Initially a college of agricultural science, The Pennsylvania State University broadened its mission after Congress passed the Morrill Land Grant Act in 1862, when it became the sole land-grant institution of the Commonwealth of Pennsylvania. Today, approximately 4,300 full-time faculty serve 68,826 full- and part-time students throughout the University.

The University Park Campus, located adjacent to State College, is the administrative hub of the institution, enrolls more than half of all undergraduates, and is the primary site for graduate study. But the University affords diverse educational opportunities throughout the state (see map, page 31) through campuses in Harrisburg and Erie (The Behrend College) and the College of Medicine in Hershey at The Milton S. Hershey Medical Center. In addition, seventeen “Commonwealth Campuses” offer the first two years of study in most of the University’s baccalaureate curricula. Nine of every ten Pennsylvanians live within thirty miles of a Penn State campus.

Effective planning strategies

Penn State has been fortunate in having executive leaders over the past decade who recognized the importance of strategic planning and adopted the administrative philosophy that “budgets follow plans.” Every department that reports to the provost annually develops a plan, which is presented at a budget hearing after which budget allocations are made.

One of these departments, Computer & Information Systems, is one of several overarching areas that must plan across the University. Over the years, C&IS has developed an outstanding set of planning documents. For example, Penn State was one of the first universities in the nation to publish a formal, written telecommunications plan (in 1984) that helped to articulate the vision and importance of an information infrastructure to the future excellence of the University. Throughout the decade, academic, administrative, and library computing have also developed and published plans. In recent years, however, these individual plans have given way to single, annual C&IS plans that provide overall strategies, directions, and budget proposals for central information technology investment.

Three years ago, C&IS, along with twenty-three other academic and support units, was asked by the University Future Committee (UFC) to develop a three-year strategic plan, based on its current budget, that included a 10 percent overall budget reduction. Funds generated from this reduction would then be reallocated to support the University’s most critical needs. In their final report in the spring of 1993, the UFC recommended that, within available resources, high priority be given to the development of the University’s information technology initiatives; that this development be coordinated through the C&IS, academic colleges, the campuses, and other support units; that priorities be established among the various funding requirements; and that the highest priority be assigned to expansion of the telecommunications infrastructure. As a result, most of C&IS’s 10 percent budget reduction was restored.

At about this same time, a study group made up of academic leaders was formed by the president’s office to develop a plan for an information infrastructure to serve Penn State’s future needs. This was prompted in part by a progress report on telecommunications initiatives, produced by Steve Updegrove, director of the Office of Telecommunications. The study group’s report pointed out that, while much progress had been made toward the goals identified in the telecommunications plans of the 1980s, lack of funding had precluded full implementation of the plans. What was significant about this study...
group was its examination of information infrastructure (including human resources) and access from an institutional view. The group's report established an institutional vision, specified essential strategic investments, and identified costs and three funding strategies: support from the Commonwealth of Pennsylvania, strategic alliances with technology companies, and internal reallocation.

This work at the campus level, along with executive leadership in understanding the importance of telecommunications and getting it onto the agenda of the state legislature, led to the approval of $15.8 million in funding for capital expenditures from the Commonwealth, which will enable completion of most of the University's network initiatives. A ten-year, $15-million alliance with AT&T negotiated two years ago has supported the purchase of interactive video equipment and plans to upgrade campus networks; other partnerships with IBM, Bell Atlantic, Kodak, Apple, and Digital Equipment Corporation have also helped to support IT investment.

According to C&IS Executive Director Gary Augustson, “We’ve done a good job of creating an environment attractive to corporations for partnering. Nonetheless, there is still the challenge of allocating ongoing dollars to support such one-time investments. Providing life-cycle funding for information technology—including permanent funding for staff positions—remains a significant, serious problem.”

Senior leadership at Penn State has also been aggressive in implementing and ensuring support for continuous quality improvement programs. Successful CQI teams have improved processes at the distributed level, but the next challenge is to reengineer processes at the institutional level. It is in this area that Augustson believes will come the most significant leveraging of IT for cost savings in the University.

Information resources management
Penn State University Libraries and Computer & Information Systems enjoy a close and cooperative relationship, both reporting to the University's executive vice president and provost. In particular, the partnership between the two organizations has enabled access to and delivery of extensive and high-quality electronic information resources, as well as the training needed to take full advantage of such resources in the developing networked information environment.

Dean of University Libraries Nancy Cline says, “We’re really fortunate in the relationship we have with IT here. There is a solid history of cooperation for many years, which has been very good for the University community. The freedom that individuals are coming to expect in accessing information is a challenge to both the library and the IT organization. The fact that we can work on this together is a real strength.”

Augustson believes the C&IS organizational structure that early on brought central administrative and academic computing, telecommunications, and library computing under one umbrella has greatly facilitated planning for and managing information technology at Penn State. Cline and Augustson both praise the decision to move library computing systems into the C&IS line organization in 1988 as forward-looking, recognizing the powerful role information technology would play in the future of the library. Cline adds that the key to its success has been that while the reporting line changed, the Library Computing Services (LCS) staff continued to be physically housed in the main library building. Under the direction of Eric Ferrin (who meets regularly with the University Libraries Council of Deans), LCS is responsible for computing solutions to support the libraries' programs and services, as well as for providing technical leadership in the development of and access to electronic information resources.

Another innovative organizational move that occurred two years ago was the creation of a top-level position within C&IS to oversee network and information security and education of users in the responsibilities associated with a network environment. After a nationwide search, Kathy Kimball joined the staff in 1993 as University Network and Information Security Officer. A committee is working with Kimball to reevaluate existing policies and practices in light of different emerging needs.

A major benchmarking study in which C&IS participated with peer institutions has shown that the organization is effectively leveraging IT investments to support teaching and learning, research, and administration of the University.1

Successful organizations continue to evolve, and C&IS is no exception. Within the next year, says Augustson, a new unit called Client Services will be created “to emphasize the importance of the service aspect of C&IS. At the same time, we'll be doing some flattening within the organization. We've intended this for some time, but severe fiscal constraints have put this on hold.”

The University Libraries and C&IS have found participation in the Committee on Institutional Cooperation (CIC)—the academic counterpart of the “Big Ten” athletic conference, including all past and current members—an excellent venue for partnership and collaboration, and consequently for leveraging resources. Through a host of subcommittees and special projects, several efforts are under way, among them CICNet, a new project on instructional technolo-

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1Penn State was featured in a book on model networking strategies published by Educom in the mid-80s; was among the institutions recognized by CAUSE in 1993 and 1994 for excellence in campus networking; and recently received an award for the best kiosk in higher education.

2The study results are reported in “Observations on Benchmarking Information Technology Support,” CAUSE/EFFECT, Spring 1995, pp. 20-28.
Electronic information resources

The University Libraries constitute a major resource for students and researchers in all fields of study. Access to bibliographical information about most of the Libraries' resources and other databases on various subjects is available through LIAS, the computerized Library Information Access System. A LIAS vision statement, written on the tenth anniversary of the introduction of the online public access catalog at Penn State, recognized the need to focus more on access to information and less on materials acquisition, with increasing attention paid to providing access to materials that the library does not possess, order, or control.

To that end, LIAS has become much more than an online catalog; it is a true information system, providing access to databases, gateways to the Internet, access to special collections, and other information. LIAS continues to evolve to meet needs in the networked environment that now includes Gopher and Web servers and systems. In cooperation with the Center for Academic Computing (CAC) and LCS, the Libraries will play an important role in supplying coherent access to "raw data." The future also is one which will provide more access to images on the network; tying that into the logical architecture that libraries have always represented so that people can find what they want is a challenge for librarians' information organizational skills.

Support for research, teaching, and learning

The Center for Academic Computing, under the direction of Russ Vaught, is the principal provider of central academic computing services at Penn State. It features a distributed computing environment consisting of an IBM ES/9000 740 computer with two vector facilities and an IBM Parallel Processor with 61 nodes that provide numerically intensive computing capability. In addition, laboratories and classrooms with high-function workstations and desktop computers that can be used for both research and instruction provide access for faculty, students, researchers, and staff at all University locations.

Over the past decade, Penn State has won more than a dozen and a half awards for innovative use of technology to enhance teaching and learning; the University was also the first to use two-way interactive video to deliver classes. Having had an early start in this area, it is not surprising that current faculty technology projects can be described as "leading edge" (see sidebar above).

Teaching, Learning, and Technology Initiatives

Penn State faculty are engaged in several major initiatives to incorporate technology into the curriculum.

Project Vision

This project, under the auspices of Penn State's Commonwealth Educational System (CES), has provided selected faculty release time to develop programs to be directly introduced into the curriculum. Jack Royer, senior associate dean for CES, says the project has provided the impetus for faculty to work collaboratively toward the common goal of a learner-centered environment, a value articulated in CES's recent strategic plan.

Project Vision grew out of complementary efforts of the Center for Academic Computing's Education Technology Services and CES's Center for Learning and Academic Technologies (C-LAT). Focusing on selected courses, nine faculty in these disciplines who were deemed to be outstanding teachers (not necessarily technology advocates!) were asked to participate on teams to develop a new curriculum for a contemporary learning environment, one that does not employ lectures but is active, collaborative, and asynchronous.

Supported by a $150,000 grant from Bell Atlantic and IBM equipment contributions, this fall Project Vision will arm sixty students (twenty each at three sites) with laptop computers to participate in four "new" courses—Science, Technology and Society, American Studies, Health Education, and a freshman seminar focused on how to learn with laptops in an asynchronous fashion. Resources will be placed on each course's Web home page (reached via C-LAT's home page) that would have been delivered through a lecture, and instead will be discussed using conferencing software throughout the course.

Business Curriculum

A similarly dramatic curriculum makeover is occurring in the College of Business, under the leadership of Peter Bennett, senior associate dean and professor of marketing. Having received assurance from the college's accrediting agency that a proposed revamping of the curriculum would not threaten accreditation, six of the college's eight core disciplines are in the process of being redesigned to take advantage of multimedia and interactive, collaborative learning. Bennett describes the capability of Hypertext linkages to content that cuts across the curriculum as offering an opportunity to teach these key courses in a much more integrated and effective manner. As in Project Vision, faculty participating in this endeavor have been given release time.

NLII Participation

Penn State is also an active participant in Educom's National Learning Infrastructure Initiative, and is planning to partner with Rensselaer Polytechnic Institute in a "studio learning project."

Vaught believes one of the reasons the University is so advanced in this area is the emphasis the academic computing strategic plans have placed on the potential of IT to enhance the teaching and learning process, backed up by the strong central support of the CAC's Education Technology Services unit. Under the direction of Judith Boettcher, ETS provides faculty support for the use of teaching and learning technologies in the curriculum. Boettcher believes that a major strength of ETS is the manner in which it works—instructional designers, programmers, and faculty content experts all work together to design and develop products. ETS staff with doctorates
in instructional systems are able to provide expertise in learning theory and design derived from the principles of cognitive psychology, a unique contribution to the challenge of creating innovative learning tools.

ETS also offers seminars in the development of instructional resources, consulting in the use of existing resources, an annual symposium on teaching and learning with technology, a summer institute that provides faculty more time to work on projects, a Faculty Integrated Media Center, the Wagner Training Center (a state-of-the-art facility for teaching software applications), and Human Resource Development Center courses. A Classroom Improvement Committee has been a powerful resource in helping to define appropriate incorporation of technology into classrooms throughout the University.

Support for administration

The Office of Administrative Systems is the central University resource responsible for providing data processing and information systems support for University administration through the design, development, maintenance, and operation of all centralized administrative databases. Penn State’s recently concluded benchmarking project demonstrated that the University runs one of the most cost-effective administrative operations in the nation.

By 1997, the University will have completed its Administrative Information Systems project—the development over the past decade of a set of integrated information systems that fully automate all of the University’s student- and business-related processes. OAS staff have done most of this development in-house, using entity modeling, joint application development techniques, and an advisory structure to significantly engage users in the development process and achieve their buy-in for these systems.

An integral part of this project was the development of EASY, an electronic approval system that allows documents to be electronically generated, approved, and updated in the University’s central database—a cheaper, faster, more accurate, more secure mechanism than paper approval. The system, which won top honors in the NACUBO/USX Cost Reduction Incentive Awards program for saving the University $746,000, recently processed its one-millionth electronic form.

OAS Director Ken Blythe says that while the University is aggressively working toward a distributed computing environment, this does not mean the demise of their legacy systems: “Our goal is to bootstrap off the existing environment, this does not mean the demise of their legacy systems: “Our goal is to bootstrap off the existing environment, but also enable the University to make significant progress on the new environment.”

The report also discusses the need to eliminate the out-of-date SNA protocol and move toward delivering administrative services through the campus backbone network, and the likelihood that the World Wide Web technology will provide a front-end for such services. Blythe envisions a “Community Web”—an internal campuswide information system that is Web-based—to fulfill this need. HTML, he says, is the most attractive aspect of this new environment: “Web technology will provide a platform for cross-platform systems, provide standards for graphics, print ubiquitously—and now we have it all on the Web.”

Penn State’s adoption of DCE as a standard, along with most of the other CIC institutions, will enable significant sharing and leveraging of resources.

Many factors contribute to good information resources management at Penn State, but when all is said and done, Augustson believes “individuals are really the key to our success. We are fortunate to have people who brought different perspectives to the University when they came, and who have stayed on. But while we enjoy continuity, we are also all open to change, and open to each other’s ideas—an important ingredient in our business. Clearly it’s not our level of funding that makes it work; it’s our people who really make a difference.”

Most of the campus documents referenced in this article are available from the CAUSE Library. For details, send e-mail to orders@cause.colorado.edu