant and effective governance structure for technology that encourages meaningful participation, information sharing, and the building of consensus on major IT issues. The IT governance structure, as a unit, should be the locus of responsibility and accountability for the progress and success of information technology at CMU. Although CMU has taken some steps in this direction, we believe it has not yet gone far enough.

Committees, policy setting, and determining priorities

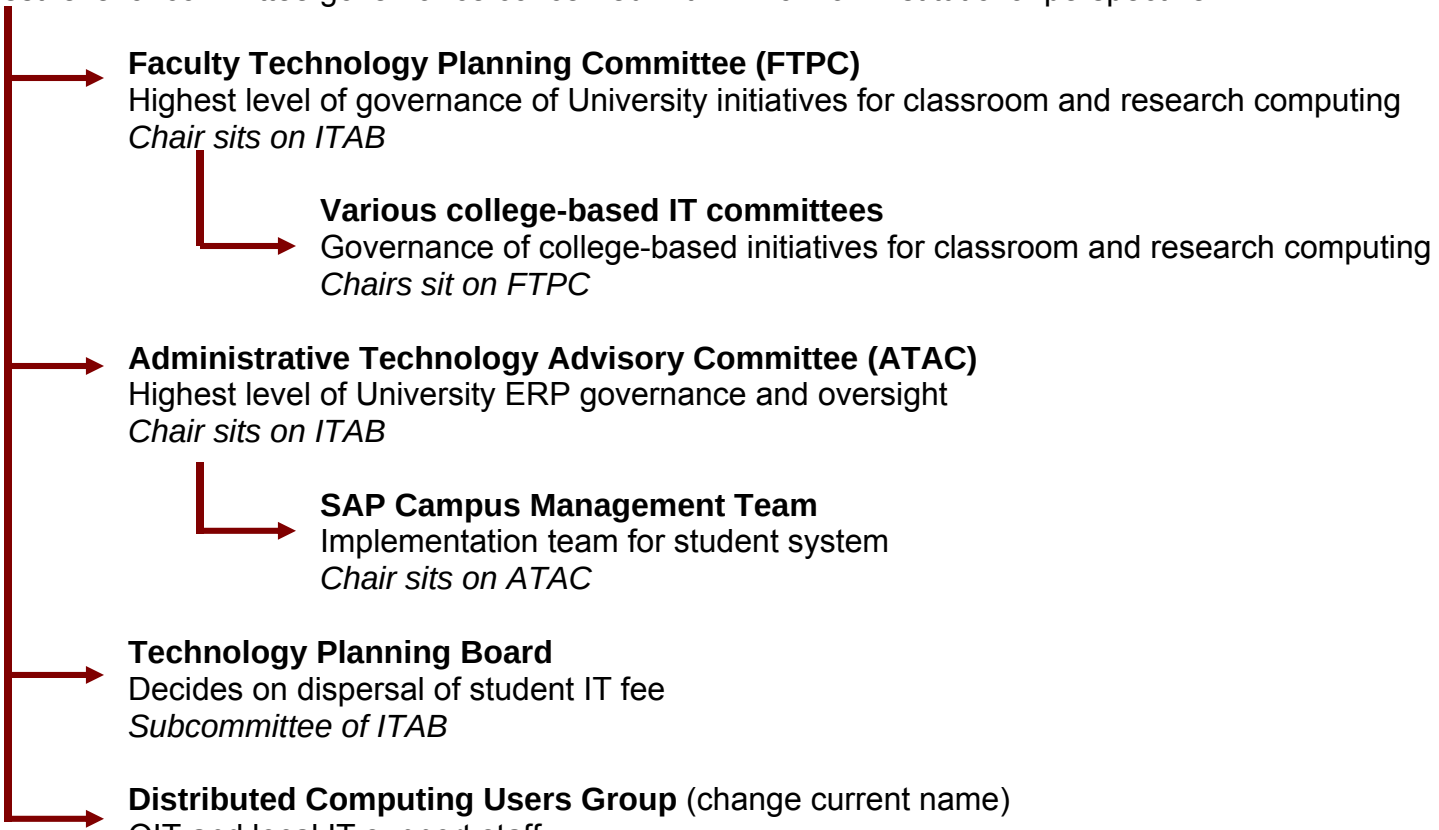
The IT committee structure is always a critical part of the institution's governance of IT. As far as we could tell, CMU now has a proliferation of committees, including:

Administrative Technology Advisory Committee
Distributed Computing Advisory Committee
Faculty Technology Planning Committee
Information Technology Advisory Board (new)
SAP Campus Management Team
Technology Planning Board
Various college-based IT committees[1]

We are no doubt unaware of all of the linkages among these groups, and the manner in which all of their work is coordinated. However, we would like to suggest that there is a rational way to make sure the linkages exist. The structure we recommend is this:

[1] Some form of IT committee exists in the College of Humanities and Social and Behavioral Science, the College of Health Professions, and probably others.

Information Technology Advisory Board (ITAB)
Highest level of committee governance concerned with IT from an institutional perspective



Faculty Technology Planning Committee (FTPC)
Highest level of governance of University initiatives for classroom and research computing
Chair sits on ITAB

Various college-based IT committees
Governance of college-based initiatives for classroom and research computing
Chairs sit on FTPC

Administrative Technology Advisory Committee (ATAC)
Highest level of University ERP governance and oversight
Chair sits on ITAB

SAP Campus Management Team
Implementation team for student system
Chair sits on ATAC

Technology Planning Board
Decides on dispersal of student IT fee
Subcommittee of ITAB

Distributed Computing Users Group (change current name)
OIT and local IT support staff
Chair (not OIT staff) sits on ITAB

The word “advisory” in some of these titles may lend itself to misunderstanding. The point of all these groups is that they are an important part of the governance of IT. They should weigh issues and priorities and form policies and plans. Those policies may be “recommended” to the University’s senior management, but another part of each committee’s role in making such policies and plans is to follow up to see that they are successfully carried out, to evaluate the success of

programs, and so on. These groups should be held accountable for the success of IT, sharing this responsibility in substantive ways with OIT.

We also want to make the point that none of these committees should be chaired by OIT or by the CTO. It is very important that the CMU community and leadership own these committees, determine their memberships, and set their agendas. That is much more difficult to do when it is OIT's responsibility to lead the committees forward. Of course, OIT staff will serve as an extremely important resource for all of these groups, but it is best that they not lead them.

We know that there are efforts underway at the moment to create the top-level group, the Information Technology Advisory Board (ITAB), and we endorse those efforts fully. We see an important role for this new committee in advising CMU's leadership.

We suggest that the committee's mission should be:

> *The Information Technology Advisory Board (ITAB) advises the president and the other senior officers on the strategic importance of information technology to CMU. It is the primary vehicle whereby the link is made between the goals and objectives of CMU and the IT tools, resources, and services that are necessary to reach those goals. It shapes and recommends to the University's leadership high-level policy on information technology, including resource levels, acquisition strategies, and support methodologies.*

In order to fulfill this kind of mission, it is necessary to ask each member of the Board to serve two roles simultaneously. The first role is as a representative of his or her constituency, bringing that perspective and point of view to the discussions. The second is as a citizen of the University overall; that is, being able, from time to time, to put aside local interests in support of the overall good of the institution.

Examples of the important issues that the ITAB committee might address at first include these:

- What should the relationship be between our mission as a large public institution and the mission for information technology at the institution? Where does information technology fit relative to CMU's other priorities? What role can technology play in the areas that are very important to us, such as recruitment and retention?[1] Do we wish to

[1] EDUCAUSE has produced a brochure for potential students and their parents to help evaluate colleges and universities (http://www.educause.edu/Studentguide/). On the website for this brochure, it says in big, block letters, "You're not just a student, you're a

use technology as a competitive advantage? How will a shift in institutional focus from a teaching mission to more of a research mission affect, and be affected by, information technology?

- How will the University decide its information technology priorities? Is technology more important for one group or one effort at the University than another? Should faculty computing be given priority over administrative computing? Should certain colleges and departments have greater access to computing resources than other departments? Will all faculty, regardless of college or department, be encouraged to use computers and telecommunications? To what extent? (Note that we are not suggesting that the ITAB rule on every request that comes forward, but that it has a responsibility to create a priority structure so that all major requests can be evaluated rationally, against University criteria.)

- How can we best use technology to increase learning? What is the appropriate level of technology for students and faculty? Our labs and facilities have been greatly enhanced, but for what? How is it all being used? Are students learning more or better? Are we using the technology in an important way educationally?

- Does CMU want to distinguish itself as a “leading-edge” or pioneer institution with respect to technology, or does it wish to be a follower? What are the benefits and drawbacks in having special relationships with vendors, national exposure, fund-raising efforts in this area, and so on? How will the University weigh the benefits against the increased risks of being a pioneer? What are the differences inherent with working with established technology vendors as opposed to working with start-ups?

- Is spending for technology an expense or an investment? Is it more important to be efficient with computing or effective? Is technology a strategic resource of CMU? Is information a strategic resource? When budget cuts have to be made in the technology area, how will we decide which services and resources to cut?

- How will new technology initiatives be justified? How will costs be determined? How will benefits be determined?

- How will the University deal with ethical and legal issues? How will intellectual property and software licensing policies be implemented? How will the University define “appropriate use”?

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consumer too... and should know what you're paying for, so ask!” Colleges and universities all over the country have used this guide to help shape their own IT services.

- How will CMU handle the University's "public face," as in, for example, the promulgation of web pages? Who will decide what is appropriate to put up on the web? What sorts of mechanisms should be in place to assure consistency, adherence to legal and ethical issues, and the appropriate amount of information dissemination? How will we balance the need for consistency with the individual creative energies among those providing content, especially the faculty?

- Where do we want to be with information technology at CMU in five years? What is our plan for reaching these goals and how will the plan be funded?

In addition, the two other high-level committees, the Faculty Technology Planning Committee (FTPC) and the Administrative Technology Advisory Committee (ATAC)[1] should focus (or remain focused) more on policy than on day-to-day operational issues. Although day-to-day issues are important, focusing on them solely leaves a gap in the IT governance environment. Both the FTPC and the ATAC should be policy bodies, working at a more detailed level than ITAB and with a more specialized scope. However, neither should be merely a super users group or a body that merely decides how funds that have already been allocated will be disbursed. The chairs of both the academic and administrative committees should sit on ITAB to provide the necessary linkage.

Typical agenda items for an FTPC:

- Should there be a baseline of IT resources for all faculty, regardless of their college or department affiliation? Do we want to determine a minimum University standard for everyone?
- Is more professional development for faculty needed?
- If students learn best when they are working together, how can technology foster group learning?
- Are there aspects to technology at CMU that pull students apart rather than together and are there ways to mitigate that?
- If student engagement is important, with the teacher acting as mentor or coach and not primarily as a source of knowledge, how can technology empower teachers and students to work together in these roles?
- What are student expectations regarding their faculty's use of technology in teaching and learning? Are the students getting ahead of the faculty in technology and are we, then, disappointing them if we don't use it sufficiently?
- How should the mediated classrooms be supported, including faculty training?
- How do we best support faculty engaged in research?

[1] Note that the ATAC has not met since June 2004.

- What are the educational applications of wireless technology?
- What should we be thinking about for e-learning strategies?
- What is the educational place for new technologies, such as blogs and wikis?
- Is our course management system being used effectively?
- What do we need in Interactive presentation tools?
- What do we want to do with online discussion/chat sessions?
- How do we facilitate the use of the administrative system by faculty and students, such as for entering grades, accessing records of advisees, revisions to the course schedule, etc?
- What are our specific academic software needs, especially that which can be shared across colleges; survey software, anti-plagiarism software, graphics software, etc.?
- Where do we want to be with academic information technology at CMU in five years? What is our plan for reaching these goals and how will the plan be funded?

Typical agenda items for an ATAC:

- What is the connection between the information systems of the University and the priorities and strategic goals of the University? How do we see to it that the University has the information systems it needs to carry out its mission as successfully as possible?
- What is our determination as to a minimum set of expectations regarding each department's responsibility to use the information system to its full potential?
- What are our policies for and our design for information flow?
- How will we assure consistent polices of data security and access?
- How can we help department managers with the process of improving workflow within and between offices?
- Are we making sure to assess the impact that changes to one component of the administrative system will have on others?
- What is our plan for moving the University from paper reports to online information?
- What are our recommendations for policies for the safe handling of information in individual offices using desktop technologies?
- Are the service levels from OIT adequate? Can we help shape them to be more useful?
- How do we accommodate downtime for system needs such as backups and maintenance?
- Should we specify hiring requirements in information technology experience and skills for administrative staff positions?

- Where do we want to be with administrative information technology at CMU in five years? What is our plan for reaching these goals and how will the plan be funded?

One issue in particular that could use additional participation from the community through these committees is that of priority setting. The Technology Planning Board does a good job in deciding priorities on the use of part of the student technology fee, but priorities for services are now set almost exclusively within the OIT department. This should be expanded so that there is a mechanism to determine priorities that has been developed and sanctioned by a broad base within the user community itself.[1] When supply does not meet demand, as is the case in virtually all areas of technology resources and services, someone needs to decide how to apportion the supply; this ought not to be done by the same folks who are responsible for delivering the services and resources. That is an inevitable no-win situation for both the service providers and the service recipients. It is especially important to make this change at CMU, in an environment where some users feel like "second-class citizens" (their words) because of the way in which services are allocated. Users in every department need to know that the portion of services they receive is the result of *institutional* decisions.

Planning

Once an IT priority structure is in place, a strategic plan for the University's information technology efforts and expenditures should be created, so that everyone is working under the same umbrella and with the same expectations. As we were informed in our preparation materials, "There has been little formal technology planning and no campus-wide technology planning prior to the current planning process. Though the central OIT division has informal planning processes in place and university senior administrators routinely review requests for large OIT investments, there is no global prioritization process for technology investments in place at the university level. 'Satellite' IT operations in the academic colleges and other campus units, though subject to the same requirements regarding senior officer review of large investments, often implement discipline-specific technologies without centralized OIT involvement or knowledge."

The plan, of course, should be created within the context of the University's overall goals and institutional priorities. CMU's excellent Vision Statement: ***CMU will be a nationally prominent university known for integrity, academic excellence, research and creative activity, and public service*** should serve as the foundation for IT strategic planning. Again, the "Learning Initiative" document that was done in June 2000 and that is now being updated is a fine example of the ways in which a plan can help the University move forward. There are college-specific plans at CMU as well and all of these can be used as models for future efforts in creating a University-wide strategic plan for information technology.

[1] Mechanisms vary widely, from informal agreements on the importance of certain initiatives to rigorous, quantitative rating schemes. See Appendix D for an example of the latter.

Organizational structure

Many universities have established a vice-presidential-level position of Chief Information Officer (CIO). We do not feel this step is necessary for CMU at this time, as long as the top IT person continues to have direct access to institutional leadership. The current reporting structure of the Chief Technology Officer to the Provost seems to ensure that this is the case.

The University might want to consider the place of FaCIT. Many universities include the services that a FaCIT-like group offers to the faculty within their central IT organizations, especially as a way to make sure that their faculty advisory committees have input into the shaping of these services. Other universities have this group report directly to the Chief Academic Officer, especially if the group's overall responsibility is to foster good teaching, with technology being just one of the tools for doing this. In either case, it will be important to coordinate the activities of FaCIT with both OIT and local IT support.

Area 2: Centralization and Decentralization

An issue that inevitably arises in the discussion of technology staffing and budgets is the degree to which end-user units, both administrative and academic, should be "allowed" or even encouraged to fund and hire their own IT support staff. We hear these discussions especially in large institutions where there is already a lot of decentralized support, but where there are also budget difficulties. With financial constraints growing tighter, thoughts naturally turn to issues such as gaining greater efficiency through increased consolidation and centralization, less overlap and duplication of effort, better use of the resources, and so on.

While having everything centralized can lead to greater efficiency, it may not be as effective in providing support to end-users. This is often true especially for faculty, whose IT needs tend to be less standard and uniform than those of administrative staff. The clarity of expectations and the speed of response that results from having local IT support almost always lead to a higher level of service than can be provided by a central support group all by itself. The value of support services located close to the users and specializing in understanding local needs is so well recognized that even when a central group provides the bulk of IT support to a local unit, it is often done in such a way that it looks to the users as if they have their own support people.

It isn't really a matter, then, of going to one extreme or another, but of using both centralization and decentralization and finding the right balance between them. An institution as large and complex as CMU is bound to have a multi-tier support system; the question is how best to coordinate the tiers. In addition, the problem of the unevenness of local support among the colleges that was mentioned many times during our visit (the "have" and "have-nots") is not really an IT problem in and of itself. That is, the IT resources largely reflect the campus culture as a whole – CMU has a very autonomous and independent culture within which each of the colleges appears to be proceeding at its own pace. We mentioned earlier that the FTPC could consider establishing a minimum baseline of IT resources for all faculty, regardless of which college or department they are in, but we suspect that would be a challenging discussion to have.

The issue also has a lot to do with expectations. If a college or administrative department sets up or acquires local IT support because of its perception of a failure of OIT to provide the right quantity and/or quality of services, then decentralization is a problem. It is also likely to lead to a defensive, unproductive reaction on the part of some OIT staff. If however, a college or department creates local support because this model does, in fact, have inherent benefits in terms

of control and clarity of purpose, then it is not a problem. It also increases the likelihood of the user department wanting to be involved in a connected, distributed web of support, rather than being a disconnected and isolated island.

Providing local, unit-based support in addition to centralized support is a good model. However, although end users get better support this way than with a totally centralized support group, it is also important to link the staff employed in the colleges and end-user departments to OIT and to each other in some way. Local support staff should be thought of as *distributed*, not *decentralized*, a distinction that has very important implications. Even though they are serving local needs, these staff members should be doing so under an "umbrella" of support that ensures that services are consistent, coordinated, and all moving in the same direction. (This is not to say that the services should be uniform across all units, only that they be consistent in approach and quality). CMU has made a good step in this direction by having the Distributed Computing Advisory Committee (DCAC), but there is further progress to be made. (More about this committee below.)

Some institutions have gone so far as to have these unit-based positions report jointly to the central services department. Although that is an unlikely scenario for CMU, additional formal communication is needed.

The Distributed Computing Advisory Committee

The Distributed Computing Advisory Committee (DCAC) meets voluntarily on a regular basis and includes most of the local IT support staff from around the University. But according to many of its attendees, it is too often used as a "show-and-tell" for OIT. The group is chaired by an OIT staff member and is largely perceived by those outside of OIT to be a mostly one-way communication service for OIT to inform the colleges and administrative departments about what OIT is doing. The name of the committee is somewhat of a misnomer – it is about decentralized, not distributed, computing, and it is not an advisory committee.

While DCAC has served a good purpose in bringing together specialists from around campus who otherwise would not rub shoulders with each other and the OIT staff, and has discussed some important issues, there is more progress that can be made here to promote collaboration and communication. The communication needs to be two-way so that OIT is fully aware of what's going on in the colleges and end-user departments, and so that decisions about policies, changes in the technical environment, and new approaches can be thoroughly discussed and consensus reached. The relationship between OIT and local IT service providers should be seen by everyone as a partnership – coordinating and collaborating on what's best for the users.

For example, some years back, OIT, feeling pressured by tight resources, made the decision to drop support for the Mac. This was despite the fact that (as someone estimated for us), there are around 1,000 Macs on campus and at least one college, the College of Communication & Fine Arts, is predominantly Mac-based. While understanding the pressure of having too few resources, we believe that this could have been an opportunity for OIT to be more service-oriented by collaborating with the DCAC to devise a way to provide Mac support to all of those at CMU who need it. There are many Mac experts at CMU, and a way could have been worked out (and still can) to make sure that end users get the support they need, even if it comes from a variety of sources. Instead, some in the community see OIT as being Windows-centric (meant as an insult, of course) and shortsighted.

One way the DCAC could be made more truly multilateral would be by having a chair who is not from OIT.

Communication

The partnerships that can and should be formed between local support staff and OIT staff are very important. For the greatest benefit to the users, OIT staff and local staff should work together – not see each other as rivals, or to be so disconnected from each other that morale becomes an issue (as when one looks at the other with envy from perceiving a lighter workload or greater recognition). In order for the partnership to have a solid footing, there need to be two ingredients:

- greater communication between OIT and local IT support and
- an acknowledgement that each college is different and has its own needs.

At the moment, the University community does not see OIT as excelling at communication. In fact, we heard many stories of decisions and actions by OIT that seemed to come out of the blue and to catch people by surprise. We found out that sometimes these matters had actually been discussed in committees; the implication was that it was the users' fault for not attending the meetings.

There is considerably more that OIT can do to foster communication, but that is probably not going to happen until it is made a formal task, rather than just an add-on that may or may not get remembered as a project gets ready to be rolled out. A side benefit of closer relations between OIT and the distributed support groups is that it will provide a much more effective communications channel with the users. Also, the way OIT is organized now, many people find it nameless and faceless. That leads to a sense of impersonality in the actions that OIT takes. This is, of course, not true for everybody in OIT. But we did hear the comment that there was no way to give feedback to OIT as a whole.

Some specific services that are being duplicated now, but that are very independent, clearly would benefit from more coordination. System and server administration is a good example. Some local system administrators are very skilled, perhaps more knowledgeable in specialized areas than anyone in the OIT. However, there have been cases of servers set up by graduate students or other temporary employees, only to be quickly orphaned. Some minimum standards, perhaps even formal certification, for server administrators should be put in place. To avoid the appearance of domination by OIT, these standards could be set and monitored by a subcommittee of the DCAC.

Other areas of overlap include security, networking, virus protection, and backup. Developing and publishing more formal procedures for these areas and other common needs would keep individuals from having to reinvent the wheel and would make sure that all University computers and networks were being maintained up to minimum standards. The DCAC should have oversight to make sure that these procedures are being followed.

Providing desktop support services is another example of overlap between OIT and local support. Even without changing the current mix between centralization and decentralization, it would be in everybody's interest to develop ways in which distributed and centralized support staff could cover for each other and back each other up. Good use could be made of the Help Desk and the Peregrine problem tracking system for this purpose, with urgent calls being referred to available staff wherever they may be located. This is already being done in some areas, such as Residences and Auxiliary Services and the College of Health Professions, but could potentially be expanded to everyone. Another benefit would be that the central Help Desk routinely uses customer satisfaction surveys to improve service levels and this could be made more generally available.

The College of Health Professions is a good model of cooperation and collaboration between OIT and local IT support. As their Director of Technology stated in a letter accompanying his college's materials:

- All of their file server space was purchased by their college, but is maintained and backed up by OIT.
- All faculty and staff are asked to call the OIT Help Desk for desktop computing problems. At that point, they are triaged back to the college (unless it is a campus-level problem). Trouble tickets are part of the central Help Desk system.
- OIT maintains all college web services except in cases of special research or non-standard customized data capture mechanism currently not supported by OIT. Even in such cases, the raw data is backed up by OIT.

Liaison staff in OIT to coordinate with the distributed support units, do staff development and training with them, make sure the communications channels are wide open, and so on, would add considerable value. We know that everyone is

already overloaded with work, so we are not suggesting that this be added to anyone's current job description, but it is something to think about for the future.

A final thought on this issue

Many people at CMU are concerned about centralization and decentralization. But much of the motivation to look at this at CMU comes from an expectation that consolidation of these resources (in other words, less decentralization) will result in lower IT expenditures overall, thus saving the institution money. A variation on this is that since OIT is understaffed, adding folks from the decentralized areas will put OIT in a position to provide better service. After looking at this issue carefully, we believe that both of these are unrealistic expectations. There are no underutilized staff in the local units, as far as we could tell. In some areas, even adding staff would not be unwarranted, given the current workloads. While it is true that some services are being duplicated (such as PC repair and troubleshooting), that is not to say that there are excess resources being spent in the duplication. After all, there is a Java City coffee shop in both the Library and the new College of Health Professions building, for good reasons.

There are, of course, economies of scale to consider, and logic suggests that having a centralized resource of any kind, IT or otherwise, makes everything more efficient. With more centralization of services and a larger staff in OIT, for example, workloads would be distributed differently and more evenly, there would be more opportunities for cross-training, servers could be consolidated, and so on. But this premise rests on the assumption that there is underutilized capacity now in at least some of the local areas, and we didn't see that anywhere. If anything, it is just the opposite. Transferring local positions to OIT would also transfer their workloads. Consolidating servers would increase the risk of downtime for greater numbers of people by creating points of failure that would have far greater impact than they do now. The fact is that, apart from whatever effects consolidating would have on service to the local units (negative, most likely), it does not make sense economically.

Speculating that greater efficiency would result from consolidation suggests that the support services that are in demand are clear and compartmentalized. This view overlooks the real value of users knowing that if they suddenly were to have a need, it would be met in a reasonable period of time and with reasonable good will – a predictability of access to resources. This kind of risk management is somewhat intangible, but very real. If a faculty member teaches a course using a specific technology, or makes a commitment to students that a specific facility will be available for their assignments, then that faculty member needs that kind of risk management. There is actual value in having the technician standing by, value that would be greatly diminished if we used this resource more "efficiently" and sent him or her across campus on another assignment. So the idea that there is money to be saved by reducing "duplication" is based on the

assumption that this risk management is not of real value to the University. – the University can't "afford" it in the current financial climate. What this points out is a differing value system between the central University and at least some of the units. As we mentioned earlier, for some of the units, IT is strategic. In contrast, by looking to consolidate, the central University is acting as if IT is purely a utility. This is a fundamental philosophical difference.

If there is an opportunity to reduce costs (we discuss this in the Funding and Resources section), it is not so much from eliminating the split between centralization and decentralization, or even changing the balance between them, as it is from creating an overview and coordination of what is happening at the University overall. No matter how spread out the IT resources are, there should be some central knowledge of all University IT expenditures and activities, as well as some central guidance on managing those resources. The fact that no one person at the University knows how much is being spent on IT outside of the OIT department, nor how many local IT staff there are, is telling. (We do want to acknowledge the good work that was done in 2003 by an IT Review Committee led by Edward Grant; they made good progress in identifying total institutional spending on IT.) Everyone at CMU with a budget can buy software, regardless of whether the University already has a site license for a similar product (or even for that same product!). Everyone at CMU with a budget can buy a computer without necessarily thinking through what the ongoing support costs will be. Again, this fits CMU's culture of local autonomy, but University budget pressures impel at least greater coordination here.

We are not suggesting that all of this should be centrally controlled; that would be anathema to CMU's culture. But every opportunity to avoid unnecessary duplications and shortsighted decisions should be made. For example, one of the recommendations made by the IT Review Committee was to have specific designations for technology expenditures and staff in the University's general ledger, making them easier to track. They also recommended that all technology purchases above a certain amount be reviewed to eliminate redundancy. Both of these are excellent suggestions. In addition, we believe that our recommendations in visioning, planning, the governance structure, and better communications will go much further in saving the University money than in trying to decrease the amount of decentralization.

Area 3: Funding and Resources

> "When asked if their institution has achieved substantial value from its IT investments, respondents note two factors that most significantly help them achieve this value. These factors are (1) having a budget process that aligns IT priorities with institutional priorities, and (2) viewing technology as a source of competitive advantage."
>
> *Information Technology Funding in Higher Education – Key Findings*
> by Philip J. Goldstein and Judith Borreson Caruso
> December 2004

The cost of technology

The growth rate for spending on information technology is something that makes almost everyone in higher education uncomfortable. It really does seem extraordinary that we can all remember a time – not that long ago – when there was no IT budget, when there were no expenses in this area for these kinds of items. And it all started rather slowly, having begun in most schools on the administrative side for one-time items in the category of "data processing," then growing to include on-going expenses for one or two computing staff members, then yearly maintenance for the increasingly expensive hardware, then a bit of support for some faculty members who wanted to try some things out, and then installing labs and "smart" classrooms that seemed like one-time capital expenses. By that time, we were already seeing a steady creeping upward of these line items, but many of us still imagined that most of what was needed could be handled through special and episodic funding – just pour some money into this area for important, but infrequent, special needs and not have to think about it again for a long time.

Of course, we have seen how misguided this thinking was. Not only is there a fundamental ongoing-ness to our need for technology and its need to be supported, but we have also seen a number of special points at which the pace of growth has actually accelerated – the introduction of personal computers, campus networking (especially to the residence halls), modern administrative information systems, and the growing interest for technology in the classroom. Each one of these milestones has created more users, more applications, and more need to provide support.

To now be faced with the need to carve out a certain definite portion of the institutional budget each year to fund and support technology, and to be further faced with the likelihood that this portion will continue to grow is very, very difficult. Nevertheless, that is the situation that every college and university finds itself in today. In environments that are undergoing budget cuts and other financial challenges, as CMU is, the situation is even more problematic.

It is very appropriate to ask whether all of the IT dollars are being spent in the most effective ways, whether the University is getting the return on its investment in technology that it ought to, whether the University has set appropriate levels for its technology environment (neither extravagant nor short-sighted), and whether there may be ways that the University can reduce at least some of the expenditures in this area. These questions should always be asked, and we will help answer them in this section. But it is also important to approach this with realistic expectations and to understand that while certain IT costs are dropping – notably, hardware and hardware components – most costs, especially for labor, are not. That means that just about everything that surrounds a user's ability to make use of the increasingly inexpensive hardware: the software, the installation and replacement, the training, the troubleshooting, security, viruses, moving forward with new technology, and on and on – all of these labor-intensive activities – is growing ever more costly. The Gartner Group, a well-known technology research and consulting firm, came up with an excellent term for this: the *Total Cost of Ownership* (TCO). Some in higher education feel that Gartner's estimates of the overhead associated with supporting technology are more suited to the corporate world than to academe. But the basic principle is ignored at some risk – every addition of hardware, software, or enhanced functionality brings a substantial support and maintenance cost with it, a cost that is ongoing.

It is clear that the TCO of each computer today is rising. At the same time, there are more users each year. And also at the same time, most users want to do more, and more of what they want to do is complex and sophisticated. When we take all of this into consideration, it becomes more understandable why IT costs at all institutions are going up. And certainly this is not about technology for its own sake, but as a means to an end – the better running of our universities, the enhanced ability to teach and learn.

Further complicating this difficult financial picture is that the benefits of technology are very hard to quantify – much harder than quantifying the costs. There is no doubt that the benefits are real and important, but they defy the approach of the traditional cost/benefit analysis. Higher education is still struggling with issues such as measuring the increase in student learning, or quantifying the importance of improved customer service.

IT Resources and Staffing at CMU

What we have talked about so far is what is happening everywhere, but there are further considerations that are special to CMU. As we mentioned earlier, our review of CMU's IT environment leads us to the conclusion that it is, in many respects, just as it should be: professionally managed, solid, up-to-date, and reasonably problem-free. *That means that the University is receiving a good amount of value for its current technology investment.* It is too easy to take all this for granted, much the way we take for granted the electricity that flows from a wall outlet or the dial tone from a telephone. But IT is very different from these other utilities – the reliability and dependability of technology is much more tenuous and unpredictable. It takes a tremendous amount of effort, training, dedication, and experience to create the kind of IT environment that CMU has, and yet it has all been done, as best as we can tell, with a careful and prudent expenditure of resources.

We are very concerned, however, that CMU is not spending enough on information technology relative to its aspirations and expectations for service. We reach this conclusion by comparing CMU with other similar institutions. CMU is very much like many of the universities that we visit in a number of ways: a large number and variety of programs, numerous distance learning and remote locations, colleges and programs that depend heavily on high-tech facilities, programs that compete with other institutions for faculty and students. The information we have for similar (Carnegie Class – doctoral intensive, physical environment, enrollment numbers, educational goals and aspirations, tuition, and governance structure) schools[1] tells us that for 2004:

- The total number of OIT central staff is **25 percent below the average** number of staff at similar institutions with similar enrollments.
- The proportion of centralized OIT staff to total IT staff is **much lower at CMU** than at similar institutions (The ratio at CMU is about 50/50; at similar institutions it is about 70/30)[2].
- The total central OIT budget-per-student at CMU is **half of the average** central budget-per-student at similar institutions.
- The percentage of the institutional budget represented by central OIT at CMU is **more than 42 percent lower** than at similar institutions (3.0 percent versus 5.2 percent).

[1] Based on data from 72 public universities surveyed by the Campus Computing Project (http://www.campuscomputing.net/), data on 164 public and private universities surveyed by the EDUCAUSE Core Data project (http://www.educause.edu/apps/coredata/index.asp), and data on 40 doctoral-intensive public institutions kept privately by us. See Appendix E for a list of the institutions.

[2] We used 70 for the number of central IT staff and an estimate of 70 for the number of decentralized staff – see Appendix C.

Further, the number of central OIT staff is declining at the very same time that services are increasing. In the last few years, for example,

- The number of servers supported centrally has risen
- The number of connected network ports has risen
- The number of mediated classrooms has risen
- The amount of applications software to support has risen
- The number of Help Desk calls has risen
- Virtually no services have been eliminated

It is, of course, difficult to get full and complete comparability between CMU and other institutions. However, we can conclude from these numbers that *CMU's IT expenditures and staffing are at the very low end of the range of spending by its peer institutions*. Further, to maintain an appropriate technology environment with satisfied and productive users, it is realistic to expect some increase in the technology budget each year.

It is probably true that many, if not most, of the offices at CMU can make a claim of being understaffed. There is no question that budgets are tight and that the situation in Michigan is very difficult. However, we believe that a good case can be made for the extremity, and perhaps the uniqueness, of the gap between what exists in IT at CMU and what should exist for the University to be able to move forward in the right ways. We are talking not just about the "invisible" utility function of IT – that is largely taken for granted anyway – but we are talking about the services as well, both centrally and decentrally. It may be that there are other offices at CMU like OIT that serve this large number of campus constituents that are understaffed by 25 percent. There may be other offices at CMU where staff who were hired for "normal" working hours are expected to routinely work nights and weekends and to not take their full vacation accruals. It is more likely, however, that an office that is having such severe shortages will just cut back on the services it provides; it may take longer to accomplish certain tasks, or there may be less availability of "open" hours than there was in the past.

Since we cannot responsibly recommend that the University add more staff to the IT effort, this cutting back is also what needs to happen in IT. As we discussed earlier, the services and resources that the IT staff provide, both centrally and decentrally, need to be prioritized against University goals and objectives. This should happen with the understanding that the list of demands far exceeds the supply and that the items toward the end of the priority list are likely to never get done if resources remain the same. It also must be recognized that some of the services that may be cut are already considered "essential" by the University community, such as the reliability of the network.

Should more financial resources become available in the future, we recommend that additional IT staff be acquired as soon as possible.

Technology renewal

CMU needs to have a funded automatic replacement and renewal policy for all of its hardware. There are several points to be made about the renewal and replacement of technology. The first is that software life-cycles are much shorter than hardware life-cycles – new versions come out more often with important and useful new features – and this is coupled with the fact that each new version of the software is likely to be both larger and more demanding on the hardware than the previous version. Thus it happens often that an individual computer, while certainly not obsolete in any physical sense, will slow down, or start "acting" funny in unpredictable ways, or crash more often, or whatever, simply because a software upgrade was installed on it that uses the hardware resources in new and more demanding ways. Adding new software packages to existing hardware is often another source of hardware "fatigue," and this also has a cumulative effect, so that adding even very small new software packages (for example, a new time clock, a new pop-up ad stopper for web browsing, or a new way of providing virus protection) can result in a highly demanding software environment. As vendors bring out new versions of their operating systems, it becomes harder to support older machines. In some cases the older machines can be brought up to the new level of the operating system, which involves cost and labor. In other cases, the hardware is not capable of supporting the new operating system. This creates a multi-level environment that is hard to manage and sometimes prevents the employment of features of the new operating system that make support easier.

A second point is that the older the hardware, the more often it will break down. Desktop and laptop computers are simply not designed to be long-lived. And, as we all know, these breakdowns can often be very difficult to diagnose (Is it the hard drive? Are the internal connections dusty? Has a wire come loose? Have I run out of GDI resources?), and then to fix. So support costs go up as hardware ages, and then they tend to go up exponentially once hardware reaches a certain point (although that point varies from machine to machine and is very hard to predict).

A third point is that hardware capabilities are changing quickly, so that a typical desktop machine today will look very different than one of four years ago. Today's "standard" computer will typically have a speedier CPU, more memory, a much larger and faster hard drive, a number of USB ports, a CD and DVD burner, a network interface card, better graphics handling, and any number of other things that are important and necessary, but missing from the standard configuration of four years ago. Is today's computer too powerful for some purposes? Yes, that may be true in some cases, but it is also about a quarter of the cost of the same configuration of four years ago. And a user's purposes also

tend to change very quickly – a machine that is used now for "just" e-mail and web surfing may well be used for curricular software or photo editing within the year.

When all of this occurs: the software outpaces the hardware, the machine starts to break down more often, and newer machines are less expensive, what we may very well have is somewhat functional, but entirely obsolete equipment. And even though the need to replace obsolete equipment may not always be obvious or visible, it is there nonetheless. For all of these reasons, most colleges and universities today have regular replacement cycles; they are usually three years for student labs and four years for faculty and administrative offices. These cycles should apply to both the centrally funded equipment in public labs and specialized labs (funded by the student technology fee) and the equipment that has been funded locally. Although some departments have made provision for this, all should.

Again, we recognize the current financial situation at the University presents a challenge to being able to fund technology renewal. We recommend, however, that when new equipment is acquired, a strategy for its eventual replacement be considered at the same time. Given the current budget constraints, this may mean that not as much new equipment is acquired, but we feel that is an appropriate trade-off.

Possible rearrangements of services

We took a hard look at this, and observed only a limited number of areas that we thought were likely candidates for rearranging services, *possibly* leading to lower expenditures. As we mentioned earlier, we do not think that consolidating IT staff through decreased decentralization would be good for the University. Other than that, we suggest:

- Discontinuing assistance for home computers of faculty and staff
- Possible outsourcing of certain service areas, such as telecommunications and machine operations (operations is very likely to change dramatically in the next few years anyway as CMU lessens its dependence on mainframe computing)
- A new strategy for the student systems project (see the section, below, on the SAP Campus Management Project)
- A laptop mandate for all students, or students in specific programs, could eventually reduce the costs of creating and maintaining labs. This is a complicated issue that many institutions are looking at, but early patterns are beginning to suggest that in addition to the educational benefits of a laptop program, there may be some financial benefits as well. (There are usually significant startup costs, especially in support services and wireless networking.)

The need for Service Level Agreements

As we noted earlier, the demands for IT services and resources outstrip the supply. But this is true in every institution today and will continue to be for the foreseeable future. Determining priorities for those limited resources will help, as we discussed. Another important tool to manage the gap between supply and demand is Service Level Agreements (SLAs). SLAs help manage expectations in a way that can be readily understood and accepted by the users.

The outcome of a properly negotiated Service Level Agreement is a document that specifies what can be accomplished with the current resources, and how those accomplishments will be measured. This process of negotiation encourages each part of the institution to define what services they expect from OIT within the limitation of available resources and helps to establish realistic expectations. It also encourages staff to search for alternative solutions when users make demands beyond the scope of the agreements.

The only example we saw at CMU of an OIT Service Level Agreement was the one with the Office of Scholarships & Financial Aid. This document clearly spells out the shared responsibilities between the two offices for their information system. Other than this, OIT has what it calls “service standards,” but these are not the same thing as Service Level Agreements. For example, OIT describes on its website (http://www.it.cmich.edu/helpdesk/helpdesk_services.asp) in considerable detail the services provided by the Help Desk. It is a very user-friendly description, very accessible and informative. Contrast that, however, with a Service Level Agreement associated with the Help Desk at Baldwin-Wallace College http://www.bw.edu/resources/infotech/about/policies/ITServices.pdf):

HelpDesk –Technical Support for Faculty & Staff
The IT HelpDesk provides technical support to faculty and staff for all college-owned computers purchased by IT. Concerns with computer hardware, software, printers, email, and any network difficulties should be reported to the HelpDesk. Hardware and software that is not purchased by IT, in consultation with IT, or approved by IT can not be supported and should not be connected to the campus network.

When a trouble call is received, the HelpDesk operator will log the call into the Remedy© database and determine the proper course of action. If required, a HelpDesk technician will be assigned to resolve the problem. Technicians receive work/help requests via the HelpDesk in a prioritized order and should not be called directly. Technicians cannot be responsible for calls or voicemail sent to their direct dial line.

1st Level Support – The HelpDesk support staff strives to resolve as many problems as possible during initial phone contact. When indicated (and with the user's consent), a HelpDesk professional can take control of a faculty or staff member's computer and remotely correct a problem. If the problem cannot be resolved within a reasonable amount of time, a call ticket will be routed to a technician for 2nd level support.

2nd Level Support - The technician assigned to the problem will contact the user within the time period indicated by the priority level below. If the technician is unable to resolve the problem over the telephone or remotely, an appointment will be arranged.

Priority Levels

- **Priority 1** – Computer Lab or Classroom Multimedia Cart (when class is in session)
  Response Time: Immediate
- **Priority 2** – Computer Lab or Classroom Multimedia Cart (when class is not in session OR time-sensitive administrative business functions as defined by the Director of IT)
  Response Time: Within 4 hours
- **Priority 3** – General hardware and software problems
  Response Time: Between 4-16 hours depending on technician workload
- **Priority 4** – Non-critical requests for service (software installations, relocations, etc.)
  Response Time: Between 1-4 days depending on technician workload

Note how clearly set the expectations are in this example. It is also important to understand that these were not unilateral dictates from a central IT office; this SLA was negotiated with the users so that service levels were both acceptable and fully understood by the service providers and the service receivers.

Related to SLAs, there should also be more transparency about how requests and problems are being dealt with. Users should be able to see online who is working on their problem, what has been done so far, and when they may expect resolution. Users also need to be clear on when they will be charged by OIT, for which services, and how much.

Sources of additional funding

We are not fully aware of all of the grant funding that is happening at CMU at the moment, but we imagine that although there may already be quite a lot of it, more could be done in this area. Federally supported programs are generally aimed at encouraging innovative results, rather than just subsidizing a campus's technology costs. This makes it vital to encourage faculty innovation and to cement a partnership between OIT and faculty standouts. To do this, it will be important for OIT to see itself (perhaps as a partner with FaCIT) as having a larger role in the development of technologically enhanced learning than just providing the operational infrastructure.

Increasing the student technology fee could be a way to raise more funds. We note that the Technology Planning Board did a study in 2003 of what other Michigan universities are doing in this area. (According to the *2004 Campus Computing Survey*, the average annual fee for full-time students is $115.) It could be fruitful to update this study and see if there is room for a raise for CMU. Even a small one could make a big difference, given the University's large enrollment. Charging students for printing, or printing over a set limit, could be another source of revenue.

Finally, an idea that some institutions have now begun to pursue is establishing a technology endowment (the University of Washington for one, see http://www.uwb.edu/gfo/technology.html). Building up a continuous stream of endowment income to fund CMU's technology environment would be of enormous benefit to the University.

Area 4: The SAP Campus Management Project

Like many at CMU, we are concerned about the SAP Campus Management project. This project has been going on for a long time, at least two years, yet despite a great deal of hard work and good intentions on the part of many people, it has not produced any tangible results. The lack of a modern student information system represents a significant gap for a university like CMU, and the gap grows larger with each semester that the system is not in place.

We did not see a project plan or a project budget. However, we believe that the current goal of being able to do registration in the spring of 2006 possibly could be achieved, but only with the most bare-bones implementation. We also believe that it could be as long as an additional three years for a full student system to be in place. We are very concerned that due to inexperience with such massive projects, the work required to achieve the results that the University needs is being substantially underestimated.

There are two major difficulties with this project: the software and the implementation process. Each of these is discussed below.

SAP and the Campus Management software

The SAP student software is very immature relative to other products available; as a result, CMU is literally building a student information system. In an environment in which resources are constrained, this kind of development activity should be a rare exception, since it is so expensive. It is possible that CMU acquired the software license from SAP for a very good price, but unless it was free (and CMU has learned that a large proportion of the cost of a project like this is for professional services) and unless CMU will have the opportunity to share future profitability with SAP from future sales to other institutions, it is difficult to understand how the expense of this development work can be justified.

The gaps between what currently exists in the software and what CMU needs are extremely large; for example, every report has to be written from scratch. In contrast, the student systems from other companies such as SunGard SCT, Datatel, and Jenzabar all come with hundreds of standard reports that only have to be tailored to fit each institution. In addition, there is a great amount of basic functionality missing from the SAP software. Just a small example is the need to program what is required of a student to get into each class – permission of instructor, a portfolio, etc.; in other systems,

these requirements can be specified by the end user and easily changed whenever necessary. Another example is the lack of a housing module – we understand that CMU is preparing to acquire this software from another source – at additional expense. All of this missing functionality has to be created for CMU or acquired elsewhere. Student systems from vendors that have been able to develop a more mature product already have a full set of functions (we have included an example of full functionality in just the student records and registration area in Appendix B).

The immaturity of the software is one drawback, but there are others as well. SAP is new in U.S. higher education, relative to its competitors. This means that there will not be a large users group for CMU to belong to and to share resources with. Having a users group is one of the important advantages to acquiring commercial software and, among other things, provides leverage with the company to be customer-oriented.

The Gartner Group, a firm that does research and analysis on technology companies, has placed SAP in its lowest category on both "ability to execute" and "completeness of vision." Of the seven companies that Gartner studied in 2004 for higher education administrative software, only one ranked lower than SAP.

The implementation process

The second problem is the implementation process itself. The organization of the project is incomplete, having no vice-presidential sponsorship, no Project Manager, and no dedicated programmers. It is not surprising that given these gaps, the project has not made much progress.

Project organization and approach are extremely important ingredients in a successful implementation. Interestingly, SAP has a paper on its website called "Higher Education ERP: Lessons Learned," (http://sap.ittoolbox.com/documents/document.asp?i=1501) written by two CIOs who have implemented large systems (neither one was an SAP system). One of the sections has to do with project organization:

> *Without question, one of the most important decisions to be made on an ERP project concerns the selection of a project manager. The project manager is the general that will lead the troops into battle. This person needs to be a leader and have the respect of the troops and university administration. It is better if they are an insider and have loyalty to the university. But, it is also necessary that an experienced project manager be selected – a professional. If your logical choice for project manager is a person who has superior knowledge of the functional area, but no formal project training or experience, be very careful. We found the ability to efficiently and*

effectively run a large project to be the single most important attribute of this key individual, far outweighing any other factor. If experience is not available, at a minimum make sure you send your designee to formal project management training. The next suggestion is that a standard project methodology be adopted that provides some guidance and structure to the project. Next, it is necessary to select a manager for the functional side and also one for the technical side of the project. Individual teams, such as the grants management team, needs to have a lead identified. The project manager needs to report on a weekly basis to a group of executive sponsors, generally composed of the Functional VPs (e.g., CFO) and CIO. A larger group, that comprises an Executive Steering Committee, will provide periodic strategic guidance and support to the project. Some schools have additional advisory committees, such as process owners, who provide focused input from users.

We agree fully with this analysis. Having worked with many institutions on planning for system implementations, we can attest to the fact that given the size, scope, and expense of these projects, there are certain things that must be in place to minimize the risk of failure. In fact, we have identified Critical Success factors that need to be present to ensure a good outcome:

- Consensus-based decision-making with what is best for the University as the guiding principle
- Support and enthusiasm from the top administration
- Community ownership and leadership of the project
- Excellence and commitment from the technical staff and a sense of partnership with the user community
- An information system provider who understands and reflects the institution's own goals, objectives, and culture
- Sufficient resources, including human resources, to do a good job
- Strong project management and planning skills, including a strong project organization
- Communication at all levels

We are concerned that CMU's project is lacking in many of these areas. In addition, the Title III Program at CMU has recently had a formal evaluation, and the findings cited some serious gaps in the current project in the areas of structure, planning, and communication.

A different strategy

We recommend that the University pause the Campus Management project as soon as possible and instead, take a step back to review all of its possible options at this stage. Each option should be examined carefully in order to answer the central question: How much will it cost and how long will it take to achieve success in this area?

We realize that this would be a radical step for the University to take at this point, and we would hope that all of the hard work and time, care, and energy that have been put into the implementation thus far would be preserved as much as possible. But we are convinced that the University should undertake an immediate review that considers the following:

- Given the initial plan, how well has the project met its goals and objectives so far? Has this project been a success so far for CMU?
- How well are the original budget and timing estimates being met? Did they have to be adjusted along the way? What are the current budget and timing estimates to complete the full Campus Management implementation?
- If changes have been necessary along the way, what was the nature of these changes and were they done appropriately?
- How well has SAP as a company performed? For example, how good has the training been? Has software always been delivered on time? Has the software been reliable and robust? How has the company handled bug fixes and other problems?
- Are there any things during the implementation so far that might have been done differently, so that appropriate adjustments could be made now?
- What specific things should be done next in the implementation if the University continues with Campus Management?
- Are there better (less expensive, more cost-effective, more reliable) software options available? What are likely to be the costs of a major shift in direction and will these costs be offset by future benefits? What is involved in searching for a new software vendor?
- What are the issues in changing software vendors at this point? How do we preserve the work that has already been done?
- If the University does decide to look for new software, what are the implications of a best-of-breed approach, given that CMU already uses SAP software for financials and human resources?

It is, of course, possible that such a review will find that continuing with Campus Management is the best option overall. We are not presuming otherwise at this point. But we are suggesting that given the difficulties with this project, the University owes itself a thorough look at alternatives that could produce a quicker and less expensive result.

Once the review is done, the University then needs to put a robust and realistic project plan into place, incorporating as many of the Critical Success Factors as possible.

Summary and Recommendations

Technology should be…
- Reliable
- Integrated
- Secure
- Accessible
- Adaptable/flexible
- Efficient
- Usable

Marymount University Technology Committee
April 13, 2004

The following specific questions were asked in the RFP for this project. We answer them below in summary form; additional details can be found throughout the report.

1) Review of the Current State of IT Operations

- Appropriateness of funding model and financial resources
  - *IT as a whole at CMU is substantially underfunded compared with similar institutions of its type and aspirations. On the other hand, the University has managed to fund pockets of truly outstanding technology facilities.*
  - *The technology fee has been in place long enough to have had a profound effect on the facilities available to students.*
  - *A long-range, sustainable financial plan for supporting and renewing equipment and infrastructure is lacking.*

- Capability, capacity, and resources, including software, equipment, and technologies

- *100% mediated classrooms, some showcase classrooms and labs, sound network, wide range of software.*
- *Servers are being maintained with strained resources in some cases.*
- *Student administrative systems are subpar; timely and adequate replacement by SAP is in doubt at this time.*

- Staffing and organization both central and decentralized
  - *Both centralized and decentralized staff are providing good service. Tensions and gray areas in the relationship between the two support models should be resolved.*
  - *IT is understaffed across the University, relative to the services IT staff are expected to provide.*

- Policy and practice
  - *Some good and effective policies are in place, such as the "Computing And Network Resources Policy"*
  - *Current policy bodies are too many, too overlapping, and too weakly charged.*

- Summary of strengths and weaknesses of the existing operations
  - *Generally good in small, routine matters; weaker in hard problems, support for niche products, major projects, long-term development, future-looking technology research.*

- Effectiveness of determining the total cost to the university (e.g. maintenance, upgrades, staffing)
  - *Cost of decentralized IT support and maintenance is not accurately known to anyone at CMU.*

- Utilization effectiveness of current technology throughout CMU
  - *Clearly on an upward path. For example, course management technology has changed both student and faculty expectations. The effectiveness is uneven, which is not surprising in the absence of an overarching planning and monitoring process based on an institutional vision.*

2) Recommendations for the FUTURE of CMU IT operations

- Funding model and financial resources (actual and ideal)
  - *The ideal would be to double the financial resources available for IT, to increase central IT staff by at least 10 positions and to increase decentralized IT staff by at least 5 positions. This would put CMU more in line with its peer institutions, and would allow IT to function as a strategic resource in endeavors such as increasing CMU's focus on research.*

- *The actual will likely stay static for at least the next year, in which case, CMU needs to make some challenging priority decisions.*

- Identify technological capabilities, capacities, opportunities and resources, including the advantages and disadvantages associated with increased standardization of software and hardware
  - *If increased standardization of software means reducing the number of titles supported or permitted on campus, this doesn't seem possible without dropping below what is currently the standard for universities of this type. One possible exception due to its universal applicability: there should be one antivirus package.*
  - *Now any unit can strike its own deal for hardware, software, or service contracts. This should be reconsidered in favor of using the University's overall purchasing power more widely.*
  - *Selecting software in the academic setting is often a very important part of designing instruction, and is appropriately left in the hands of academic decision-makers rather than technical staff. That doesn't mean that every individual faculty member has the right of "academic freedom" to buy and use any version of any package. But it does mean that the setting of standards in instructional software should be done by the people responsible for the quality of the curriculum.*

- An ROI model that CMU would utilize to determine whether implementation of technology initiatives is desired. Example: anticipated utilization levels, timeline to maximize investment, etc.
  - *Sometimes the return on investment in technology can be identified very clearly (such as distance learning courses). In other cases, the aim is to enhance existing programs in intrinsic ways that don't generate additional revenues directly, but do boost the effectiveness and prestige of the University (such as mediated classrooms). If a single ROI is followed rigorously, some kinds of benefits may tend to be dropped out. The most rational plan is to tie new technology initiatives to carefully thought-out strategic goals of the institution and then to monitor the results carefully to see if the money spent really moves the institution close to those goals in measurable ways.*
  - *Some institutions use a rigorous quantitative model to determine priorities. An example is given in Appendix D.*

- Essential services or functions that CMU currently does not provide including anticipated costs and benefits to CMU for providing such services
  - *There is nothing "essential" that CMU is not currently providing. The major changes between what is happening now and what should happen have to do with governance, planning, and communications, all of which have no "direct" costs associated with them.*

- *Wireless networking will become essential before too long.*
- *Development of curricular computing and additional support for faculty development is already happening, but the University may decide that it needs to happen faster.*

- Capabilities or technologies that CMU could reduce or eliminate with the least campus-wide impact and/or student impact
  - *It is possible that outsourcing of certain services may lead to cost reductions; this should be explored.*

- IT functions and services including costs provided by OIT and other campus units that are not critical to the university mission
  - *This is something that the new Information Technology Advisory Board should decide.*

- The appropriateness of the staffing model and organization of IT operations, including the demarcation of roles and responsibilities between central and departmental units
  - *Central IT departments can be organized in many different ways; the current organization at CMU is as good as any. It would be useful, however, to make sure both units within OIT are communicating with each other regularly and effectively.*
  - *Please see the section on Centralization and Decentralization*

- The appropriateness and comprehensiveness of CMU IT policies (include what policies are missing, as well)
  - *The existing policies seem quite appropriate and quite comprehensive at this time. We understand that there is a new policy in being developed that will cover machines that can connect to the campus network; that will be a good addition.*
  - *More important than the polices at any given moment (because they are certain to evolve over time) is how the plans are developed and revised. Policy-making should be moved from OIT and disparate, fractured committees to a more coherent governance structure, with direct involvement from senior staff. Campus policy makers and those responsible for campus programs should set the IT policies, with the help of OIT.*

Summary of recommendations

1. Develop a leadership and governance model for information technology.

- Create ITAB to, among other things, decide what level of excellence in IT CMU needs, and can afford, to be consistent with its academic quality. Since the OIT department reports to the Provost, ITAB should report to the Vice President for Finance and Administrative Services for balance. In its new capacity, this committee will serve as the Institution's "Chief Information Officer" in determining high-level IT policies, broad allocation of resources, and accountability for the progress and success of CMU's information technology efforts.

- Use the two advisory committees for OIT, one for administrators and one for faculty, to make sure that users are determining the *what*, the *why*, and the *when*; and then OIT will determine the *how*. Members of their respective user communities should chair these two committees and the chairs should sit on ITAB. The most important tasks for these committees will be to foster collaboration and to set priorities for IT efforts. These committees will also function as far more than sounding boards or focus groups; they should report on the state of IT at CMU in their respective areas. They should have a regular mechanism for following up on their recommendations and seeing whether they have been carried out and whether they have had the expected results. They should carefully examine policy recommendations that are put forward by OIT and endorse or amend them. The committees should then be the public face that explains those policies to their respective user communities and acts on feedback from the users about the policies.

- Link all of the various IT committees together, as described in the chart in the section on Vision and Planning.

2. Develop a vision for IT, taking into account CMU's particular culture and tradition.

IT will not fully succeed at CMU unless it is designed to be consistent with CMU's culture and other values that give the institution its character. The development of a vision should include a specific requirement to assess whether the manifestations of technology at CMU are consistent with the institution's core values, to correct any ways in which it diverges, and to think creatively about ways in which technology can enhance them.

- Consider a University-wide approach to computer literacy standards for students and professional development for faculty.

3. Create a strategic plan for IT

CMU should create a strategic plan, using the following steps:

- Document the current state (this is largely completed at CMU at this point)
- Determine the planning drivers. These include:
    - Institutional drivers. Examples:
        - Increase student retention rate
        - Attract new industry through workforce development
        - Focus on student assessment and outcomes
        - Become a leader in distance education
        - Put more emphasis on faculty research
    - User-generated drivers; what the users want and need. Examples:
        - Greater use of instructional technology
        - Better access to data in the administrative information system
        - Student portal
        - More training
    - Infrastructure drivers. Examples:
        - More robust and reliable network
        - Wireless networking
        - Disaster recovery/security
    - Technology forecasts and trends (not specific products). Examples:
        - Better, faster, cheaper, smaller
        - Not as good as we want yet
        - The technology is plateauing in some areas

- Create the framework – large, short statements about where IT fits at this institution; strategic objectives. Examples:
    - We want ubiquitous computing on campus
    - We want to be an early follower, not on the bleeding edge
    - We want efficiency and effectiveness to be in balance
    - We recognize the foundational and critical aspects of the network
    - We know that service and support, including training, is as important as the hardware and software

- Delineate specific initiatives for the next (3, 4, or 5) years based on the institution's priorities through an iterative process, consensus-based, each initiative tying back to one or more drivers
    - Not specific vendors or products – that should be decided in other forums.
    - Not detailed operational plans; rather, "a compelling direction and winning strategies"
    - Doesn't have to be all "technology work"; can also be governance, quality control, policy setting, etc.

- Determine and commit the funding (including the possibility of developing new sources)

- Spell out the implementation plan, year-by-year, with specific responsibilities assigned

4. Make sure that centralized and decentralized IT support services are working together in partnership to provide the most efficient and the most effective services to users.

- Think of support services as distributed, not decentralized, to foster the idea of connection and collaboration.

- Change the name of the Distributed Computing Advisory Committee to the Distributed Computing Users Group and have it be chaired by someone other than OIT staff.

- Charge the DCAC with a more active role in fostering coordination, mutual aid, cooperation, standard procedures, and quality assurance in the operation of the distributed support units.

- Encourage good communications among all service providers and look for specific ways to coordinate services to the community, such as providing Mac support, and universal use of the Help Desk.

- Establish minimum standards for certain aspects of local support, such as server administration.

- Make sure that all policies and major procedural changes by OIT are discussed and endorsed by the appropriate governance committee.

- When it becomes affordable, establish liaison staff in OIT to coordinate with distributed support staff

- We endorse the recommendations made by the IT Review Committee to have specific designations for technology expenditures and staff in the University's general ledger, making them easier to track, and to have all technology purchases above a certain amount reviewed to eliminate redundancy.

5. As soon as possible, increase funding levels for IT, especially by adding staff.

Because the needs are already large and because IT usage at CMU will continue to grow, we recommend that the University increase the OIT staff by the equivalent of at least two positions a year for a five-year period, at a total cost of approximately $1.8 million in salaries and benefits over that period. We believe additional staff are needed in at least these areas:

- Systems and server
- Instructional and research support
- Networking

6. Develop Service Level Agreements (SLAs) with all user groups.

These will serve to match user expectations with the department's resources and capabilities. Service level agreements are written standards against which the provision of computer services can be measured and evaluated. These agreements should be worked out with each group of users, stating what kinds of support they can expect from OIT, how long it will take to fulfill the different kinds of requests or solve certain kinds of problems.

7. As soon as possible, institute a University-wide funded replacement program for core faculty and lab desktop/laptop hardware.

As we mentioned in the report, most institutions today use a three-year cycle for lab-based hardware and a four-year cycle for faculty and staff machines. A full cost model would need to be developed for this, including making the determination of whether the funds should come from central or local budgets.

8. Consider ways to increase financial support for technology.

- Increase the student technology fee.
- Pursue additional grant money for specific technology initiatives.
- Create a technology endowment.

9. Pause the Campus Management project as soon as possible and consider alternatives that will reach the goal faster, at less cost.

Whatever the outcome, CMU should establish a project organization that will accomplish the project in the most efficient way. There are many ways to organize, but we suggest the following:

Team	**Membership**
A steering committee for major policy decisions and general project oversight *Reports to President and executive staff; Chair sits on ITAB*	Project Manager (Chair), VP-level project sponsor (Provost), Dean of Students, Registrar, Director of Admissions, Director of Scholarships and Financial Aid, Director of Receivable Accounting, Executive Director of ProfEd, CTO
An operational committee for decisions regarding usage *Reports to steering committee; Chair sits on ATAC*	Registrar (Chair), department heads of all affected offices, at least 2 faculty members, representatives from at least 2 peripheral offices, OIT project manager
Task forces for particular areas, such as:	End users and IT staff

• Reports/data warehouse • Workflow • Transfer articulation • Training • Student billing Each reports to the operational committee	

Note that the task forces are not built around offices or specific software modules; they are built around functions. This is to ensure that the software is being implemented in an integrated way.

Note also that this is a parallel structure to the IT governance committee structure discussed earlier. This is a project-specific structure, meant to be in place just for the duration of the student system implementation.

Appendix A: Additional Resources

Vision and mission statements

St. Francis University
http://www.stfranciscollege.edu/Content/NavigationMenu/SFC_Employees/Information_Technology1/Information_Technology_Mission_Statement.htm

Assumption University
http://www.assumption.edu/dept/cserve/mission/default.php

Carlow University
http://it.carlow.edu/html/Mission.htm

University of Houston
http://www.uhd.edu/computing/mission.htm

University of Oklahoma Health Sciences Center
http://www.ouhsc.edu/it/it_mission.asp

Duke University
http://www.oit.duke.edu/itac/vision.html

Service-level agreements (SLAs)

Baldwin-Wallace College Department of Information Technology
http://www.bw.edu/resources/infotech/about/policies/ITServices.pdf

The Gettysburg University Department of Information Technology SLA

http://www.gettysburg.edu/it/compserv/sla/

Yale's software SLA
http://www.educause.edu/ir/library/pdf/NCP0408.pdf

California State University - Long Beach
http://daf.csulb.edu/offices/ima/its/sla.html

Griffith University – Service Catalogue
http://www.griffith.edu.au/ins/service_catalogue/

Best Practices

The EDUCAUSE Resource Center is a repository for information concerning use and management of information technology (IT) in higher education. It aggregates content submitted by EDUCAUSE, ECAR, Net@EDU, NLII, and EDUCAUSE members. Resources include articles, books, conference sessions, contracts, effective practices, plans, policies, position descriptions and blog content.
http://www.educause.edu/content.asp?SECTION_ID=11

In terms of a standard package of computer center management practices, the best description can be found in "Information Technology, Systems, and Services in Higher Education: A Primer." Unfortunately, this actual publication is not longer available in this form, but it was adapted from a chapter in a book that still is available (from Amazon.com, for instance) called *University and University Business Administration*, published by the National Association of University and University Business Officers.
www.nacubo.org

Strategic Planning for IT

Once again, EDUCAUSE is an excellent source of information about strategic planning, with articles and book chapters, as well as a library of plans from a variety of institutions. Of particular note, see the article, "The Development of Institutional Strategies" http://www.educause.edu/ir/library/pdf/erm0333.pdf.

Appendix B: Functional Checklist for Records/Registration

A modern student information system will do all of the following in the records/registration area:

- Maintain all student biographical and demographic information, including specialized formats for international students.
- Allow students to submit changes of their personal information online.
- Provide multi-level security and access control for data. Provide necessary access throughout the University, while providing sufficient controls to ensure privacy as required by law and University policy.
- Access all relevant data about an individual student in as few screens as possible, in a logical way.
- Maintain a unique system identification number for each student that is different from the Social Security Number.
- Support online self-service registration, both logged into the system directly and via the web.
- Provide a way of insuring that students consult with their advisers before completing online registration.
- For online and web registration, provide current information about closed courses, based on real-time data. If a course is closed, suggest alternatives and selectively add students to a wait list. Check for time conflicts and links to required labs or recitations. Support requirements for instructor and advisor signatures.
- Restrict which students can register during a certain time period, to allow setting priorities.
- Allow rules-based limits on course enrollment. For example, allow the creation of a rule that takes the seats that remain in the course after spring registration and divides them equally among the freshmen who attend each summer advising section, so that the seats are not all taken by the time the last freshman advising group arrives to register.

- Allow priority for registering for a particular class to be based on a student's major, class year, etc.
- Provide capability to automatically enroll waitlisted students in order as seats become available in the course. Automatically notify students and faculty that they have been enrolled.
- Provide the ability to search for open classes based on selected criteria (days, time, GE requirements, etc.).
- Allow for both global and local course maximums (i.e., maintain an actual enrollment maximum and a lower maximum used to manage enrollments during the summer orientations).
- Allow for override of closed section with proper authorization (by Registrar, department chair, instructor, etc.)
- Allow implementation of shared enrollment limit for cross-listed classes.
- At registration, enforce rules and requirements about course eligibility (prerequisites and co-requisites, repeat courses, etc.) and holds.
- Maintain a system of administrative holds that will interface with both registration and transcripting. Allow holds to be overridden only by those with proper authorization. Allow an unlimited number of hold types.
- Allow multiple terms to be active at the same time.
- Allow courses to begin and end on any date.
- Allow course information to be rolled forward to the next semester, selectively by department, term, etc.
- Allow groups of courses to be selected and modified by a global change, rather than one by one.
- Maintain a history of changes to the course catalogue over time.
- Track cross-listed courses and report on them accurately.

- Do classroom/facilities scheduling and reporting.

- Support the automatic generation of semester course bulletins. Support the web publication of schedules, course catalog. Provide the ability to link course schedule and faculty information from the University bulletin to the registration schedule.

- Provide faculty with electronic class lists on demand, both for printing and for downloading into desktop applications.

- Provide a class cancellation process to automatically drop all students registered in the class and generate notification letters for them.

- Provide a final-exam-scheduling module including report generation options.

- Produce and distribute grade sheets to faculty, with a message stating when grades are due. Record all grades and follow up on incomplete grades. Receive grade reports electronically (from spreadsheets or ASCII files created by opscan processes) and allow online direct entry of grades by the faculty. Process grades on multiple calendars.

- Allow faculty to print their own grade entry sheets on demand.

- Produce grade distribution reports by term, department, course, instructor, etc.

- Update GPAs as grades are entered and note which classes should be excluded. Allow rules to control how repeated courses are treated in averaging.

- Provide flexible rules for D and F processing, including rules for which courses can be retaken to replace a D or F grade.

- Calculate rank in class by GPA for all classes.

- Permit plus and minus letter grades.

- Recalculate all relevant information upon grade entry and grade changes, e.g. Dean's List.

- Automatically make grades available on the web. In addition, issue grade mailers or grade hold letters dependent on holds placed by various offices on students' records. Allow multiple copies of grade reports to be sent at the request of the student.

- Provide students with online access to their transcripts, grades, GPA, declared major and minor, schedules, and other academic records, through a web browser and the telephone. Provide a student with the ability to print an unofficial copy of his/her transcript.

- Maintain and issue transcripts including maintaining "hold" status from information received from Financial Aid, Student Accounts, and elsewhere. The transcript must be University-specific and have flexible format. Support transcript automation: production (including multiple transcripts for one student), record, and history of requests. Create transcripts: view dates, courses in process, advanced standing, transfer credit; allow exceptional additions and notations on transcripts.

- Provide the ability to enter transfer credit awarded. Allow the use of University course numbers when granting transfer credit.

- Maintain a historical course articulation file to be used in awarding transfer credit.

- Provide advisors access to advisees' records, including enrollment records for advising purposes.

- Support "what-if" course program planning (to map options for programs of study) for advisors to use with their students.

- Provide both summary and detailed degree audits and the ability to generate audits for selected groupings of students (e.g. certain majors).

- Provide a complete online, easy-to-use, self-service degree audit function, including the use of wild cards for creating program requirements. Allow "what-if" analysis and the capability to roll information forward from year to year. Accommodate cross-listed and repeated courses. Allow for the waiving of requirements, course substitutions, and changes to requirements for individual students.

- Make degree audit information available to students and advisors via the web.
- Calculate major, minor, and overall GPA.
- Provide the ability to identify those students who have completed/not completed specific requirements/entire program, etc. to support enrollment planning and forecasting and graduation tracking.
- Allow students to have multiple majors, minors, and advisors.
- Provide an audit trail on steps in records processing, history of changes.
- Provide online student and faculty directory look-up, based on real-time data.
- Assure student right to privacy by adhering to FERPA and Buckley Amendment standards.
- Interface with Student Accounts to track outstanding tuition/fees and other holds before releasing diploma to student.
- Support satisfactory academic progress checking for financial aid as required by federal and state regulations, including the automatic generation of appropriate letters.
- Provide automated academic dismissal and probation processing and tracking, including letter generation options.
- Provide automatic notification to faculty and department chairs when a student withdrawal is processed.
- Provide historical tracking of the following: academic dismissal, academic probation, academic deficiency, class rank, Dean's List honors.
- Provide automatic posting of degrees awarded.
- Generate enrollment verification letters and track historically where the verifications have been sent.
- Track leave of absence and reason along with a correspondence stream to be able to maintain contact.

- Produce IPEDS reports.
- Provide flexible and powerful standard reports, such as grades distribution, faculty load, course information, schedule of classes, enrollment reports, rosters, and class schedules.
- Provide flexible query and reporting tools.
- Support all government requirements and regulatory changes, such as changes in the requirements for IPEDS reporting.
- Allow the generation of labels, personalized correspondence, and email for selected groups of students.
- Provide an easy means to create/edit a customized screen of most frequently used data.
- Maintain a student in context without reentering the student ID number while moving from screen to screen.
- Provide complete and real-time integration of room use information between the classes and events.

Appendix C: Decentralized IT Resources

Note that this is just an initial attempt to quantity and to total decentralized IT resources. The information in the table is not complete; the entries that are there are "best guesses" at this point and need to be verified.

Area	IT staff[1]	2004-2005 IT expenditures[2]	Servers[3]	Labs[4]	Fac/staff Computers
College of Business Administration	3	80,000	19	8 (+1 mobile)	
College of Communication & Fine Arts	4	43,000			425[5]
College of Education and Human Services	1	0	0		
College of Health Professions	5	19,500		11	
College of Humanities and Social and Behavioral Science	2	131,400	7	17	500
College of Science and Technology	8		23	30 (+1 mobile)	458
Professional Education	11				
Admissions	1				
Registrar's Office	2	11,290	1		35
Scholarships & Financial Aid	2		0		
Finance & Administrative Services	15	180,000			
Residences & Auxiliary Services	3	330,000		14 (2500+ student computers)	100
Faculty Center for Innovative Teaching (FaCIT)	8	500,000	7	1	33
Libraries	5	87,067			
Total	70				

[1] Does not include students or unpaid interns
[2] Does not include salaries or student wages
[3] Does not include servers maintained by OIT
[4] Some are combination lab and classroom
[5] Includes lab computers

Appendix D: Priority Setting

Establishing a rational priority-setting structure

Basic principles

The structure should be developed through a collaborative effort. This should not be seen to be an IT department device; this is a tool for the institution, and a representative group from the institution (such as the IT policy committee) should determine its nature.

Once the structure is in place, there should be no end runs around it, for any reason. The first time there is a successful end run is the last time anyone will take the structure seriously. That is not to say that emergencies should be ignored. The structure itself should accommodate genuine emergencies. Furthermore, once the structure is in place, insofar as it will represent the institution's own sense of what is important and what is not, it should not change very often.

The structure should apply to all technology work and all technology resources, large and small. It should be such that the same criteria are used whether the project is a small, two-hour bug fix or a large, three-year initiative. ("Fitting small things in" just because they're small, is often one of the causes of not having room for the big things.) In this way, everyone working on a project, regardless of its nature or impact, will always know they are working on the most important item possible. And the institution will have the same assurance.

It is crucial to make the distinction between urgent and important. If something breaks, that immediately instills a sense of urgency. In fact, however, it may not be important to fix it right away. This is not an intuitive concept, and may be particularly hard for the IT department people to adjust to (IT folks usually *hate* it when something is broken). Nevertheless, it is one of the basic principles of rational priority setting.

Having objective priorities removes the "bullying" factor from resource allocation. No one has to yell or scream, no one has to make a dramatically threatening case of the dire consequences to befall the institution if Project X is not done, no one has to take a "no" personally (and no one in IT has to feel guilty about saying "no," because, in fact, it won't be any of them saying it). If someone gets a "no," it will be because of an institutional decision that determined, on an objective level, that this particular request is not as important as the ones currently being fulfilled. It may be that this request will

become more important at another time, and having a queue of requests is certainly appropriate. But the point is, these are *institutional*, not IT department decisions, and they are made as a result of the business cases behind them.

Example
The table below shows one structure to consider for setting priorities. The actual criteria used, and the weights given to each one, should be institutionally determined. This is just an example of what might be done:

Rank	Criteria	Weight	Measures
1	Internal/External	5.0	Required by law (+3) Required by internal policy (+2) Satisfy external mandate (+2) Satisfy internal audit needs (+1)
2	Function involved	4.5	High priority (+2) Moderate priority (+1)
3	Income generating	4.0	Increase income (+2) Stabilize current income (+1)
4	Future possibilities	3.5	Reduce reliance on IT (+2) Generic approaches (+1)
5	Constituency serviced by size	3.0	More than 100 (+2) 30 - 100 (+1)
6	Staffing	2.5	Staff reduction (+2) Staff stabilization (+1) Staff increase (-2)
7	Asset protection	2.0	Protect assets (+2) Improve asset management (+1)
8	Maintenance or Enhancement	1.5	Maintenance (+2) Enhancement (+1)

The way this table is used is as follows. The Housing Office at College X has made a request for a new program to assign freshman roommates.

1. The request does not have to do with any external laws or mandates, nor is it required internally at the institution. Score for first criterion: 0

2. Because of its contribution to retention, the housing function has been (as an example) identified previously by the College as a high-priority function. Score for second criterion: 4.5 x 2.0 = 9.0

3. The request does not relate directly to income. Score for third criterion: 0

4. The request will not reduce reliance on IT, nor is a generic approach applicable in this case. Score for fourth criterion: 0

5. The constituency serviced will be dormitory-resident freshman, the number of whom exceeds 100. Score for fifth criterion: 3.0 x 2.0 = 6.0

6. The Housing Office believes (as an example) it can reduce its staff by half of one position if room assignments are done by computer. Score for sixth criterion: 2.5 x 2.0 = 5.0

7. The request does not affect the College's assets. Score for the seventh criterion = 0

8. The request in an enhancement to the student system. Score for the eighth criterion: 1.5 x 1.0 = 1.5

The overall score for this request is then found by adding the scores for each of the criteria, for a total of 21.5. This total score should then be considered in relation to the scores of other requests, to determine its priority relative to other work. On that basis, it either becomes a scheduled project or it is put in the request queue for consideration at another time.

This is just an example. The criteria used, the weight given to each one, the actual numbers and so on, are all institutional decisions to make. This is not an easy thing to do, but it only has to be done once. From then on, the actual assessment of priorities is fairly mechanical.

Appendix E: Comparison Institutions

Our comparisons were based on data from 72 public universities surveyed by the Campus Computing Project (http://www.campuscomputing.net/), data on 164 public and private universities surveyed by the EDUCAUSE Core Data project (http://www.educause.edu/apps/coredata/index.asp), and data on 40 public doctoral-intensive institutions kept privately by us.

Unfortunately, the list of institutions from the Campus Computing Project is on paper only; it is not in any electronic form. We will be glad to make paper copies of the list and send it to MSU under separate cover.

EDUCAUSE Core Data project institutions, public and private, doctoral-extensive and doctoral-intensive (164)

American University
Arizona State University
Auburn University
Ball State University
Baylor University
Boston College
Boston University
Brandeis University
Brown University
Carnegie Mellon University
Case Western Reserve University
Central Michigan University
College of William and Mary/
Colorado State University
Columbia University
Cornell University
Dartmouth College
Drexel University
Duke University
Duquesne University
East Carolina University
East Tennessee State University
Emory University
Florida Atlantic University
Florida State University
Fordham University
George Mason University
The George Washington University
Georgetown University
Georgia Institute of Technology
Georgia State University
Hofstra University
Idaho State University
Illinois State University
Indiana State University
Indiana University
Indiana University-Purdue
University Indianapolis
Iowa State University
Jackson State University
Louisiana State University
Loyola University Chicago
Marquette University
Miami University
Michigan State University
Michigan Technological University
Middle Tennessee State University
Mississippi State University
MIT
Montana State University-Bozeman
New Jersey Institute of Technology
New Mexico Institute of Mining and
Technology
New York University

North Dakota State University
Northeastern University
Northern Arizona University
Northern Illinois University
Northwestern University
Oakland University
The Ohio State University
Ohio University
Oklahoma State University
Princeton University
Purdue University
Rensselaer Polytechnic Institute
Rice University
Rutgers, The State University of New Jersey
Saint Louis University
Seton Hall University
South Carolina State University
South Dakota State University
Southern Illinois University at Carbondale
Southern Methodist University
St. John's University
Stanford University
Stony Brook University
Syracuse University
Temple University
Tennessee State University
Texas A&M University
Texas A&M University-Commerce
Texas A&M University-Kingsville
Texas Christian University
Texas Tech University
Tufts University
University at Albany, SUNY
University of Akron
University of Alabama at Birmingham
The University of Arizona
University of Arkansas
University of California, Berkeley
University of California, San Diego
University of California, Santa Barbara
University of California, Santa Cruz
University of Central Florida
University of Chicago
University of Cincinnati
University of Colorado at Boulder
University of Colorado at Denver
University of Dayton
University of Delaware
University of Florida
University of Georgia
University of Hawaii
University of Houston
University of Idaho
The University of Iowa
University of Illinois at Urbana-Champaign
University of Kansas
University of La Verne
University of Louisville
University of Maine
University of Maryland
University of Maryland Baltimore
University of Maryland, Baltimore County
University of Massachusetts Amherst
The University of Memphis
University of Miami
University of Michigan-Ann Arbor
University of Minnesota
University of Mississippi
University of Missouri-Columbia
University of Missouri-Kansas City
University of Nebraska - Lincoln
University of Nevada, Las Vegas
University of Nevada, Reno
University of New Mexico
University of North Carolina at Chapel Hill
University of North Carolina at Charlotte
University of North Carolina at Greensboro
University of North Dakota
University of North Texas
University of Northern Colorado
University of Notre Dame
University of Oklahoma
University of Oregon
University of Pennsylvania
University of Rhode Island
University of Rochester
University of San Francisco
University of South Carolina
The University of South Dakota

University of Southern California
University of Southern Mississippi
The University of Tennessee
The University of Texas at Arlington
University of Texas at Austin
University of Texas at Dallas
University of Texas at El Paso
University of the Pacific
The University of Toledo
University of Tulsa
University of Utah
University of Vermont
University of Virginia
University of Washington
University of Wisconsin-Madison
Washington State University
Wayne State University
West Virginia University
Wichita State University
Widener University
Worcester Polytechnic Institute
Yale University
Yeshiva University

Public, doctoral-intensive institutions kept privately by us (40)

Ball State University
College of William and Mary
East Carolina University
East Tennessee State University
Florida Atlantic University
George Mason University
Idaho State University
Illinois State University
Indiana State University
Indiana University-Purdue University Indianapolis
Jackson State University
Miami University
Michigan Technological University
Middle Tennessee State University
Montana State University-Bozeman
New Jersey Institute of Technology
New Mexico Institute of Mining and Technology
North Dakota State University
Northern Arizona University
Oakland University
South Carolina State University
South Dakota State University
Tennessee State University
Texas A&M University-Commerce
Texas A&M University-Kingsville
University of Akron
University of Central Florida
University of Colorado at Denver
University of Maryland Baltimore
University of Missouri-Kansas City
University of Nevada, Las Vegas
University of North Carolina at Charlotte
University of North Carolina at Greensboro
University of North Dakota
University of Northern Colorado
The University of South Dakota
University of Southern Mississippi
University of Texas at Dallas
University of Texas at El Paso
Wichita State University