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It is hard not to be enthusiastic about the current status of information technology (IT) and especially the progress Cornell has made within the last year. This success has been possible because of the constructive engagement of our partners in other departments and our customers, and especially because of the core excellence of CIT’s staff.

This year has made clear how interdependent those two elements are: We can have the best staff in the world but will fail if we lack engaged relationships with our partners and customers. Likewise, we can’t accomplish anything for our partners and customers if our staff are not at the top of their game. This was a year of realizing success in bringing both elements along together.

As is our tradition, we have organized our annual report into chapters, each corresponding to one of the major objectives of CIT’s strategic plan (www.cit.cornell.edu/oit/mission.html). We view our annual report as an important piece of our accountability for progress against that plan.

Our strategic plan is a rolling, three-year view of priorities, updated annually with input from CIT and other technical departments, customers, and partners. This year we took another major step: finishing our plan in time to have each CIT unit develop its budget plans and staff performance objectives in direct support of the plan’s objectives. We are striving to keep all of our activities aligned with the plan.

In this introduction, I will take a different view of progress and identify themes I see in the year’s activities.

**Major accomplishments**

1) The PeopleSoft upgrade to 8.0 and implementation of the Contributor Relations module were accomplished on time and under budget. Both were major projects and we managed and led them with much improved skill. We also went into production with NUBB (the Network Usage-Based Billing system). This involved modifying our current billing system, but the more important part was helping people all over campus transition to our new model for billing network services partly as data port charges, partly as a general tax for common infrastructure, and partly as metered Internet traffic.

2) The Web Production Group and Educational Television Center (both formerly part of Media and Technology Services) joined CIT in July 2003. We are lucky to have these outstanding individuals.

3) We began working with a new group of faculty on 20 Faculty Innovation in Teaching grants. We also expanded the Lynx program to give faculty wanting to use technology in their classes more hours of support from these highly capable students. January’s “Learning and Teaching with Technology” expo showcased many faculty projects and let many other faculty explore them with their creators.

4) EzraNet, a proposed decade-long project to modernize the data wiring infrastructure within Cornell’s buildings, received approval and promise of funding.

5) We are upgrading Cornell’s e-mail system to improve performance and add new features. Our new mail servers provide virus filtering, spam identification, and more security for NetID passwords. We also added support for the IMAP protocol plus a way for users to securely access their e-mail with only a contemporary web browser.

6) It seems like every direction we looked this year, there was a need for policy development and clarification. Tracy Mitrano, our director of IT policy, worked with people across campus to shepherd three major policies through formal adoption and is managing the consideration of five more. In addition, we have continued the national EDUCAUSE and Cornell Institute for
Policy and Law in Information Technologies, and Tracy has developed a local ethics/policy education program.

7) On our annual customer satisfaction survey, we improved on all 10 questions! On our Quality of Work Life survey for CIT staff, we also improved on most of the dimensions surveyed.

Continued foundation-building

1) The first year of using a new process for allocating funds for administrative computing projects and managing those projects taught us a lot, and we made some changes along the way. As a whole, most customers and CIT staff are satisfied.

2) Cornell’s assessment of the information technology (IT) workforce is well underway. The IT review team presented draft recommendations for IT roles and responsibilities and best practices to the Workforce Planning Team. The final version will outline how IT is managed campuswide going forward. People who have seen the draft recommendations have said that if Cornell can implement even a fraction of them, there will be significant improvements.

3) Project management training at the university is being ramped up after a very successful pilot program this year. The potential to improve our effectiveness in delivering large and small projects is huge. My personal goal is for everyone in CIT to complete at least the basic level of training.

4) IT security continues to be a major area of focus. Our new director of IT security has assessed the environment and is developing a plan for policy and practice across the institution.

5) CIT’s management team completed the 11-day Cornell University Leadership Development Program. This represented not only an individual growth experience for the 35 staff who participated, but also a major step forward in how we work as a leadership team. The best evidence of the program’s impact? The team decided that generalizing this training for the rest of CIT is our highest-priority initiative.

Plans for next year

Six areas of focus stand out for me.

1) EzraNet will be put into practice.

2) Our PeopleSoft focus will shift to student administration and the Student Records deployment, followed by Admissions the following year.

3) The draft IT workforce recommendations will be revised after campus input, and we should see some changes put in place during the year.

4) We will take several steps to implement the goals of the IT security plan.

5) NUBB will have its real-world test. I am sure we will learn from this experience and find ways to improve the process for successive years.

6) The CIT management team will continue working to improve our performance in the eyes of our customers and to improve work conditions within CIT.

As in past years, I dedicate this report to the smart, talented, hard-working staff in CIT who do so much to keep the IT environment at Cornell at the forefront—doing their part to ensure that students can learn effectively, faculty can create new knowledge and pass it on to students, and the institution runs as efficiently and effectively as possible.

I especially want to dedicate this report to my colleagues on the faculty and in the administration who have constructively engaged with us this year to envision the challenging future and work through the inevitable roadblocks to achieving our mutual goals.

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Our Mission Statement

Cornell Information Technologies (CIT) is Cornell’s premier provider of communications services, administrative systems, and support for academic uses of information technologies. CIT collaborates with other campus units to ensure cost-effective, seamless, and efficient solutions. CIT’s primary mission is to provide an array of strategic services that enable faculty, students, and staff to excel in their functions, and to deliver those services at a very high level of quality and reliability.

What Is CIT?
The Office of Information Technologies (OIT) provides strategic leadership for information technology at Cornell University. It is the office of the vice president for information technologies, as well as the parent organization of Cornell Information Technologies (CIT).

OIT’s work includes
- Exploring and recommending information technology architectures and standards
- Directing strategic human resource management for OIT and CIT
- Providing university-wide guidance in technology policy development
- Coordinating campuswide security efforts and security education
- Overseeing OIT and CIT financial and budgetary planning

What Is CIT?
Cornell Information Technologies (CIT) is the university’s central information technology organization. It supports business infrastructure, informational software, and instructional and operational uses of video, data, and telecommunications at Cornell.

CIT consists of six divisions under the leadership of the vice president for information technologies. It is housed in four campus locations: the Computing and Communications Center (CCC), Rhodes Hall, and 110 and 120 Maple Avenue.

- Business Information Systems
- Customer Services and Marketing
- Distributed Learning Services
- Integration and Delivery
- Network and Communication Services
- Systems and Operations
Outlining what computing looks like at Cornell

Goal:
Map Cornell’s culture and requirements into an updated vision of computing at Cornell

Progress:
- University-wide information technology workforce review
- New policies
- Policy education and compliance programs

Surveying the university’s information technology workforce

dpb.cornell.edu/wp

In October 2002, the university began reviewing information technology (IT) support as part of Cornell’s comprehensive study of nonacademic staffing on the Ithaca campus. Serving on the IT review team are Polley McClure (chair); Bill Arms, professor of computer science; Charlie Fay, associate provost for research administration; Fred Schneider, professor of computer science; Paul Streeter, senior project director in the Division of Planning and Budget; and Joe Thomas, associate dean for academic affairs at the Johnson School.

The objectives outlined for the team included documenting the number of staff and their responsibilities and organizational structure, calculating how much money is spent on IT, developing ways to integrate and coordinate IT efforts across campus, and having an external team review administrative computing.

Initial findings indicate that, on an annual basis, Cornell spends more than $68.9 million on IT (about 5.4 percent of the university budget). Personnel expenses account for about 60 percent of that figure, which does not include benefits. There are over 725 full-time-equivalent positions in IT, with about a third of those positions in CIT.

In preparation for a survey of Cornell’s IT workforce, the review team identified 11 types of IT work: academic/instructional applications; administrative/business applications; computer operations/facilities; general workstation/end-user support; management and oversight; networking/communications support or development; servers and group services; training and education; and other application/development areas.

The three largest categories in terms of staffing are administrative/business applications; general workstation/end-user support; and networking/communications support or development. The two smallest are security and related activities and academic/instructional applications.

The IT review team submitted its initial recommendations to the university’s Workforce Planning Team in June 2003. Two core recommendations were made for helping the university realize greater efficiencies in IT work and expenses. One is to suggest specific roles and responsibilities for local units, central administrative departments, and CIT. The other outlines a common set of best practices for management of IT. Both recommendations are described in some detail to facilitate implementation should they be adopted.

The external review team of administrative computing made its recommendations in April 2003. One central issue was that of leadership and governance. The external team recommended naming an individual outside of CIT to serve as the administrative systems “champion” campuswide; including college and unit administrative officers in the governance scheme to ensure that their needs are articulated; giving CIT direct access to the
people who use administrative systems; and having CIT develop a long-range vision of the administrative systems architecture.

The university’s Workforce Planning Team will review the initial recommendations of the IT review team, which will then work to refine the suggested directions for change. Various campus constituencies will be involved as appropriate.

Promulgating policy
www.cit.cornell.edu/oit/PolicyOffice.html

We’re continuing to roll out new policies to protect Cornell’s information technology resources as well as the people who use them. This year, three policies were added to the University Policy Library: Mass Electronic Mailing (Policy 5.2), Use of Escrowed Encryption Keys (Policy 5.3), and Data Stewardship and Custodianship (Policy 4.12). Five more are working their way through the approval process:

- Privacy of Electronic Mail: circumstances in which the university will intercept, access, or disclose the contents of electronic mail transmitted or stored on Cornell-owned information technology resources, and procedures for requesting such action
- Security of Information Technology Resources: responsibilities of different categories of users with regard to best information technology practices
- Assignment of Domain Names: standards for domain names and process for registering domain names within the “cornell.edu” realm and non-Cornell domain names hosted on university servers, and the reporting of any domains purchased with university funds
- Reporting Electronic Security Incidents: responsibilities for reporting network and computer security incidents and collecting information about security incidents, and actions taken to correct security incidents
- Information Technology Authorization and Authentication: authority, standards, and processes for authentication and authorization practices for university network services

Helping the community understand and apply policies
www.cit.cornell.edu/computer/policies/

Developing information technology policies using the university’s policy process is just the beginning. To achieve their intended purposes, policies need to be supported with extensive education efforts. Our goal is to help the community understand what these policies mean as a whole and how to apply them to their own circumstances.

Top Five Protocols on Cornell’s Commodity Internet (Fiscal Year 2003)

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Gbytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>KaZaA</td>
<td>35,000</td>
</tr>
<tr>
<td>HTTP</td>
<td>30,000</td>
</tr>
<tr>
<td>FTP</td>
<td>25,000</td>
</tr>
<tr>
<td>NNTP</td>
<td>20,000</td>
</tr>
<tr>
<td>EDonkey2000</td>
<td>15,000</td>
</tr>
</tbody>
</table>

- KaZaA is a file-sharing application.
- HTTP is web sites.
- FTP is a file transfer protocol used to move files between systems.
- NNTP is USENET, or newsgroups.
- EDonkey2000 is a file-sharing application.

What Cornell’s CIT Dollar Buys: Actual Expenses
$47 Million [Fiscal Year 2003]

University Computer Purchases [Fiscal Year 2003]
This year, we’ve put a lot of energy into educating the community about the politics of digital copyright and file sharing. In response to political and legal activity aimed at stemming the illegal online trade of music, we, in consultation with University Counsel, revised our compliance procedure to provide greater efficiency, improve security and maintenance of the network system, and protect the identity of end users.

When Tracy Mitrano, director of policy for OIT and the university’s designated Digital Millennium Copyright Agent, is notified that an IP address at Cornell is allegedly in violation of copyright law, she has CIT block the IP address and requests the identity of the person whose computer uses that address. Tracy then notifies the person and requests that he/she (1) reply with a “cease and desist” statement in the case of intentional sharing; (2) remediate the computer in the case of a virus or hacking; or (3) follow the instructions for counter-notice action if the person believes he/she has a license or fair-use exception for the material. In the past, Tracy used to first contact the person and ask him/her to remove the material.

The new procedure provides better security for the university, since a third of the cases turn out to be security incidents. It is also more stringent than that required by law, but without going so far as to block or monitor file sharing itself, which some universities and colleges have done. We processed more than 200 notices last year.

In the upcoming year, we will revise Responsible Use of Electronic Communications (Policy 5.1). Once that project, together with the other policies mentioned, is complete, we will kick off a rewriting of our user-friendly, and much cited, “Understanding Your Rights and Responsibilities,” a comprehensive, interpretive guide to all of the university’s policies that govern use of information technology. Doing this will be a vital part of our effort to help the community understand how all these policies fit together.

Providing policy leadership beyond Cornell
Tracy Mitrano, director of policy for OIT, continues to be recognized at the national level for her work in information technology policy. In December 2002, she was part of a videostreamed roundtable discussion titled “Safeguarding Our Patrons’ Privacy: What Every Librarian Needs to Know about the USA PATRIOT Act and Related Anti-Terrorism Measures,” sponsored by the Association of Research Libraries, American Association of Law Libraries, American Library Association, Association of Research Libraries, Medical Library Association, and Special Libraries Association. The video and accompanying manual is a bestseller.

Most recently, Tracy was awarded the 2003 Ada M. Stoflet Lectureship at the University of Iowa. She will lecture at the university in October on federal legislation and its impact on information technology policy development in higher education and will meet with members of the University of Iowa community.
Updating the campus phone system and data network

Goal:
Develop and execute a plan to modernize Cornell’s communication networks in order to meet the teaching, research, and outreach missions of the university

Progress:
- New network rate model with usage-based billing
- Off-campus extension of Cornell’s network
- Network switching upgrade and cost reduction
- Update on public ports and wireless
- Update on EzraNet project

Laying out a new way to recover data network costs

www.cit.cornell.edu/services/newnetrates

In July 2003, we launched a new way to recover our costs for the data network, in response to the community’s desire to have our rates reflect a more equitable distribution of costs based on actual usage. The approach we’re taking was recommended by the campuswide Network Cost Recovery Task Force. It has three components:

- The network port fee. Charged monthly to every port, this fee covers the cost of local area networks (LANs) within buildings and their connection to Cornell’s central backbone network.
- The infrastructure tax. Assessed through Cornell’s Campus Allocation Method and applied at the college and department levels, this tax covers the cost of the backbone network, including the fiber plant, routers, the Network Operations Center, plant maintenance, public ports, and the RedRover wireless network.
- The usage fee. Charged monthly to every IP (Internet protocol) address that accesses the Internet or Internet 2 (wide area network or WAN), this fee covers the cost of Cornell’s connections to the WAN. A flat fee covers usage between 2 megabytes and 2 gigabytes; additional usage is billed per megabyte. Fewer than 5 percent of the community use more than 2 GB a month.

We’re handling billing for the Residence Hall Network Service (ResNet) the same way. For the majority of students, the service cost is included in their residence-hall room rate; students only pay additional charges if their usage exceeds 2 GB in a month.

To help network administrators and billing coordinators track the usage fee component and ensure accurate billing, we built NUBB, the Network Usage-Based Billing system (nubb.cornell.edu). Calculated monthly for each IP address, NUBB shows the number of bytes received and sent, the destination IP address of the top 100 “conversations,” and the fee.

Between Dec. 2002 and June 2003, network administrators used NUBB to update information on the IP addresses for which they are responsible and to get a sense for usage patterns. As of July 2003, we are using NUBB to bill the usage fee.

Providing “public” access to the data network

We worked closely with key representatives of the community to determine how to fund so-called “public ports” as well as RedRover, the 802.11 wireless network. The community requested that both services be available at no cost.

Public ports are typically in classrooms, computer laboratories, kiosks, public areas of libraries, and other campus locations not used exclusively by a single department or unit. Through a campuswide selection process, more than 1,300 public ports were designated for funding through our infrastructure tax.

RedRover, as of July 2003, was available through 112
wireless access points in 37 buildings across the campus. All maintenance and usage is covered by the infrastructure tax. Departments or colleges pay only the initial cost of purchasing and installing RedRover access points.

**Extending the data network to off-campus locations**

Faculty and staff working in 9 buildings off the main Cornell campus now enjoy the lowered costs and better service that being connected directly to our high-speed, high-quality phone and data services provides.

In fiscal year 2002/03, we ran about 9 miles of fiber-optic cabling to connect the campus network to Cornell Business and Technology Park, Langmuir Lab, the Equine Research Park, the Lab of Ornithology, the Robert Trent Jones Golf Course, Schuyler House, 301 College Avenue (Computing and Information Science), 1201 N. Tioga Street (Educational Television Center’s satellite studio), and East Hill Plaza. We anticipate extending the network to more buildings next year.

Extending the campus network makes good economic sense for the university. Once construction and materials costs are recovered, it’s inexpensive to add new buildings. The more people who use our network services, the lower the cost is for everyone, because our cost-recovery approach bases rates directly on the number of users.

For most buildings, the last infrastructure update was in 1981. The fiber infrastructure we’ve installed will be good for the next 15 years. To minimize upfront costs, we painstakingly engineered the off-campus fiber pathways and connected buildings in geographical groups. We also did our own project management work. Both efforts kept the university’s dollars and expertise in house, expertise that is transferable to other network projects.

Several buildings used Verizon’s now-discontinued FDDI service, with 100 Mbps (megabit per second) data service. Our standard, switched data service costs less than FDDI and, with speeds up to 1,000 Mbps (gigabit), is faster than FDDI and other options available locally. Verizon’s DSL switched service and Time Warner’s Road Runner shared service are under 10 Mbps.

**Moving ahead on plans to revamp data wiring in buildings**

We received approval from the university for EzraNet, an ambitious $67-million project to install new data wiring in 59 buildings over the next 10 years. It’s the next step in our overall data network upgrade. To make the most of our improved campus backbone network, people need better networks in their buildings.

Most buildings have category-3 wiring that is 15 years old. They’ll be rewired with category-6, twisted-pair copper wiring and switched networking equipment that provides speeds up to 1,000 Mbps (gigabyte). With that boost, the building networks will handle bandwidth-heavy tasks with ease, such as videoconferences, virtual reality, and data collaboration tools and simulations.

In 2003/04, design and rewiring will be done for Upson Hall, as well as design for Clark Hall and the Biotechnology Building. The pace will accelerate in each subsequent year. The experience we gained in 2001/02 through a $6-million pilot rewiring of five buildings gave us a solid understanding of both the financial and logistical scope of rewiring buildings on this scale.

**Reducing network costs while enhancing performance**

From September 2002 through March 2003, in a $1.2-million project, we replaced the university’s few remaining shared-10 Mbps (megabits per second) Ethernet hubs with 10/100 Mbps switches, upgraded the bandwidth capacity of links to nearly every campus building from 100 Mbps to 1,000 Mbps (gigabit Ethernet), and replaced Ethernet switches that had high maintenance costs. About 10,000 active Ethernet ports in over 100 buildings were affected by this work. Switched Ethernet service provides faster, more efficient networking.

By deftly applying project management skills and tools, we accomplished our work without the community even noticing. We were on time and under budget, and our lowered maintenance costs on the switches will save the university $450,000 a year. We also saved money by getting credit for much of the old equipment.
Positioning Cornell to expand its distributed learning venues

Goal:
Develop Cornell’s capability to support distributed learning with appropriate infrastructure, facilities, and services

Progress:
• New director of Distributed Learning Services
• January Expo
• Videoconferencing and web collaboration
• Online orientation to computing at Cornell
• Support for faculty using technology in teaching

Guiding our distributed learning efforts
dls.cit.cornell.edu

In October 2002, Eric Fredericksen joined us as director of Distributed Learning Services. His nationally recognized experience in the field will help guide Cornell’s efforts to continue exploring and incorporating distributed learning tools in the most productive ways possible.

Most recently, Eric served as assistant provost for advanced learning technology at the State University of New York (SUNY), where he provided leadership and direction for the nationally recognized SUNY Learning Network (sln.suny.edu), the SUNY Teaching Learning and Technology program, and SUNY’s involvement in the international MERLOT project (www.merlot.org). All three use technology to enhance instruction and learning, in and out of the traditional classroom.

He was also instrumental in working with the Alfred P. Sloan Foundation, which provided more than $4.3 million in grant funding to the SUNY Learning Network, winner of the 2001 Educause Award for System Progress in Teaching and Learning. In 7 years, the network expanded from 2 campuses offering 8 online courses to 119 student enrollments to 53 campuses offering 2,500 online courses to more than 40,000 student enrollments.

In the upcoming year, Eric will pay special attention to the underlying infrastructure that instructors count on, including classroom technologies and course technologies, as well as the Faculty Innovation in Teaching Grant Program. Collaborating with other campus service providers, including Cornell University Library, the Center for Learning and Teaching, the School of Continuing Education and Summer Sessions, and Communication and Marketing Services, to create a seamless and unified support program for faculty will be another top priority. Finally, Eric will be integrating two new units, the Web Production Group and Educational Television Center (formerly with Media and Technology Services), into CIT.

Tying it all together: January’s expo on teaching with technology
dlexpo.cit.cornell.edu

In January 2003, we partnered with Cornell University Library, the Center for Learning and Teaching, Communication and Marketing Strategies, Media and Technology Services, and the School of Continuing Education to present a two-day expo and celebration of the myriad ways technology enhances teaching and learning at Cornell. The event itself serves as an example—much of it was captured for viewing online, to extend its usefulness beyond the estimated 130 people who attended.

“Learning and Teaching with Technology” included demonstrations by faculty members already using technology, including projects developed through the Faculty
Innovation in Teaching Grants program, as well as short workshops and information stations on instructional design, assessment of program impact on student learning, content development and management, integration of digital library resources and services, web hosting and maintenance, videostreaming, webcasting, and videoconferencing.

Exchanging ideas without leaving home

www.cit.cornell.edu/services/av

More than ever before, faculty, staff, and students are engaging their far-flung colleagues without setting foot outside the campus. And we are helping them do it. In the past year, we served as design consultants on new facilities and advised do-it-yourselfers on what to buy and why. We’ve been involved with the design and development of the Martha Van Rensselaer Hall addition, the Applied Engineering Faculty Innovation in Teaching grant project, Duffield Hall, the Hotel School addition, and the planned Life Sciences building.

We’re also supporting more videoconferences and live videostreaming. In addition to the Global Seminar (ALS 480—Environment and Sustainable Food Systems—a course with students in 6 countries) involving universities and colleges in over 12 countries, we facilitated several multi-site conferences for the nanobiotechnology department and Cornell Cooperative Extension, as well as many one-time events for other departments and units.

By the start of the fall 2003 semester, our dedicated video distribution and control facility will be completed. With this facility, we’ll be able to distribute audio and video to and from classrooms, conference rooms, and the Educational Television Center studio. It will also serve as our operations center for creating and managing videoconferencing and videostreaming events.

Another big area of interest is web-based tools for holding virtual meetings and working interactively and simultaneously on projects. Participants launch their web browsers, log in to a meeting, and can then run applications, work on documents together, give presentations, and even “write” on a virtual whiteboard. We’ve been working with the Johnson School, the Hotel School, and eCornell to investigate various vendors with an eye toward acquiring a campuswide site license.

We expect demand for these services to continue growing. The quality of the services and the speed of Cornell’s data network are both so good now that videoconferencing and web collaboration are attractive, viable alternatives to traveling. And the time (not to mention money) saved by not traveling can be re-invested into richer and broader collaboration and knowledge sharing, the very core of Cornell’s mission.

Orienting new students to computing services—online

teh.cornell.edu

All new undergraduate students are required to complete an orientation to Cornell’s computing environment, services, and policies. In the past, students signed up for a 50-minute “Travelers of the Electronic Highway” class, held just before fall or spring instruction began. Getting over 4,000 students through the orientation was an intense effort, requiring up to 70 student trainers and 3 full-time staff.

In fall 2002, we began offering the orientation online. Students can now complete the orientation and a quiz on the material at a time and place convenient to them. Of those completing the online instruction, 96 percent say they are confident they know how to get further help if needed, and 82 percent prefer that the orientation be done online. Our administrative effort has been reduced by 50 percent, and we’ve saved 38 percent in expenditures.
Supporting technology-enhanced instruction with tools and services
www.cit.cornell.edu/atc

We help faculty and instructors leverage technology to address their particular instructional challenges and goals. Selected highlights of our work last year:

- Faculty Innovation in Teaching Grants Program:
  Since 2001, we’ve played a central role in this university program, which helps faculty and instructors creatively apply instructional technologies to achieve specific pedagogical goals. Through a competitive process, 16 grants are awarded annually by the college and school deans and 4 by the Faculty Advisory Board on Information Technologies (FABIT). To date, 40 grants have been awarded. Grant winners receive assistance from our Distributed Learning Services group, which serves as the overall project coordinator, as well as from Cornell University Library, the Center for Learning and Teaching, and the Human Computer Interaction Group. Some recurring themes in the grants include case-based studies and simulations; interactive role-playing; three-dimensional modeling; virtual exploration/experimentation that would otherwise be impossible, too risky, or too costly; and techniques for fostering participation and community in large-enrollment courses.

To involve the entire teaching community, we host speakers, sponsor special events, and provide venues for grant winners to share what they’ve learned. This year, Gerry Hanley, executive director of MERLOT, discussed that organization’s international effort to help faculty in higher education share learning materials that are peer reviewed and organized by discipline. Douglas D. Mann, associate provost of information technology at Ohio University, outlined scientific principles that support technology-enhanced learning. We also hosted a 2-day distributed learning expo in January (see page 9) and a luncheon for faculty to exchange ideas and share their progress.

- Lynx: Student Technology Assistant Program: Begun in fall 2001, this program gives faculty access to 70 students who are highly trained in a wide array of instructional technologies. Depending on the need, Lynx students work either at the faculty member’s location or in our facilities, doing everything from providing PowerPoint assistance to building course web sites to digitizing video.

This year, we simplified scheduling so that, during our standard hours, faculty can now get help within an hour of requesting it. In the fall, we’ll pilot a web-based, live “help” channel. We’ve also modified the Lynx training to include a rigorous final project that demonstrates the students’ technical skills as well as their ability to plan and execute a project using instructional technology. It also happens to employ a technique that is gaining momentum in higher education—digital storytelling.Using a variety of media, from video and audio to text and photographs, each student creates a 3- to 5-minute personal story. The resulting films are shared with the other students as a way to build community and encourage technical exchange.

The final projects proved to be an exceptional way to reinforce the students’ skills and also challenged their beliefs about their own creativity. And we are now well-positioned to support digital storytelling as another educational tool available to faculty. In fact, we anticipate being involved in a pilot project for a small language course, in which our Lynx students would help the course participants create digital stories.

- Online course evaluations: More and more faculty and instructors are choosing to have their students com-
plete course evaluations using our secure survey tools. Students use their NetID to access the course evaluation, and separately we track which NetIDs have responded so that students can only complete an evaluation once. Human Ecology’s Department of Policy Analysis and Management researched the validity of completing course evaluations online versus the old-style bubble sheets and found no statistically significant difference in ratings. That department now uses online course evaluations for all of its courses.

- **Blackboard/CourseInfo**: This hosting service for course web sites is now home to more than 2,500 courses. In the upcoming year, we will install the enterprise version of Blackboard. This version will enable us to significantly enhance what faculty can do with their course sites. Among the possibilities we’re exploring are integrating with other university systems, such as registrar information; providing access to Blackboard/CourseInfo using the university’s standard Kerberos system, instead of having a separate password system; and being able to write software add-ons for Blackboard. Cornell University Library, for example, is interested in library tie-ins using this technology.

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In the new Martha Van Rensselaer Hall addition, CIT’s Greg Bronson sets up the videoconferencing room. CIT helped design and develop this room.

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**Cornell faculty anywhere, anytime: CyberTower**

cybertower.cornell.edu

We work closely with Cornell’s Adult University (CAU) to produce the web-based CyberTower, a distributed learning service that offers directed noncredit study with Cornell professors. Study rooms feature in-depth lectures along with resources for further self-study. Forums are moderated interviews on current issues. Views and Reviews are short lectures on current books, films, breaking news, or anything else that intrigues or inflames faculty. A sampling of topics:

**Study Rooms**

- “Antigone,” New Student Book Project
- “Natural and Human History of Plant Cloning”
- “Protecting Adolescents from Bullying, Sexual Harassment, and Emotional Violence”
- “Islam”
- “Myth, Film, and Dream”
- “The Gender Pay Gap: Going, Going... But Not Gone”
- “Halal and Kosher: The Muslim and Jewish Dietary Laws”

**Forums**

- May 2003: “Iraq and After: A Military Historian Looks at War”
- April 2003: “The Web, Artificial Intelligence, and Computational Biology in Modern Life”
- March 2003: “Student Mental Health Issues on College Campuses Nationwide and at Cornell”
- December 2002: “The State of the University”
- November 2002: “Myths and Realities about American Juries: Capital Punishment and Punitve Damages”
- October 2002: “Brain Waves”

**Views and Reviews**

- June 2003: “Power Sleep and Peak Performance”
- May 2003: “Broadway Boogie Woogie: Damon Runyon and the Making of New York City Culture”
- May 2003: “Rethinking Diversity. David Hollinger’s Postethnic America”
- May 2003: “Fossil DNA: Is There Life after Extinction?”

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Supporting Cornell’s administrative information systems

Goal:
Renew and extend Cornell’s administrative information systems

Progress:
- New director of BIS
- PeopleSoft
- WebMethods
- Graduate Registration Unit Recommendation solution

Providing leadership for administrative systems
www.cit.cornell.edu/cit/bis.html

In October 2002, David Koehler joined us as director of Business Information Systems. He brings 20 years of experience in administrative computing at three major universities, including Cornell.

Dave’s last position with Cornell was as director of information resources in 1993. He went on to serve as administrative systems director at Stanford University and then at Princeton University for the last seven years. At all three universities, Dave was responsible for updating and integrating administrative systems using enterprise resource planning (ERP) systems, among them PeopleSoft.

Other organizations that have benefited from his skill include the Java in Administration Special Interest Group, CAUSE, EDUCAUSE, and CAUCUS, all of which are focused on furthering information technology in higher education. Dave’s experience positions him well to lead Cornell’s multimillion-dollar commitment to modernize its systems over the next 5 years.

Upgrading and expanding PeopleSoft

In April 2003, the upgrade of the Human Resources/Payroll module to version 8 of PeopleSoft was completed. This version provides more functionality and flexibility. During the upgrade, it was necessary to shut down the HR/Payroll module, as well as several tools used by the community, including Employee Essentials, COLTS, the Position and Employee Data Lookup (PEDL), and the Student Employment System (SES).

Careful preparation and the dedication of the upgrade team enabled us to complete the upgrade in 4 days instead of the expected 5.

In May and June 2003, we delivered an enhanced reporting datamart for the HR/Payroll module, using the ad hoc querying tool Brio. The datamart gives HR/Payroll professionals greater flexibility to do their jobs by providing easy access to data. It will be the foundation on which new HR/Payroll data delivery initiatives are built (HR On-Line). Previously, only batch reports and datasets were available. Cornell was the first university for which PeopleSoft consultants developed an HR/Payroll reporting datamart.

The PeopleSoft Contributor Relations project team completed its discovery phase and then its implementation on time at the end of July 2003. The Contributor Relations module replaces a database that doesn’t have
the functionality needed to fully support Alumni Affairs and Development’s upcoming fundraising campaign. It will be the university’s second PeopleSoft module.

Other work this year included completing the discovery phase for PeopleSoft’s Student module and beginning the planning and design phase, and enriching PeopleSoft with some tools:

- FormScape accepts data from PeopleSoft, applies sophisticated formatting, and prints on high-speed printers. Alumni Affairs and Development is using it to produce dues cards. No longer do they contend with more than 80 different forms. In late July 2003, they will also be using FormScape to produce pledge cards.
- FirstLogic automatically updates addresses by comparing our PeopleSoft records with official postal data. Currently, we update addresses located in the U.S., Canada, and Great Britain.
- Load balancing distributes demand for PeopleSoft’s web-based services among the available servers. It’s a way to maximize performance and is widely used on commercial web sites such as Amazon.com. Currently, we use it only with PeopleSoft, but it can be used with other web-based services as well as non-web services.

Integrating data across many systems

Currently, we maintain data about faculty, staff, and students in many separate places, including PeopleSoft; the electronic directory; Oracle and Adabas databases; and various small databases. We are using an integration tool called webMethods that lets these systems talk to each other without needing to be modified themselves.

So far, we have built integrations between the electronic directory and the PeopleSoft Human Resources/Payroll module, Student Information Systems, the Student Employment System (SES), Employee Essentials, the Graduate Registration Unit Recommendations system (see below), the Registration ID system, and many other smaller systems.

Streamlining registration unit recording for the Graduate School

Just as Cornell undergraduates must earn a certain number of credits to earn their degree, graduate students need a certain number of registration units. Graduate students earn one registration unit for each semester of satisfactory full-time study and research. Four times a year, the Graduate School requires the graduate faculty to update this information. In the past, that meant processing a total of 4,400 forms.

When we saw that the Graduate School wanted to automate this process, we offered our help. In March 2003, we launched a web-based Graduate Registration Unit Recommendations system. After receiving an e-mail prompt from the Graduate School, faculty members update their students’ information through a web form. The difference in how quickly this administrative chore is now completed is nothing short of impressive. Five days after the new system was in place, registration unit recommendations had been entered for nearly a third of the students.
Meeting campus needs for tools and services

Goal:
Execute our current portfolio of services with a high level of performance and reliability while improving our efficiency and responsiveness

Progress:
• New e-mail system and services
• Storage Area Network initiative
• EZ-Remote future
• uPortal.Cornell
• Hosting environment
• Lower EZ-Backup rates

Expanding e-mail services and enhancing performance
www.cit.cornell.edu/computer/e-mail

Our e-mail system hosts more than 35,000 e-mail accounts, and, on the average day, a million e-mail messages buzz through. E-mail is so popular and works so smoothly that many people rely on it as their primary means of communication. This year, we introduced a brand-new, more robust e-mail system that offers not only superior performance, but also a new suite of services requested by the community and better security for Cornell’s campus network.

Our original e-mail system was over 10 years old and heavily overloaded. Although we were able to continue delivering nearly all messages in seconds, on occasion, some messages (a few thousand out of a million) had to be held for later delivery to prevent crashing the e-mail system. The traffic significantly outstripped our projected increases, and spam alone nearly doubled the typical volume at times.

Tweaking the old system’s performance wasn’t enough to handle the excessive load, so we began encouraging the community to try our new e-mail system. Because moving to the new system requires people to make some changes on their computers, we wanted them to have plenty of time to do it at their own convenience. So throughout the spring semester, we ran the new and original e-mail systems concurrently. Migration to the new system will continue through the fall semester.

Highlights of our new e-mail system:
• All incoming e-mail goes through PureMessage, which blocks virus-infected messages and flags spam so that recipients can easily delete or filter it.
• Our new WebMail service lets the community securely read and organize messages from anywhere, on any computer with a modern web browser, without installing anything.
• Messages stored on our new system are no longer deleted after 60 days. Each e-mail account can store up to 200 MB of messages indefinitely.
• We continue to support Eudora via POP, which is what we offered on the original e-mail system, as well as Eudora via IMAP. A new way of storing and organizing messages on our e-mail system, IMAP is especially useful to those who travel or use multiple computers.
• Security is better. We now require that NetID passwords be transmitted securely using Kerberos, SideCar/CUWebLogin, or TLS (the latest version of SSL, the same technology that protects credit-card and other sensitive information on the web).

Celisa Manly manages the CIT Customer Service Contact Center (HelpDesk). Her all-student staff answers more than 200,000 requests for help each year.
Scaling server storage to save money

Historically, storage has been purchased and upgraded with each server, and each server’s budget includes maintenance and disk replacements. Typically, when a server is purchased, enough storage is also purchased to last several years.

Given how budgeting is done at the university, this strategy is understandable. Nevertheless, it leads to several problems. We can’t benefit from bulk discounts and other pricing offers. Buying storage in advance costs more, since storage prices drop every year. In a pinch, we can’t shift storage from one server to another. And with no standardization, more storage equals more staff time spent managing it. Currently, more than $500,000 is spent annually on storage.

Our new Storage Farm solves these problems and saves the university money. Leveraging existing disks as well as new fiber-based Storage Area Network (SAN) technology, the Storage Farm interconnects servers and storage. All storage is owned and managed centrally, and the servers “rent” however much storage they need. Different levels of performance are offered, so that a server that needs high performance pays for a better class of storage than a server that doesn’t. High-performance storage needs are met with our newly purchased IBM Enterprise Storage Server (“Shark”).

Initially, we are using the Storage Farm for CIT’s 250 servers. We anticipate lower storage and staffing costs and improved turnaround time on disk space requests.

Changing our dial-up services

www.cit.cornell.edu/ezremote

This year, we looked at alternatives for offering modem dial-up service to the community. Our fee-based service, EZ-Remote, and our free service, Express Lane, had operated at a financial loss over the past two years as more people upgraded to faster Internet services offered by external vendors.

At their peak, EZ-Remote and Express Lane had more than 10,000 users. As of June 2003, EZ-Remote had approximately 5,000 paid subscribers. We’d also seen a marked increase in usage of Express Lane, which is subsidized entirely by EZ-Remote subscribers. It accounted for 20 percent of the overall dial-up service costs.

Keeping our dial-up services afloat would mean making changes that would bring our pricing into the range offered by other Internet service providers (ISPs). So we issued requests for proposals to several ISPs. Based on the proposals returned, we determined that we wouldn’t be able to save the community money by contracting with an external ISP for modem dial-up service.

By continuing to offer our own dial-up service, we can offer the flexible billing options the community requires, as well as continue to offer our Express Lane offering. But, effective September 2003, we will raise the rate for individual subscriptions by about 17 percent and the rate for group (department) subscriptions by about 60 percent. We will also restrict usage of Express Lane to students and retirees.

Refining your web, your way

uportal.cornell.edu

In July 2002, we debuted uPortal.cornell, the university’s central web portal. At just one web site address, community members can find links to the resources they’re likely to need, based on their role (faculty, staff, student, etc.) and their college or unit affiliation. They can also launch any Bear Access service and can customize what they see when they visit uPortal.cornell.

The portal also provides a new way for faculty, departments, service providers, associations, and clubs to present information to their particular audiences. The Colleges of Agriculture and Life Sciences and Veterinary Medicine; the School of Hotel Administration; Administration, Facilities, and Finance; and CIT are some of the groups already doing this.

The technology behind the scenes makes it very easy
for content providers to publish in the portal. For content that already exists, it’s simply a matter of requesting a “channel” in the portal and specifying whether to display the content as full text or links. Another nice feature is that the portal can transform content, on the fly, into a form usable by devices such as personal digital assistants (PDAs).

Beginning in summer 2003, we made the portal the primary source for Bear Access services. This high-profile application will make uPortal.Cornell even more attractive as an enterprise-wide communication vehicle for the entire university. Previously, we packaged Bear Access with Runway, an application that ran on a person’s computer. People who already have Runway installed can continue using it that way, but everyone else will use the portal instead.

uPortal.Cornell is an implementation of uPortal, a free, open-source, sharable portal tool developed by higher education institutions under the auspices of the Java Architectures Special Interest Group (JA-SIG).

Hosting Java and ColdFusion
solutions.cit.cornell.edu/Hosting

We are now offering a secure, professionally maintained web hosting service for Java and ColdFusion applications. Our service includes a “live” (production) environment as well as a development/testing environment, and we do the work of setting up web addresses and securing the site with SSL or CUWebLogin as desired. The service also provides access to Cornell’s computing infrastructure, including the electronic directory, authentication and authorization, and interfaces to core applications.

Backing up data at lower costs
ezbackup.cornell.edu

EZ-Backup is a fee-based, automated, remote backup/archive/storage service that automatically backs up computers and servers and allows subscribers to restore data themselves. Because of continued growth in use of the service, we were able to significantly reduce rates effective September 2002. The new rates provide a 12.5 percent rate reduction for all subscribers.

EZ-Backup protects over 35.4 terabytes of data on more than 2,500 laptops, workstations, and servers, including Cornell’s server “farm” in Rhodes Hall, home to critical university data.

Top Ten Pages Requested on www.cit.cornell.edu
(Fiscal Year 2003)
Keeping Cornell’s data and networks secure

Goal:
Advance our programs supporting access management and security in identity management, authentication, and authorization; directory services; and network and system security

Progress:
- New director of security
- Identity management strategy
- Encryption technologies
- Defensive mechanisms

Taking the lead on IT security at Cornell

www.cit.cornell.edu/oit/SecurityProg.html

In April 2003, Steven J. Schuster joined us as director of Information Technology Security. His responsibilities include security policy and education, infrastructure, and monitoring; business continuity and disaster recovery; and incident response and analysis.

Most recently, Steve was division manager of the Information Security Center at AT&T Labs, where his work included cyber-defense monitoring and incident response, intrusion detection systems, secure architecture development, and security auditing. He has also worked on cryptology and large-scale data processing for the defense industry.

In his short tenure, Steve has been supporting the development of three security policies, establishing a more secure information technology and computing environment, and creating campuswide incident response procedures. These areas are particularly important due to federal security legislation, in particular the Gramm-Leach-Bliley Act (financial records), Health Insurance Portability and Accountability Act (HIPAA), and Family Educational Rights and Privacy Act (FERPA).

Immediate priorities for bolstering the university’s security infrastructure include a thorough examination of the university’s needs for authentication and authorization and what tools can best meet those needs; improved access control to networks at the campus and department levels; and direct support to departments not only for incident response but also for planning.

Knowing who you are and what services you can use

At Cornell, who can access what is largely controlled by our system of NetIDs and passwords. Playing a crucial supporting role are the technologies that verify NetIDs and passwords, as well as the supporting policies and the electronic directory. Together, we call this identity management.

This year, our Identity Management group met with various campus stakeholders to find out how we could best enhance our existing services, as well as what new services we should explore. We have incorporated those recommendations into our program plans. Some, such as the modification of Cornell University Library’s proxy web server to work with CUWebLogin (see below), we have already accomplished. Others are on the slate for the upcoming year. And a few, such as a mechanism for university guest registration and authentication, are in the proposal stage.
Security Specifics

Electronic directory
directory.cornell.edu

Cornell’s electronic directory is so much more than an online phone book. It can be used to authorize access to services. It can reconcile a person’s various identifiers into a single record—a person can be on record as a staff member, alumnus, and student, for example. It can even store and display ID photos, a service we prototyped within CIT this year.

Our primary goals are to integrate the directory with more services and to have it store authorization information. Instead of having that information stored in the Permit Server, and in some cases, in custom lists maintained by individual services, we want to have authorization information stored centrally in the directory. In the upcoming year, we plan to do just that with a prototype.

CUWebLogin
www.cit.cornell.edu/authent/web/cuweblogin.html

As important as Kerberos and SideCar are in providing strong network security at Cornell, they can also be an obstacle for some people. SideCar must be installed on the computer attempting to access a particular service, it doesn’t work well with firewalls or network address translators. Further, CIT maintains a version of SideCar only for the Macintosh and Windows operating systems, not Unix. As an alternative for web-based services, we developed CUWebLogin in 2000 to eliminate the dependency on SideCar.

This solution, based on web cookies and SSL, works with any contemporary web browser. For the user, it couldn’t be easier. Deploying CUWebLogin for a new web-based service is also fairly straightforward. Some older web applications, however, may require some rewriting to take advantage of CUWebLogin. Such is the case for Faculty Advisor and Employee Essentials. Faculty Advisor is scheduled to be rewritten in the fall timeframe. Proposals for addressing Employee Essentials are currently under discussion.

In the upcoming year, we plan to encourage wider adoption of CUWebLogin by increasing our campus outreach, meeting with campus developers on a monthly basis, and providing better online support. This year we introduced the Authentication, Authorization, and Directory Services (AADS) web site to assist developers in using our authentication and authorization infrastructure.

Policies

We have begun working on an authentication and authorization policy. Because NetID passwords permit access to many restricted services as well as private information about individuals and university data, Cornell’s audit department recommended that CIT eliminate the use of “clear-text” passwords with its services. Clear-text passwords are sent without any encryption, making them easy prey for people who “sniff” our networks looking for ways to gain unauthorized access to services or information. We have made significant progress in this effort by eliminating the option of using a clear-text password with our new e-mail system, instead requiring authentication via Kerberos, SideCar/CUWebLogin, or TLS (SSL).

We are also investigating better ways to handle access for people who are in the category of affiliate or subsidiary. With our campus colleagues, we need to define those terms precisely and then settle on what services these groups of people are entitled to use. Currently, each person is treated as an exception. Developing standard rules would enable us to build an infrastructure to more adequately support a wider range of people.

NetID management

Our current method for retiring NetIDs from active use is so laborious that it cannot be done nearly as often as it should be. As a first step toward fixing it, we have shifted to thinking about the entire life cycle of a NetID, from creation to status changes to retirement. In the upcoming year, we will develop a multiyear plan for automating the process and bringing it as close to real-time as we possibly can. As part of that effort, we will address the growing need to assign NetIDs before people are actually on campus and the issues of logistics, support, training, and policy enforcement that it raises.
Keeping an eye on encryption technologies

This year, we sponsored a pilot PGP (Pretty Good Privacy) program to give us concrete experience in the realm of public-key-encryption technology. Public key infrastructure (PKI) is a developing technology that offers encryption and digital signature capabilities and could potentially replace Kerberos as our authentication scheme.

PGP provides a subset of the functionality PKI offers. Through a system of public and private encryption keys, it encrypts and decrypts e-mail data and allows the sender to digitally sign the message. In our pilot program, we set up a CIT-maintained key server that let users “sign” their PGP keys using their Kerberos credentials. We now know that the learning curve for PGP is fairly steep, and we could expect a similar curve for PKI.

Although there was not sufficient interest to justify deploying PGP as a campuswide service, we are continuing to maintain documentation and instructions for obtaining and installing the software for use with key servers maintained outside Cornell. We also created a discussion list for PGP users.

Beginning in fall 2003, a project team will meet on a quarterly basis to discuss PKI initiatives at the national level and assess opportunities for Cornell to move ahead.

Strengthening our network defenses

As the graph on growth in security cases so vividly illustrates, network security continues to be a top priority. University networks are favorite targets of unsavory people who need a launching point for their mischief, or, in some cases, debilitating attacks. This year, we introduced two more tactics.

ResNet security scanning

In spring 2003, we performed security vulnerability scans of the Residence Hall Network Service’s approximately 100 subnets. Our scanning tool examined 6,500 computers for configuration or management flaws that might make them vulnerable to exploitation. We notified owners whenever our scans detected a serious vulnerability, and provided specific explanatory and remediation notes for correcting the problem.

We did the scans as a free service to help ResNet subscribers protect their computers from people outside Cornell looking for vulnerable computers. Unlike faculty and staff, students do not have local technical support providers who can help them configure their computers in the most secure way possible. Our statistics show that machines on the university’s network are scanned over 300 times a day by people outside Cornell, and that ResNet computers, in the past, had been frequently used without the knowledge of the owners.

Security Trends and Tips newsletter

During the past year, we broadly circulated a periodic summary of current events and trends, observed and anticipated, in Cornell’s network security environment. The notes also included suggestions and tips for dealing with our dynamic computing environment. Some of the topics addressed included dealing with increases and changes in the hostile probing of our networks, guarding against newly detected viruses, and protecting home computers and data there from exploitation.

Security Cases: (Fiscal Years 2002 vs. 2003)*

*Excludes 370 cases categorized as computer abuse or copyright cases
Enriching Cornell’s leadership in technology

Goal:
Enhance Cornell’s role as a technology leader

Progress:
• Faculty Innovation Grant: Calculus
• Faculty Innovation Grant: Biochemistry
• Regional and national high-speed network initiatives
• Web site accessibility
• Copyright services and education
• University Computer Policy and Law programs

Deepening understanding in introductory calculus

Each year, several hundred Cornell students take an introductory calculus course. Many of their instructors—advanced graduate students and postdoctoral junior faculty—are at an early stage in their professional development as teachers. We’re working with Maria Terrell, lead instructor for Math 111, on ways to enrich that experience for students and instructors alike.

Through a Faculty Innovation in Teaching grant (see page 11) titled “Using Web Technology to Support Just-in-Time Teaching and Peer Instruction in Teaching Calculus,” Maria is adapting two related methodologies widely used in teaching physics—peer instruction and concept testing. The project aims to assess whether students truly grasp the concepts of calculus, beyond what they need to hand in problem sets, and whether instructors will adopt a novel, interactive teaching method if it’s easy to use and stimulates good discussions of mathematics concepts.

In brief, students are given a concept-based question in class, which is connected to earlier homework assignments. They have a minute or two to report their initial response, then they compare notes with the student next to them. All students then report their final answers and see how they compare to the correct answer. In doing this, students challenge their own beliefs and uncover misconceptions. And instructors can adapt what they cover in a particular class based on the students’ understanding at that moment.

Often, these methodologies are used without any special technology. For Math 111, though, deploying them with technology is key. As many as 20 sections are taught in a semester, so Maria needs to be able to easily see how all the students are doing and to what extent their instructors are using the method. And since this project is part of a larger research effort to improve how math is taught, capturing data is essential.

Our Distributed Learning Services group is supporting Maria’s initiative in three ways. First, we selected an online assessment tool, Maplesoft’s brand-new Maple T.A. Using only a web browser, students can do warm-up questions before class, and instructors can use their responses to prepare for class with some knowledge of what the students understood from the reading assignment. Because Maple T.A. supports mathematical content, students can be asked questions that require symbolic responses.

Next, we’re enhancing Math 111’s existing course web site to support Maple T.A. both for the students and the instructors. Maple T.A. also allows Maria to conduct a crucial part of the project evaluation: analyzing how students and instructors use the pre-class warm-up and in-class concept questions and comparing that data with student performance on exams.

Finally, we investigated in-class polling systems. We chose one that lets students use an inexpensive, fountain-pen-like device to anonymously submit their initial and final answers. Graphs of the results are instantly dis-
played on the instructor's laptop, giving a quick picture of the class's thinking. The effect of peer instruction is also recorded. We're purchasing three portable systems. Cornell's physics department is already using the same system.

Maria will start using the new approach in fall 2003, with approximately 350 students and 15 instructors.

Making proteins dance

Create an animated tutorial showing the principles and methods of protein purification. Transform protein sequence data into three-dimensional models that are easily manipulated to illustrate the interconnection between protein structure and function. Streamline the logistics in managing about 500 students per year who are essentially doing an independent study in biochemistry.

Those are some objectives identified by Professor Peter Hinkle and Senior Lecturer Jim Blankenship in their Faculty Innovation in Teaching grant (see page 11) titled “Technological Modernization to Improve Learning and Instruction in Two Biochemistry Courses at Cornell.”

One course is “Principles of Biochemistry (Biochem 330),” an intense, one-semester autotutorial course covering material that spans a two-semester lecture sequence in many equivalent courses. Students learn via a study guide and textbook, with help from teaching assistants as requested. At the end of each of 14 units, they take an oral and written quiz.

To help Peter and Jim achieve their objectives, our Distributed Learning Services group has taken two strategies. One is to incorporate more course management tools. The other is to build components for making some of the instructional material computer-based. All of the tools will be ready for the fall 2003 course.

Although students do most of the learning on their own, they're required to complete weekly assignments, as well as oral and written quizzes. Supporting their learning requires selecting, scheduling, and tracking about 40 teaching assistants. Jim and Peter want to streamline some of these processes so they can spend more time doing hands-on teaching. To this end, we are working on software that will efficiently track student progress, enable students to submit course evaluations online, and track applications for teaching assistant positions.

To provide more computer-based learning, Jim and Peter are identifying new materials to incorporate into the course and enlisting our help to develop some. We’re animating laboratory procedures using Flash. To do three-dimensional rendering and manipulation of protein structures, we’re using MDL’s Chime, a web browser plug-in. By learning about proteins this way, instead of through textbook illustrations, students can gain a much stronger understanding of how the structures work and where the critical links are. Although other software had been used in the course for the same purpose, students found it difficult to install and were often disappointed with the outcome.

CourseInfo provides an easy way to make these learning materials readily accessible to students via the web. We've also installed RedRover wireless service plus 5 computers in the Stimson Hall study room, where students come to take their unit quizzes and work with teaching assistants. Students now have the option of using the Stimson computers, bringing their own laptops, or working from home.

The other course we’re working on is “Computer Graphics and Molecular Seminars (BioBM 330).” A major assignment in this course is for students to give a presentation on a related topic. A laptop computer and an LCD projector have been purchased so that students can prepare their presentations in PowerPoint.
Lighting the path to a new research network

The downturn in the fiber optics market has created a rare opportunity for universities around the country to affordably build regional and national research networks with unprecedented bandwidth speeds. It could make a huge difference in both the quality and quantity of research, as well as the viability of cross-county videoconferencing and distributed learning. Many of Cornell’s peer institutions are well on their way.

One slight problem for Cornell—current national research fiber optic projects, such as National Lambda/Light Rail, do not go through upstate New York. So we in CIT have been thinking strategically about where and how it’s most advantageous for us to connect, as well as how to loop in other upstate institutions.

We’ve initiated discussions with other upstate universities, Nysernet, and Internet2 to come up with the best strategy for optimizing our investment. To our favor is the Weill Medical College’s location in New York City, which is “on the map” in the competing initiatives.

We’re pricing what it would cost to have a dedicated fiber connection to New York City. We expect to make

Learning about the laws of technology
www.cit.cornell.edu/oit/UCPL.html

The University Computer Policy and Law (UCPL) program promotes information technologies ethics education and encourages campus community discussion and debate on these topics by sponsoring speakers for both small workshops and university lectures.

2002/03 programs

- Nov. 2002: “A Nation of Felons: The Impending Political Debate over Digital Copyright,” Alan Davidson, associate director, Center for Democracy and Technology
- Dec. 2002: “The Computer Incidents That Take Your Time and Their Costs: Telling the Story” and “Computer Logs and Education Records: How Far Can We Go Before We Violate the Intent of the Law?” with Virginia Rezmierski, professor emeritus, Ford School of Public Policy and School of Information, University of Michigan
- Dec. 2002: “Safeguarding Our Patrons’ Privacy: What Every Librarian Needs to Know about the USA-Patriot Act and Related Anti-Terrorism Measures”
recommendations and seek funding in the upcoming year to ensure Cornell is part of this networking revolution.

**Striking down web site barriers**

More ways to communicate. Easier access to information. Anonymity. Perhaps more so than other technological advances, the Internet has been a boon in some ways to people who have disabilities. But just as the absence of conveniently placed curb-cuts hinders the mobility of people who use wheelchairs, lack of attention to certain details can render a web site useless to people who use adaptive technologies.

At Cornell, great care has been paid to making sure people who have disabilities can get to their offices and classrooms and have the tools they need to perform at their best. The university is focused now on removing barriers to Cornell’s rich “virtual” world. Among the groups working together to identify best practices for accessible web sites are OIT/CIT, the Center for Learning and Teaching, Cornell University Library, Student and Academic Services, the Office of Workforce Diversity, Equity and Life Quality, and the School of Industrial and Labor Relations’ Program on Employment and Disability.

This year, the goal was to begin raising community awareness. In the upcoming year, the group plans to develop a policy on accessible web sites and launch hands-on workshops. At CIT, we have already begun incorporating accessibility into our existing web development workshops.

**Collaborating on copyright concerns**

[www.copyright.cornell.edu](http://www.copyright.cornell.edu)

At a place where knowledge creation is revered, it seems logical that everyone would strive to honor copyright. But copyright laws have become so complex that violating copyright at one point or another borders on inevitable. That’s why Cornell University Library, the Cornell Store, University Counsel, and OIT/CIT have teamed up to serve as the university’s knowledge base on all things copyright. With each partner contributing a different perspective and range of experiences, this group has unparalleled breadth and depth.

Major accomplishments so far include creating a comprehensive Copyright Information Center, where the community can find Cornell-specific and general information about copyright, and developing a workshop for faculty. Called “Unfolding the Mysteries of Copyright,” the workshop uses a case-study approach to touch on issues likely to be encountered by faculty who are creating course web sites, working with digital images and video, and sharing documents.

The workshop is team-taught throughout the academic year by Peter Hirtle, director of the Cornell Institute for Digital Collections; Patricia McClary, associate university counsel; and Tracy Mitrano, director of information technology policy. Our Distributed Learning Services group provided instructional design and collaborated with the Copyright Education Working Group to develop the training workshop and supporting materials.
Making CIT a better organization

Goal:
Improve our service delivery models and skills

Progress:
• Annual customer satisfaction survey results
• Quality of work life results
• Integrated planning
• Leadership development
• Project management training
• Employee orientation

Measuring how well we meet campus needs

Once a year, we do a customer survey among faculty, staff, and students on the Ithaca campus. With the help of Communication and Marketing Services, we distributed a 10-question postcard in February 2003. Just over 19,200 surveys were sent out, and about 1,900 were returned.

Our 2003 results showed improvement in all 10 areas surveyed over our 2002 results. As with the 2002 survey, our customers once again told us that their satisfaction is most directly influenced by the speed and convenience of our services, as well as the variety of services we provide.

Making CIT a better place to work

Every year, our staff are surveyed on how they feel about working at CIT. The survey reports on employee/supervisor relationships, opportunities for growth, job satisfaction, compensation, perceptions of trust and fairness, and the general quality of work life (QWL) at CIT.

A team of six staff reviews the results and recommends ways that CIT can improve its quality of work life. (The 2003 team will increase to seven members so that each division of CIT plus OIT is represented.) After the 2002 survey, the QWL team determined that focusing on trust in management, particularly at the director level and above, would have the most positive influence.

Recommendations for improving trust in management include the short-term goals of more effectively communicating about personnel/job advancement changes and space planning. Long-term goals include seeking a balance in disseminating sensitive information to appropriate people within their organizations without compromising confidentiality and following through on commitments to act upon the survey team’s recommendations.

The QWL team also outlined three strategies for improving the process itself: shortening the turnaround time between when the survey is administered and when recommendations are made, increasing survey participation levels, and consistently and formally communicating about the survey process and actions being taken to address the survey findings.

The 2003 survey was conducted shortly after the 2002 recommendations were adopted. The results show significant improvements in four measures:
• I feel a strong tie to Cornell University.
• I am familiar with CIT’s goals and objectives.
• What happens in CIT is important to me.
• My job gives me an opportunity to do the things I do best.

The QWL team is looking forward to making new recommendations by September 2003.
Integrating strategic, business, and operating budget planning

This year, we realigned our planning calendar to integrate, across CIT, our strategic, business, and operating budget planning. We now have a holistic framework for ensuring that our work aligns directly to our strategic goals and operating objectives.

Our overarching guide is our 4-year strategic plan. Developed with input from many campus groups, this plan outlines CIT’s long-range goals in terms of campus priorities and technology imperatives. Next is our 5-year capital plan, which covers investments in excess of $2 million.

From these two plans, we derive a 1-year business plan for making progress on new services and projects and supporting current service offerings. We also derive 1-year service plans and operating budgets for all ongoing and new services. Finally, we have an important new addition—1-year project plans and budgets for all one-time projects. These used to be wrapped into service plans and budgets, making them more difficult to track.

We are working to shift our 1-year service operating budgets to rolling 3-year plans, to better plan for when we’ll need additional resources to sustain current levels of service.

Honoring our leadership

“We are what we repeatedly do. Excellence, then, is not an act, but a habit.”—Aristotle

Striving to achieve excellence in the technology services and support we provide Cornell takes commitment, skill, heart, and, most important, coordinated leadership. The same independent spirit that makes Cornell a great university also makes it a place where what the community needs and wants from CIT varies hugely.

2003 Customer Satisfaction Survey Results

- **I feel well informed about CIT services and facilities.**
  - 2002: 48.2%
  - 2003: 52.6%
  - Other responses: 23.5% neither disagreed or agreed (was 23.8% in 2002); 23.9% disagreed or strongly disagreed (was 28.0% in 2002)

- **I am satisfied with the speed and convenience of CIT services.**
  - 2002: 59.6%
  - 2003: 64.1%
  - Other responses: 22.4% neither disagreed or agreed (was 24.0% in 2002); 13.5% disagreed or strongly disagreed (was 16.4% in 2002)

- **I can usually find the campus technology information I’m looking for in CIT printed and web resources.**
  - 2002: 63.5%
  - 2003: 68.5%
  - Other responses: 20.0% neither disagreed or agreed (was 22.7% in 2002); 11.5% disagreed or strongly disagreed (was 13.8% in 2002)

- **When there is a fee for services, CIT provides fair value for the price.**
  - 2002: 24.4%
  - 2003: 27.9%
  - Other responses: 43.5% neither disagreed or agreed (was 41.6% in 2002); 28.6% disagreed or strongly disagreed (was 32.3% in 2002)

- **When I need to contact someone at CIT, it’s easy to get in touch with the appropriate person or group.**
  - 2002: 59.4%
  - 2003: 61.5%
  - Other responses: 25.1% neither disagreed or agreed (was 24.3% in 2002); 13.4% disagreed or strongly disagreed (was 16.3% in 2002)

- **CIT is an innovative university technology organization.**
  - 2002: 46.3%
  - 2003: 48.9%
  - Other responses: 39.4% neither disagreed or agreed (was 41.6% in 2002); 11.7% disagreed or strongly disagreed (was 12.1% in 2002)

- **Overall, I am satisfied with the variety of services and facilities CIT provides.**
  - 2002: 75.1%
  - 2003: 77.1%
  - Other responses: 16.4% neither disagreed or agreed (was 17.2% in 2002); 6.5% disagreed or strongly disagreed (was 7.7% in 2002)

- **Overall, I am satisfied with the quality of services and facilities CIT provides.**
  - 2002: 67.3%
  - 2003: 68.8%
  - Other responses: 20.6% neither disagreed or agreed (was 21.1% in 2002); 10.6% disagreed or strongly disagreed (was 11.8% in 2002)
To further hone our skills in meeting those needs and desires, and to continue strengthening our team approach, we enlisted the help of the Cornell University Leadership Development Program. More than 180 Cornell faculty and staff have completed this intensive, highly personal, 11-day course, offered 8 times in the past 4 years. Usually, participants are nominated to attend, and each course has participants from around the campus. We were the first unit to request a program for a single, intact work group.

A host of assessment tools, simulations, models, and team-building exercises gave CIT’s top management extremely valuable insight into each other’s leadership styles and highlighted the most effective ways to leverage those styles into a unified approach to meeting both CIT’s short-term and long-term goals. Significant attention was also paid to guiding an organization like CIT through change, both changes that we initiate and changes to which we must respond.

The program is already paying operational dividends. Our top managers have formed working groups to look at key areas of concern. One is investigating ways to ensure the management team is really modeling our organizational values (“walking the talk”), while another is investigating what training would be required to let CIT’s entire staff benefit from the program.

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Helping new staff get off to a great start

We hire more than 30 people a year, many new to the university itself. In short order, our staff need to acclimate not just to their particular jobs, but also to CIT as a whole, in all its complexity. To enhance the effectiveness of our orientation process, we refined and completed an orientation guide that had long been used in draft form. It’s now available in both web and printed format.

A major goal of this project was to ensure that new staff receive an appropriate level of orientation in areas relevant to their local workgroup. The significant time we invest doing this is readily recouped by the fact that new staff become effective in their roles more quickly and are more satisfied overall.

Developing expertise in project management

One of the university’s goals, and CIT’s as well, is to more effectively manage large- and small-scale projects using the resources of its own staff, instead of relying on external consultants. Project management offers a suite of tools designed to ensure projects meet their purpose and are completed on time and on budget.

Good progress has been made on this goal. Working with a campuswide steering committee, the Office of Human Resources selected a project management methodology that would best meet Cornell’s diverse needs. Our staff were part of that committee, which chose the International Institute for Learning (IIL).

The program offered by IIL can be scaled to meet the needs of people responsible for multimillion-dollar projects as well as people whose roles in projects are tangential or limited. Participants can also become certified in project management. Training began this spring with small groups from several departments, including CIT, Student and Academic Services, Cornell University Library, Human Resources, and Facilities.

We are fortunate to have many staff who already have extensive experience in project management. Through this program, those staff can further develop their skills, and more staff can become proficient.
Measuring what CIT does

Academic support

Classrooms (Schedule 25) with active network connections: 50% … with data and video projectors: 65%
Courses with active CIT-supported web sites: 3,000 … number using CourseInfo: 2,500
Courses using videostreaming services: 87 (80 instructors)
Surveys created with CIT survey tools: 275 (requested by 110 people)
Class sessions hosted in CIT’s instructional computer labs: 707 (2,236 hours of instruction)
Academic Technology Center workshops and events: 114 … workshop participants: 951
Academic Technology Center custom-requested workshops: 44
Academic Technology Center walk-in consultations: 468 (189 individuals)
Lynx Student Technology Assistant appointments: 148 (130 hours) … projects: 57 (110 hours)
Video support provided: 30 events
Average visits a week to CyberTower from non-Cornell addresses: 43,188
Students completing CIT’s online “Travelers of the Electronic Highway” orientation: 4,214

Administrative systems support

Data in Cornell’s central administrative data marts: 210 gigabytes
Queries made each month against the Accounting Data Warehouse: 15,000
Human Resources/Payroll users of Actuate/PEDL: 875 … of PeopleSoft Student Employment: 450
Actuate Human Resources/Payroll reports delivered each month: 2,314 (144,515 pages)
Human Resources/Payroll datasets delivered each month: 4,458 (371 megabytes)

General campus services

Bear Access (Cornell’s package of popular Internet and local administrative services)—times used in a year: 18.9 million
CIT-Alert-L (mailing list for notifying community about computer viruses and significant service outages)—messages sent: 12
Computer labs—computers supported by CIT’s lab group: 351
Contact Center (HelpDesk)—requests for help (phone, e-mail, walk-in): 200,457
Contact Center (HelpDesk)—requests for help by constituency: 13.4% faculty; 27.5% staff; 44.5% students; 6.1% retirees; 8.5% other
Contact Center (HelpDesk)—callers who hung up after being put on hold: 11.5 percent
CorporateTime (university-wide personal calendar and meeting scheduling service) users: 6,583
CU People (free web hosting for personal pages)—accounts: 10,046 (4.5% faculty; 13.4% staff; 78.6% students; 3.5% other)
Actuate Human Resources/Payroll reports delivered each month: 231,514 (145,515 pages)
Contact Center (HelpDesk)—callers who hung up after being put on hold: 11.5 percent

E-mail—messages routed in a year: 678.9 million
E-mail—average cost of a message: $0.001
E-mail—mailing lists: 3,000 (322,150 subscribers, 158,261 unique e-mail addresses)
E-mail—special mailboxes (e-mail accounts set up for a business purpose): 322
Employee Essentials—average visits in a year: 2.5 million
EZ-Backup—35.4 terabytes of data backed up on more than 2,500 computers and servers
EZ-Print (CIT’s high-speed laser printing service)—pages printed: 6,512,993
EZ-Remote (paid, dialup service) modems: 506 on 22 T1 lines
Express Lane (free, time-limited dialup service) modems: 69 on 3 T1 lines
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NetIDs created: 10,327
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most of our staff.

CIT staff and business measures

Staff hired: 29 (19 new to Cornell)
Average years of service by our staff: 11 (8.9 with CIT)
Staff with 10 years of service at Cornell: 94
... with 20: 59
Number of CIT purchasing/accounts payable, payroll, capital assets, and facilities transactions processed:
37,047

NetIDs supported with Kerberos: 140,206
Net-Print (CIT’s lab-based laser printing service)—pages
printed in CIT labs: 2.2 million (506,301 print jobs)
Net-Print—pages printed in non-CIT labs: 4.3 million
(936,438 print jobs)
Network Operations Center—phone calls each month:
1,870
Network—data going over campus network daily:
3 terabytes
Network—data ports: 22,071
Norton AntiVirus—application downloads: 8,655
Phones—calls made in a week: 98,199 local; 54,425 long
distance; 1,714 international
Phones—AUDIX messages in a week: 32,382
Phones—assigned phone jacks: 17,120
Phones—reliability of phone system: 99.966%
Publications—175 communications; 248,000 web page
hits/day
RedRover access points: 112 in 37 buildings
Security—complaints made about alleged computer viola-
tions, electronic copyright violations, and other types
of computer-related abuse: 1,388

Security—networks scanned with vulnerability assess-
ment service: 75 (3,476 hosts)
Security—number of security cases reported (denial of
service, open mail relay, scanning/probing, spamming,
system compromise, viruses/worms, other): 7,307
Software licensing—savings compared to educational
retail pricing: $1.5 million
Software licensing—software titles and packages: 30
(including major contracts with Oracle, Microsoft,
Adobe, SAS Institute)

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The Creative Team

Beth Goelzer-Lyons
Laurie Ray
Leslie Intemann
Bob Bourdeau

Written by Beth Goelzer Lyons of CIT. Designed by Laurie Ray of Communication and Marketing Strategies. Production coordinated by Leslie Intemann and Bob Bourdeau of CIT. Photography by Nicola
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Blackboard/CourseInfo     Brio     Cell Phone Service     CIT-Alert-L     Classroom Technologies Design     COLTS
Computer Classes     Computer Recommendations     Computing at Cornell Web Site     Contact Center (HelpDesk)
Copyright Information Center     CornellC     CorporateTime     CoursEnroll     CUFS     CUinfo     CU People     CU Search     Customer Satisfaction Survey     CUWebLogin     CyberTower     Data Connections     Data Marts