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Computer Center–Library Relations at Smaller Institutions: A Look from Both Sides

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Privacy Issues in a Virtual Learning Environment

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“Few would assume that having the tools to build a house would give someone the basis from which to do so.”

S
pend the better part of two
weeks on the conference circuit, I saw
some impressive presentations on the use
of information technology, most of it geared
toward teaching. I also heard one presenter and
corporate exhibitor after another assure con-
ference attendees that their latest technologi-
cal developments were “increasingly more com-
plex, but easier to use.”

There's no question that today's technology
can be easier to use. However, that may be a
curse as much as a blessing. For example, one
of the more impressive pieces of equipment
demonstrated at TechEd98, the California
Community College Foundation technology
conference, was a nonlinear editor. This is a
device that allows you to import video, cut it
up, and rearrange it to your heart's content. If
you make a mistake, you simply rearrange the
components until you're satisfied. In SAT par-
lance, nonlinear editing is to linear editing as
word-processing is to typing.

The ability to dump substantial amounts of
video into this device, and the ease with which
one can create a finished video production or
multimedia presentation doesn't bother me. In
fact, this is a video editor’s dream machine.
However, selling this technology with a pitch
that it will take every faculty member or infor-
mation technology support staff one step closer
to being their own video producer, director,
and editor, raises the same concern as the claim
that pagination systems would make everyone
a publisher.

Technology often gives us a false sense of
our ability to accomplish a given task. It lulls
us into believing that having the technology
also gives us the knowledge, skill, and talent
necessary to use it effectively. Few would as-
sume that having the tools to build a house
would give someone the basis from which to
do so. We all understand the fundamental ele-
ments of a house, such as wood, bricks, con-
crete, plumbing and electrical supplies, and so
on. However, few fail to realize the complexity
of successfully arranging the elements in such
a way as to create something that is aestheti-
cally pleasing, functional, and effective—and
that the neighbors would allow to remain on
their block.

Why is it, then, that computer-based tech-
nology, such as the nonlinear editor, seems to
create an environment in which we believe we
can accomplish tasks without developing the
skills necessary to do the job right? Introduc-
tion of such technology does make it easier for
those who already possess the skills and for
those who will develop those skills, but it
doesn't make it easier for those who simply learn
how to use the technology.

The value of technology shouldn't be that it
gives any one of us the tools necessary to per-
form a task, but that it gives those who special-
ize in a given field the ability to perform their
tasks more efficiently and effectively.

Video production for courses is an excellent
example of how this can and should be applied.
Video, as made evident in recent years by pro-
grams on PBS, The Discovery Channel, and
The Learning Channel, is an incredible me-
dium for learning. However, the effectiveness
of the medium is based as much on the quality
of the production and delivery of the informa-
tion as it is on the content.

As distance education classes and the use of
multimedia in the classroom and over the
Internet become more prevalent, video produc-
tion will become more necessary and common.
The difference between high-quality produc-
tion and its low-quality counterpart is that with
the former, content is enhanced by the appli-
cation of visual composition, rhythm, syntax,
pacing, and so on. Other graphic enhance-
ments, such as titles, transitions, and special
effects, as well as the audio effects of music,
voice-over, and sound effects, are also critical.

Educational institutions will serve their stu-
dents better if they provide, or encourage fac-
culty to use, production specialists for video or
multimedia production for their on-site or
online classes. Faculty should concentrate on
content and giving that content meaning, and
not have to worry about the delivery mecha-
nism. By providing experts in the area of deliv-
ery of content, the information can be trans-
ferred from faculty member to student in a
manner that, like the house built by a profes-
sional builder, is aesthetically pleasing, func-
tional, and effective.

James Roche, Editor
Another Essential Element of the Campus Network

by Richard P. West

Lately I have found myself falling into the trap of overusing the word “infrastructure.” Although I was made familiar with the concept when I received my education in economics, I have become weary of the term. The word is used so often that I am afraid it has become cheapened and does not serve its most important role, which is to communicate.

In a regional development sense, infrastructure describes all the things necessary to allow a community to develop economically: water distribution and waste control systems, the provision of electricity and gas. Roads, rail systems, harbors, and airports all form the basic transportation system. These investments establish the foundation upon which commerce and economic well-being can be developed. They are necessary before individual economic transactions can take place between parties. In politics, they have traditionally been called “public works.”

Public works connotes the common-good nature of infrastructure projects. These projects are done for the well-being of all community members. It’s difficult, however, for any one person or group to pay for these projects. The benefits of these projects are too widely distributed to charge any one user. There are often fees associated with the use of infrastructure, such as toll roads, or charges for water or electricity. These charges usually serve to ration, rather than recover, the basic costs of investment, which are funded by the collective. Collective goods are characterized by single providers and therefore often are regulated or governed by the greater community served.

In our campus environments we have come to view our information networks as an important common good. Fees may be charged to help ration a scarce common good in certain instances, but we accept that the network has to be funded collectively so that teaching, learning, and research can proceed using modern communication methods such as information network technologies. Routers, cable plant, and terminal equipment are all part of these campus public works. It is increasingly clear, however, that to make the information technologies comprehensive we need to assure that other features are included in our underlying common foundation.

CNI is committed to the promise of networked information for the advancement of scholarly communication. Over time, networked technologies are expected to replace print technologies because of their superior speed and their ability to better bridge the obstacles of time and location. If you are on the network, you are immediately part of a larger community.

A project on authentication and authorization is a major component of the CNI program. This project plans to explore an essential element of the campus network. Simply put, the issue is: How do we identify those on the campus network who may appropriately use the campus information and technological resources? It is—by design—easy to get onto our campus networks, but because our local campus pays for the information and machine resources that are on the network, we want only those who are part of our local community to use these unique resources. We need to add to the network easy ways to identify those who are part of the campus community and also to provide differential levels of access or service to campus resources. Not all resources on the network are—or should be—provided to all members of the community on an equal basis.

Like water or electrical use, some information resources will be rationed, by price or by time, as to the volume of use allowed for any one student or faculty member. It is essential, however, that all community members know
”The common good we have previously thought of narrowly as routers and cable plant needs to be expanded to recognize this broader environment.”

how to present themselves to the common good (campus network) and that this presentation be consistent for all resources and for all users.

Although our network and its associated resources have been around for more than fifteen years for common use, we are still early in the maturity of providing the infrastructure to allow easy communication and rationed transactions to occur across the network. Without this public works investment, our information network environment will not be successful. The networked environment needs to provide all the functions that have been provided in print or by physical means. We recognize that these functions will be provided in significantly different ways.

CNI’s authentication and authorization project will encompass elements characteristic of standards development. The project will also recognize that there are a variety of ways of pricing and rationing information databases or electronic journals. Site licenses, the number of simultaneous users, and every other combination of rationing and payment are being negotiated by our campuses to provide network services. Authentication and authorization techniques need to be able to handle this variety of buying rights to information resources for our faculty and students. To date, these strategies have relied on a single server, IP source addresses, or multiple password control to meet the concerns of payment and security. A single, common strategy as part of the campus network, regardless of where the information resource is located, is an essential part of the authentication and authorization project. And now, we are also in a networked world where users may not be physically connected to the campus network when they want to access licensed resources. A new conceptualization of these approaches is essential.

Clifford Lynch, Executive Director of CNI, has received expressions of interest from more than fifty institutions to help develop, explore, and serve as potential test sites for this effort. As progress is made, reports will be provided on the progress of the conceptual framework or the series of standards and strategies that information providers (the private sector) and information users (our campus constituents) can expect in a campus network. This project is timely in helping our community develop a strategy to meet the needs of an any-resource, anytime networked world. The common good we have previously thought of narrowly as routers and cable plant needs to be expanded to recognize this broader environment.

Librarians and information technology professionals have common interest in this project. As providers of goods to the campus community at large, you are particularly vested in this project. The provision of these elements in the “commons” of the campus infrastructure is essential for the success of your individual responsibilities.

Richard P. West (richard_west@calstate.edu) is senior vice chancellor for business and finance for The California State University System. He has chaired the steering committee of the Coalition for Networked Information since its establishment in 1990.
Privacy Issues in a Virtual Learning Environment

by Susan K. Ferencz and C.W. Goldsmith

Privacy issues for students in a virtual learning environment are an order of magnitude greater than those for students in a more traditional campus learning environment. The legal foundation for student privacy has been the federal Family Educational Rights and Privacy Act (FERPA) of 1974. This landmark legislation has served the academic community well, and the privacy protections afforded today’s students are a direct result of the vision of the drafters of FERPA. Given the changes in higher education since 1974, especially the changes introduced by the infusion of technology into admissions, registrar, bursar, financial aid, and student advising functions, higher education leaders are beginning to question whether FERPA can remain unamended. Does FERPA sufficiently reflect the 1990s higher education environment to allow staff at all levels in organizations to make the day-to-day decisions in a technology environment that are consistent with the basic principles of FERPA? Or should FERPA be reexamined and amended to clarify privacy issues that were unheard of twenty-five years ago?

As was true in 1974, privacy is important to students. Students expect the right to control and inspect personal information, and students expect that their personal information maintained by colleges and universities will be accurate. But today students expect their privacy to be protected beyond physical campus boundaries—beyond the file cabinets located in the student services buildings and beyond the databases stored on systems in the central computer center. Today, students expect colleges and universities to protect these rights throughout the campus intranet and the Internet, that is, throughout the virtual learning environment.

There is another difference between student expectations for privacy in 1974 and today, a difference in the type of information to be protected. When FERPA was established, students expected colleges and universities to protect the privacy of grades and transcripts. Today’s students also expect information about their personal activities to be kept private—information that is captured automatically as they use card keys to gain access to campus buildings, purchase meals or books, access online library resources, or log onto the campus network (whether on campus or from another location). Students expect all of this information to be protected. At the same time, students generally don’t object to the recording of such activities. Having grown up in a cultural environment where security equipment routinely records activity in many public and commercial buildings—convenience stores, ATM locations, parking garages, banks—students generally recognize that such transactional recording and monitoring is a component of institutional security measures.

In an effort to maintain the highest level of security for student information collected and maintained by student services offices, which is increasingly accessed through network-based systems, technologists have used a variety of methodologies—firewalls, encryption, middleware, token cards, smart cards, one-time passwords, and, in a few instances, biometrics. Each of these methods has strengths and weaknesses, and they are often employed in combination to compensate for any deficiencies. Of course, the responsibility for maintaining the security of the virtual learning network is compounded by the fact that the technology to defeat such security measures is changing (and improving) as rapidly as the technology itself.

The bottom line, however, is that institutions of higher education cannot depend solely on even the best technological solutions for maintaining security and privacy of student information.
Appointing a privacy policy task force

How should colleges and universities respond to the additional privacy issues of students in the 1990s? To deal adequately with privacy issues in the virtual learning environment, institutions should consider charging a comprehensive task force to develop policy suitable for such an environment, perhaps even making the task force a standing committee for the long term.

The composition of a privacy task force requires considerable thought. Primary stakeholders must be represented, and yet the task force cannot be so large as to defeat efforts to make timely decisions.

At a minimum, there should be one representative from each of such areas as the registrar’s office, financial aid, admissions, bursar’s office, student advising, computer center, library, student judicial affairs, legal counsel, and student government. In addition, selected faculty members and other students should also serve. Members should be chosen to represent both local and remote issues, and they should be officially appointed to the task force. It should be understood from the beginning that multiple tiers of review will be necessary for any policy development and, ideally, these tiers and their constituents will be identified at the beginning of the process.

Beginning the policy discussions

The process of developing policy is as important as the outcome. The process, if done effectively, will result in discussion and debate of issues before policy implementation, providing the necessary buy-in that, if not present, will defeat any effort to introduce new policy. A number of critical issues must be decided as groundwork to the policy discussions.

Right vs. Privilege. Are network resources a right or a privilege for virtual learning students? This distinction has ramifications for how privacy violations will be handled by the campus judicial board, the role of the campus police, and the legal right of the institution to withdraw network privileges as a sanction for privacy violations.

Privacy/Confidentiality Guarantee. What level of privacy is the institution prepared to offer virtual learning students and faculty? If on-campus faculty and staff use network resources for both academic and non-academic purposes (for example, chat rooms), is the computer center prepared to offer the same levels of use to virtual learning participants, and can the computer center guarantee their privacy at all levels?

Chargeback Security Services. If heightened privacy measures are required for virtual learning students and faculty, should chargeback security services be implemented, and what campus unit should receive the revenue stream? For example, will there be a charge for smart cards or a charge when students forget their password?

Security Help Desk. When problems arise, whom does the virtual learning student contact? An online help desk staffed by the registrar, financial aid, bursar, and admissions offices? The system administrator on the home campus? A departmental LAN administrator? A local Internet service provider? All of the above?

Policy on Monitoring of Network Use. With privacy guarantees comes some level of activity monitoring to ensure privacy. What level of monitoring will be required for virtual learning students and faculty? What if some virtual learning students are located in areas where monitoring is at a higher level than at the home campus?

Privacy Expectations. Many students will have expectations about the privacy of their student services transactions (financial aid, admissions, bursar, registrar, advising, etc.) that are derived from experiences as residential students. How will these expectations be managed? How will colleges and universities communicate any differences in privacy levels?

Principles of fair information practice

Policies on privacy and the handling of student information in the virtual learning environment should rest on a firm foundation of principles of fair information practice. Last year, a task force commissioned by CAUSE devel-
oped a white paper in cooperation with the American Association of Collegiate Registrars and Admissions Officers (AACRAO) called *Privacy and the Handling of Student Information in the Electronic Networked Environments of Colleges and Universities.* The paper, which is available at no charge through the CAUSE Web site at [http://www.cause.org/information-resources/lit-library/abstracts/pub3102.html](http://www.cause.org/information-resources/lit-library/abstracts/pub3102.html), outlines eight relevant principles of fair information practice to provide a framework for evaluating campus values and creating policy with respect to privacy and access to information in a networked environment:

- Notification
- Minimization
- Secondary Use
- Nondisclosure and Consent
- Need to Know
- Data Accuracy, Inspection, and Review
- Information Security, Integrity, and Accountability
- Education

These principles, though variously titled in the literature, have been recognized over years of legislative intent, action, and implementation as the foundation for sound information practice. A full set of recommendations regarding these principles, as well as a checklist for privacy policy and fair information practice, are included in the online white paper. The following discussion is excerpted from the paper with permission from CAUSE.

**Notification**

The notification principle provides that students be informed of what information is being collected; who is collecting the information and from whom it is being collected; why the information is being collected (i.e., the intended use); what steps are being taken to protect the confidentiality, integrity, and quality of the information; the consequences of withholding information or of providing false or incomplete information; and the right to inspect information and obtain appropriate remedy. These elements of the notification principle provide the basis for knowledgeable actions when individuals are asked to give consent for others to have access to their information. Without solid knowledge, consent can be hollow instead of informed. This is what is meant by informed consent.

Within the virtual learning environment, the process of notifying and informing students may become increasingly problematic. In such environments, information is being stored and transported between many different offices at different institutions and organizations, on a continual basis. Questions concerning notification frequency, intensity, and granularity and scope will need to be addressed in building policy about handling student information in this complex environment.

How frequently should students be notified, in a dynamic electronic environment, of information that is being collected about them? Should students be required to positively acknowledge—by signature or other means—receipt of this notification? In the distributed computing environment, to what extent should students be notified of each record’s distinct usage, security, and other characteristics? How much detail is it reasonable to provide before the volume itself becomes an impediment to true understanding?

**Minimization**

The principle of minimization relates to what kind and how much information is collected from students, with an emphasis on gathering the minimum amount of relevant personal student information needed to accomplish a legitimate, identified purpose. Associated with this principle is the responsibility to delete information when it is no longer needed. The challenge is to identify those elements that are truly the “minimum” needed, avoiding collection for collection’s sake or for “potential future use.”

One driving force for increased collection of information in higher education is the requirement by state and federal agencies for the reporting of increasing amounts of student data. In some states, laws have recently been passed which require institutions to collect and use more, rather than less, personal student information.

Policy issues related to minimization include the automatic collection of data by computer systems, appropriate sources of information about students, collection of sensitive data, collection of data for emergencies, and how
long data should be kept. Should information be collected and retained merely because the hardware or software permits it? What kinds of data are appropriate to collect as part of the admissions process? How long should data be kept and under what conditions? When are the purposes for which the information was collected deemed to no longer exist?

Secondary use

The premise of this principle is that when personal information is gathered from a student, it should be used only for the purpose for which it was collected (even within the same institution or office) or for a use compatible with that purpose, unless the individual has given additional consent. Thus the principle of secondary use goes hand in hand with the principles of notification, minimization, and nondisclosure and consent (discussed below). Application of this principle means that an institution must articulate, when gathering personal data, precisely the purpose for which it is being gathered.

The principle of secondary use is one of the most critical to be examined and understood as colleges and universities participate in virtual learning. Once information is gathered and stored in a medium that facilitates its fast access, sorting, sharing, transport, and reuse, this information becomes much more accessible to the exercise of new options and opportunities. Data mining and sharing information in new ways to answer new questions or to form new hypotheses is not only possible, but may seem essential to better serve students or more aggressively market to new students. Matching one database with another enables looking at information in new ways, perhaps gleaning new information from these combinations. Care needs to be taken that any such manipulation of data does not disclose or make accessible individual, personally identifiable data.

FERPA allows for, and most reasonable individuals would agree to, routine secondary uses that are compatible with the purposes for which the information was collected. But if the use of personally identifiable student data is for non-routine purposes, the secondary use principle requires that the student be so informed and that consent be obtained.

Nondisclosure and consent

The term “nondisclosure” means not distributing personally identifiable information about students to parties external to the academic institution. (Note that the release of information about students to parties internal to the academic institution is addressed under the secondary use principle above and the need-to-know principle below.) Policy issues related to the principle of nondisclosure and consent revolve around consent strategies and data sensitivity, the nondisclosure of information created by use of information resources (such as library circulation records), and flexibility of inter-institutional information systems.

In the virtual learning environment, do the scope and concept of the principle of disclosure and consent change? For example, though a student may not object to the public release of his or her directory information when it is to appear in a campus print directory, will the student feel differently if such information is to be incorporated into a directory accessible on the Internet?

Given that there are likely broad individual differences in what types of personal information students feel are sensitive in a networked environment, how flexible do institutional policies, procedures, and systems need to be in enabling students to change categories in which the institution has placed a particular kind of information? For example, if disclosure of street or e-mail address on the Internet is unacceptable to an individual, should a means exist for him or her to place those elements in a more restricted disclosure category?

To what extent should systems be able to accommodate individual privacy preferences? An application of technology or systems design can hinder an individual’s desire to exercise more control over release of information, but technology may also offer solutions that could facilitate a student’s ability to choose.

Need to know

This principle is based on the premise that an individual within the virtual learning environment seeking access to personally identifiable student information is granted such access if and only if s/he has a need to know the information as part of an official and legitimate educational interest and in conformity with disclosure agreements. Under this prin-
ciple, access to student information is based on normal job duties and the purpose and scope of the proposed use of the information.

How an institution defines the boundaries of legitimate educational interest will depend on many factors, but it will be increasingly important to articulate such policy very carefully and in conjunction with other institutions in the virtual learning environment.

Implementations of technology—for example, a network-based information system—must guarantee the ability to control information dissemination in accordance with the institution's defined need-to-know criteria. For example, personally identifiable student information may be accessible to someone classified as a "school official" without the student's prior consent. However, the definition of a school official may be vague, ambiguous, or not universally understood.

Some institutions integrate student information in other information databases or displays. This commingling or merging of information presents challenges with regard to the principle of need to know in that certain personal information will require a higher level of access privilege. For example, a faculty advisor may have a legitimate need to access a student's grade information, but if the information is displayed with other information about the student to which the faculty member is not entitled access, this could violate the student's privacy.

Data accuracy, inspection, and review

The premise of this principle is that information about students collected and maintained by a college or university must be accurate, and that students have the right to examine information about themselves and to request changes they feel should be made to their education records. The institution's responsibility with respect to this fair information principle is to define an effective request process and to make known to students the types of data that are being collected and maintained and the various offices responsible for the records to facilitate their request for review of their data. Methods for properly authenticating the identity of the student making the request to inspect data should be in place prior to information release.

Two issues associated with this principle in a virtual learning environment relate to responsibility for ensuring accuracy of student data in distributed databases, and the extent to which the right of inspection and review applies to data captured through transactions and automatic logging, including the feasibility and cost implications of such review.

Technology has enabled student information to be replicated in a number of different databases, under the control of different organizations and institutions. It is unreasonable to expect the student to be cognizant of every office that may have replicated his or her information and to contact each one when a change is necessary. Network technologies and network-based student systems can actually facilitate a student's access to his or her own data, and thus make it much easier for a student to inspect and review that data to be sure of its accuracy.

There are items of information now being collected about students that are not a part of the structured databases under the jurisdiction of student services and academic discipline officers—primarily data captured as a function of electronic transactions generated by student activity such as accessing electronic library holdings or signing on to computer systems. This type of data collection will only increase in a virtual learning environment. To what extent is it possible to make such data available for student inspection and review? May a student request a modification to an event log, and how should such a request be handled? There may be costs associated with complying with student requests to inspect and review such records that the institution will need to address. Policies and procedures will be needed concerning these types of records, to define the records that can be made available and the related request and change process.

Information security, integrity, and accountability

The principle of information security, integrity, and accountability is composed of three related elements. Security, in terms of information technology, is the protection of user files and system resources from loss, damage, inappropriate access, and unauthorized disclosure or use of sensitive or private information. Integrity is reasonable assurance that data, once entered, will not be subject to unauthorized

"It is unreasonable to expect the student to be cognizant of every office that may have replicated his or her information and to contact each one when a change is necessary."
modification by intentional or unintentional means, and that data will remain unaltered during transmission between sending and receiving systems. Accountability in this context is the ability to explain security-related events and to link them to the originator.

Policy issues related to this principle arise in several areas, including appropriate levels of security for information of varying sensitivity, institutional policy for information access and acceptable use of electronic resources, and limitations and capabilities of the technologies employed.

Before adequate and reasonable security can be defined for the virtual learning environment, there must be a shared understanding of which information is, in fact, sensitive and the degree of sensitivity. The expansion of access to information generated by student activity or data in system logs introduces issues that may not yet have been considered in traditional learning environments. For example, how sensitive is student electronic mail? Is its protection to be a high priority, or is it to be assumed and made known to students that unencrypted electronic mail is not private? How sensitive is a file about a student that is kept online by a faculty advisor? What security measures are appropriate for information required in an online application form (for example, family and background information, credit card number)? Is an individual’s picture more sensitive when stored or disseminated electronically?

Within the virtual learning environment, institutions must consider whether and how to define acceptable use of its information resources and how potential breaches in security or information privacy will be handled. Without a formal policy to define security rules, roles, and responsibilities, it may prove difficult to hold users accountable. Rules that are unwritten may also prove unenforceable.

In a nutshell, the primary security issue surrounding electronic transmission of private student information is: can information be ensured of privacy protection if the network itself is not at least reasonably secure? Are there areas where limitations in existing security technology make a particular implementation unwise? Who will decide whether the value of access is more important than the risk of a privacy violation?

Fundamental technical issues for heterogeneous networks of the type likely to be found in most virtual learning environments include authentication and authorization, communications security, and logging.

**Authentication and authorization.** What technical means can and should be employed to reliably validate the identity of network users (authentication) and to determine their access (authorization) levels? How can network access be controlled such that unauthenticated (and thus untraceable) access is eliminated, or services that can be obtained anonymously are limited to only those that can do little harm? How can individuals ensure that the electronic correspondence they receive is actually from the purported sender? How can an application determine it is connecting to the correct server and not to a system that has assumed its network identity? There are emerging cryptographic solutions in these areas, but who will be responsible for planning their widespread introduction and use, and in what timeframe?

**Communications security.** How can institutions safeguard private information being transmitted to or through traditionally less-controlled academic networks where students work? How can the institution ensure that applications used in the virtual learning environment take into account such communications security? How and where can technologies such as encryption be employed effectively, and how will standards in this area be determined?

**Logging.** A final technical network security issue is how much information about network transactions will actually be maintained. Because network intrusion detection is in its infancy, security events are seldom reported in real time. Thus, there is an increasing need for logs sufficient to reconstruct events weeks or even months after the fact. However, many of the systems that students commonly use may not yet employ an adequate level of logging to permit detailed reconstruction. Moreover, the logs themselves, if not properly managed, used, and secured may become a target or a potential privacy concern. How will accesses be logged and how much is appropriate and necessary to log (in keeping with the principle of minimization)?

**Education**

The premise of this principle is that colleges and universities have a basic responsibility to
educate not only their students but faculty, staff, and administrators about the privacy rights of students and potential implications of use and misuse of personal information, especially in a virtual learning environment. This definition of “education” extends beyond simple notification and informed consent.

Administrators who handle arbitration of computer abuse incidents on college campuses have long recognized that more harm is done through ignorance than intention. Central to developing an educational program is assessing the current state of awareness regarding privacy issues in a virtual learning environment. To what degree does the college or university wish to be responsible for helping its students become informed consumers of information technology and its implications for privacy, fully cognizant of both risks and benefits as well as existing discipline and enforcement procedures?

When and how to reach students is an important issue in the formulation of an educational program, and the answers are probably unique to each campus. How much information do students need immediately, and what information can be disseminated later? Students may sign a statement that they agree to abide by the campus policy for ethical use of electronic resources, and receipt of a computing account may be contingent on this signing.

Beyond education of the students, there remains an institution-wide process of raising the community's sensitivity to privacy, and to the individual responsibilities of its members referred to by FERPA in these matters. Some unit or individual on campus should take responsibility for periodically providing professional development opportunities about these matters, especially for data handlers and technologists.

Summary

The virtual learning environment has become an attractive mechanism for individuals to receive education as well as for institutions to deliver education. It may also be the most complex and challenging new tool individuals and institutions have ever had to deal with in education. As we endeavor to use this technology for the good of students, faculty, and staff, we must be cognizant of the legal and ethical responsibilities of all the participants. The most effective mechanism for dealing with the privacy issues raised in the virtual learning environment will be a task force or committee made up of those who are closely involved. The results of the task force efforts must be widely disseminated and ultimately absorbed into the institutional culture so that the privacy issues of everyone—on the physical campus or virtual campus—are met equally.

For additional resources on privacy, see http://www.cause.org/issues/privacy.html.

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“Administrators who handle arbitration of computer abuse incidents on college campuses have long recognized that more harm is done through ignorance than intention.”

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Managing Knowledge: An Interview with Thomas Davenport

Thomas Davenport, Curtis Mathes Fellowship professor and director of the Information Systems Management Program at the University of Texas, Austin, spoke to CAUSE97 attendees about “New Roles for Information Professionals.” After his presentation, he talked with CAUSE97 conference chair Gerald Bernbom about the topic of his latest book, Information Ecology.

Bernbom: In your book, Information Ecology, you provide many examples of corporations that have begun to take an ecological approach to information management. Are the concepts you discuss also applicable to colleges and universities, and how might they be applied?

Davenport: Administratively, there are a lot of similarities. I don’t think there are any significant problems in applying the ideas of information culture, politics, and staff to universities. It gets tougher in academic computing because it is such a knowledge-oriented environment, but the issues are relevant. I think the need to apply some of the ideas is very strong, particularly the ideas on information engagement.

There’s a real need for focusing on how people use the information we transmit in academic environments, but because pedagogy and teaching and learning are worlds unto themselves, I think the information ecology concept is less applicable there than in the area of administrative information systems. Thinking seriously about it, there are probably more attempts to make administrative information environments better than where information, knowledge, and learning are the heart of the matter.

Bernbom: Do you see any synergy for people who do structural design, people whose real work is not pedagogy and content, but design of delivery?

Davenport: I probably should have included them by saying that it takes a village to make a good information environment. There’s a lot of good thinking in communications schools, and in library science programs, about these issues.

Bernbom: Higher education is in the knowledge business. Could you comment on how topics like information strategy or information architecture apply to the scholarly record?

Davenport: I’m very interested in that issue. While I haven’t done a lot of formal research on it, I do a lot of day-to-day observation. Somebody asked me last week, since I write about knowledge management, what I have done at the University of Texas to improve the management of knowledge. I said that’s too big a task for me to even think about! It’s much easier for me to work with external organizations than to focus internally.

In terms of knowledge or information strategy, part of that is focusing on what knowledge is really important. Universities have a tough time doing that because all knowledge is supposed to be equally important. Increasingly, as physical environments get tougher, people will have to make more decisions about what kind of knowledge we want to generate and transmit and inculcate in people.

The other part of information strategy is deciding what aspects of the information process are really most critical to you. Clearly, in universities we’ve decided knowledge creation is the thing we care about. We care much less about knowledge distribution, dissemination, use. We produce a vast amount of knowledge that never gets used by anyone but other academics. The average research article never gets cited by anybody. We’ve proliferated all these channels, but nobody seems to pay attention to them. There’s a real need for change in that respect. But the tradition of the culture is so weighted against making any change. The in-
mates run the asylum in these places; the professors have all the power. Deans and administrators realize that there’s a big problem. They go out to raise money and people say, “After I’ve graduated, the place is irrelevant to me.”

Bernbom: Do you work with anyone in the information business where you see anything going on that could be applicable or parallel to higher education?

Davenport: The biggest area is clearly in consulting and professional services. Most people define consulting as a knowledge business. What they’re doing is to help their clients to overcome problems using knowledge and to apply knowledge to business situations. Consulting firms have been extremely diligent in managing their knowledge. It’s clearly the leading industry. Most of the large firms have huge repositories of knowledge. For example, Ernst & Young has done a really good job of capturing what they know. They’ve been more focused on stocking the shelves with knowledge and less focused on motivating people to take things off the shelves and actually use it. They are a role model the university could look to. Andersen Consulting has been extremely aggressive in using technology for pedagogical purposes. The best educational technology I’ve ever seen comes out of work Andersen has done with Roger Schank, a cognitive scientist at Northwestern University’s Institute for Learning Sciences,1 who has a model of scenario-based educational simulations on CD-ROM.

Bernbom: You indicate in your book that good business decisions are based on fact rather than intuition or rumor. What do you see in higher education decision-making vis-à-vis this issue?

Davenport: As my editor kept pointing out to me, one person’s facts are another person’s opinions. You can get into difficult issues in this area. In general we don’t pay enough attention to fact in American organizations, and focus too much on other sources of decisions. For higher education, there’s good news and bad news. The bad news is that the things that really matter in universities are hard to measure—learning, for example. When you come to the things that matter most, it’s difficult to agree on what facts really count. The good news is that in state schools—this is largely due to semi-

ignorant interference by legislators—universities are starting to have to document what they do, how many hours people spend in a classroom. To try to address the learning-oriented issue at Texas, we have this thing called the performance-based instructional system. If you’re a faculty member and you want to go to your department chairman to argue for more resources, the numbers are right there as to how many students you have, what classes you teach, how that compares to other places, what percentage of courses are taught by tenure-track faculty. Because of that external influence, there has been a much more fact-based orientation. I’ve been away from private schools for a while, but I think it’s going to spread there as well.

Bernbom: The corporate world has focused a lot on business process reengineering in recent years. As a university faculty member, what do you think colleges and universities need to do to be successful in reengineering their business processes?

Davenport: Unfortunately, I’ve seen most of the problems of reengineering in the corporate sector be replicated in universities. I’ve heard someone at my school say, “Oh, yeah, we’ve reengineered our curriculum.” Of course, it didn’t change very much! We have adopted the term for our own purposes when it was fashionable to signify radical change whether radical change was really happening or not. The other problematic thing is that the reengineering I’ve seen in universities—some of it has even been successful!—has almost exclusively been in administrative areas. It’s the easier stuff to reengineer, but what I would have liked to have seen is for somebody to say, “We’re going to reengineer the educational process.” That is at the core of what we do.

I’ve worked with a couple of institutions on one important area, fund-raising, with some success. Reengineering in general had a tough time living up to the hype around it. People made improvements, but what I’ve learned in both my research and in observing companies is that in reengineering, design of the new ways of doing a particular process is quite revolutionary, but implementation is almost always evolutionary. It takes a lot of patience and time. In universities, you have a lot of smart people. The problem is, when you have a lot of smart people, they want to participate in the design of their own work. (You should do that more,

1 See http://www.ils.nwu.edu.

“The bad news is that the things that really matter in universities are hard to measure—learning, for example.”
even when people aren’t so smart!) Particularly, in universities reengineering projects tend to be quite large. Some of them get unwieldy in terms of how you design a process when you’ve got forty-two people participating in it. But it’s a worthwhile effort. The need for changing how we do our work has not gone away, but the term reengineering is no longer a fashionable way to describe it.

**Bernbom:** As you’ve indicated, administrative processes in higher education are somewhat marginal to the core business of teaching and learning. How do you assess the value of investing in processes that are essentially not core?

**Davenport:** I think they’re good things to do. One of the reasons why we focus on them is because we know the other areas are more valuable but so laden with difficulty and peril that we don’t want to venture into them. If it’s a foregone conclusion that you’re not going to be able to touch the core stuff, then you might as well do the more peripheral stuff. Focusing on improving financial processes and financial information is a good thing to do. Institutions have to stay in business and be sound financially. But if it distracts you from looking at the teaching, learning, and knowledge creation processes, then it’s dangerous.

**Bernbom:** In the examples you said were somewhat successful, like fund-raising, were changes in information practices an important part of the reengineering, or were there other things that made it successful?

**Davenport:** Almost every major reengineering project has some information components. We focus too much on technology and not enough on the information people need. Part of the fund-raising efforts involved circulating information. For example, a company comes to Texas to talk to me about my research. Typically, I have no clue whether we’re trying to hit them up for money or whether they’ve given us money in the past or not. One university I worked with started to enlist faculty much more in the fund-raising process, giving everybody an account-team kind of structure. Everybody on the team, including faculty and even some students, had access to much more information about who had given what in the past and what the goals were for this organization. Clearly it’s very useful to know the history if you’re going to get people to give you money.

**Bernbom:** What about information politics in the campus setting? Is it as much of a challenge as in the corporate world?

**Davenport:** The politics are quite fierce! That’s one of the reasons why I focus my efforts more externally than internally. The thing about universities is that we expect that because we’re interested in knowledge and learning, we’d be above that sort of thing. Clearly, we’re not. I don’t know if the politics are any worse, but they may be more overlooked by people who think that because they are in an academic environment, they can leave all those corporate politics behind. The need to pay attention to information politics is quite strong; the political structures in universities are the most difficult to deal with. In most universities, you have some form of information anarchy. Anarchy isn’t all bad because it shows that there’s widespread interest in information. If you’re going to get people together, you’ve got to enlist a pretty broad stakeholder community, much more so than in most corporations. I don’t know if the politics are more severe, but they’re much more difficult to manage.

**Bernbom:** Your book makes the point that the techno-utopian approach is outdated and inadequate, that the focus needs to shift from technology to information and knowledge, and that what we need are chief knowledge officers. What about the people in higher education who carry the title chief information officer?

**Davenport:** They are no more chief information officers than their counterparts in business! They are largely chief technology officers.

**Bernbom:** Do you think this role of chief knowledge officer has applicability in higher education?

**Davenport:** I think there’s a real need for it. We manage our knowledge pretty poorly in universities. It’s a tricky thing. In universities, almost everybody feels like they’re involved in knowledge. It’s difficult for a university to say, here’s the knowledge czar. Even if I were creating that kind of role, I don’t know if I’d call it chief knowledge officer. There’s a quite distinguished professor from Japan who was just named the Xerox Distinguished Professor of
Information Ecology: Mastering the Information and Knowledge Environment by Thomas H. Davenport
Oxford University Press, 1997, hardcover, 255 pages, $29.95

Reviewed by Julia Rudy

As competition in the higher education marketplace heats up, the need for an institution-wide approach to information management will become increasingly key to success and survival. And while investment in technology and return on that investment will continue to be major concerns for campus administrators for the foreseeable future, it is important that a focus on technology not overshadow the institution’s fundamental, critical resources—information and people.

In Information Ecology, Thomas Davenport argues that the “status quo approach to information management—invest in information technologies, period—just doesn’t work.” He recommends, instead, a new approach that takes into account an organization’s entire information environment. Such an information ecology approach is counter to the traditional “machine engineering approach” that throws technological solutions at information problems. The approach recommended by the author puts people, and how they create, distribute, and use information, at the center of information management. It also recognizes that technology is only one part of the equation—and sometimes the wrong one—for creating change: “The effective use of information,” says Davenport, “much more than any new technology, can change how an organization runs.”

Key chapters of the book emphasize the importance of developing an overall strategy for information use; address information politics, behavior, and culture; explore important information staff issues; describe key steps of a common information management; and present alternative approaches to information structuring and modeling. Each of these chapters includes a helpful “assessment survey” for readers to see how their organizations measure up.

While the examples that Davenport provides to illustrate best practices in “holistic management of information” are largely from the corporate world, the concepts he explores and the processes he recommends are also applicable in academe. I particularly enjoyed the author’s discussion of information staff and his position that non-information-technology information providers such as librarians, management accountants, records managers, analysts (business, market, and/or financial), and individual managers and workers are also critical to the information support structure. What is important is that this combination of information professionals must work together to provide, as much as possible, a single interface to a wide range of information sources for users.

Worth the price of the book is Davenport’s discussion of new tasks for information staff (such as information pruning, adding context to information, enhancing the style of information, and choosing the right medium for information), as well as new support roles in the “television-type” organization—information innovators, content editors, content directors, information producers, and a chief content officer. With the emergence of the World Wide Web as the central platform for accessing and delivering multimedia campuswide information systems, the academic community should especially appreciate these concepts.

If you have an interest in information rather than technology management, this book is one you won’t want to miss.

Reviewer Julia Rudy (jrudy@cause.org) is director of research and development at CAUSE.

Knowledge at Berkeley. There was an article in the New York Times about this. They interviewed several other professors at Berkeley who said, “First, there’s no knowledge in a business school anyway. Second, we’re all professors of knowledge. Why does this guy get the title?” The usual academic jealousy and resentment popped up. That would probably be the case if you established a chief knowledge officer. People are more used to the chief information officer idea. I don’t know whether chief content officer would work or not. It’s a little less presumptuous than knowledge, as a term.
Bernbom: You talk about the different kinds of information support workers who are going to be needed in order to pursue this information ecology approach. Where will they come from?

Davenport: There is some progress in that regard. Probably the best example is in library schools where they're starting to graduate generic information professionals who can operate across information technology environments as well as book- and document-oriented environments. The key thing is that we get together on this, that we not assume that any one group has the territory staked out. The other thing that worries me is that we'll pass each other like ships in the night.

Bernbom: What kind of changes could you envision in an undergraduate curriculum to help develop the skills for the kind of professionals that are going to be needed?

At a basic level, we need to raise the visibility of knowledge management. You could argue that in universities, the core of what we do is teach people how to manage information on a personal level. But it never gets addressed in any kind of explicit way. I had one professor in all of my twenty years of education who once took up the issue of when you walk into a library, is it better to go to the card catalog first or to the reference librarian first? He had this vociferous belief that it was better to go to the card catalog first. My sense is that I'd rather take advantage of a human, but we don't address those issues. We don't tell people how to acquire information. Our libraries may offer some Lexis-Nexis searching course every other Wednesday, but it's very peripheral to what we do as institutions.

If we're serious about creating lifelong learners, the skill that matters most of all is teaching people how to find, filter, and act on information. If we go to an information function in an organization, whether it's in a university or a company, the person is familiar with a whole variety of information-oriented approaches. But now you walk into the information technology department and they say, sure, we can build an information system for you. You walk into the market research department and they say, yep, we can do a focus group for you. But nobody can see the entire picture. It's very problematic.

Bernbom: In your book, you propose information mapping as an alternative to information modeling. Would the World Wide Web be the place for information mapping, and how would you go about this exercise?

Davenport: The Web is great—clearly, a very information-oriented tool. It doesn't totally take technology out of the picture as a barrier, but it makes a lot of progress. I'd like to get to the point where the Web is like television and just as you don't hear any spirited discussions of whether my cable box is made by General Signal or General Instruments, you wouldn't hear any spirited discussions of whether I am using Internet Explorer or Netscape or what kind of processor is best. That's the nice thing about television. Technology has not been much of a barrier.

Where would you start? I've thought of this in regard to my own school. There are a lot of information providers within universities. You probably want to start with a task force of different types of information providers to list the information that you have. It might get overwhelming pretty quickly. You'd have to start making decisions about what's really important to you. You can put it all online if you want, but you have to have a structure where the important stuff is most visible. Otherwise, it can be a morass. Putting it all in one place may be a good idea, but it requires a lot of architcturing and navigational aids and some prioritizing about what really matters the most.

There's a concept in the archival manage-
ment field, vital records. You start by prioritizing your vital records. Those we know about. Maybe it's what's between the vital records and the cafeteria schedule that is the challenge!

When I was attending an information management meeting in Boston I wandered into a records management meeting. I started looking at the agenda. It looked just great! I thought, I really need to pay more attention to what happens here. The only issue, from a vital records standpoint, is we live in an environment where there are so many information providers. No one group can hope to monopolize it, totally architect it. We’d like to be in a place where everybody in a university would have a personal Web page to say, here's what I'm working on. All we can really hope to do is try to provide people some guidelines, some common format, so that the most important information gets seen first, but it won’t be the only information there. You’ll see pictures of people’s kids and pets, but the easiest stuff to get to should be what they’re expert in or what kinds of courses they’re teaching. You can’t control it all. All you can do is hope to guide people where they need to be guided. The Web is also a good paradigm for that. It’s a very democratic information medium.

Bernbom: In closing, what do you think are the most important issues today, with respect to knowledge management, for colleges and universities?

Davenport: I’d say there are three important issues. First, addressing what knowledge management means in a university context. I would encourage CAUSE to really pursue that issue in a hot and heavy way. It’s critical to the mission of the university, but we do it pretty poorly now. We don’t want to let everybody else take the lead on us. Second, figuring out what to do with information technology and pedagogy—a very difficult problem. All boats have been lifted, but the level of the sea is still very low in that regard. The third thing to worry about is competition from the corporate sector. I visit consulting firms and corporate universities and get very nervous because they are a lot more progressive than we are in higher education in using technology to support their mission. I’m afraid these corporations are going to jump in and take over our charge as creators and distributors of knowledge and educators of human beings. It would be awfully sad if the higher education institution died out.

Gerald Bernbom (bernbom@indiana.edu) is assistant to the vice president for information technology at Indiana University.

“You can put it all online if you want, but you have to have a structure where the important stuff is most visible.”

INTEGRATING COMPUTING AND LIBRARY SERVICES:
An Administrative Planning and Implementation Guide for Information Resources
by Arnold Hirshon

The latest release in the CAUSE Professional Paper series is a pragmatic, forthright treatment of a subject many higher education institutions are thinking about as networked technologies and information resources create common sets of challenges and responsibilities in hitherto separate organizations. As Clifford Lynch, executive director of the Coalition for Networked Information, says in his foreword, Hirshon “provides us with a tremendously valuable discussion of the conditions under which [organizational] mergers are likely to succeed, and offers detailed, step-by-step advice for those institutions that may choose to pursue such a merger.”

Complimentary copies have been sent to all CAUSE member representatives and Coalition Task Force representatives. Additional copies are available for $16 (for employees of CAUSE and CNI member institutions) or $32 (non-members). Contact orders@cause.org; 303-449-4430
Is Strategic Planning for Technology an Oxymoron?

by Martin Ringle and Daniel Updegrove

In preparing for battle I have always found that plans are useless, but planning is indispensable.
— Dwight D. Eisenhower

Introduction

Strategic planning for technology is a topic that has received so much attention it hardly seems worthy of further discussion. The CAUSE Web site, for example, includes dozens of articles on strategic planning as well as copies of technology plans that have been contributed by more than eighty colleges and universities. What more needs to be said? Apparently, a great deal. In an effort to investigate strategic technology planning, we queried more than 150 technology officers in higher education around the country. The results were surprising. Roughly 10 percent of the respondents indicated that they simply don’t do strategic technology planning at all, saying it is a frustrating, time-consuming endeavor that distracts from rather than contributes to the real work of building and maintaining an adequate technology infrastructure.

The vast majority of technology officers, however, devote a considerable amount of time and energy to strategic and financial planning. In most cases, their efforts follow the traditional model of institutional planning; that is, a committee or task force gathers information, conducts interminable discussions about what the institution needs, and ultimately drafts a huge document that meets with overwhelming approval by the three people who actually have time to read it. The relevance of the document to day-to-day operations, the quality of services, and the implementation of new initiatives is often questionable, although, oddly enough, few people seem to be concerned about this.

It is our contention, in this paper, that there are two distinct aspects of strategic technology planning. One is socioeconomic and the other is pragmatic/technical. The traditional focus on the creation of a planning document tends to merge these aspects and obscure the distinction, often leading to confusion and frustration. The differences between socioeconomic objectives—which are essentially strategic—and technical goals—which are primarily operational—are non-trivial: while the former need to be stable and comprehensive, the latter need to be agile and responsive to rapid changes in technology and in users’ needs.

We believe strategic planning for technology is not an oxymoron, yet a failure to appreciate the dual character of technology planning can make it seem that way. Many technology officers with whom we spoke intuitively recognize the essence of good planning and achieve impressive outcomes with a minimum of frustration. Our goal in this study is to bring these underlying practices and perspectives together into an explicit—and relatively simple—model of a good technology planning process.

What are we trying to accomplish?

To many people both inside and outside of information technology, the reason for technology planning seems apparent. It is to look ahead and determine which forms of hardware, software, and technical support will be required to meet the future needs of the institution. In conversations with more than 150 technology officers, however, this obvious goal barely surfaced. Indeed, most technology officers express skepticism about anyone’s ability to accurately predict which kinds of technology will be
needed beyond the next two or three years. The motivations for strategic technology planning that were most frequently mentioned were the socioeconomic ones of:

• aligning technology with other institutional priorities;
• disseminating knowledge about technology needs and constraints;
• building alliances with key decision-makers;
• lobbying for (and obtaining) financial and other resources;
• addressing existing technology needs; and
• keeping an eye on the leading edge.

**Aligning technology with other institutional priorities**

Technology organizations that enjoy the greatest success are those whose agendas clearly serve the priorities of their institutions. Without a strategic planning process for technology, it may be difficult to identify the connection between technology initiatives and the institutional goals they are designed to support.

**Disseminating knowledge about technology needs and constraints**

The strategic planning process is an essential vehicle for dispensing information to the community about current operations, achievements, and constraints of the information technology enterprise. There is a likelihood that members of the community will pay greater attention to this kind of information during a planning exercise because it is provided in the context of goals that are important to them.

**Building alliances with decision-makers**

In order for a technology effort to be successful, key individuals within the community—faculty, senior officers, and others—must understand the importance of an initiative and, to some extent, take ownership of it. This type of understanding and endorsement is best achieved when those individuals play a role in the formulation of the initiative itself, as they might during the planning process.

**Lobbying for (and obtaining) financial and other resources**

Financial resources are critical to virtually all information technology efforts (information technology is, unfortunately, an expensive business). Except in rare instances, the strategic planning process is the primary way institutions identify their required long-term funding levels for technology and obtain funding commitments.

**Addressing existing technology needs**

Many technology officers indicate that strategic planning is often a reactive process for accommodating unmet needs. This is not quite as negative as it sounds. It represents an approach to technology that relies on proven needs to drive future enhancements. While it does not propel institutions into technological leadership, it helps them optimize the use of scarce resources and avoid costly mistakes. This approach is especially valuable for smaller or less-wealthy institutions.

**Keeping an eye on the leading edge**

Some institutions, however, use strategic planning to track the leading edge in order to gain competitive advantage with respect to faculty and student recruitment, research, and other priorities. This approach is limited primarily to research universities, technical institutions, and other colleges and universities that have decided to make advanced technology a centerpiece of their institutional agendas.

As you will note, each of these goals has far more to do with social and economic concerns than with technological issues. This is underscored by the fact that the most common trigger for a strategic planning process is the arrival of a new chief academic or information officer. When responsibility for information technology falls into new hands, the need for a strategic technology plan often becomes a priority. Understanding the non-technological aspects of technology planning can help shed light on why so much of technology planning can be an unparalleled waste of time.

**Why does strategic technology planning fail?**

Some technology officers and a surprising number of chief academic officers\(^3\) believe technology planning fails because technology evolves too rapidly, there will never be enough resources to satisfy technology demands, or users have no way of knowing what they will

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\(^3\) This question was discussed by chief technology officers, librarians, faculty, presidents, chief academic officers, and board members of thirty-one independent colleges and universities in the Pacific Northwest in a series of meetings held during the summer and early fall of 1997, sponsored by the M. J. Murdock Charitable Trust.
need in the future. Many of our respondents, however, provided a different set of answers. They blamed, for example:

- failure to tie technology to institutional mission and priorities,
- failure to get the right people on board,
- excessive focus on technical detail, or
- lack of suitable leadership.

It's critical to remember that a plan is a statement about priorities and their implementation, given our best knowledge at planning time, and that all kinds of events will cause the unfolding of history to differ from the plan.

— Greg Jackson, Associate Provost for Information Technology, University of Chicago

Excessive focus on technical detail

For many reasons, focusing on technical details in a strategic planning process can be counter-productive. As mentioned above, it dampens the interest of vital participants; it tends to obscure, rather than illuminate, genuinely strategic issues; and its relevance diminishes quickly when the planning process looks at a horizon of more than a few months. The issue of whether to provide network access to residence halls is strategic; the decision of whether to achieve this by installing copper, fiber, or wireless transponders is not. An extraordinary amount of energy and money is wasted on efforts to define—sometimes to the level of specific hardware configurations—the kind of technology that should inhabit desktops and conduits years into the future. There are miles and miles of dark fiber in the ground that provide silent testimony to such mistakes.

Lack of suitable leadership

Strategic planning processes can suffer as badly from too much leadership as they can from too little. Anecdotes abound of chief technology officers who assume a mantle of technomysticism and exercise near-total control over the planning process. The community is tacitly asked to trust that the information organization and its officers will do what's best. At the opposite end of the spectrum are technology officers who serve as little more than clerks to the planning process, allowing committees or campus communities to vote with their feet on new directions for technology. Suitable leadership for technology planning requires the chief technology officer to guide the process along, identify critical choice points, solicit input, and ensure that personal agendas, including one's own, do not divert the process from serving the broader needs of the community.

A more agile approach to planning

It appears there are some common practices that contribute to healthy technology planning processes, regardless of the size and type of institution. The following ten-step method is an effort to fuse these practices into a comprehensive approach. This approach should be viewed as a model—to be adapted to fit the individual needs of a campus—rather than as a blueprint.

A guiding principle of this method is to sepa-
rate the socioeconomic aspects of a technology strategy from the operational aspects, while nevertheless ensuring coherence between the two components. The first five steps of the method focus on the strategic overview, the latter five on the operational dimension.

**Step 1 – Review institutional objectives.** Before initiating any strategic technology planning, it is vital to bring senior officers, deans, faculty, and other key people into the process, identify their priorities, and solicit feedback on ways in which technology might—or might not—support the institutional objectives they consider to be most critical. This first step, while obviously vital for new technology officers, is equally important for long-time incumbents. Too often, experienced technology officers take this step for granted, only to discover that players and priorities have changed and long-standing assumptions are no longer valid. Needless to say, this kind of oversight can lead to disaster.

**Step 2 – Establish a framework of strategic technology objectives.** In order to build a framework of strategic objectives, a broad effort must be made to survey all institutional constituencies. Typically, this involves the distribution of a survey to selected focus groups in order to solicit information about problems, unmet needs, future goals, and so forth. An exercise of this sort is likely to consume several months, hence it should be performed, ideally, at five-year intervals. It is especially important to strike a balance between focusing survey questions on institutional priorities and allowing respondents sufficient latitude to express individual objectives. Above all, this type of solicitation should concentrate on strategic objectives rather than on technological details. The outcome should be a brief annotated list of pedagogical, research, administrative, communications, or similar objectives that can be directly enhanced through the application of existing or new technologies.

**Step 3 – Prioritize objectives.** Even in a small institution, the list derived from Step 2 can be formidable. It is necessary, therefore, to identify broad points of convergence and to prioritize them according to costs and benefits. For political reasons, this step needs to be taken by an appropriate campus technology committee rather than by the chief technology officer or the information technology organization. Ideally, such a committee should include representation from all constituencies—faculty, students, staff, library, the information technology organization—as well as key financial, academic, and administrative officers. While the prioritized list should provide an explanation of how the objectives relate to wider institutional concerns—and some discussion of costs and benefits—it should be as brief as possible, a memo rather than a tome. For most institutions, the days of eighty-page strategic technology plans are gone, hopefully forever. The effective horizon of the list should not be more than five years.

**Step 4 – Invite key group review.** Before the framework of strategic objectives is finalized it should be vetted among key groups—such as the institution’s senior staff—to allow critical decision-makers an opportunity to consider financial and policy ramifications of the objectives. If such groups don’t have a chance to review the objectives, substantial obstacles to their implementation may arise later. In some cases, it may be necessary for these groups and the technology committee to refine the framework until consensus is achieved.

**Step 5 – Disseminate strategic technology framework.** The outcome of Step 4 should be made available to the community at large. The brevity of the document should permit many forms of distribution, ranging from an article in the school newspaper to a posting on the campus Web server.

The discussions need to be managed and to take place in a context that does not have a “rah-rah” tone. While advocacy is no less of an issue these days, it needs to be more atten-
itive to ROI [return on investment] and the expected value that technology adds to an ac-
tivity or institutional function.

— Raney Ellis, Associate Vice President for Information Systems, University of Puget Sound

**Step 6 – Translate objectives into operational goals.** In an ideal world, Steps 1 through 5 should consume no more than six months and

“It is vital to bring senior officers, deans, faculty, and other key people into the process, identify their priorities, and solicit feedback on ways in which technology might—or might not—support the institutional objectives they consider to be most critical.”

3 In very small colleges and universities, face-to-face meetings with departments (or even individuals) are often possible. At Reed, for example, all faculty members are personally interviewed every five years to discuss strategic technology objectives.
should be repeated every five years. On an annual basis, however, the information technology organization must identify operational goals that can be used to address the strategic objectives. The initial development of these technical goals should not require broad input from the community; indeed, delegating this level of decision-making to committees or end-users is often counter-productive.

**Step 7 – Discuss operational goals with key people.** The annual list of operational goals developed by the information technology organization should be circulated to key financial, academic, and administrative people to obtain feedback and support for changes in technology, services, procedures, and policies.

**Step 8 – Disseminate operational goals.** The list of operational goals should be made available to the community at large to ensure there is sufficient awareness of technical innovations and their strategic benefits to users.

**Step 9 – Enable continuous input.** Members of the community should be encouraged to express their technology needs to the information technology organization on an ongoing basis. Such items should feed into annual assessments of progress toward completion of operational goals.

**Step 10 – Conduct retrospective assessment.** Progress toward annual goals should be evaluated each year, prior to the development of the following year’s goals; similarly, an assessment of progress toward strategic objectives should be generated as a prelude to each five-year strategic planning exercise. As with the documents that describe objectives and operational goals, assessments should be as brief as possible, indicating targets that have been reached as well as the reasons why targets have been missed, modified, or abandoned.

**Increase fungibility**

For many people, strategic technology planning is just another name for long-term financial planning. While this is a somewhat parochial view, it nonetheless underscores the central role of funding issues in technology planning. Traditionally, strategic funding requests and allocations involve many layers of author-ity and a substantial amount of justificatory detail, regardless of whether an institution is large or small, public or private. The amount of time it takes to analyze funding needs, gain approvals, and locate or create resources, is often out of sync with the windows of opportunity for technological innovation. Anecdotal evidence of this is plentiful. By the time an institution has dotted the last “i” and crossed the last “t” on capital funding for a campuswide network, the envisioned technology may have changed sufficiently to render the plan obsolete.

One way to address this problem is to earmark a significant amount of fungible capital resources for technology and allow it to be allocated as required. While it may not be possible to justify future technology needs in detail, good planning should permit an institution to estimate the level of financial resources that it can and should devote to technology for a period of several years. A further refinement of this approach is to create a “rapid reaction fund” as part of the annual technology operating budget. By allowing unused funds to carry forward across fiscal years, an institution can establish the type of budgetary flexibility that will allow it to maintain technical stability despite the peaks and valleys in user demand, infrastructure modification, and technology innovations.

Fungibility can also be increased with respect to staffing. Typically, institutions struggle with the choice of either outsourcing or providing internal support for technical operations. The problem of recruiting and retaining qualified staff—along with rapid changes in required skill-sets—impels many colleges and universities toward selective outsourcing despite their apprehensions about having staff members whose primary loyalties lie outside of the institution. There is a third alternative: closed-end contracts. Recognizing that it is becoming increasingly difficult to keep high-quality technical employees for more than three years, some institutions are designating certain positions as multi-year contract positions. While the turnover rate remains high, it occurs with greater predictability, hence with less disruption. More importantly, it enables the institution to modify position requirements as changes occur in technology and the needs of users. It is, in some sense, a way of introducing fungibility into
staffing, a concept that is largely alien to the traditions of higher education and that makes sense only in the context of a job market as competitive as that of high technology.

Be best, not first

About ten years ago, word started to circulate in higher education that the future of networking was going to be Fiber Distributed Data Interface (FDDI). In an effort to reduce future costs, many institutions began to pull dozens of strands of fiber into concentric rings around their campuses, into buildings, up to closets, and down to wall plates. Today there are miles of unused fiber lurking beneath our campuses and crowding conduits within our walls. Although FDDI has been employed in many places, alternative technologies such as fast Ethernet have vastly superseded it. Much of the visionary network planning of the late 1980s appears oddly naive in hindsight. There is an important lesson in this for technology planners: Within higher education, institutions are more likely to gain competitive advantage through technology if they are best rather than first. Because the pace of technological innovation is so fast, being the first one on the block to adopt a new platform or strategy yields little more than a quick flash of attention. Indeed, establishing an environment in which technological missteps are rare, resources are optimally deployed, and users are continually satisfied is far more likely to serve the strategic needs of the institution and engender lasting, rather than transitory, recognition.

Use outside assistance carefully

Within the past few years, a growing number of colleges and universities have sought external assistance from consultants or from so-called model institutions for their strategic technology planning. Reading someone else's strategic technology plan or hiring a consultant to guide the strategic planning process, however, should be done with great care. In order for a planning process to be fully effective, it must be internally managed. If plans from other institutions are acquired, they should be read with a very critical eye. Likewise, the use of an outside consultant should not be viewed as a way to relieve the institution of its responsibility to define priorities and understand the full implications of moving in one technological direction or another.

Conclusion

Getting bogged down in lengthy, complex, and confused technology planning is one of the more expensive—and potentially self-defeating—exercises an institution can undertake. It is extremely easy to lose sight of the most critical objectives and become embroiled in pointless arguments about particular vendors, platforms, micro-standards, and the like. However, the alternative—to simply fly by the seat of one's technological pants—is hardly a sensible option. The key to making optimal use of time, energy, and institutional resources is to understand the important differences between long-term socioeconomic technology planning and short-term operational technology planning. It is important to focus on process rather than document, and to devise mechanisms that enable funding, staffing, and other assets to be readily allocated and re-allocated, as circumstances require.

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“Within higher education, institutions are more likely to gain competitive advantage through technology if they are best rather than first.”
Almost all pedagogy conceived under the rubric of virtual learning seeks to leverage information technology (IT) and so requires the implementation of powerful and readily accessible computer and networking systems. What are the technical and financial implications of upgrading network infrastructure to support virtual learning environments? How will we support advanced applications using such technologies as virtual reality and streaming video? The production of distance learning materials is currently quite expensive, in terms of both courseware development costs and faculty time. What are the prospects for lowering these cost barriers? Will administrative systems provide the tools for access and customization to handle large numbers of remote students? Can we establish a common “middleware” infrastructure on and between our campuses (for example, standards-based authentication, digital signatures, electronic authorization, directory services) necessary for collaboration and resource sharing?

**FIRST QUESTIONS**

At the outset, it is important to sort through the clutter of terms such as distance education, virtual learning environments, and online instruction. For the purposes of the analysis in this article, we consider the broad range of IT-leveraged educational activities, regardless of location of the student (on or off campus) and instructor.
face as a design criterion for learningware. The points of view of the “supply side”—faculty and teachers—will need to be understood as well. Teachers will want to use modules and instructional objects from a variety of sources to build their courses. This suggests standards at the educational object level, with the creation and indexing tools that manipulate such objects. To some degree, teachers will move from being composers to being conductors, assembling materials and motivating students more than writing new scores from scratch.

While this disaggregation of education allows consumers to pick a variety of learning experiences and customize course timing, content, and interface, it also makes packaging, continuity, and assessment difficult. It is important that higher education institutions preserve their critical role in programmatic sequencing of courses and assessment, even as their other “middleman” role of overall educational broker is reduced.

**LIVING WITH TECHNOLOGY**

A key challenge in leveraging technology to support a virtual learning environment is the volatility of emerging technologies. Some relevant technologies that are needed for an effective infrastructure have not yet reached maturity (for example, see the discussion below on authentication, authorization, encryption, and other security technologies). On the other hand, even wise investments in relatively mature technologies have at best limited life spans in a world where performance doubles every eighteen months.

We are also currently working with some seriously “broken” technologies. For example, hypertext markup language (HTML) is the simplified stepchild of the standardized general markup language (SGML). It was an experiment gone wild, put out on the Internet on a trial basis; yet within a matter of months it became a global de facto standard. Now, the retrofit of the more powerful SGML into the Internet is made difficult by the embedded HTML base. This is just one example of a technology that became established before it was refined.

There are a couple of technological axioms to keep in mind as we sort all this out. Interoperability—open standards that allow a variety of creative entities (both academic and corporate) to build separate components that work together and leverage each other—is perhaps the most important principle underlying the rapid development of technology. At the same time, it makes the standards processes themselves byzantine and occasionally inconclusive. Indeed, as networking has moved from an academic activity to a major industry, collegial standards processes have been replaced by competitive forums that often do not lead to a single consensus. (There is a well-known saying that technology standards are so useful that we should have a lot of them.) Managing complexity is the most challenging aspect that we face as the technology builds on itself in this layered fashion. And scaling is an eternal consideration. Technologies must be able to accommodate not only orders of magnitude increase in usage, but orders of magnitude difference in the variety and performance characteristics of environments in which users apply the technologies.

While higher education was the wellspring in the rise of computing and networking, for the most part the torch now has been passed to the commercial sector. It remains for us to focus on the factors that make us different from the corporate world, and concentrate our energies there. For example, unlike corporate workers, who tend to stay at a single computer all day, many of our workers (students) will work at several different computers during the course of their day. This creates a mobility requirement for services such as authentication and customization that we in higher education will likely need to address ourselves. Similarly, our directory services requirements, as public institutions, have aspects that differ from the corporate sector, particularly related to the Family Education Rights and Privacy Act (FERPA), and will need somewhat distinct engineering.

**A TAXONOMY OF INFRASTRUCTURE TECHNOLOGIES**

As we sort through the technological issues in building effective widespread virtual learning environments, it is useful to categorize technologies into four groups:

- **Delivery systems**—technologies such as on-campus and residential networking, Internet, video servers, and so forth.

“We to some degree, teachers will move from being composers to being conductors, assembling materials and motivating students more than writing new scores from scratch.”
“Even what we have today as proven technologies, such as electronic mail, may work well in their current mode, but scaling and ‘industrial strength’ implementations are unproven.”

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- **Middleware**—the “glue” pieces, such as authentication, authorization, customization, and localization, that transform raw delivery into viable service offerings.
- **Creationware**—tools such as authoring tools, Java libraries, multimedia editing systems, etc., that allow authors and subject experts to develop electronic materials.
- **Administrative support**—the systems that track not only the students but also the online educational materials, allowing students to shop for courses and faculty to build new courses on other modules and components.

Some of these areas, such as delivery systems, are farther along than others, such as creationware, but all are still relatively immature. Even what we have today as proven technologies, such as electronic mail, may work well in their current mode, but scaling and “industrial strength” implementations are unproven. For example, many of us are finding that e-mail, once a critical productivity tool, has become almost overwhelming in volume. That problem is exacerbated in virtual learning environments as well; several online universities have reduced their student-to-faculty ratio expectations as teachers reported their inability to respond in a timely fashion to student e-mail correspondence. Industrial strength e-mail with encryption and digital signatures and standard means for attachments is also still not commonplace in the online world.

### Delivery systems and basic instructional tools

Two areas to consider here are physical delivery options and the communications and information tools available with those options. It should be noted that the people to support such services are a critical component as well; other CAUSE/EFFECT articles and a CAUSE professional paper have examined the crisis in support services.1

#### Physical delivery systems

In general, higher-speed lines and frame relay services have made delivering virtual education to businesses and schools easier, but delivery to the home is still a major challenge. Emergent extensions of telephony called the DSL group (ADSL being the most promising) can offer high-speed access to the home, but much as with the earlier approach of ISDN, these digital subscriber services are limited to homes fairly proximate to central telephone offices. (Note that both ADSL and cable technologies are deployed with asymmetric bandwidth, so that home users have little upstream bandwidth compared to the into-the-house flow. Whether this is an impediment to virtual learning depends on the tools in use; streaming video into a house would be viable, but video conferencing between a house and a remote instructor needs symmetric bandwidth.) Satellite technology has been proven to be effective in a broadcast environment of one-to-many, that is, reaching great numbers of learners from single points of dissemination. There are low-earth orbit technologies that promise to enable the delivery of two-way Internet services (including video) to rural environments, but they are not moving along as rapidly as was hoped.

What we see today in the Internet is pretty much what will be available for the next year or two. The Internet2 project promises potential solutions to the challenge of enabling new and innovative network applications, especially those that require high bandwidth or other committed transmission characteristics. The biggest invention to be delivered from the current Internet to Internet2 is quality of service (QoS), that is, the ability to send some packets with a guaranteed level of service. In some sense, the current Internet is about connectivity, while Internet2 is about differentiation. (It should be noted that another of the stated goals for Internet2 is a scalable multicast approach, which is necessary to permit viable ad hoc one-to-many video communication and distance education applications.) The technical challenges here are considerable, and solutions will not reach broadly into higher education for some time.

Dedicated video links are expensive and do not scale well; they are an interim component of the distance learning technology infrastructure. While economics will continue to justify one-to-many video via satellite, most multicast video services will ultimately be carried on top of conventional data networks.

CD systems are another alternative for delivery of content, the cheapest bulk-rate delivery medium. This technology can be used in conjunction with the Internet, so that it’s easy to
incorporate hot links as well as permitting updates via the Internet. They should not be overlooked in the move to fancier delivery schemes.

As we get deeper into the provision of virtual education, we will develop some good practices around the servers that house and distribute content. For example, we may situate information servers beyond internal firewalls to permit distance education or within our Internet protocol (IP) address space to license databases. It is likely that video servers (with their exceptional network bandwidth requirements) that are intended to serve external communities may be located in gigaPOPS sites or other external locations, so that the traffic does not congest our own Internet linkage.

Information and communication tools

Electronic mail is already in widespread use. While e-mail delivery mechanisms will improve somewhat, this medium is relatively mature (technologically, if not sociologically). Better security and multimedia for e-mail will finally become viable in the next year or two.

Two other communications tools, Net News and IRC (also known as "chat"), can create an electronic agora. While we have improved these tools over the years, they still have limited filtering and archival mechanisms and very little structure. They serve some role as general discourse tools, especially in asynchronous classes, but cannot deliver content well.

In terms of information tools, the Web is obviously powerful. Java applets offer particular promise, especially to facilitate simulations, but this technology is not without challenges. For example, for a short time one could be confident that a program written in Java would be executable in every Web “browser,” but Java is now fragmented and less a standard. Other issues, such as applet authentication, are also unresolved.

The University of Colorado (CU) is one of several campuses experimenting with desktop video across the Internet, commonly referred to as “video over IP.” Our early experience indicates that it is truly a “killer” application (both in its appeal and its impact on the network). It’s not just that it’s video; it’s that it is video to a computer rather than to a television, fundamentally changing the use of video because of the appliance it is plugging into. Today we can cobble together off-the-shelf technologies to run coordinated conferencing—with video, voice, and data—across IP networks (albeit lightly loaded networks). In one current CU journalism class being delivered to a computer lab one hundred miles away across the Continental Divide, the student computers display a real-time video of the instructor. When she opens a Web page, it simultaneously opens on the students’ browsers. In yet another part of the screen (large screens are very helpful in virtual education), the instructor can play a video tape through a VCR connected to her computer; the students see the video and hear her voice-over describing salient aspects of the scene. This technology may be costly today, in terms of equipment and network capacity, but these costs will drop considerably in the future.

Middleware

Middleware is a term for the evolving set of software tools needed to turn rough capacities into useful services. Today, these areas include network and individual security, customization (for example, bringing your folder of browser bookmarks, e-mail aliases, and other preferences to your current location), and access to personal files. In the future, new applications such as calendaring and video may add new middleware requirements.

Authentication

Currently, the single most important middleware gap is in the realm of electronic identification—proving that individuals are who they claim to be, either by something they know (for example, a password), something they have (for example, a smart ID card) or something they are (the new field of biometric authentication). To enable a virtual learning environment, two needs are immediate: a campuswide authentication scheme for students of an institution, and interoperability of such schemes between institutions.

“To enable a virtual learning environment, two needs are immediate: a campuswide authentication scheme for students of an institution, and interoperability of such schemes between institutions.”

(continued on page 32)
DUKE UNIVERSITY

Well known for its contributions in North Carolina's Research Triangle and its strong position in men's basketball, Duke University is located in Durham, North Carolina. The striking 9,350-acre campus includes 7,700 acres of forest, and the 210-foot tower of the Duke Chapel accentuates the predominantly Gothic architecture of the West Campus.

Duke is a private institution with an enrollment of more than 11,500. The university was established in 1924 by expanding Trinity College, which traces its roots back to 1838. The internationally known Duke University Medical Center, currently under reorganization, incorporates one of twenty-one federally funded comprehensive cancer centers, an eye center, and a federally supported general clinical research unit. Duke’s library holdings are the eighth largest among private universities in the United States, boasting more than 4.5 million books.

EXECUTIVE SUPPORT

Information technology is a priority at Duke, and a commitment to implementing innovative systems and taking advantage of new research starts at the top with President Nannerl Keohane. She applauds the Duke community, explaining that the most valuable resource for information technology at Duke is the supportive atmosphere "created by faculty, students, administrators, alumni, trustees alike. We’re all hooked on information technology and determined to do things even better."

Keohane notes that Duke carefully measures its investments in the information technology arena. She explains, "We are not rich enough to be on the cutting edge of technology in all areas, and we also know that it’s a risky place to be. We’ll take the risks in some high-tech areas, but we choose our bets carefully."

Still, Duke has been aggressive enough in the field to earn widespread media attention, including recent pieces in Network World and PC Week, as well as award recognition for its networking infrastructure and help desk.

Duke's Office of Information Technology was established in 1994, pulling six information technology units under one umbrella. At the same time Betty Le Compagnon arrived to fill a new position, vice provost for information technology and chief information officer. Le Compagnon’s tenure at Duke has been characterized by communication, personal relationships, and collaboration, both within OIT and with other organizations.

ADVISING THE CIO

Much of the planning and decision-making for information technology at Duke is spearheaded by one group, the Information Technology Advisory Council (ITAC). The council, which includes representatives from all corners of the institution, advises Le Compagnon. ITAC was established in 1995 and comprises faculty, undergraduate and graduate students, and staff and administrators, including information technology representatives from different schools, the library, and the Medical Center.

The purpose of ITAC is "to support the academic mission of the University through the appropriate use of information technology." Toward that end, the council advises the vice provost on issues of technology and policies, it develops strategic plans for information technology, and it keeps the community informed about issues and initiatives.

A recent decision reversal illustrated the council’s willingness to listen to its members. Students protested a plan to create a Macintosh multimedia center in lieu of replacing Macs in computer labs. While money would be going into Mac computers in either case, students preferred having up-to-date machines available for everyday use. When student representatives presented their position at a council meeting, administrators were persuaded that the original plan was not the best one.

Though ITAC is a conglomerate of people with different views and different needs, Le Compagnon says the efficient handling of the Mac issue is indicative of the council’s style. “The council has productive discussions and resolves a number of issues, while including everyone. Even those people who aren’t necessarily happy with a decision understand the process,” says Le Compagnon. “It allows us to make the decisions we need to make as we go along, and that’s key.”

CAUSE/EFFECT’s Campus Profile department regularly focuses on the information resources environment—information, technology, and services—of a CAUSE member institution, to promote better understanding of how information resources are organized, managed, planned for, and used in colleges and universities of various sizes and types. This article is based on a visit to Duke University by CAUSE Writer/Reporter Shannon Burgert.
CAMPUS CONNECTIONS

“People, process, and then technology,” says Philip Verghis, manager of Customer Services, explaining his philosophy of customer support. When hiring Help Desk staff, Verghis looks for customer service skills over technical expertise. Once on board, staff can quickly gain technical knowledge, while people skills are more difficult to pick up.

At the same time, Verghis wants to tackle the majority of inquiries at the first point of contact. “The philosophy is that the frontline customer support should have all the toys that every group has and more,” he says. This enables the staff to quickly access the system that is problematic. Verghis’ principle is paying off: In September of 1996, 60 percent of the inquiries were solved with the first call; a year later that figure rose to 90 percent.

And customers aren’t going to be satisfied if the Help Desk isn’t, so Verghis is careful to reward employees with social events as well as involve them in the decision-making process. “Assign projects to whomever they affect most,” he says. In fact, two students completed 90 percent of the work to streamline last fall’s Students With Access to Technology project, or SWAT, a project to get students connected as they arrive on campus.

Duke’s residence hall rooms are wired for direct Internet access to DukeNet. Through SWAT ’97, three-quarters of the student population, including all freshmen, were connected to the campus network before school started. The rest were connected within the first week of classes. In its third year, SWAT’s pricetag was lowered; the project cost less than half of what it did the previous year.

The idea was also not to overload or increase the size of the staff, says Ginny Cake, director of Customer Support, who is proud of Duke’s success in self-help. “We want to maintain the size of our staff, even though the inquiries are increasing. We want to help people help themselves.” With this process, students who do need real-time help get quality response right away.

Cake explains that self-help starts with published hardware and software guidelines. An easy-to-understand Internet Survival Kit, complete with a guide and diskette or CD, is distributed to students, and the Help Desk runs self-help Web pages. More than 27,000 documents addressing common issues exist on the Web site, and more documents are added as inquiries filter through the Help Desk. During the September crunch in 1996, the Help Desk received 17,500 direct (primarily e-mail or phone) inquiries and 7,200 hits to the Help Desk Web site, totaling 24,700 hits. Although the total
number of inquiries more than doubled to 53,200 during September of 1997, the number of direct inquiries rose only to 18,200, while Web inquiries rose dramatically to 35,000.

The success of the Help Desk is credited to DUNK, the Duke University Network Knowledge Base. A reengineering project, DUNK placed Duke as runner-up for the Help Desk Institute’s 1998 Team Excellence Award—a position previously unattained by a university.

A collaboration between OIT and Medical Center Information Systems (MCIS), DUNK was a multi-year project that transformed the Help Desk—a paper and pencil operation—into a state-of-the-art support structure. In mid-1997, the Fuqua School of Business and the Law School information technology groups joined Project DUNK. Start-up costs for DUNK were evenly split between OIT and MCIS.

The Help Desk recently helped to keep a pilot project running smoothly at Krzyzewskiville—a village of tents where students camp out for up to six weeks to get men’s basketball tickets. The village, which this year had 1,300 residents, is named after Duke’s head basketball coach, Mike Krzyzewski.

Bob Currier, director of Data Communications, convinced Akom, a manufacturer of wireless Internet connections, to use Krzyzewskiville as a test site for their new equipment. A central transmitter and Ethernet-card-like devices permit laptops to access Duke’s award-winning campus backbone.

Watching the excitement of students during the Wireless Project at Krzyzewskiville was gratifying to Currier. “It’s easy to forget why we’re here. When you only see the technology, you tend to disassociate yourself from the person,” he said.

Following the successful run of the Krzyzewskiville project, the wireless technology has been installed in the Bryan Center, Duke’s student union building, where students with specially equipped laptops can now check e-mail from any of the study rooms or while sipping coffee in the cafe. Other locations being considered for wireless networks are the Perkins Library and the Fuqua School of Business.

Currier is also in charge of DukeNet, which won an honorable mention in CAUSE’s Awards for Excellence in Campus Networking in 1997 and was a co-winner in the 1997 Network World User Excellence Award competition. The network, conceptualized in 1989, now boasts more than 20,000 individual registered hosts.

For academic and administrative buildings, Duke is three years into a $20 million, four-year plan to install Category 5 wiring for voice and data and RG-6 coax for video services. An earlier project to provide Ethernet connections and cable TV to student residence halls was completed in 1994.

**Building Alliances**

Two key partnerships at Duke are those that OIT holds with the Medical Center and the library. Le Compagnon stresses that it wouldn’t work to keep the organizations isolated, saying, “For everything now, you have to collaborate with everyone else on campus—the technology is forcing you to.” But she also believes that the organizational structure is not important: “When you think of collaboration, you always try to think of structures. I think collaboration comes from a feeling that you try to give to your staff, that we try to do by example. You build the right relationship with the person in the organization, and it permeates in all directions.”

University Librarian David Ferriero, who sits on ITAC, has worked with Le Compagnon and OIT on projects such as building an electronic reserves system. He agreed with Le Compagnon, saying, “I think there’s a growing realization that we need each other, and there’s a tendency now for libraries and computer centers to work together.”

In March, 1,300 students camped out—some for up to six weeks—to get tickets to Duke’s men’s basketball games. This year residents of the tent village Krzyzewskiville, named for head coach Mike Krzyzewski, were able to access the campus backbone through a pilot project testing wireless Internet connections.
regardless of reporting or organizational structures.

But noting that some people or schools still prefer to work as separate entities, Le Compagnon added, “More than anything else, I think the role of the chief information officer and of the librarian today has to be that of facilitator and negotiator.”

A similar spirit exists between OIT and Medical Center Information Systems, where walls existed not so long ago.

Landen Bain, CIO for the Medical Center, said that he and Le Compagnon have worked to collapse the barriers between their departments and work under a different principle. “What we have arranged is a general willingness to collaborate and do things together, unless there’s a clear reason not to,” he said, explaining that factors such as patient confidentiality make partnerships in some areas inappropriate. But projects like DUNK work well. “The closer something is to an infrastructure level, the easier it is for us to collaborate, and the farther out it is at the application level, the more distinct it is.” Most of the work in classroom enhancement isn’t crossfunctional, for example, but there are real advantages to working together to negotiate with common vendors.

A year ago, OIT and Medical Center Information Systems combined their printing operations, saving $35,000. The printing load of MCIS was transferred to OIT Computing Operations’ high-speed, network-attached printers. Le Compagnon said that it was the first major collaboration where one unit had to rely on the other, and it was managed successfully.

Both administrators noted the importance of communicating to their staffs and maintaining a balance between the two organizations. Said Le Compagnon, “At our level, we don’t have to make it happen, so we can say, ‘Gee, it would make perfect sense to combine our two machine rooms and make it one virtual machine room,’ but we don’t have to then figure out how to do it.” So when it comes to planning a project, staff are urged to get involved from both sides.

Bain added that while he and Le Compagnon talk often, the staffs don’t mix as frequently. To encourage positive relationships, the groups now hold a joint annual holiday party. Bain stressed the party’s impact: “I think that was an incredibly important, symbolic step—people started to think in the collective ‘we.’”

Cake noted that as Duke implements new technologies, the university is changing its style. “I think the old adage at Duke was that the information technology department should decide how things should be done, and how the technology should be used, and we’re trying to change that focus to say, ‘You tell us what you want to achieve, and we’ll come in and give you the tools and techniques to get things done.’”

Two current projects are university-wide. A new financial system is being implemented, and so is Student Information Services and Systems, a project that will replace antiquated and redundant systems and services. SISS will synchronize efforts throughout the schools and allow the community access for tasks such as online registration.

**BEYOND DUKE**

The University has recently worked to coordinate community outreach, and OIT was among the first organizations to extend a hand. A number of Durham neighborhoods have been identified to receive contributions from Duke, and OIT is working with schools and community centers to assess their computer needs and to generate corporate support. OIT is donating computers and office furniture, as well as helping with training teachers in information technologies.

On a national level, Duke is a charter member of Internet2, the initiative to create the next generation of the Internet. Ferriero and Le Compagnon both serve on the advisory board for the North Carolina GigaNet Initiative, a regional network interconnecting Duke, North Carolina State University, the University of North Carolina at Chapel Hill, and the Micro Electronics Center of North Carolina (MCNC) in Research Triangle Park.

The Triangle is at the forefront in the Internet2 project, and through North Carolina GigaNet, researchers will have access to high-speed network resources like the vBNS (very high-speed backbone network system) and the Energy Sciences Network (Essent), which together will form one of the first implementations of Internet2. A related project, Peer Central, will keep local traffic from traveling to remote locations unnecessarily.

**IMPACT**

President Keohane notices technology’s impact throughout the university: in the relationships among students, through electronic conversations about ideas; with faculty members, in sharing course information and holding “virtual office hours”; and among administrators, in being able to exchange ideas and information rapidly and effectively.

“Most of the impact has been positive; our forebears would have been open-mouthed at the ease with which we communicate and transfer complex information. But we also need to turn off the computer more often and get out for face-to-face exchanges over coffee.”

Looking forward, Le Compagnon also wants to maintain a focus on people and a continued exploration of collaboration and cooperation. She says, “It is important to remember that the answer is not simply more technology. As the use of technology becomes more widespread, we must focus on human issues.”
Virtual Learning...

(continued from page 27)

Institutions will form consortia to purchase instructional materials in bulk; the vendors of those materials want to have a common way to grant the consortium privileges. Institutions will form consortia to purchase instructional materials in bulk; the vendors of those materials want to have a common way to grant the consortium privileges. Individuals will affiliate with multiple institutions and want a common means to confirm those separate relationships.

There are several candidate technologies for authentication, and the limits of each illustrate the complexity of the task.

**Kerberos** was developed by MIT some fifteen years ago as a basic password encryption mechanism. Its simplicity is a strength and a weakness. The simplicity helps in its deployment and low-cost operation, yet Kerberos does not provide interoperability between authorities, e-mail authentication, and other advanced features.

**X.509** is a set of protocols that permits authentication through digital signatures and encryption of e-mail. Unlike Kerberos, this technology has a hierarchical structure that will permit an authenticated exchange of authentication credentials among disparate authorities. However, it is not a low-cost technology, either in deployment or operation. Moreover, the current generation of X.509 implementations depends on a user's credentials being stored on the hard drive of the local machine. This model works for the stationary workers of a typical corporate setting, but does not accommodate the roving student-user on a campus. (This is an example of one of the uniquely higher education challenges mentioned above, where industry may not readily develop academically appropriate solutions.)

**Smart card technology** offers a long-term promise through the use of computer chips that can embed digital credentials in credit cards. However, it is unlikely that home computers, the platform for many distant learners, will soon have readers for smart cards.

It is likely that different universities will choose different alternatives, based upon their embedded technology base and their urgency in deploying authentication and other security schemes. The issue is less which option an institution chooses and more that one does choose an institution-wide authentication approach with a plan to interoperate with other institutions' approaches. Institutions should follow activities such as the CNI authentication project to stay abreast of developments in this area.

**Authorization**

A key follow-on to authentication, authorization refers to the provision of a set of attributes and characteristics to authenticated individuals to permit certain electronic interactions by those individuals. Indeed, electronic authorization is where the real payoffs exist. In some sense, authorization extends the Access Control Lists (ACLs) of computing lore into a general set of permissions and restrictions that govern the kinds of actions that an individual can take. Authorization will determine who can modify what data, what path workflow documents will take for approvals, and which students can access particular reserved materials.

Authorization is a very difficult challenge for several reasons. First, the enabling technologies are not evident at this point. Generally each application has its own internal authorization mechanisms, and they do not interoperate with other applications. Second, the maintenance of permissions on an individual basis is extremely time-consuming; it would be far better to establish group characteristics and define an individual as the intersection of various groups (and perhaps some individual "negative permissions" to allow for exceptions). For example, a departmental secretary working on a research project would have a set of permissions representing membership in the department, a job classification, and a project code. But a group-based approach, while administratively viable, raises the hardest of issues—establishing the classifications and associated metadata that define the classifications. In preparation for electronic workflow, one major university spent two years establishing some ninety distinct relationships that an individual could have with the institution, only to discover during implementation that a president emeritus of the university was not in any category.

**Customization and directory services**

One of the characteristics of the information age is the concept of "mass customization," that is, developing applications that permit a wide variation in preferences and features and...

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2 The Coalition for Networked Information has developed a white paper on authentication issues. See http://www.cni.org/projects/authentication.
enabling valuable personal datasets such as e-mail aliases, bookmarks, and so forth. With the increasing complexity and volume of software, we have come to rely heavily on these personalizations to make the world tractable.

Two further developments in mass customization could have positive effects on virtual learning. We need to learn how to make personalization portable, so that we see the same networked world regardless of location and computer. And, as contradictory as it sounds, customization must become standardized. We will need ways to move our preferences between applications and interoperable tools to manage these personal data. The core technology on which to build these services lies in middleware called directories. Directories are standard repositories for storing these data; protocols such as LDAPv3 can access and manage these data, providing portability and interoperability. We have a fair distance still to go to refine these tools and put them into effective use.

**Creationware**

Beyond the basic information and communication tools described above, some virtual learning is based on advanced instructional environments such as virtual realities and multimedia courseware. Creation technologies for these systems, be they Web-development tools, Java applets, or multimedia authoring systems, are still immature, both as tools and in the marketplace. There is little interoperability and much volatility in key pieces of the technology, and the management mechanisms are limited.

The primary tools for Web development are a mix of homebrew systems and proprietary packages. Most take the user fairly far but leave some magic to local systems administrators, in that they lack the scalability necessary for the large volumes of volatile online information to come. The current lack of standards for instructional objects, coupled with still-complex developer interfaces, makes multimedia authoring a difficult task that locks a developer into a proprietary environment. Java applets show much promise, but the recent destandardization of Java, along with some nagging technical problems about security and categorization, are of concern.

The target courses for virtual learning are not clear. On one hand, it is well known that a relative handful of core academic courses (for example, Basic Chemistry, English 101, American History) account for the bulk of college education credits; there is clearly the highest payoff (academic and economic) to using virtual tools to support these large lecture classes. Yet some, by their nature, are otherwise poor candidates for virtual education. Another driver for virtual education is need for technical classes for corporate workers to stay current. Yet the very volatility that drives the need for reeducation makes investment in such course development risky. A faculty member is not going to make a huge commitment to putting a course online if 50 percent of that course is going to erode in a year.

While not a strictly “technical” issue, the current realities of intellectual property greatly compound the complexity of creating educational systems. Few professors understand the ongoing changes in copyright and their consequence on the display of materials; the resulting permission processes are byzantine. Technical solutions to copyright are not being pursued as aggressively as containment. On the other side, few faculty understand their ownership rights and limitations, especially with regard to institutional rules related to electronic materials they create.

**Administrative support: systems upgrades and metadata creation**

Two technical areas will be essential to the effective administration of virtual learning: opening up our current administrative systems (especially student information systems) to student access regardless of location, and developing new systems to administer and manage the instructional objects of virtual education.

Many institutions have started to extend access to core administrative systems, generally through Web interfaces. These efforts will need to include authenticated updates and transactions as well as the inquiry mode usually deployed. The prospect of opening up institutional financial systems to student users, in a manner consistent with that student’s access to academic resources, requires strong technologies and partnerships with internal auditors as well as faculty.

The greater challenge lies in the development of computing systems to manage the curricular objects and student profiles that repre-
sent the components of virtual learning interactions. Curricular objects include the academic modules, their subcomponents (be they MPEG videos, audio streams, simulations, applets), workflow and homework submission systems, database access tools, and museum reference systems. We need to be able to find such objects, associate objects together, pass data among objects, enable distributed change control, and monitor the history of all these activities. Going against all these activities are sets of student users, bearing profiles and permissions to perform actions on the objects. Those actions may include reading the object or submitting homework to it. And in turn, both those objects and those profiles, filled out by educational institutions and users across the world, will need a consistent interpretation of their many variables and parameters. This metadata may well be the toughest area of all; to date, we have neither the tools nor the predilection for such cooperation on meaning.

One recent development in particular deserves considerable attention. The Instructional Management System (IMS) project\(^\text{3}\) is attempting to develop a broad range of standards in support of virtual learning. Led by Educom, it is a joint effort of higher education, K-12, and training organizations seeking to enable interoperability among institutions, software, and users. It has already created draft standards and the metadata to characterize both learning materials and users, and has been informed by solid scholarly work in this area, such as the Dublin Core and other digital library research. If it holds its consensus together, and continues to implement the best of breed research, IMS will provide a considerable contribution to virtual learning.

**RIGHT LEVEL OF INVESTMENT**

There are several key factors for institutions to consider in evaluating the technological investments for virtual learning.

*How important is virtual learning to the institution’s role and mission?* It is clear that not all schools will find it strategically or economically appropriate to pursue virtual learning; indeed, many may be adversely affected by the virtual worlds to come.

*What investments should be made?* The inventory of technological needs described above is long and costly. Foci and priorities are essential. One rule of thumb is that those pieces that are also germane to the broader academic enterprise, such as authentication and Web/email/video servers, are clear wins. Tolerance to volatility may affect when and how the monies are spent. The leading edge is always more expensive and frequently leaves avatars with implementations that are inconsistent with final standards.

*Where will the funding come from?* While virtual learning is often, and perhaps inappropriately, touted as a cost saver, for now much of the infrastructure is not in place at many institutions, so it will mean spending more than saving dollars. Return on investment will not be immediate. It would appear that the savings are not going to be nearly as dominating as anticipated until we have better tools for interactions between faculty and students that are less consumptive of faculty time. It may also be the case that twenty-five students is always going to be the optimum number for a “community of learners,” regardless of the technology tools available. On the other hand, there is great promise for decreasing costs in areas where human interaction is not required. For example, in the area of student registration, it should be possible to reduce the cost per transaction dramatically.

**Next Steps**

Despite this litany of technical realities, we should not despair. Virtual education is inexorable, not only for the power and economies that it may afford, but for the changing base of customers and their orientation to online activity. There are several steps that individual campuses should consider, regardless of their long-term commitment to virtual learning. As mentioned above, there are a number of basic investments in networking, campuswide authentication, and administrative system interfaces that should be considered now. Robust desktop computers on campus, and standardization of the software on those desktops, are obvious needs. Beyond these concrete steps, there is the large cultural education that is required to raise the pedagogical issues within the academy, to initiate the discussions and evaluations that will provide incentives for the faculty to build the grist of the next generation of learningware.

On the national level, we need to move to-

\(^3\) See http://www.improject.org.
Computer Center–Library Relations at Smaller Institutions: A Look from Both Sides

by Larry Hardesty

The relationship between libraries and computer centers at smaller academic institutions has become increasingly important in recent years. This article looks at that relationship through a series of ninety-one interviews of leaders of both kinds of units. It reports on differences and similarities found and offers recommendations based on the interviews.

Introduction

When the organizer of a panel discussion on “The College Library and Computer Center” at the 1997 American Library Association conference proposed the subtitle, “Marriage, Good Friends, or the War of the Roses?” none of the participants—all librarians—demurred. While the organizer suggested the provocative subtitle mostly to gain an audience, none of the participants considered it a misleading characterization of the range of relationships between the two units. In fact, during the resulting discussion, participants described situations at their own institutions that covered the full spectrum of relationships suggested by the subtitle. To borrow an analogy from a popular book on relationships between the sexes, one might wonder if at some institutions the two units are from different planets.

Relationships between computer centers and libraries have become more important as presidents, deans, and others have focused their attention on the connections and overlap between the two units, particularly when there is a vacancy in the leadership position of either. With increasing frequency, senior college officers have sought to move the computer center and library from the “good friends” arrangement to some form of “marriage.” What do the parties most directly involved (computer center administrators and library directors) think about this trend? Do they see it as resulting in “a War of the Roses” between the two units, or a blissful, highly productive union?

This study was prompted by concern among computer center administrators and library directors at small colleges over changing roles and the relationships between their two units. From January 1994 to October 1996, with the financial support of the Council on Library and Information Resources, one forty computer center administrators and fifty-one librarians (forty-nine library directors) at fifty-one small colleges throughout the United States agreed to interviews.

Mergers, the creation of chief information officers, and similar amalgamations of computer centers and libraries often met with considerable concern and apprehension from both sides. As a computer center administrator at a well-known midwestern college explained during an interview, “You may use the word ‘merger,’ but many of us [computer center administrators] will translate that into ‘takeover’ as you speak.” From the other side, a library director from a comparable institution candidly observed, “My counterpart in computing and I both feel uneasy about the other’s aspirations and what responsibilities will be left for us in the future. I have a feeling that, in the end, one or the other of us will lose out.”

Why are many computer center administrators and library directors so uneasy about changes in formal structures that bring them closer together?

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1 This project was largely funded through a contract with the Council on Library and Information Resources.
closer together? “Is it possible,” a dean of a southern college asked, “that the hesitancy, even resistance, to structural changes of this sort from library and computer center directors has more to do with issues of control and autonomy than with the validity of the conceptual model?” Or, in fact, do computer center administrators and library directors have insights into the relationships between the two units not readily perceived by senior college officials and others? Are there two different cultures that do not mix well? It is hard to answer this question without the risk of perpetuating images that, as Patricia Battin wrote in 1984, “continue to keep us apart.”

As described in published reports and during these interviews, some institutions have changed the organizational relationships between the two units with positive results. On the other hand, some have made changes, and then, often with little or no publicity, reverted to more traditional organizational structures. Still others have continued the new organizational relationships despite reports of resignations, early retirements, considerable personnel stress, and other evidence of a dysfunctional organizational structure. One computer center administrator at a small college described his perception of a well-publicized reorganization of the relationship between the library and computer center at a large university: “It wasn’t really a merger. The library took control of computing. Then, most of the computing folks quit and went elsewhere.”

Library directors who were interviewed had varying degrees of administrative responsibility for the computer center. When they were asked to identify the head of the computer center unit with whom the library director worked the most, they offered a variety of individuals on the computer side, including academic computer center directors, administrative computer center directors, computer center administrators with day-to-day responsibilities for both academic and administrative computing, and chief information officers—who often had few day-to-day computer center responsibilities.

Findings

Most computer centers and libraries at small colleges have neither merged nor closely converged. When they have moved more closely together, the driving force generally has come from outside the units. As Gene Engeldinger and Edward Meachen reported regarding the mergers at Carthage College and the University of Wisconsin-Parkside, “In neither case did the reorganization result from a grassroots or rank-and-file staff initiative.” The impetus most often (but not always) comes from the top administration.

The library directors and computer center administrators interviewed generally came from dissimilar backgrounds. While the library directors all had the same graduate degree—the masters in library science—computer center administrators did not have a common degree. As one computer director described the situa-


4 Robert Plane, the president of Clarkson College of Technology, wrote an early article on the topic, “Merging a Library and A Computer Center,” Perspectives in Computing 2 (October 1982): 14-21. From the library side, Patricia Battin provided the rationale for the most prominent early merger of the two units (University of Wisconsin) in her article (see Battin, “The Electronic Library,” 12-17, 34).


6 Robin Wagner, “The College Library and the Computer Center: Marriage, Good Friends, or the War of the Roses,” Panel discussion at the annual meeting of the American Library Association, ACRL, College Libraries Section, Leadership Committee Discussion, San Francisco, California, 29 June 1997. [In late June 1997, Robin Wagner, head of the (footnotes continue)
tion: "Librarians represent a profession in which you have an accepted degree. You have an organization—a librarian association that makes you a profession—and we are not. We all came
to computing by the back door—almost all of us. We are just a ragtag group of folks who are
doing some interesting things. I think we are quite professional, but we do not belong to a profession."

Undergraduate and graduate degrees in the social sciences and humanities predominated
among the library directors. Undergraduate and graduate degrees in mathematics and the sciences
(both virtually nonexistent among degrees held by library directors) predominated
among the computer center administrators, although a few had degrees in the social sciences
and the humanities. There were even a few computer center administrators who did
not have any advanced degrees—something not found among the library directors.

Without an academic socialization process similar to that librarians have, computer center
administrators may lack ready networking opportunities made possible through sharing
of common experiences. The lack of common academic socialization process does not facilitate
development and reinforcement of widely shared values among computer center administra-
tors.

Unlike the educational path to becoming a library director, there is no formal educational path to becoming a computer center administrator. Many computer center administrators were once classroom faculty members interested in technology. A fairly typical comment by a computer center administrator was, "Computer services started here with me. I did everything. That meant I cut the wires. I soldered the wires. I planned the budget." Ten to fifteen years later, such individuals find themselves overseeing complex and rapidly evolving organizations—challenging even the best-prepared managers. The above-quoted computer center administrator, for example, noted, "Now we have six people and I see that there will be more." Computer center administrators at many other small colleges have experienced a similar growth in their responsibilities, often evolving from one-person operations to heading dynamic units with ten, twenty, or more individuals with disparate backgrounds. As a library director observed of his counterparts in the computer center, "It is a newer field, and the people who are fixing the engines in the biplane are still at the stage of becoming presidents of the company."

"Two sets of individuals with generally quite different preparations for their positions will tend to bring dissimilar perspectives to their responsibilities, making effective communications between the two groups challenging."

Members of both groups are aware of their dissimilarities. One computer center administrator, with tongue in cheek, described stereotypical images of the two groups: "There is the view of computer people as being bearded, long-haired, wearing flannel shirts, sitting in a room at 1 a.m., and playing with computers. And librarians as being stiff, prim, and proper and keeping everything down to the finest detail."

Such stereotyping, of course, can do a disservice to members of both groups. Nevertheless, interviewees noted them with sufficient frequency to reasonably concluded that either the differences exist or, at least, many individuals from both units believe they do. Perceptions, accurate or not, often drive behaviors.

When questioned about differences and similarities of perspectives between librarians and computer center personnel, library directors often mention the long tradition of librarians, the closeness of the library to the academic enterprise, and the service orientation of librarians when defining their role. They seemed to be more concerned than computer center administrators about preservation issues, standards, and what will happen to information ten, twenty, or thirty years from now. Both computer center directors and library directors often expressed the view that librarians tended to evaluate decisions more carefully before embarking on a new direction. A computer center administrator observed, "They [the librarians] would like to see things settled and tied up and permanent and regulated before they will allow anyone to have access to it. I want to be able to provide access if people want access."

Library directors typically held that librarians know how people search for information and should actively provide information seekers with needed guidance and instruction. Library directors described "service" as a core value of the library profession. As one library director stated, "The service aspect in librarianship is really fundamental." He continued,
“Computer center personnel appear more likely to revisit decisions, change them, and then move on—sometimes without ever reaching closure.”

However, “I think this is not nearly as true in the computer area. They do not draw that identity from their professional vocation.” Another library director commented, “The library feels responsible for supplying ongoing support.” In contrast, he elaborated, “Their [computer center personnel’s] view is often, ‘Let’s try that, and see if people want it.’ If they don’t want it, they’re ready to walk away from it, and even sometimes when they do want it, they leave it to others to support.” Another library director declared more strongly, “Supporting and educating is not in their vocabulary. There is also a sense that solutions are seen as providing hardware and connectivity.”

This is not to imply that many computer center administrators are not service-minded or that all library directors are. The common professional education of library directors appears, however, to have socialized them to a strong service-orientation. Responses by some computer center administrators tended to support the view that the service orientation of the two groups differs. A computer center administrator noted, “The library has taken an attitude of being aggressively helpful, and I have taken an attitude, ‘If you ask me, I will help.’” Another computer center administrator remarked, “There is a tendency I see in my staff to pass on the responsibility for seeking [information] to the client. ‘Here is a tool; try it. Here are a bunch of good sites. Go play with them and discover all that you can.’” Yet another computer center administrator observed, “I would say that our concern is much more with getting access, and we do not fret about the uses.”

On the other hand, some computer center administrators expressed concerns about the philosophy and motives of librarians. A computer center administrator observed, “While our views are extremely charitable toward the users, theirs [the librarians] are overly compensatory.” He added that among librarians, “There is almost the presumption of the user being lost. ‘You cannot do without us.’”

The kinds of students with which each group primarily deals may explain these different approaches. Computer center personnel may tend to form their particular views because they may more frequently observe students who take it as a challenge to figure out a computer program and, as one computer center administrator put it, “read technical manuals for fun.” Librarians may tend to form their particular views because they may more frequently observe students who want to walk away from a computer-based catalog or index if it is not immediately obvious how to use it.

Computer centers contrast with libraries in other ways. Computer centers are a relatively recent addition on campus and so they do not have a long history as stable organizations. The rate of change is generally faster in their area. Computer center personnel appear more likely to revisit decisions, change them, and then move on—sometimes without ever reaching closure. One computer center director colorfully described the mode in his area as “slash and burn.” He explained, “We move over and chop down the trees, plant a crop, and, if we are lucky, we stay long enough to get the first yield.” Another computer center administrator commented, “We shed yesterday’s new stuff for today’s new stuff very readily.” From the computer side, the librarians appear to move more slowly and cautiously. As one computer center administrator put it, “The librarians have all these standards, and they cannot possibly break from these standards.” Another observed that libraries are “very structure laden, very tradition laden.”

A frequently reported dichotomy by both parties is “content versus conduit.” “I see the computer center as simply a delivery mechanism,” responded one midwestern library director. Another library director commented, “It is like the electricity and plumbing. It needs to be running, or none of us can do our work.” Most, but not all, computer center administrators accepted this analogy. Typically, a computer center administrator stated, “They [the librarians] do the intellectual side. We do the technical side. We make sure that the connections work, but we are not in the information providing business.” Sharing this view, a computer center administrator observed, “My staff and my strength will never be in saying, ‘This is good information.’” This difference can be a source of tension. With some exasperation, a library director responded: “I just listened to three computer center fellows talk with me yesterday about the Internet and so on. While I was trying to get at content and evaluation and the material that is there, they were not interested in that at all. The documents themselves had no intrinsic interest for them.”
This feeling led one midwestern college librarian to say, “This may appear smug, but I see librarians more as educators and computer people more as technologists.”

Whatever caution librarians may have regarding technology, it has presented them with a myriad of avenues to enhance library services. On the other hand, whatever interest computer center personnel have in facilitating the use of new technology, it has presented them with formidable challenges in meeting the needs of their various clienteles—including the librarians. Few computer center directors would declare that they have sufficient staff to keep up with the growing demands—even from the supposedly more cautious librarians. As one computer center administrator remarked somewhat wearily, “You are looking at an overworked [computer] staff, and the librarians have a lot of new ideas.” Tension, exacerbated by the lack of understanding between the two groups, can be the result.

Many individuals on both sides referred to the differences as strengths rather than weaknesses. One computer center administrator contended, “You need the computing folks to be a levenering and say, ‘Let us try this,’ and you need the library folks to have some reservations and say, ‘Have you thought about…?’” Another observed, “If I think of librarians as being the epitome of organization, and computer people as being the epitome of disorganization, there are strengths in both.” He added, “The key is understanding each other.”

Engeldinger and Meachen wrote, “Those who suggest that the cultures and missions of computing services and library services are too different to merge successfully are, we believe, mistaken.” The individuals interviewed provided considerable evidence of successful cooperation and collaboration between the library and the computer center through traditional structures. Frequently at small colleges, personal friendships (and occasionally even marriages) exist between members of each unit. Occasionally, the two have successfully merged. Nevertheless, it is important not to underestimate the differences between the two units and the challenges involved in bringing them closer together. We should consider not just if the two units can be brought more closely together but, more importantly, why and at what costs—both monetary and human.

While creating better service may be the primary impetus for most “marriages,” a few senior college administrators expressed their hope that some economies will result from the new relationship. It is not clear, however, how this will occur. One library director-turned-CIO adamantly stated, “Every time I talk with an administrator about [mergers], the first thing I try to get out of their head is that they are going to save money!” As one wit put it, “How can you save money by combining the old ‘bottomless pit’ [the library] with the new ‘black hole’ [the computer center]?” Interestingly, interviews with more than three dozen small college academic deans involved in a similar project almost ten years ago revealed that none viewed the computer as a way to save money. Perhaps increased economic pressures in recent years have forced college administrators to seek economies in their computer operations.

Regarding the CIO position, a computer center administrator at a wealthy northeastern college reported that to attract an individual with the necessary skills, “They may have to talk about the $100,000-and-up price range.” Another institution concluded the costs of a CIO office would run $100,000 to $125,000 a year. Given such costs, many computer center administrators and library directors said the faculty would be unlikely to support the creation of another senior administrative position.

There are other, perhaps less obvious costs—the human costs. Some institutions have simply put either the current computer center administrator or (more frequently among small colleges) the library director in the CIO position. At small colleges, however, the directors of both units typically also have operational responsibilities. Individuals may find themselves, as one library director-turned-CIO reported, “doing a job that previously they were paying one-and-a-half people to do or one-and-two-thirds people to do.” As a result, some responsibilities are unmet or left to become responsibilities of other members of the unit—occasionally to the dismay of the library director and perhaps to others. One library director commented, “One thing I left behind with this is serving on the reference desk. I miss that terribly.”

The selection of the director of one unit to administer both units creates another challenge. Members of one unit may view an inexperienced CIO as an interloper, while the mem-

“There are other, perhaps less obvious costs—the human costs.”


10 Engeldinger and Meachen, p. 4.

bers of the other unit may view the individual as negligent for not fulfilling previous responsibilities. The increased challenges are not to be approached lightly. One individual who had been through a merger thought carefully before responding to a question about mergers, and said, “Anybody who is taking on the process of a merger of this kind ought to be prepared to give much of himself into it for a few years.”

Interestingly, only a few library directors said they eagerly seek the position of CIO. In fact, most library directors in the CIO position candidly admitted they felt pressured into assuming the CIO responsibilities by their institution’s administration. Many of these same library directors, however, also tended to believe a librarian in the CIO position offered some opportunities to the library. Interviewees who strongly supported the creation of a CIO position along with the merger of the two units typically had backgrounds in the humanities or social sciences, and served as assistant deans or vice provosts. Perhaps even more important is that they had only general responsibilities for the computer center. The combination of those attributes may have provided them with the time and broader perspective to reflect on the future of the two units without being preoccupied by (or sensitive to—depending on one’s perspective) the day-to-day operational demands.

**Toward a solution**

Most of the individuals interviewed believe the key to an effective organization is not the structure, but the people involved. “If the personalities and styles of operation do not fit, then no matter how good it looks on paper, it will not work,” responded one computer center administrator. Another computer center administrator observed, “Taking people with different training and stuffing them in the same organization—is that really going to change anything at all?” No doubt personalities are important at any institution, but at small institutions with fewer personnel they may be particularly important.

What are the solutions to the challenges of creating and sustaining good computer center and library relations at small colleges? There are no simple and quick answers. In the short term, most computer administrators and library directors at the colleges provided considerable evidence that they want to, and will continue to, collaborate and cooperate closely with their counterparts through traditional organizational structures. Many felt, as one computer center administrator colorfully put it, “We will not make good bedfellows if we snuggle too closely together.”

In the long term, most of the individuals interviewed thought the two units are likely to evolve and work more closely together. Leaders of each unit seemed to look to their counterparts for the needed skills and abilities. Library directors typically answered that they needed more technical knowledge (although not highly technical skills). Computer center administrators usually responded that they needed better management and communication skills. Observed a computer center administrator, “There comes a point in the operation when the need for management skills overshadows the need for technical skills.” Or, as one computer center director more bluntly put it, “I do not manage a computer center. I do not manage hardware. I manage emotions. That is what I do, day after day after day. All the technical background in the world is not going to help manage emotions.”

One should not underestimate the importance of increased technological sophistication among library directors. Nevertheless, increasing emphasis on service, management, and communication skills during a computer center administrator’s education is the most important single component in the equation for better relations and services. As those computer center administrators whose primary preparation and interest is in the technology return to the classroom or retire, increasingly many colleges will seek to employ computer center administrators possessing softer skills relating to leadership, educational vision, and interpersonal relations. This is already occurring. Reported a former senior administrator, “When we looked for a computer person [to direct the computer center], we were looking for compatibility with faculty mission and a mindset about what education is all about.” The writer also agrees with the library director, now a CIO, who commented during an interview about the service and leadership skills of computer center administrators, “I have met a lot of heads of academic computing, and many of them are..."
really outstanding.” Nevertheless, it is an area in which computer center administrators themselves believed they needed the most improvement to lead the computer centers of the future.

In addition, as computer centers develop longer histories and test various organizational structures and management styles, models may emerge, as they have among academic libraries. The variety of reporting and organizational structures found among college computer centers suggests they are still seeking appropriate models.

**Conclusions**

Libraries and computer centers face similar challenges. Numerous related factors drive both computer centers and libraries to provide better service and to seek economies. More and more students are showing up on campus expecting to plug in their computers to access the growing variety of electronic resources from their dorm rooms, yet they are still unprepared to use information in the traditional formats that now predominate in libraries. More and more faculty members are incorporating computer technology into their teaching and research, while still publishing in print sources. Both computer centers and libraries are trying to respond to a diverse and demanding clientele. At the same time, both computer centers and libraries are experiencing problems associated with increased costs, rapid technological change and obsolescence, and decreased resources. No doubt cooperation and collaboration between the two units may help alleviate some of these problems. Nevertheless, no organizational structure will solve all, or even most, of these challenges.¹²

Most of the computer center administrators and library directors interviewed felt some concern about organizational structures that might be imposed on them. In seeking solutions to the challenges that computer centers and libraries encounter, we make little progress if we ignore differences between the two units. Organizational structures imposed without considering these differences can result in expensive, dysfunctional units that add to the stress and anxiety of dedicated individuals. We must define carefully the problems we seek to solve and consider individual and group differences before hastening to solutions that may prove to be only temporarily fashionable. Many of those interviewed shared the thoughts of one computer center administrator who commented, “Right now, they [mergers] are going to create all kinds of new problems for us to solve.” Or, as one wit put it, “Creating CIOs and mergers may be like getting married and having a spouse help you with problems you would not have if you had not gotten married.”

**Acknowledgments**

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¹² CAUSE has just released a professional paper that offers a pragmatic analysis of comparative institutional experience in integrating the two functions. See Arnold Hirshon, **Integrating Computing and Library Services: An Administrative Planning and Implementation Guide for Information Resources**, CAUSE Professional Paper Series 18 (Boulder, Colo.: CAUSE, 1998).
Putting the Web to Work: Streamlining Work Flow via an Institutional Intranet

by Perry Brunelli and Lynn Gunn

The Medical College of Wisconsin (MCW) is one of several institutions of the Milwaukee Regional Medical Center (MRMC). MCW faculty and staff often have offices within separate institutions on the MRMC, which include Froedtert Memorial Lutheran Hospital, Children’s Hospital of Wisconsin, and Curative Rehabilitation Center. Providing information services and network support to MCW faculty who reside in disparate institutions is a challenge both for users, who often are unsure about what paperwork to complete for a given request and where to send it, and for Information Services staff, who must work closely with their cross-institutional counterparts to coordinate wiring, port activations, software installations, and the like. MCW Information Technology Systems has created a Web-based instance of a common work-order form that uses e-mail triggers to keep concerned parties notified as work requests flow through its system.

The Medical College of Wisconsin Department of Information Technology Systems (ITS) is responsible for campus network support, LAN administration, UNIX system administration, a network help desk, and desktop support. Despite the many technological hurdles we cross each day, our biggest challenge isn’t with technology itself. Rather, our greatest difficulty is dealing with a dynamic environment in which users want service as quickly as possible, network jurisdiction crosses institutional boundaries, and the rules for doing one’s job can change from one building to the next.

MCW faculty members typically wear numerous hats. Many clinical faculty members have offices both in the college facility proper and in a hospital or clinic. The former areas are directly controlled by the college, while a hospital or clinic site is the bailiwick of the member institution. Given that the various institutions in which MCW faculty reside have their own Information Services (IS) staff with their own policies and procedures for service requests, a simple work-order request isn’t always a straightforward proposition.

MCW ITS has historically coordinated work requests via a form called the Facilities Service Order (FSO). The form was initially deployed by the facilities department, which ably provides carpentry, moving, and other such services to the campus. Additional service departments, including IS, quickly found the form a convenient tool for submitting non-facilities requests for two reasons. First, each department has copies of the form, eliminating the need to create a new form for users, and second, the FSO contains a lengthy work-order description field that is useful for detailing network as well as facilities requests. Typical ITS work requests include connecting a workstation to the campus network, configuring a workstation for LAN services, and installing MCW-supported software.

Work orders submitted to ITS via an FSO are assigned to an ITS staff person. That staff
person will then visit the site, determine what the job requires, (wiring, port activation, software installation, or network card, for instance) and coordinate with other service departments and contractors to pull the job together. Again, the job location will determine who is involved in software installation, wiring, and port activation, with MCW having direct control over MCW-owned premises. If the site is in another institution, ITS would submit additional paperwork, as appropriate, to request these services.

The problem faced with the FSO is one inherent in all paper-based work flow: delays while paper changes hands. Figure 1 describes the paper flow involved in a typical FSO request.

**Phase I**

In Phase I of our project we addressed the paper-based work-flow problem by making the FSO available as a Web page. To enhance user comfort levels with the page, the Web version of the FSO was made to look very much like the paper version. Our initial objective was simple: to receive feedback from user departments regarding this new method of submitting work orders. In addition to receiving critical and constructive comments on the page, Phase I helped pave the way for buy-in, as our users helped develop the page.

**Phase II**

After meeting with department representatives and reviewing comments on the page, we implemented changes and worked toward Phase II of the project: making the FSO page do much more than its paper counterpart ever could.

The first enhancement was to eliminate the need for data entry by writing electronic FSO submissions directly to a database. A second, more dramatic, enhancement was the e-mail trigger, which provides for instant e-mail notification when jobs are submitted, assigned, or authorized. For example, when a user submits an electronic FSO, the ITS manager immediately receives e-mail notification of the new job. A separate section of the page allows the manager to assign jobs to an ITS staffer. When the assignment is made, the ITS staffer also receives e-mail notification. The trigger concept was propagated throughout the administrative sections of the page. When wiring is assigned, e-mail notification (including internal, cross-institutional, and private) is sent to wiring contractors. When a job is estimated, e-mail is sent to department administrators requesting autho-

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"The problem faced with the FSO is one inherent in all paper-based work flow: delays while paper changes hands."

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**Figure 1: Paper flow of typical FSO request**

<table>
<thead>
<tr>
<th>Description</th>
<th>Estimated Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>User fills out FSO and sends to ITS via campus mail.</td>
<td>1 day</td>
</tr>
<tr>
<td>FSO reaches IS; paper copy is placed in manager’s mailbox; order is entered into FSO database by hand.</td>
<td>1 day</td>
</tr>
<tr>
<td>Manager assigns job to ITS staff; they estimate job.</td>
<td>1 day</td>
</tr>
<tr>
<td>If fee is involved, form is sent back to department for authorization.</td>
<td>2-3 days</td>
</tr>
<tr>
<td>FSO authorized and returned to IS.</td>
<td></td>
</tr>
<tr>
<td>If wiring is involved, internal, cross-institutional or external wiring contractor is contacted to perform the work.</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Wiring is completed. Activate jack and configure workstation.</td>
<td>.5 days</td>
</tr>
<tr>
<td>Notify user of job completion.</td>
<td>.25 days</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>8.75 - 11.75 days</td>
</tr>
</tbody>
</table>
rization of charges. Upon job completion, our department administrator receives e-mail notification that billing is required.

Each of these e-mail trigger recipients has a section of the FSO page. When wiring contractors complete a job, they can update their section of the page, which generates e-mail back to the staff member assigned to perform the work, notifying the staffer that the wiring is complete. The same is true for department administrators, who can authorize charges online and automatically e-mail ITS staffers a notice to that affect.

Additional features

Users who submit work requests can check on the status of their jobs through a special, password-protected section of the page. The “check status” page allows users to easily check on where a job is within the work-flow process. Comments on the “check status” page are derived from staff members, wiring contractors, and management, and are required to be updated whenever a job screen is updated.

Improved work flow

By initiating e-mail triggers at each critical point in the job process, we have eliminated 65 percent of the delays involved in processing a typical work-order request. Just as importantly, if a job is held up for wiring, authorization, or another reason, users have instant, online access to the reason why the job is detained.

Technically speaking

The FSO Web page is written in HTML; Cold Fusion 2.0 provides links to a Microsoft Access 2.0 database. Both Cold Fusion and the Access database reside on an NT 4.0 server. Demonstration versions of the FSO Web pages are available at:

http://vail.is.mcw.edu/fso-demo/fso.htm
(user pages)

http://vail.is.mcw.edu/fso-demo/login.htm
(management pages)

The opening section of this page allows one to enter an e-mail address. If you choose to provide it, you will receive the results of the various e-mail triggers as you walk through the page.

Why it works

An important design tenet of this project was “hands off the user desktop.” Our goal was to avoid installation of additional software on a user desktop; no custom applications or plug-ins were installed. The only requirement for access to the page was that users have Netscape Navigator or Internet Explorer—these applications are commonly available across campus.

Unlike some large corporations where IS solutions are standardized and desktop resources are rolled over frequently, MCW is a diverse workstation environment. Our desktop resources range from 386 PCs to Pentium processors, Macintoshes, and UNIX systems. By adhering to a “hands off the desktop” principle, ITS staff did not have to install software on 3,000 user desktops to roll out the application. Consequently, ITS staff had more time to dedicate to developing the application—a much better use of resources.

Feedback and future directions

Feedback to the FSO page has been extremely favorable. Users appreciate the ability to check job status and to receive notification on work-order progress. In the future we plan to tie the FSO page directly into MCW’s financial system for automatic billing. We also are working with additional MCW service departments to bring their work-order requests online.

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Good Ideas

this article is online at http://www.cause.org/information-resources/ir-library/html/cem9819.html

Home-Grown Web Help Desk Software

by Fredrick Miller

In the fall of 1996, Illinois Wesleyan University’s Office of Information Technology developed a simple intranet Web application for tracking user support calls. This paper looks at how the use of this application evolved and how it helps improve customer service at this liberal arts university. Lessons learned from this project can help improve services at other institutions with limited information technology resources.

Background

Located in the heart of central Illinois, Illinois Wesleyan University has more than 1,900 undergraduates, 500 faculty and staff, and more than 900 institutional computers. The university has a campus network linking classrooms, the library, offices, and dormitories with the Internet.

In the fall of 1996, our newly formed Office of Information Technology (IT) had a staff of nine. Assisted by a few student workers, these information technology professionals provided support for the campus network, academic and administrative computing, telecommunications, and the campus cable TV network. There was no physical information technology help desk, and offices were spread across multiple locations on campus. At this time, the single loudest complaint about information technology was not knowing whom to call.

Our solution evolves

Our first attempt at answering this complaint was to create a single telephone number for faculty, staff, and students to call for any technology problem or request. We soon noticed that many of the calls to this new support number were follow-ups to determine the status of an earlier call.

Our first strategy was to use our main administrative server (an IBM AS/400) with a traditional terminal-based approach for information technology staffers only. We quickly found that only a few of our staff members were comfortable using a terminal application. We had just begun experimenting with Web access to our administrative data, so we decided to build a simple Web interface to the call-tracking database. Our information technology staff members considered this step a big improvement, but we found our AS/400 to be a slow Web server. We decided to keep the Web interface idea and moved the database to a Macintosh computer.

With the Web-based tracking system on the Macintosh, we found the right combination of interface and performance. Assembling the initial system took less than a day. We used EveryWare’s Tango software as a front-end to a Claris FileMaker database. All of our information technology staff members began using the tracking system consistently, and in January 1997 we opened the database to our campus users.

The Web-based solution

Our Web-based call-tracking system has a few key features. Users can enter calls into the database using a Web server that is only accessible from within the campus firewall (our intranet). Users can also look up their calls, including the status of calls, by searching on a name. Information technology personnel can

“Many of the calls to this new support number were follow-ups to determine the status of an earlier call.”
enter and update calls, as well as look up calls by a number of criteria including staff member assigned, caller name, and department. We can provide additional management reports using the database’s native report capabilities.

We’ve tried to keep our Web-based call-tracking system fast and easy to use. Our early efforts showed that these were the two most important concerns for both our information technology staff and our users. To keep our system simple and response time fast, we’ve deliberately kept security barriers to a minimum. We only allow access to the Web server from computers behind our firewall. Information technology staff members gain access to update calls using a single ID and password. Any member of the campus community can look up any open or closed call by entering a caller’s name. Our campus community finds this level of openness acceptable.

During the first year we used our Web-based tracking system, we logged more than 4,000 calls. We have documented how calls to Information Technology fluctuate with the academic year. Although we routinely get fifteen to twenty calls per day, during the second week of fall classes in 1997, we logged 219 calls. For the past year we closed about 50 percent of calls in less than a day, while about 20 percent of calls are of a project nature that require more than a week to close. We are seeing these statistics improve. In March 1998, we closed 68 percent of calls in less than a day. We look to continue to improve these customer service measurements.

Continuing improvements

We continue to update the system as we think of improvements. Most of our improvements have come from suggestions from IT staffers. We have standardized our department naming for better call analysis. Our information technology staff now has a choice of formats for viewing calls. We encourage detailed descriptions of problems and how they were resolved. This documentation has proven especially helpful when we are dealing with repeat problems and when we’ve had staffing changes within IT.

One of our earliest improvements was the “emergency call” designation. Shortly after we made the Web-based tracking system available to users, we started to get requests for an emergency code in the database. Users wanted assurance that if they had an emergency, IT staff would respond as quickly as possible. Information technology staffers feared that if users could designate a call as an emergency, the majority of calls would be tagged as emergencies. We satisfied both our staff and our users by adding an emergency code to the database, but only allowing an Information Technology staff member to designate a call as an emergency. Emergency calls now appear on IT call-tracking Web pages in red. When an IT staffer sees an emergency call, we respond as quickly as possible. Emergencies now account for fewer than 3 percent of all calls.

After the first semester in which the Web-based tracking system was available to users, we heard some complaints from the IT staff. These complaints included a perception that because we had staff specialists, calls were not evenly assigned. Some staff members also complained about a lack of cooperation in resolving calls. We decided to take steps to eliminate the prevailing attitude that “if the call’s not assigned to me, it’s somebody else’s problem.”

In fall 1997 we used our call-tracking database as a foundation for providing a different approach to customer service. We assigned each IT staff member “department liaison” responsibilities. As a department liaison, an Information Technology staff member is responsible for watching the service calls from specific departments. While various information technology specialists may be assigned individual calls from a department, the IT liaison watches for call trends and helps provide solutions for the department’s technology problems. We use the liaison program to help build teamwork within our organization and to emphasize that all service calls to IT are “our calls.” Everyone in the organization now regularly accesses the call tracking database and monitors questions and responses.

Lessons learned

Having used our Web call-tracking system for more than a year, we’ve learned a number of lessons about our campus community and information technology.

We’ve learned our users like the Web-based system. They like being able to see not only the status of outstanding requests, but also the history of their calls. Putting a graph of our
call statistics on our intranet Web site also gives our users an idea of the information technology workload.

We’ve learned that the Web-based system helps our IT staffers work better together. With a relatively small professional staff, all of our information technology staff members have specialties, but everyone also responds to user calls. With our Web-based system, our technologists can easily refer calls to a specialist with detailed history. Our techs can also look up how similar problems were solved in the past. If one staff member is out, another can easily do a Web search to cover that person’s outstanding calls. The Web tracking system also helps the IT staff respond to phone inquiries about previous calls.

The call tracking system has helped our campus administration better understand the work of Information Technology staff members. We have used statistics from the call database to justify additional positions. Since we began using our Web-based call-tracking system, we’ve used it to help justify three additional professional positions for the department: a Webmaster/system administrator, a technology training coordinator, and a database administrator. Call-tracking data was not the sole justification, but the system helped provide statistics showing how these positions would help our campus community. The call-tracking system has also helped explain when we should use outsourced repair technicians to meet demand during peak periods.

Statistics from the call-tracking system also help us think about how we use our Information Technology staff members. Since the start of the fall 1997 semester, half of the 3,900 calls have come from academic departments. We’re considering adjusting some IT staff positions to provide more direct support to faculty. In addition, we’ll soon be locating the majority of IT offices to a new location where we’ll also provide a physical help desk. We will use the expertise we’ve gained from our Web-based call-tracking system as a foundation for providing support from that desk.

We’ve learned that by using a simple, internally developed system, we can tinker with our Web interface and database so it better meets our needs. Future improvements include identifying long-term projects more clearly and eventually tying into a Web-based computer inventory. We also intend to investigate producing regular reports to support our IT liaison program.

**Conclusion**

A Web-based front end to a trouble-ticket system improves communications and improves information technology services at Illinois Wesleyan University. Our intranet system has benefits for our users, our Information Technology staffers, and our campus administration. It is a useful tool for resolving technology support problems and it provides important information for assessing IT performance. For a small investment in time, we developed an important management and customer service tool.

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**Virtual Learning**...

(continued from page 34)

Towards interoperability and support the continued development of tools. Initiatives such as the CNI authentication project and the IMS project are important efforts. Federal agencies need to promote the core technologies, assessment approaches, and intellectual property structures that are still needed to move us closer to the promise of virtual learning.

The last twenty years have been a breathtaking ride on the beasts of technology, lurching fitfully towards an uncertain future in our life and our learning processes. As we conquer the technical challenges that lie ahead, the ride will only accelerate.

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A Visit From Saint Mickolas: Earning Your Mouster’s Degree In Leadership

by Howard Strauss

Once upon a time (actually it was December of 1997) in a tiny corner of Disney’s Magic Kingdom (the Dolphin Hotel) during CAUSE97, Dennis Snow (that’s who Disney said it was) appeared and enchanted us with tales of Disney’s success in delivering off-the-chart service to its customers (whom it refers to as its guests). But I was not fooled by this obvious ruse. I knew in a moment that Dennis was really Saint Mick.

Once again I found myself at a Disney resort where the staff seemed to anticipate my every need, where disarray had been outlawed, and where smiling people vied with each other to provide me with unsurpassable magical moments. How does Disney do it? Do they only hire people with ESP? Of course the Disney magic goes far beyond running enchanted resorts.

St. Mick showed us two clips of identical scenes from Snow White. The first was okay, but flat, jerky, and definitely aimed only at third graders. The next version was a delight. It was enthralling, uplifting, and I actually heard adult computer professionals sobbing when Snow White “died.” It seemed impossible that the two clips told the same story.

Sure, you think, the second clip, the one by Disney, was better because it used all the modern computer animation stuff that only Disney can afford. Who couldn’t do a better job with terabytes of data and gigahertz of processor power? But the Disney clip predated the dreadful one by over fifty years. In fact, it predated the ENIAC, the world’s first electronic computer.

Disney’s secret isn’t technology. It isn’t superhuman staff, zillions of dollars, or the latest project management silliness. Disney has a simple philosophy of exceeding people’s expectations at every encounter. The secret to making that happen is leadership. All the software in Redmond, Washington, and all the gold in Fort Knox, without the proper leadership, will not be enough to turn a resort, a story, or a university from something mundane into something memorable.

Disney’s secret isn’t management. Excellent management will get the most widgets turned out for the least cost in the least time. That’s a hard thing to do, and it might even be a worthwhile endeavor, but it will lead only to an efficient or well-run university, not a great one.

Disney knows that having hordes of happy guests results in lots of repeat business. Happy guests also influence the decisions of those who have yet to try Disney’s services. Disney’s formula for keeping its guests happy (and making lots of money, because Disney does it so well) is simple. Excellent employees (whom Disney calls its cast members) create happy guests, who generate lots of money. To attract and stimulate excellent employees takes strong leadership.

A leader is the source and owner of a vision. To make a vision a reality, a leader must convey the vision to the people who will help make it happen. Thus the vision becomes the leader’s story, and the leader is the keeper, disseminator, and enforcer of the story. A leader’s vision determines where an organization is going and how it will get there. A leader with a compelling story and a passion for making the story a reality can readily get others to buy in to the vision. This is not a new idea. Moses knew all this some years before Disney figured it out.

Lots of people have visions, but visions that work best stem from unfulfilled needs. Walt Disney once took his family to an amusement park. The place was sleazy and tacky. While
his children rode mindlessly on merry-go-round palominos with peeling paint, Walt waited nearby, nearly bored to death. There had to be a place, he thought, that provided fine entertainment for people of all ages. That vision of Walt's caused him to build Disneyland. When Walt saw that sleazy motels moved in right next to Disneyland he had a vision of a place where tackiness could not get near his magical kingdom and where his most expansive dreams could be realized. And so he built Disney World on zillions of acres in Florida. Walt's vision of an All-American town that was safe, friendly, and convenient to live in eventually resulted in the building of the town of Celebration, years after Walt had died. Visions and passions can transcend our mortal beings.

After the conference I visited the Rain Forest Café in Downtown Disney. The ceiling, walls, and supporting columns of the café are covered with a thick tangle of local flora and fauna. Monkeys in perpetual motion peek out from crannies in the jungle while gigantic butterflies now and then flutter their wings. The café is lit by filtered light that seems to make its way in from above the forest canopy. A chorus of birds, hyenas, and monkeys fills the air, while safari guides rush bamboo trays laden with food to hungry customers seated on camp tables set by ponds and waterfalls. Everything in this place is exactly "on story." No detail has been missed. It soon dawns on me, however, that I may be the only thing not on story. When I return I will wear my safari clothes.

For the rest of my trip I notice that outside of the Disney kingdom few things are ever on story. It is glaringly obvious at every restaurant, gas station, and even at the airport and on the plane home. I have to restrain myself from informing everyone that they are hopelessly off story. Back at the university, however, it is less obvious. Nothing seems to be off story, but then nothing seems to be on story either. I soon realize I am not sure what the story is. Do you know what the story is where you work? Really?

Leadership must be shared to the very lowest levels of an organization to be effective. That's another difference between management and leadership. People at the bottom don't manage anyone, so they are not managers, but they should be leaders. A leader's job is to stay "on story" and to ensure that everyone else does, too. A great leader must be a great storyteller. In fact, Michael Eisner, Disney's CEO, has said that the study of great literature is vital for executives, because, among other reasons, it helps them understand how to tell a great story. Every leader at every level is the teller, keeper, and enforcer of the story, and everyone must be empowered to do so. Staying on story means ensuring that everything that is done fits the vision. But of course there must be a vision before you can stay on story.

While leadership must be shared, it is not democratic. You cannot have leadership by committee or consensus. The leader at the top is the keeper and enforcer of the story for those who report directly to him or her. Those folks are the keepers and enforcers of the story for those who work for them, and so forth down through the organization. Leadership is everywhere in the organization, but vision flows from the top.

Visions are normally tested by economic and technical realities. Disney's 20,000 Leagues Under The Sea ride, as realistic as one would like to make it, can't really dive 20,000 leagues under the sea or even under an artificial lake. Visions are also tested and further developed by the team of leaders who are enlisted to make the vision a reality.

Not everyone will share even the best leader's vision. Many people think the town of Celebration is an awful idea; many think that theme parks are simplistic, silly, and worse. If you do not share a leader's vision (though a strong leader's passion will likely get you
hooked), find another leader to serve or, if you have the passion and the vision, forge out on your own.

Disney’s overarching story is “We create happiness by providing the finest in entertainment for people of all ages.” This is their fifteen-word mission statement, and it is plastered everywhere cast members (but not guests) can see it. Sure, after a while employees hardly read it. But they know what it is and what it means, and they are reminded again and again that their job is not to flip hamburgers, clean hotel rooms, create spreadsheets, or attend board meetings, it is to “create happiness by providing the finest in entertainment for people of all ages.”

What story is your institution trying to tell? Is the statement of it much longer than fifteen words? Does everyone know what it is, or do they have to look it up in a dusty book somewhere? Is it really a clear statement of what you expect everyone to be doing, or does it suggest some vague search for truth and the betterment of society? Are faculty and staff telling the same story? If your institution is like most, your story probably needs some work.

Once you have a good leader with passion and a good story to tell, it is vital that the story be told in the best way possible. Disney does this by fussing with every detail, using a process it calls “plussing.” Plussing is simply looking for every opportunity to make something good even better. Disney believes that every detail speaks—even details you might not notice. The result of fussing with thousands of tiny details, each of which seems inconsequential, is overwhelming. Even infinitesimal things, as students of calculus are well aware, can add up to something quite significant.

Disney, for example, asks that each cast member spend just five minutes a day creating a magical moment for a guest or for another cast member. That doesn’t seem like much, but suppose that were done in a university with 1,000 faculty and staff. That’s 5,000 magical moments a week or over a quarter million magical moments a year. How many magical moments are you delivering today? How would your users and staff react to a torrent of them?

Disney doesn’t expect its cast to constantly blow people away with “knock your socks off” service. No staff, however well motivated, could manage to be that energized all the time. All the cast is expected to do is to exceed people’s expectations all the time by just a little. Disney knows that guests encounter their employees dozens of times each day. If at every encounter each guest has his or her expectations exceeded—even by just a smidgen—the effect is overwhelming. Once your customers get over the shock of it, think what a difference it would make if your faculty and staff exceeded their expectations every time by even a little.

During a session at CAUSE97, speaker Liz Murphy of Datatel rattled off the names of some of her obvious competitors, but then said that the competitor she was most concerned about was Disney. Disney, I thought? Disney doesn’t make a single product or offer a single service that is remotely related to anything done by Datatel. But Liz pointed out that the great service offered by Disney had raised the expectations of her users. Having seen what Disney could do, they expected the same level of service from Datatel and in fact from everyone. Disney service, Liz thought, had become the standard by which her customers measured everyone else’s service, including, no doubt, ours at colleges and universities.

Disney, in fact, has a Disney University for internal training and a Disney Institute, which among other things offers management and leadership training to the outside world. When St. Mick was asked what he viewed as Disney Institute’s competition, Harvard Business School was near the top of his list. Of course, he pointed out, the Disney Institute treated its students as guests, giving it some advantage over traditional places of higher education. Later, as I toured the Disney Institute’s campus, I found the same Disney level of service at literally every turn. The forbidding guardhouse blocking my entrance to the Institute, for example, turned out to contain a guard whose major concern was that my visit wouldn’t miss any of the key points I wanted to see. Once I was able to get past the guardhouse, Disney’s magic really went into high gear.

After seeing the Disney Institute, I regretted that the universities that I had attended had not known about the Disney model. Why would anyone choose a conventional university if there were a Disney Institute option? It’s not that the Disney Institute is a theme park. It’s not; it works its guests very hard. But it treats its students as guests (which is what it
calls them), ensures that they have the best environment for learning, understands their needs, keeps them excited about their work, and does not allow their time to be wasted. Fortunately for most of our institutions, Disney has no plans to offer undergraduate degrees. But if some college or university decides to emulate Disney, it could spell big trouble for higher education as we know it.

During a lunch break at CAUSE97 in the Dolphin Hotel, we are given box lunches with barely cold glass bottles of soft drinks and are encouraged to eat our lunches in the blazing Florida sun. About 500 of us settle in by the pool, where I quickly spot the “No Glass at the Pool” sign. At about the same time, I see a young, smiling, clean-cut, perfectly tanned Disney cast member heading towards me with a stack of plastic cups and a garbage bag. Sensing that my marginally cold Coke is in great peril, I try to hide it. As a backup plan I decide I’ll tell him that I’m responsible for all computers in all universities and will change all his grades to Fs if he forces me to pour my Coke into a warm plastic cup.

But before I can offer my strongest challenge, a bag of ice appears and I hear him say, “Hi, I’m Matt. Like me to pour your Coke over some ice for you? It’s pretty hot out here. Let me take that glass bottle from you.”

I’m ecstatic. Unasked, I’ve just been given a most welcome cup of ice. But I know that Matt is still in deep trouble.

“Thank you. That’s very nice of you,” I say, “but there are hundreds of people with glass bottles. There’s no way you’ll get all of those.”

Matt pats a wireless communicator that every hotel employee seems to carry and points across the pool. There, a dozen or so Susans and Tyrones, recruited temporarily from elsewhere in the hotel, are working their way through the CAUSE crowd. In minutes, hundreds of contented conventionees are sipping cold drinks by the pool, and not a single glass bottle remains.

How does Disney do it? How were they able to turn a looming nasty confrontation into a public relations coup?? How does Disney get employees to be so dedicated and considerate, and to treat their guests and other employees so well? How do they get people like Matt, Susan, and Tyrone to understand that their real job is to create happiness for their guests—not to be bellhops, lifeguards, accountants, or vice presidents?

Disney’s employees are not special people. They are ordinary folks selected from the same pool of people that the rest of us use. It is Disney’s vision and leadership that makes the difference.

Perhaps only Disney can do this, and perhaps this only applies to folks who run theme parks, not to people who run regular businesses such as universities, factories, and regular hotels. However, although Disney owns the Dolphin hotel, it is not run by Disney at all. It is a Sheraton hotel. Matt’s paycheck, manager, and training are all from Sheraton, not from Disney. They deliver Disney service because they use Disney leadership techniques.

So can you. The Sheraton Dolphin employees are not special in any way. Chances are they are even lower paid than the staffs at the most financially challenged colleges. Their managers labor under worse conditions—lower pay, less vacation, more mundane work, etc.—than the folks at your institution do. But their managers have a vision that is shared and nurtured. Everyone knows the story the hotel is trying to tell, and management is passionate about keeping people on story and about developing and telling the best possible story.

Every institution, indeed every person, has a compelling story to tell, a passion that once unlocked moves everything inexorably with it. If you are a mover or shaker at your institution, it is your responsibility to discover or develop the story and to unlock that passion. If you are lower on the organizational food chain, it is your job to convince the necessary key players to act. Failing even that, you can institute the power of Disney leadership at whatever level you are. Having vision and passion and fussing with details are part of the very difficult task of leading.

Earning your Mouster’s degree in leadership will not be easy, but doing so will take you from the ordinary to the extraordinary. Then you, and your students, and your faculty, and your administration will all live happily ever after.
The Learning Revolution: The Challenge of Information Technology in the Academy
Edited by Diana G. Oblinger and Sean C. Rush (Anker Publishing Company, 1997, $35.95, 251 pages)
ISBN 1-882982-17-7
Reviewed by Skip Noftzger

“Although there are many challenges to implementing the learning revolution, there is too much at stake to not take the risks that will be necessary for success.”

The learning revolution is about human potential. Although there are many challenges to implementing the learning revolution, there is too much at stake to not take the risks that will be necessary for success.” In the midst of our turbulent times, fundamental challenges are raised concerning the preparation of educational institutions to adapt to new competitive, student-centered learning environments that offer a multitude of choices for delivering educational experiences and certifying competencies. Through inquiry, analysis, and suggestion of alternatives, this book provides a framework for consideration of the “successful” campus of the future.

Starting with a succinct summary of the critical changes occurring within both society and higher education, the authors offer insights into the potential deployment of technology to respond to these emerging challenges. In documenting this “learning revolution” and in lifting up “exemplary programs which place learning and student needs at the center of the academic enterprise,” Oblinger and Rush have provided a valuable resource to the higher education community. Whether considering adaptations to current practices or imagining new educational structures, the focus remains on the shifting expectations and climate for learning. Robust applications of technology will recognize and address that change.

In “Understanding the Challenge,” the first of its three sections, the book lays the groundwork for key issues. The second section, “Meeting the Challenge,” supplies tangible snapshots of some current alternative responses. Finally, the authors provoke educators to reflect in “Looking to the Future.” As with all books with multiple contributors, there is some unevenness between the chapters. Some chapters induce and stimulate innovative thought, while others repeat familiar problems which are being addressed by many institutions. Yet the diversity of the cited examples should accommodate any doubts about the relevance of this material to the full range of institutional types on the higher education landscape.

Ultimately, the book’s real value is its call for action among higher education institutions. The Learning Revolution demands a response for the learners of tomorrow. It will contribute to the debates occurring across American campuses about not only potential applications of technology, but the rationale and purpose for employing such applications. A springboard for planning and reflection among campus constituencies, it provides both coherent analysis and tangible “signposts” of change. Regardless of the current level of adaptation within your institution, this book may make a valuable contribution in framing the strategic discussions.

Reviewer Richard (Skip) Noftzger is vice president for Institutional Planning/Research and Information Technology at Waynesburg College and a member of the CAUSE Editorial Committee.

For the Record: Protecting Electronic Health Information

National Research Council, Committee on Maintaining Privacy & Security in Health Care Applications of the National Information Infrastructure (National Academy Press, 1997, $29.95, 264 pages)
Reviewed by Helen Samuels

In the good old days each academic institution had their few “custodians” who controlled access to information. Those key people housed the paper records and determined who could see the student records, personnel files, and other personally identifiable confidential information. Those days are gone. In our distributed networked environments every user has become a “custodian” who collects, maintains, gains access to, and uses such information. This radically different environment has challenged every campus to rethink their privacy and access policies. Colleges and universities have devoted particular attention to student information, as the Family Education Rights and Privacy Act (FERPA) requires aca-
demic institutions to comply with the requirements outlined in this federal legislation about access to student information.

Fortunately, the problems associated with managing student information are very like those of medical records. Academic administrators can benefit from the analysis and recommendations offered in this thoughtful study, which “examines the motivations behind the growing use of information technology within the health care industry; identifies related privacy and security concerns; and assesses a wide variety of mechanisms for protecting privacy and security in health care applications of information technology” (page 2).

One of the most valuable ideas offered in this report is the authors’ three-part framework (privacy, confidentiality, and security) which, they argue, must each be used when examining these issues. Privacy recognizes an individual’s right to limit disclosure of personal information. Confidentiality, recognizing that there can be legitimate reasons to release personally identifiable information, refers to the conditions in which information is shared or released in a controlled environment. Security consists of a number of measures that organizations implement to protect information and systems, including efforts to not only protect privacy, but also ensure the integrity and availability of the information. This framework was recently used as part of MIT’s re-examination of their student information policy, and served to clarify and emphasize the separate but related issues that we had to address.

CAUSE readers will probably find chapters 4 and 5, “Technical Approaches to Protecting Electronic Health Information” and “Organizational Approaches to Protecting Electronic Health Information,” of greatest value. While the literature contains much more detailed advice on the technical issues, this is a useful summary. The organizational approach focuses on the policies, structures, education, and sanctions that are required. The report’s recommendations wisely acknowledge that organizational and technical approaches must be seen as related to and supportive of one another, and therefore must be developed together.

**Reviewer Helen W. Samuels** is special assistant to the associate provost at MIT, where she works on policy issues. She is the author of *Varsity Letters: Documenting Modern Colleges and Universities* (Scarecrow Press and SAA, 1992). She served as Institute Archivist at MIT from 1977 to 1997.

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**Strategic Change in Colleges and Universities: Planning to Survive and Prosper**
by Daniel James Rowley, Herman D. Lujan, and Michael G. Dolence

Reviewed by Skip Triplett

This book will interest senior administrators. It will frustrate people who espouse strategic planning and change but who lack either the authority or the influence to initiate it. Strategic Change in Colleges and Universities will only reinforce their convictions about the importance of systematically aligning the aspirations of their colleges with the needs of their external communities. Regents, executives, and those to whom regents and executives turn for advice will find it valuable.

*It is both theoretical and practical.* The book’s value lies in its dual nature. Its authors make a solid theoretical case for conditions that require strategic planning and for its purposes, characteristics, and consequences. They provide practical advice about how to read uncharted waters to anticipate and avoid (or con a course through) the political rocks that lie beneath them.

*It explains how to build participation, trust, and communication.* Planning hazards include the deceptively visible: dissenters who take firm root to the campus sea-bed in small clusters, but whose turbulence hints at the presence of wide-spread shoals. The authors show how to deal with these people by identifying and including them throughout the planning process.

My own experience suggests that this is the critical planning consideration. At Kwantlen University College, we identified those people whose support we needed, then met with them individually to show them our in-progress thinking and ask for their contributions. This prevented the usual “there was insufficient consultation” objection.

*Its subordinate themes offer detailed planning considerations and models.* The authors identify several probable key planning areas such as enrollment, resource, and support system management. They explain how to add to these and

(continued on page 56)
**Question:**

Has your institution built a new or re-purposed an existing building on campus to support the creative use of technology in teaching and learning?

If so, what were the basic planning assumptions and design principles, and what forms of instructional technology are supported? Please provide URLs for any supporting material available on the network.

Southwest Missouri State University is building a $20-million classroom building scheduled to open in Fall 1998. It will contain twenty-one classrooms (two equipped with student computers) and seven smaller seminar rooms, along with a fifty-station open-access computer lab, a distance learning support center, the university’s radio station, a promotional television studio, and an instructional television studio. Students will have access to data network jacks scattered throughout the building in alcoves and hallways.

This building was designed and is being constructed with both flexibility and synergy as key components, applying the classroom design guidelines learned from Dr. Daniel Niemeyer (http://classrooms.com/consulting.html) and others. All classrooms have projection screens, wiring conduit in place, and will be connected to the campus data and cable television networks. At least six of the classrooms will be very media rich, containing “smart podiums,” ceiling-mounted data/video projectors, and sound systems. These “smart podiums” will house a networked computer, VCR, touch-screen control panel, and additional input ports for notebook computers, document cameras, etc. Other classrooms will be served by mobile “media carts” containing a computer, data/video projector, VCR, and additional input ports. Selected seminar rooms will contain large-screen Gateway Destination systems.

By co-locating the Distance Learning Support Center (interactive TV classroom, digital media production center, faculty training lab, help desk, and support staff offices) on the same floor with the university radio station and two television studios, our intent is to encourage and capitalize on the synergy we predict as technologies converge and meld.

Greg Burris  
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The University of Calgary has just announced that its “Learning Commons” will open on September 14, 1998. The Learning Commons is a set of campus services and facilities for University faculty, students, and staff who wish to enhance learning and teaching skills, be involved in the design and delivery of curriculum, or engage in research related to teaching and learning.

The name Learning Commons was chosen to encompass all of these ideas, because it embraces the concept that a university should be a community of learners and that the overall learning environment is a resource available to all. As such, the Learning Commons is as much a philosophy as a particular facility. It will offer support both in physical locations and virtually, through the use of technology.

The Learning Commons will align with the University’s Strategic Direction statement of December 1996. It will facilitate redesigned curricula, partnerships, collaborations, new revenue streams, innovative research, and enhanced post-degree continuous learning opportunities. See http://www.ucalgary.ca/~commons/ for more information.

Ken Hewitt  
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Duquesne University has both built new and re-purposed existing buildings on campus to support teaching and learning. Basic planning and design assumptions were that faculty access had to be straightforward, powerful, and truly supportive of teaching and learning.

All campus academic buildings have, at a minimum, Ethernet connections in every classroom. Large lecture halls in two academic buildings have an instructor podium with a minimum of Pentium and Power Mac computers, projection systems, connection to the Media Distribution Center for access to Laser disks, video tapes, 35-mm slide controls. Each academic building has at least one computer teaching facility, with student workstations, faculty workstation and projection system, and connection to the media distribution system.

From the very beginning, Bayer Learning Center was designed with the use of technology to support teaching and learning. Meetings attended by architects, faculty, and the IT leadership resulted in a building that had the teaching mission of the university at its core. Each room has connection to the media distribution system, permanent video display facili-
ties, and Internet connectivity. This building also hosts video-conferencing facilities.

Fisher Hall was completely renovated to include two floors of classrooms that have an updated version of the Bayer Learning Center facilities and a video conferencing center.


Lynda Barner West
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Just as the college’s Instructional Computing Resource Center came into its own at San Juan College, the opportunity to design a brand-new classroom addition came along. This presented a unique opportunity for the college to build classrooms specifically designed to take advantage of the equipment, materials, and training in which the college has been investing for the past five years.

The design of this room is essentially a little theater, rectangular in shape, with a “teaching trapezoid” at the front. It has three presentation areas for the display of images, handled by three ceiling-mounted projection systems. One image can be displayed on all three walls or a different image can be displayed on each wall. Input equipment includes laser disc, video visualizer, VCR, and both PC and Mac workstations. The projection surface covering all the walls allows for writing, erasing, and projection. The room is also wired to meet all requirements if we need to use the classroom as a distance learning room.

The entire learning environment is controlled by the faculty member with either a touch-screen apparatus or a mouse, which will simply “point and click” to call any computer, multimedia equipment, or room control into play. The sound system is built into the ceiling, providing equally good acoustics for students no matter where they are sitting. The lighting is an innovative, adjustable fluorescent system. After much investigation the device control system we chose was by AMX.

These “little theaters” will have tiered seating to provide the best possible viewing of the display areas in the front of the room. The rooms have been designed so there are no bad angles, even from the back row corner seats.

What we have accomplished at San Juan College may not be the answer for everybody. However, we believe our training program and multimedia classrooms will be second to none in providing our faculty members with the latest in instructional technology in an environment designed with the teaching/learning process as the primary design criterion.

Ann Degner
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The Computing Commons of Arizona State University opened at the beginning of the fall semester 1993. Designed in 1990, the Computing Commons provides a “technology hub” that draws together students, faculty, and staff from all disciplines on campus in an environment which fosters maximum interaction. Since its opening, the building and its facilities have drawn national recognition. The Commons houses a 200-workstation student computing site, nine mediated classrooms, Customer Assistance Center, Visualization Center, a computer store, and a technology-based art gallery. The total project cost $15.2M for 75,000 net assignable square feet. The building and furnishings have tremendous flexibility, which will enable Information Technology to meet changes in technology and teaching methodologies well into the 21st century.

Instructional technologies presently supported include both enabling and delivery technologies. Enabling technologies include resources that support the creation of instructional materials, ranging from the use of print graphics to digital video production. Delivery technologies include resources for learners to receive, view, and interact with instruction—from audio amplification and video projection to cross-platform networked computers.

The building supports the R&D necessary to create and distribute instruction via asynchronous and synchronous learning environments. A great deal of information has been gleaned over the past six years in the areas of building and instructional technology. ASU is now designing a new Social Sciences/Mediated

Because of space constraints, we were not able to include all responses to this question in this print publication. Full responses are accessible on the Web at http://www.cause.org/information-resources/ir-library/html/cem981b.html.

CAUSE/EFFECT
Vol. 21 No. 1, 1998
“More than a building renovation, we see Eads Hall as a new way to organize our human and technology resources.”

Next Readers Respond Question:

Has your institution attempted to assess the impact of information technology on instruction, student life, and/or administrative services, or do you have plans to do so? Please comment on your progress in one or more of these areas.

Send your response by electronic mail to Elizabeth Harris, CAUSE/EFFECT Managing Editor, charris@cause.org.

Selected responses to this Readers Respond question will be printed in the next issue of CAUSE/EFFECT, space permitting. All replies will be included in the online edition available on the CAUSE Web server.

Classroom building that will allow ongoing delivery of world-class instruction.

John Babb
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The new 120,000 sq. ft. University of Michigan School of Social Work Building makes maximum use of information technologies in all offices and teaching/learning spaces. The library and computer sites are combined into a Comprehensive Information Resources Center. Classrooms, seminar, and meeting rooms have an Ethernet connection and power at every student station, as does the Commons lounge and other sitting areas, including hallways where students wait outside staff offices. There are also a networked computer classroom, a distance learning facility, a multimedia room for developing instructional materials, adaptive technology workstations for handicapped students and staff, a clinical suite with audio-visual recording and broadcast capabilities, and broadband in each teaching/learning space and at announcement video monitors at each elevator landing. The underlying principle was flexible connectivity (e.g., large cable trays above the ceilings, access flooring, chair-height wiremold around the perimeters of teaching/learning spaces, demarkatable terminals in the BDF for local control of data/communication distribution). Instructors' stations are movable to several positions and include Ethernet and phone ports, and controls for lighting, sound, video projector and VCR through programmable touch-screen panels with presets for individual instructor preferences.

Jesse E. Gordon
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Eads Hall, built in 1903 and one of Washington University's most venerable buildings, is being renovated and re-designed as a first class teaching facility and a “center for centers.” General emphasis will be placed on the humanities, with particular focus on language learning. Eads will house such key academic support areas as the Teaching Center, Writing Center, Arts and Sciences Computing Center, and a new Language and Instructional Media Center. By housing these services in one building we seek synergy and efficiency through collaboration. Students and faculty will interact in various levels—in class, over coffee, in computing and media labs. More than a building renovation, we see Eads Hall as a new way to organize our human and technology resources.

Eads will include seventeen renovated, wired classrooms ranging from seminar rooms to rooms that can hold fifty. In addition, two classroom/lab facilities will include individual work stations for courses utilizing technology as the core teaching tool. A self-paced language learning lab will be supported by both audio and digital technologies, individual video viewing stations, lab areas for instructors to explore software, and a large, open student lab. Support in the form of full-time staff and student assistants will give students and faculty the assistance they need, when they need it.

Dennis J. Martin
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Recommended Reading …

(continued from page 53)

how to develop “key performance indicators” and to measure and monitor them. They have also developed a supplemental workbook with step-by-step planning models ($22.00, ISBN 0-7879-0796-0).

Planners will find the models in both the book and the workbook most useful as first-draft templates. The models can serve as the agenda in early “how would you modify these?” discussions with potential dissenters.

It is easy to read and to use. Administrative and academic audiences will both enjoy reading the book. It is a scholarly, well-researched work, easy to read because it uses active voice in plain language. It is also a good working document because it uses headlines (in a style similar to this review’s) to clearly mark ideas.

Reviewer Skip Triplett is vice president of education at Kwantlen University College in British Columbia, where he is responsible for developing, implementing, and updating the strategic plan.