Computing and Information Technology [CIT]
Annual Report for FY 2001

This annual report for FY2001, CIT's final year, chronicles the cumulative efforts to provide computing and information technology support for faculty, staff, and University students. Fourteen years after CIT's formation, the entire campus community now has access to a rich array of networking and computing resources. Members of the University community have come to depend upon information technology for research, teaching, learning, and administration.

CIT consists of the following departments:

Academic Services supports academic uses of information technology at the University, including support of classroom and web-based instruction, language instruction, and uses of multi-media.

Administrative Services provides support services for CIT (personnel, contract administration, facilities operation, and planning). The group also provides a range of services to the University, including Printing and Mailing, ID Card, Software Sales, Telecommunications, and Policy and Security.

Budget and Finance assists the operating units within CIT with all financial issues. The group consolidates budgets, acts as the financial representative on funding issues, sets rates for CIT services, and ensures compliance with University rules and procedures.

Information Systems implements and supports core administrative applications and provides information services (Network, UNIX, NT, DBA, and mainframe) to the entire campus.

IT Architecture works to define and document the present and future Information Technology infrastructure at the University.

Enterprise Services provides core middleware, e-mail, monitoring, and software and coordinates deployment of desktop computer systems for the campus community.

Support Services provides front line support for all members of the University community. In addition, the group installs and maintains the campus networking infrastructure.

The detailed nature of the annual reports from each group may obscure the overall depth and breadth of CIT's accomplishments during FY01. The following table illustrates numerically the magnitude of the cumulative efforts of the organization. The immediately following pages highlight the most significant accomplishments during the year under review.

CIT, by the numbers

32,000,000,000,000	Bytes of information backed up over the network for 7,000 users
5,000,000,000,000	Bytes of disk space on CIT's 80 central systems
21,044,700	Copies made under the oversight of the Copier Center
6,546,485	Hits on the Help Desk web site from nearly 27,000 unique IP addresses
500,000	Average number of daily user e-mail connections to the University's IMAP server
500,000	Yearly logins on Windows machines in Campus Computer clusters
110,000	Average number of daily Webmail connections
17,000	Distinct network hosts on campus
8,000	IMAP e-mail accounts
5,275	ID Cards processed
5,000	Peak daily e-mail load of simultaneous connections
4,800	Changes to telephone service or equipment
4755	Campus events supported by Media Services
4,635	Subscribers to Dormnet
2,436	Requests in the Dorms for assistance from 32 students working as Residential Computing Consultants (RCCs)
2,000	DeSC computers upgraded
1,785	New voice mailboxes
1,680	Users of the dial-in remote access service
1,600	Lists hosted by Princeton
1,538	Staff who enrolled in a CIT course
1,500	Simultaneous users of Streaming Media
1,086	Video connections installed by Hardware Support
1,000	Daily users of the OnTime Calendar
833	Computer systems ordered by students in the Student Computer Initiative
776	Course websites
629	Staff from 105 departments participated in DeSC training
400	Campus printers supported by CIT
172	Training classes offered to administrative staff
151	Number of UNIX and Windows systems monitored by the Tivoli Enterprise Console
96	Blackboard orientation visits by Graduate Students to faculty offices
37	37 Computer Clusters containing a total of 231 Windows machines, 59 Macintoshes, 56 UNIX workstations, more than 100 network drops, and 34 printers.
13	Administrative departments and 20 staff are participating in the new Distributed Computing Support Program
1	New Vice President for Information Technology

Highlights of the Year

New Administrative Systems

CIT implemented a new Human Resource Management System that integrates the Human Resources, Benefits, and Payroll systems using PeopleSoft. This client/server system replaces Tesseract, the University's former centralized mainframe system.

The new PeopleSoft system improves data integrity and data control because it shares information among all central offices. For the first time, departmental managers are able to view critical job information online about all the employees in their departments. The system also provides new and improved ways to communicate changes to all authorized parties via automated workflow.

Time Collection

Time Collection is a web application that serves as a front end to the PeopleSoft Human Resources Management System. Time Collection enables the collection and approval of time for biweekly, casual and student employees for both main campus and the Princeton Plasma Physics Lab. Time Collection includes all the business rules regarding pay,making the process of collecting and approving time both more efficient and accurate.

Distributed Media Centers

During FY01, CIT increased the number of locations from which students can gain high speed access to a centrally situated video server. The Graduate College, Lower Madison Hall, McCosh B59, Frist Campus Center, and the LRC were added to Forbes and Wilson. Several classrooms in McCosh and all of the classrooms in Frist were also connected to the server. In the fall semester, in addition to language classes, 11 courses (788 students) accessed 45 films on the server. In the spring 85 additional films were digitized for 11 courses.

Course Web Sites

In August, 2000, the Provost's Office funded an initiative with the aim of creating a web site for every University course. CIT's Academic Services created skeleton web sites for every course. During the year, graduate students visited 96 faculty offices to provide assistance in improving the web sites. The number of course web sites grew from 673 in FY00 to 776 in FY01.

Email

The installation of additional e-mail servers improved overall reliability of campus e-mail. The campus community connects to IMAP, POP, and webmail services nearly 13,000 times daily.

Dormnet

On the recommendation of the Priorities Committee to eliminate the direct, separate, charge for student Dormnet access, the University combined the Dormnet fee with the general housing fee for all undergraduates and most graduate students living in Dormnet-capable housing. The action takes the campus much further forward toward a ubiquitous computing environment. During FY01, Dormnet was extended to Lawrence Apartments and the Grad College Annex. Dormnet subscriptions rose 2.3% from FY00, totaling 4,598 members (4,246 undergraduates, 352 graduate students). The University agreed that all new student living spaces (including those for Graduate students) will be data capable.

ID Card Project

During FY01, the University evaluated the current and future uses of the campus ID card. A report proposes an expanded Campus Card Office to handle data administration for all card uses. Beginning next year, students should be able to use their ID card as a debit card on campus and with participating local vendors.

Funding network infrastructure

During FY01, the Provost established a building wiring upgrade project funded jointly by CIT and the University. The funding will extend the campus's fiber optic infrastructure from the backbone to the desktop and permit CIT to provide the campus with networking speeds in excess of 10MB. During FY01, CIT began to wire selected buildings and to provide high-speed access as far as funds would permit. New procedures with Facilities now ensure that planned renovations include an upgrade to the building wiring.

Towards the Future

The new Vice President for Information Technology, Betty Leydon, has established a new organization, the Office of Information Technology [OIT] that joins the existing groups within the former CIT with two new additional groups.

Partnership 2000 [P2K] brings improvement and innovation to administrative processes through the replacement of all of the University's administrative systems with client-server systems.

The *Educational Technologies Center* [ETC] develops and supports technology applications in support of teaching and learning. The ETC also develops courseware for alumni lifelong learning and enrichment.

The mission of OIT will be to enable the effective use of information technology in support of the University. In pursuit of this mission, OIT's goals are to

- Deliver information technology products and services that meet the needs of the University community and achieve the highest levels of customer satisfaction.

- Support the use and development of information technology to enable innovation in teaching, learning, research, and scholarship.

- Provide leadership in planning for the effective use of technology.

- Provide a robust, reliable, and secure information technology infrastructure.

- Attract, develop, and retain quality information technology professionals.

- Enable communication and collaboration among information technology professionals and users of information technology at the University.

Academic Services

Academic Services supports Academic uses of Information Technology on campus, principally in the form of instructional technology (IS). During FY01, Academic Service's second full year, AS shared this mission with the Educational Technologies group [ETC]. ETC focused on supporting faculty who are developing relatively sophisticated web-based instructional technology applications. AS focused on baseline IS support for faculty (media services, courseware) as well as support of student and staff use of IS.

Academic Services contains four groups:

- Academic Technology Services (the PLACE)
- Academic Applications
- Language Resource Center
- Media Services

During FY01, there was steady growth in the services supported by Academic Services, particularly courseware services and media services. There were also some new initiatives in the area of IS training and support for research computing, but these were limited. With new leadership in place, AS hopes that a number of new initiatives, both in research computing support, and in classroom use of video, will come to fruition, against a backdrop of ever-more robust and reliable courseware, language and media support.

Academic Technology Services (ATS)

Academic Technology Services aims to enhance the educational experience of Princeton undergraduates and graduate students by encouraging the use of, and supporting, digital instructional technologies.

- ATS operates a fully equipped New Media Lab that offers walk-in equipment access and advice to Princeton students, faculty, and staff seeking to integrate digital media into their work;

- ATS selects and supports general courseware tools;

- ATS offers non-credit lectures, workshops, and seminars in new media and IT;

- In coordination with other campus groups, ATS undertakes selected IT development projects.

During FY01, use of the Blackboard courseware tool grew dramatically. A new instructional technology training series witnessed modest success, principally among staff and students.

Blackboard

The Provost decided in August, 2000 to have AS create a skeleton Blackboard course web site for every Princeton course. To assist this effort, a faculty outreach program involving graduate students involved 96 in-office Blackboard orientation visits totaling 174 hours.

As a result, the number of course websites grew to 776, an increase of 78.4% over FY00. 87% (673) of these websites used Blackboard.

During FY01, ATS staff provided special Blackboard training and orientation sessions to the following Princeton students, faculty and staff:

- Help Desk demo
- New facilitators (fall and spring)
- SCADs
- Politics academic departmental staff
- WWS academic departmental staff
- History academic departmental staff
- ELE academic departmental staff
- EAS Studies academic departmental staff
- Office of Population Research
- History faculty demo
- Library Staff (originally 2 sessions; 4 more added by popular demand!)
- Molecular Biology academic departmental staff
- WWS301-POL308_S2001 student drop box demo (300+ lecture course)
- WWS301-POL308_S2001 instructor drop box demo
- WWS JCI faculty demo
- WWS JCI student demo

During FY01, ATS staff responded to 511 phone calls to the Blackboard hotline. Staff actively maintained the Blackboard knowledge base in order to assist Help Desk consultants in responding to questions. ATS staff spent many hours beta-testing the new Blackboard version 5.5.

Course Support

During FY01, ATS staff contributed to the following courses and courseware development efforts:

Online Music Reserves Pilot: AS staff have worked with the Library and ETC on this project. ATS defined and documented the process by which audio tracks are located on Library CDs, converted into RealMedia format, and moved to the NT streaming media server machine operated by CIT Web Services. Courses served include FRS159w, MUS103, MUS106, MUS204, MUS209, and POR101.

Online Foreign Language Poetry follow-up projects: These course tools use synchronized text/audio presented over the web using Flash. Staff developed the prototype for Classics Language Instruction Project (CLIP): http://www.princeton.edu/~clip. Prof Wildberg took over project production and completed it on his own.

Professor Coffin served as content provider for Online Arabic Poetry. http://www.princeton.edu/~arabic/poetry and for the Musical Tour of the Arab World: http://www.princeton.edu/~arabic/music. ATS staff built the modules.

VIS315 class based in ATS New Media Lab: As in previous terms, this course had regular meetings in the lab. ATS hourly employees actively participated in the training of VIS315 students in Photoshop, Illustrator, Freehand, and Flash.

Web authoring training for Princeton classes: At the request of the professor in charge of the following courses, ATS staff and hourly employees held special "Intro to the Web" sessions:

POL230 (F2000). Professor Tucker
CHM333 (S2001). Professor Spiro
CEE393 (S2001). Professor Peters
ENG574 (S2001). Professor Hayles

CHM202 online lectures: ATS and ETC staff collaborated to produce web-based streaming lectures for CHM202.

MUS105 Practica Musica: Working with CIT's Clusters group, ATS provided file-hosting services for Practica Musica software and student projects for Professor Koonce.

Project Eclips: Supporting Professor Dworkin's effort to digitize small publications, ATS student workers scanned these materials and delivered the digital media to ETC.

New Media Lab consulting and equipment access

AS's New Media Lab offers year round walk-in consulting and equipment. Members of the University community with questions about new media and instructional technologies come to ask questions, to use equipment not generally available such as slide scanners or digital video, and to get help in assembling courses. Overall, faculty and student walk-in visits declined by approximately 3% from FY00 (see separate graphic, below) but visits by University staff increased by more than 50%.

During FY01, a new ID-card-based guest register captured lab usage as well as counting visitors. The top four usages were: video capture/editing (26%), flatbed scanning (23%), non-Blackboard web design advice (20%), and slide scanning (13%). As in prior years, ATS staff continue to provide hardware and software support for the Language Resource
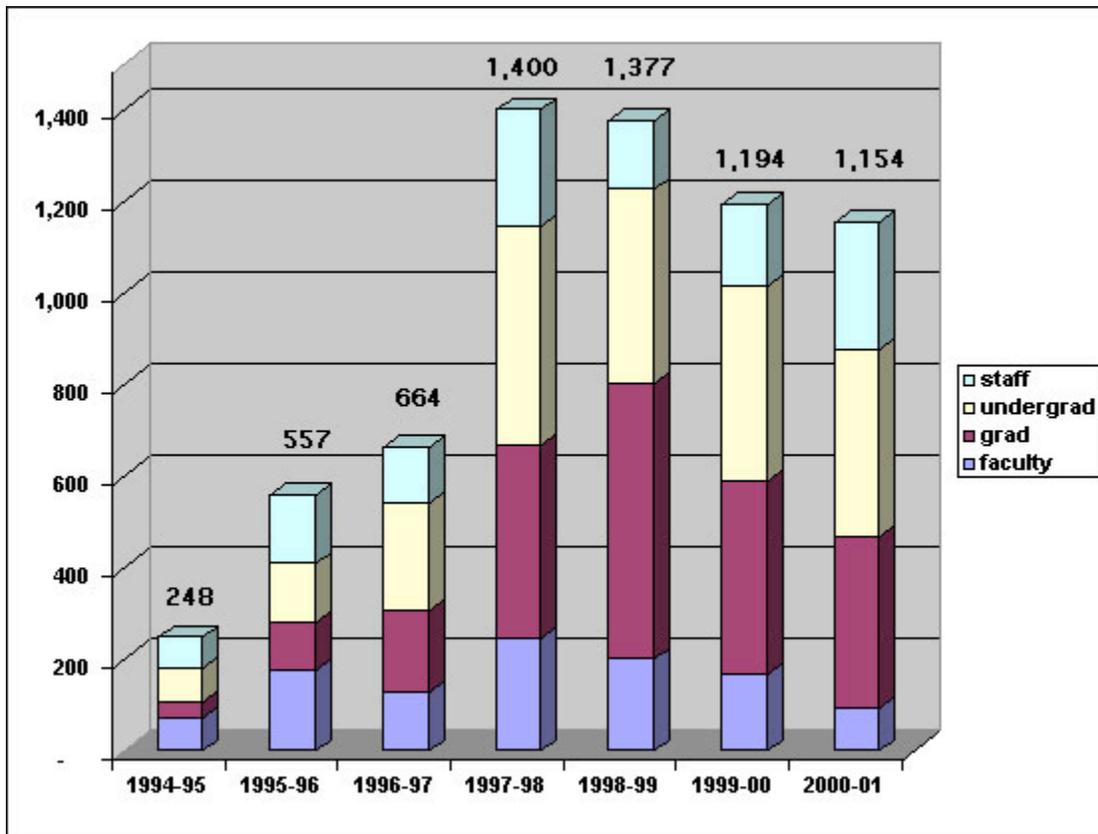
Center [LRC] and to a number of clusters dedicated to high-bandwidth video applications.
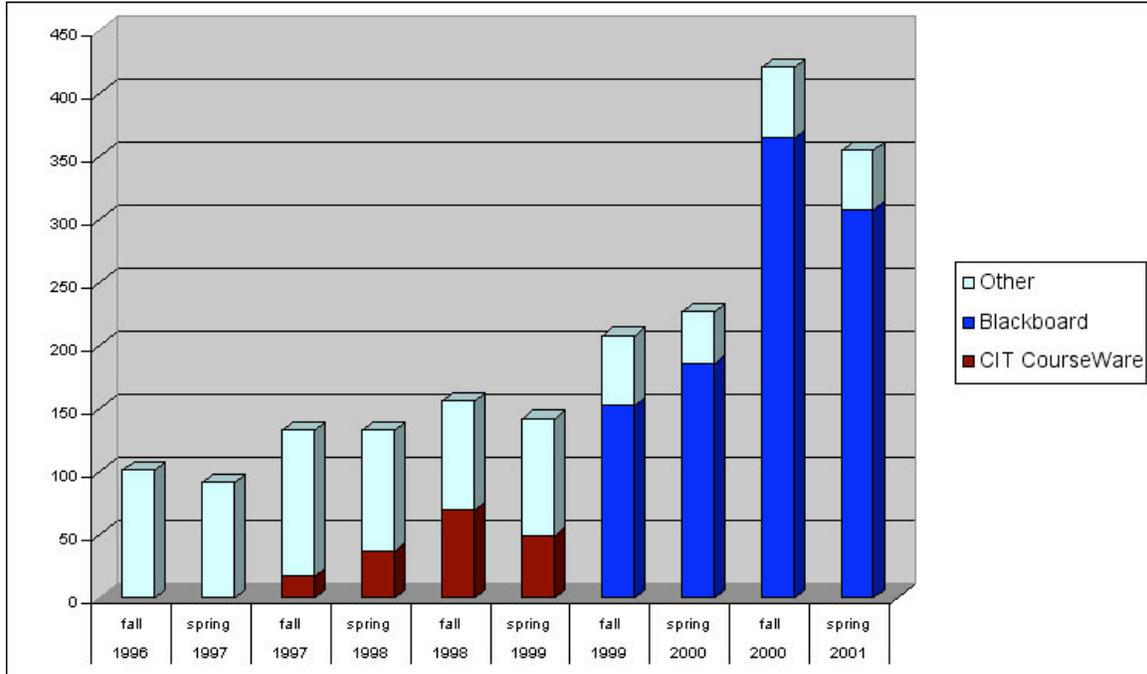
ATS Education Series

During Spring, 2001, ATS offered eleven non-credit mini-courses on topics related to new media and instructional technology. The courses were particularly well attended by Princeton employees. The titles of these courses were as follows:

- Intro to digital images
- Pixels v. vectors
- Intro to Photoshop
- Intro to Freehand and Illustrator
- Intro to Blackboard CourseInfo
- Enhance your course with CourseInfo's online assessments
- How to have a successful CourseInfo site
- Using Blackboard CourseInfo's communication tools
- Intro to web publishing at Princeton
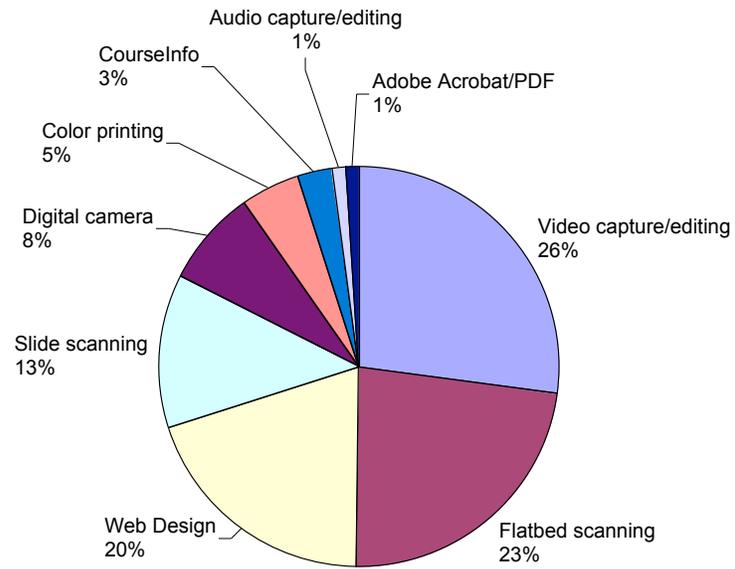- Finding things on the web
- Final Cut Pro / Media Cleaner 5

ATS New Media Lab Walk-in Visits, by customer type

Princeton University Course Websites, by term

Usage of New Media Lab
2000-2001

Audio capture/editing
1%

CourseInfo
3%

Adobe Acrobat/PDF
1%

Color printing
5%

Digital camera
8%

Video capture/editing
26%

Slide scanning
13%

Web Design
20%

Flatbed scanning
23%

Media Services [MS]

Media Services supports the media requirements of all academic, administrative and special events at the University, including classroom media, audio and video for classroom and special events, and specialized media support.

As a result of increased use of laptop and data display technologies, staff are providing more setup and user training.   During FY01, MS spent more time training users in the ever-increasing number of presentation display systems installed throughout the University.

There was dramatic growth in in-class setups during FY01. With the increase of user-operated systems on campus, staff became less involved in setting up equipment and more involved in training and "triaging" user problems.

During FY01, staff again tracked non-billable hours. These non-billable services totaled 328 events involving more than 950 hours of non-cost-recovery time. The staff continued to support several non-course related events such as Alumni Day, Freshman Parents Day, Reunions, Public Lectures, Graduate Alumni Lecture series, Baccalaureate, Graduate Hooding Ceremonies, and Commencement '01.

Office Moves

Staff coordinated two complete moves of the entire operation, once in January to temporary quarters in the Dillon Court Trailers, and then back into a smaller, re-configured space in New South basement, all without significant disruption of service to campus users.

Classroom and Special Events

Media Services provided multimedia support, video recording, simulcasting over the campus' Tiger TV and into town, and the webcasting of 88 University Public Lectures. The staff also provided webcasting for all of the Alumni Studies events held in 2000/2001. The staff provided video recording services for 113 Center for Teaching and Learning recordings, all of the classes in HIS 520, CIV 102, MOL 427, and WWS 320.

Media Services provided in-room operators for 801 course events, and 332 non-course events, and a total of 1332 course set-ups and 2091 non-course event setups. There were 4755 total events during 2000/2001. The staff provided on-going support for course related 35MM projection at the Jimmy Stewart Theater. Media Services provided 16MM projection services for film courses and festivals showing multiple films for RLL, Visual Arts, and for the International Graduate Student Association.

Media Services provided consultation on design and installation of data projection systems in Jones 113, McCosh 60, 62, McCormick 101, 2 Blair Arch seminar rooms, 4 areas in the new Wallace Social Science Building and Marx 101. Media Services not only

developed the instructional documentation for each system, but also provided one-to-one faculty training and support through both semesters. Staff provided on-going support for data display in courses taught by Professors Bogan, Gleason, Silver, Mendelberg, Howarth, Branson, Litman, Rooks, Danson, Rheinhardt, Gould, Wang, and Farber.

Our satellite services continue to provide foreign language programming, continuing this year with two dedicated channels from the digital DISH network. Media Services downlinked 6 special teleconferences, and 24 videoconference events in the new Wallace videoconference seminar room.

Tiger TV continues to provide 24-hour programming to the community with programs including the International Center Forum, The Undergraduate Student Government, student produced programming, community produced programs, and the Bulletin Board, displaying the events calendar of the Princeton Weekly Bulletin.

Media Productions Services

Using the broadcast production van, MS staff again recorded, simulcasted, and webcasted Baccalaureate and Commencement exercises. At other times, staff used the van equipment to assist in the translation of many master tapes to the more widely distributed VHS format.   A permanent climate controlled parking area now houses the van in a fully-loaded configuration.

Staff provided Betacam, SVHS and Digital DVCAM mastering of various venues including EEB seminars; Student Bioethics Forum; Fall Assembly, and Diversity lecture; SHARE programs "Sex on a Saturday night; the Progressive traditions conference, with President Bill Clinton as keynote speaker, James Madison Conference, David Horowitz/Dorothy Lewis Debate on Monetary Reparations, and the APGA President's Panel symposium. Several important lectures were recorded, simulcast and webcast including: Maurice Sendak, Ralph Nader, Jeff Bezos, John Dilulio, Mike McCurry, Craig Venter, Doris Kearns Goodman, Richard Leakey, NASA's Storey Musgrave, Halle Berry, and A. Scott Berg.

MS staff continue to be involved in the effort to upgrade campus audiovisual systems. This coming fall, in conjunction with the office of the Registrar, Office of Physical Planning, and individual departments, the University will open new or upgraded systems in the new Friends Center (including 24 multimedia rooms), Frick 124, Jadwin A10, and Bobst Hall. Projector upgrades in Guyot 10, Rocky-Mathey Theater, McCosh 28 and 46, and McCosh 66 were also completed in FY01.

Language Resource Center [LRC]

The LRC supports language instruction at Princeton through the use of various technologies. The LRC also maintains the University's collection of video and DVD film materials and manages the Distributed Media Centers (DMC), clusters of computers connected to a video server.

While there has been a decline in language enrollment during the past 10 years, the number of students studying Spanish has increased by 18%. The overall usage (audio, video, and interactive materials) of the LRC by language courses during the 2000/2001 academic year is was follows:

- Fall 2000: 35 courses, 1,458 students enrolled

- Spring 2001: 30 courses, 967 students enrolled

The total number of students with assignments made available by the LRC was 2,246 in the fall and 1,328 in the spring.

Audio

Audio materials for 27 courses (covering 11 languages) are available online. 60 students chose to take analog copies of audio assignments home.   Before materials were accessible online, the number of students requesting tapes was approximately 15 times higher.

Video

In addition to language courses, 64 courses in 24 non-language disciplines had video viewing assignments in the LRC.   80 faculty members placed 515 videos on reserve. 640 videos were signed out by faculty, the same number as last year.

Interactive Materials

14 language courses assigned interactive CD-Rom's and laserdiscs in the LRC and on the video server. French 103 regularly scheduled small group sessions in the LRC to use these materials.

ESL

During the summer, 100 incoming foreign graduate students used the LRC facilities for the intensive ESL program individually and in a class setting.

Video Library

The Princeton University Video holdings increased by 211 videos and 18 DVD's bringing the total to 1,770 videos and 35 DVD's. The laserdisc (a disappearing media) collection remains at 205.

<u>Foreign Language Channels</u>

To the existing French and Japanese channels, the LRC added four foreign language TV channels via the Dish Network: Arabic, Portuguese, Italian, and Spanish.

<u>Distributed Media Centers</u>

Students can now gain access to the video server in seven campus locations (up from 2 last year). The Graduate College, Lower Madison Hall, McCosh B59, Frist Campus Center, and the LRC have been added to Forbes and Wilson. In addition several classrooms in McCosh and all in Frist are connected to the server. In the fall semester, in addition to language classes, 11 courses (788 students) in other disciplines accessed 45 films on the server. In the spring 85 films were digitized for 11 courses.

Professors Danson and Wood intensively used the video server in their English course Shakespeare and Film. Twenty films were viewed by 43 students in the clusters and clips were shown in the classroom. Quoting some of the student comments in their course evaluations: "The DMC was easy and contributed greatly to the film study," "The movies on DMC were amazing. They added a lot to my understanding."

Academic Applications

The Academic Applications group helps to create and support information technology applications in support of research and instruction at Princeton. During FY01, the mission of AA was modified to include support for high performance computing and the management of the math and science software repository. During FY00, the group directed substantial effort to completing and supporting applications that had been designed by CIT's former Advanced Applications group. Staff have now completed and transferred responsibility for all of these legacy applications. The group is now devoting all of its effort to the mission of the new group.

<u>CONDOR</u>

Using software developed at the University of Wisconsin, AA staff are building what may be the largest campus supercomputer from the spare cycles of nearly 2,000 DeSC machines. The project, CONDOR, has been hampered by the lack of production software for Windows 2000 from Wisconsin, but staff have pushed the endeavor as far as possible given the current constraints. Staff have developed custom software to test CONDOR at Princeton on small clusters of computers. When Wisconsin's software is ready, Princeton will have an infrastructure and the necessary staff ready to move ahead. Note that Microsoft has just given the Wisconsin team funding to support additional programming staff that will be dedicated to the Windows versions of CONDOR.

The Princeton Software Repository [PSR]

Princeton has long maintained a repository for unlicensed software but the repository has been little used.   AA is working to make the service much more useful to the University community.   To that end, a new full time person is working on the project and has begun to design the web interfaces that will permit users to search, obtain, and request both licensed and unlicensed software.

AA will be working closely with faculty members and committees to determine the direction of the project. In addition to the use of the web, staff are looking for other related ways to deliver the latest software. For example, staff are building a Linux mirror web site that will give users local access to all Linux software as soon as it is available.

Faculty Voting

Staff are developing a web-based application that will permit the Office of the Dean of the Faculty to create and manage on-line elections. Faculty will be able to vote on the web and to see the results as soon as they are official. The system will be capable of creating very complex ballots. The system, including vote tallying algorithms, is expected to go live in the fall of 2001.

Other Projects

AA has completed two projects for the Psychology department and has assisted in managing Princeton's licensed software. AA members have participated in the AS seminars, they were part of the user survey analysis team, and they made many presentations.

Administrative Services

Administrative Services is comprised of four groups:

- Vendor Relations (including the ID Card Office and Copier Center)
- Printing & Mailing
- Telecommunications
- Policy and Security

In addition, Administrative Services manages CIT's human resources function, facilities management and planning, as well as other CIT internal support functions.

<u>Human Resources</u>

There were many staff departures and arrivals in FY01. In FY01, there were 16 new hires and 27 departures (compared with 13 new hires and 14 departures in FY00 and 21 new hires and 20 departures in FY99). There were more retirements during the year under review than in previous years. The number of departures for other reasons (termination for cause, job dissatisfaction by the employee, or a better job offer) has remained roughly constant.

FY01 was the third year of the pilot CIT bonus program. In order to remain competitive in the marketplace and to retain staff, CIT initiated a new pilot bonus program in December, 1998.   The program offers new compensation strategies to reward CIT's HR and DOF employees. The two main components of the bonus program include spot bonuses, which are small bonuses up to $500 for going above and beyond the call of duty, and project bonuses, which can be up to $10,000 for completion of large-scale projects.

CIT can also use the program for staff retention purposes. During the past year, 23 CIT staff members were awarded a total of $26,200 in bonuses as compared to 25 CIT staff and $41,350 last year and 19 CIT staff and $38,000 in bonuses two years ago. Recruiting bonuses accounted for 43% of the dollars given. Spot bonuses accounted for 30% and project bonuses 27%. Funding for these bonuses comes from the salaries from vacant CIT positions.

<u>IT Reclassification Project</u>

Begun in February 2000, the IT Reclassification project aims to develop a new classification structure for all University staff members who have primary IT responsibilities and to conduct a market review of IT salaries. The new classification system will solve the long-standing CIT issue of having IT staff on both the DOF and HR payrolls. The new system will place DOF and HR IT workers throughout the University under a new structure that will provide managers with more flexibility in compensation

and other HR issues. The results of the market review of our IT salaries indicates that the University is not keeping pace with the greater IT market.

A cost estimate to bring University IT salaries closer to market was sent to the Provost in May 2001. Funding for approximately one third of the estimate was allocated for FY02.

Space Planning

Following the CIT reorganization of 1999, CIT moved to reallocate space within the 87 Prospect Computing Center. The project was completed in the Fall of 2001, with the move of nine administrative staff to 116 Prospect and 8 Technical staff to 87 Prospect. In total, this project added 7 staff work areas to an already overcrowded space.

Vendor Relations

Vendor Relations coordinates all of CIT's licenses and agreements including licenses for software and hardware, for initial purchases and for ongoing maintenance. In addition, Vendor Relations oversees the university's ID Card Office and Copier Center.

Software Sales and Site Licensing

During FY01, CIT purchased a site license for Norton Anti-Virus [NAV] software. CIT had been paying approximately $10,000 a year for NAV licenses and maintenance for DeSC machines. Purchase of a site license for all eligible institutional computers permitted the University to install NAV on every student computer at no additional charge. CIT Support Services paid the additional cost for the site license owing to their savings by not having to handle walk-in customers with virus problems.

The University renewed Microsoft Campus Agreement 2.0 through the North East Regional Computing Program (NERCOMP), a consortium of colleges and universities in the Northeast. While enrollment in Campus Agreement 2.0 through NERCOMP provides Princeton with the best possible volume pricing, the pending revision to the Campus Agreement program may provide far greater access to software titles at a higher price. The majority of NERCOMP members have agreed to remain with version 2.0 for another year.

The University's Student Select agreement, a site license for Microsoft products, expired on June 30, 2001 without a new agreement in place because Microsoft was unresponsive to repeated requests to renew the agreement. Microsoft now says that the University's contract will be extended to October 1, 2001, when Student Select, a pilot program for the last two years, will be offered to all eligible schools.

The University has begun to increase the number of software products now available for purchase for departmental servers. CIT supports S+, SPSS, Matlab and Mathematica on CIT-managed public servers. In addition, Software Sales will now sell licenses and

media to departments for installation on departmental servers. Software Sales will continue to work with faculty and departments to add new programs.

<u>The Copier Center</u>

During FY01, the Copier Center provided oversight for 21,044,700 copies.

A periodic review of revenues and expenses revealed that the Copier Center experienced a significant deficit in FY01. The financial difficulties can be traced back to a change a few years ago when the Treasurer's Office began directly charging the Copier Center for overhead. Another factor contributing to the deficit is how paper is factored into the cost. An analysis of paper usage revealed that while copier volume had decreased by approximately 12%, the amount of paper used by departments and purchased by the Copier Center had increased by about 18%. Departments appear to be using copier paper (paid for by the Copier Center) in departmentally-owned printers.

To remedy both of these problems, the Provost approved incremental increases in the per copy price until the Copier Center reaches full cost recovery. Further, the departments will be responsible for their own paper purchases.

<u>ID Card Office</u>

During FY 01 the ID Card Office provided approximately 2,000 cards for students, 700 cards for faculty and staff, 300 cards for new hires, and 2,275 cards replacement cards owing to failing proximity chips.

At the request of the Provost and the Vice President for Finance and Administration, the University conducted an evaluation of the current and future uses of the campus ID card. A report outlined current and proposed new uses for the card, as well as administration of the data involved in those uses. The report proposes an expanded Campus Card Office that would handle data administration for all card uses. A single, central office would provide validation for different privileges.

The proposal set forth the additional positions required in the central card office. A new program called SA Cash from Student Advantage will permit students to use their ID card as a debit card on campus and with participating vendors in town. The debit card will generate income that will help pay for the new Card Office positions. There are still several legal hurdles, but the program may be in place by the fall of 2002.

The ID Card Office and the Copier Center are scheduled to move to New South in fall 2001.

Printing and Mailing Services

FY01 was a very challenging but successful year for Printing and Mailing. Printing and Mailing Services provides a broad base of printing and mailing services for the University community. Printing and Mailing has strong relationships with Communications, Annual Giving, Development, Alumni Council and the Athletics communications office. Printing and Mailing provides four cost effective services to departments of the university:

- Graphics: Design and layout, film output to 2590 dpi resolution, Minolta color proofing and copying, Encad large format printing from 60 inches in width by 20 feet in length.

- Offset Printing Production: The manufacturing of a wide variety of printed work, from single color to process color, envelope and stationery, brochures and flyers, with bindery capability for perfect bound and saddle stitched books;

- Xerox Networked Printing Center: Both black and white and color networked printing. Equipment includes a Xerox 6180 and a Xerox 2060.

- Mailing Production: Addressing, inserting and sorting for both 1st class and 3rd class mail. Pre-sorted first class and bulk international mailers keep costs low. Mailing also coordinates and sends files for use with the Xerox 6180 and Xerox 2060 for on-demand printing and addressing. Mass e-mail to the campus community.

Total income in FY01 was $2,561,923. Expenses were $2,251,397 for a net margin of $310,526.

The 1998/1999 Administrative Review

Printing and Mailing continued to devote much time carrying out the recommendations suggested in the 1998/1999 Administrative Review. Some actions were delayed owing to a on-going administrative review of the communications and publications function. However, Printing & Mailing did make progress on the following issues:

Outsourcing opportunities: Taking advantage of a retirement, Printing and Mailing successfully outsourced the production of envelopes reducing staff by 1 FTE

On-Demand Services: During FY01, Printing and Mailing acquired a new Xerox 2060 color digital press. Combined with the Docutech 6180, these digital presses have dramatically increased "on demand" capacity.

Coordination with customers: This recommendation, perhaps the most complex to implement, has been delayed by the communications review. A new model under

development will funnel many printing requests to the Communications Office rather than directly to Printing and Mailing.

Goals for FY02 include the development of digital color printing and using the Xerox 2060 and the Heidelberg press to refine and improve "on demand color printing."

During FY02, Printing and Mailing will integrate a new management control system. The new system will replace PACE and provide web linkage to the Xerox 6180 and the Xerox 2060. As a result, departmental users will be able to track their printing and mailing jobs.

Printing and Mailing will phase in a new addressing and tabbing system in mailing. The new system will add the ability to apply pressure-sensitive postage stamps to fund raising pieces. Annual Giving anxiously awaits this important initiative.

Printing and Mailing will continue its efforts to recruit and train a more diversified staff.

Telecommunications Services [TS]

Telecommunications Services provides telecommunications support to the University community reliably and cost-effectively. With 2001 revenues of slightly more than $3,000,000, TS is the largest cost-recovery unit within CIT. During FY01, TS selected new carriers for long distance and local service, the unit relocated into the Frist Campus Center, and marked the retirement of three managers.

During FY01, more than 4,100 work orders issued for telephone work involved some 4,800 changes to telephone service or equipment. In addition, TS processed 1,785 work orders for voice mailboxes.

In addition, TS removed more than 5,000 student mailboxes in June and reassigned them in September. During the year, TS administered 2,875 student telephone lines and approximately 6,900 academic and administrative lines. More than 14,000 voice mailboxes are in service. Current switch capacity provides potential capacity for 11,400 telephone lines. During FY01, the monthly service rate for telephone service continued at $21.55 for a fully featured telephone line with voice mail.

During the past 18 months, TS has moved to a Competitive Local Exchange Carrier (CLEC) and a new Long Distance Carrier (IXC). The CLEC agreement permits the University to establish a long-term relationship without the necessity of a long-term contract. The IXC agreement will permit the University to move to any new technology that emerges in a very timely basis. TS hopes to maintain the current monthly service rate for FY02 and to reduce the domestic long distance rate to $.07/minute with rates of $.10/minute to Canada and the United Kingdom. University volume permits offering these competitive rates.

Long distance revenue, direct termination revenues, and Zero plus calling revenue remained relatively constant during FY01. However, turmoil in the local and long distance industries may reduce revenues for the next three years. The University will experience a short-lived spike in the direct termination revenues owing to the change in local and long distance vendors.

Last year, TS reported that one of its services, the Telephone Conference Bridge, saved one department more than $20,000.00 a year when they switched from AT&T Conference Calling rates. During FY01, that same feature of TS's MSL-100 PBX has helped eight departments to save money. One of the departments saved more than $40,000.00.

Renovation and new construction activity on campus has continued at a frenetic pace. TS outsourced new installation work when it exceeded TS's capacity. Outsourced techniciams are usually less productive owing to their relative unfamiliarity with the campus.

Three senior managers retired during FY01. In addition, a fourth manager left the University. At the time of this report, TS has appointed three new managers in Student Services, Voice Mail, and the Business Office. 85 applicants are being reviewed for the Technical Operations Manager position. The absences in these positions has impeded TS's ability to implement new customer service initiatives. Rather, TS has devoted its resources primarily to perform essential tasks. The group looks forward to a more dynamic year when all of the managerial positions are filled.

During FY01, TS entered the initial stages of a Voice over IP (VoIP) trial with Nortel. This new approach, essentially the integration of the telephone and the desktop computer, will require technical innovation as well as support from throughout the University community. New services may include high-speed, gigabit service to the desktop, telephone service over the internet, wireless data and voice, desktop video, and unified messaging. Such technical initiatives will develop over the course of the coming decade.

Policy and Security [P&S]

The CIT reorganization of April 1999 created a Policy and Security group. P&S has coordinated a panel of University officials and student representatives who have revised the Guidelines for use of University information technology. P&S consulted with deans, directors, department heads and other appropriate University officials regarding breaches and violations of these guidelines and related University policies during the year. P&S has provided appropriate support and information for use in subsequent disciplinary hearings and personnel decisions.

P&S maintained up-to-date information regarding virus attacks at Princeton on the CIT "Protection" website created the preceding year. P&S forwarded to the computing-support list advisories received from CERT at Carnegie Mellon University and from the FBI's National Infrastructure Protection Center.

P&S prepared and submitted to Department of Public Safety [DPS] daily reports on campus cybercrime incidents observed by CIT and reported to CIT by members of the University community. P&S has also cooperated with DPS in investigating cases with cyberspace involvement. On referral by DPS, P&S has cooperated with Princeton Borough detectives and agents of the Federal Bureau of Investigation.

During FY01, P&S initiated a pilot of an "electronic patrol" of the campus.   By detecting vulnerabilities that hackers might exploit, the pilot aims to assist those responsible to secure systems within the Princeton domain.   Problems that arose during the pilot have thus far precluded the implementation of the patrol as a routine procedure.

P&S circulated relevant bulletins, news items, and other information to keep campus computing support personnel current with new threats to systems and services. P&S also served as a resource to assist and/or refer members of the campus community and departments who experienced break-ins or who expressed security concerns.

P&S responded to complaints from outside individuals or entities regarding Cyber-attacks originating from or coming through Princeton.EDU domain systems, "spam" e-mail apparently originating from or relayed through the domain, and other allegations of abusive electronic behavior. P&S coordinated CIT and/or other departmental investigations into such allegations. P&S conveyed to appropriate representatives in other departments and to students, information received regarding the possible compromise of systems for which those individuals are responsible. P&S provided advice and referral to assist in diagnosis and correction.

The Office of General Counsel asked P&S to act as Digital Millennium Copyright Act agent for the University. All alleged infringements of copyright involving the technology are referred to P&S for response, investigation, and resolution. During FY01, valid concerns involved MP3 format music, full-length films, and published textual materials.

In FY02 P&S will attempt to formulate an institutional standard for protection of the University's information technology resources against deliberate or accidental damage, both by outsiders and by members of the University community. There are two major challenges related to this effort: the lack of definition regarding what institutional information should be secured and the need to obtain accurate information regarding what safeguards and procedures are currently used.

P&S will also work with computing support staff assigned to academic and administrative departments to draft local guidelines and policies relevant to electronic security concerns .

Finally, P&S will continue to work with the community to raise awareness of electronic security concerns and the importance of individual responsibility in protecting the University, its departments, and its faculty, students and staff.

Budget and Finance

During the University's search for a new CIO, the Budget and Finance group worked closely with CIT's two Managing Directors to keep pace with its commitments. New services funded in CIT's operating budget included the enterprise version of Blackboard (a course software application) and a Virage, a Video Application Server that will permit the University to provide access to video over the Web. The opportunity to work more closely with the Provost's Office facilitated the resolution of several funding issues.

<u>Campus wiring</u>

For approximately five years, CIT has tried to obtain the funding required to extend the campus's fiber optic infrastructure from the backbone to the desktop. This extension would permit CIT to provide campus with networking speeds in excess of 10MB. The campus would also be able to exploit new technological advances.

During FY01, CIT began to wire selected buildings on a limited basis and to provide such new capabilities as far as funds would permit. The Provost established a building wiring upgrade project as a capital improvement with funding provided jointly by CIT and the University. In addition, new procedures with Facilities now ensure that planned renovations include an upgrade to the building wiring. Wiring projects will not be attempted within buildings that are planned for future renovation.

<u>Internet2</u>

Two years ago, the University received an NSF grant that provided access to Internet2, a noncommercial network that provides a consortium of universities with very high speed access in support of research and education. Current Internet2 use is limited, but the University expects growth over the next several years.

Owing to our physical location and the lack of competition among nearby vendors, the cost of sustaining Internet2 service was quite high and no new source of funding was readily available. CIT brought the need for additional funds to the Priorities Committee with a proposal to raise Tigernet rates to cover the cost of Internet2. The Priorities Committee concluded that it would be unfair to ask the entire University community to pay for a service whose use is so limited.

Fortunately, a new telecommunications vendor in the area has offered very competitive rates that drastically reduce the needed amount of incremental funding. As a result, CIT has worked with the Provost's Office to find funding independent from the Tigernet rates.

Partnership 2000 Budget Cuts

The University asked CIT to contribute additional budget cuts as a contribution towards the development of P2K applications. In addition to FY00 cuts, CIT contributed another $253,000, bringing its total contribution to the $500,000 level.

Backup Services

There has been substantial growth in demand for network backup service for several years. CIT currently bundles the cost for providing backup service with all the other networking services as part of the campus Tigernet/Dormnet charge. Network services are entirely cost recovered. An increased need for backup facilities would therefore require additional revenue to pay for the new equipment.

Rather than increasing our network charge for all users, the Budget and Finance Group has worked with Platform Services and the Director of IT Architecture to develop a new business model.   A specific amount of storage will be bundled with the Tigernet service. Users can pay for additional storage space if they require it. Users who need large amounts of storage will be able to obtain it without passing on such costs to average users.

Upgrade of Inventory Software

A new interface between the Help Desk software and the inventory/billing software will permit Hardware Support customers to call the Help Desk directly for computer repairs and installations.   The Hardware Support group will no longer need to open up a new service request in their billing system. The new system builds upon the Help Desk as the focal point for all customers' needs.

Telecommunications Documentation

Staff formally documented all financial procedures involving Telecommunications expenses. As a result, there will be consistency in Telecommunications charging, an audit trail, and changes in staffing will become easier to accommodate.

Departmental Billing

CIT has begun a P2K project to modernize the departmental charging applications. The project will unify the various applications that have been developed over the years. A more general design will accommodate both existing and future needs. As one of the largest users of the software, CIT is sponsoring the initiative. High level design is under way.

Partnership 2000 (P2K)

CIT needs to resolve one critical issue, identifying the funding needed to run the new P2K administrative applications when the development effort ends in FY02. Three years ago, the Partnership 2000 (P2K) Advisory Group questioned the feasibility of maintaining the new P2K applications at the same funding level as the University's legacy applications. Although steady state projections have been developed and discussed, no consensus with regard to the appropriate level of funding for administrative computing has been reached. It is now clear that maintenance of the new P2K applications will require more funding than the legacy systems; the only question is how much. With less than a year left until the end of the project, resolution of the funding issue has become critical.

Information Systems

Information Systems provides a reliable, cost-effective information technology infrastructure in support of the University's academic and administrative efforts. IS also develops and supports administrative applications. During FY01, Information Systems concentrated its efforts on the following goals:

- Providing a reliable, cost-effective data network in support of the University's academic and administrative needs;

- Sustaining highly-reliable, responsive, and consistent computing, database, and file services by installing, maintaining and supporting central hardware and operating systems for both administrative and academic computing;

- Supporting and facilitating the successful implementation of Partnership 2000;

- Providing a single enterprise-wide computing environment for administrative systems;

- Facilitating the use of central information resources for management decision-making;

- Maintaining current information systems at the highest possible operational level;

- Encouraging technical staff to take advantage of training resources and, using many approaches, to encourage and motivate staff.

During FY01, IS made significant progress toward many of these goals. Highlights include:

- Enhancing the coverage and quality of the networking infrastructure;

- Providing redundancy for critical services;

- Completion of major administrative information systems;

- Development of the final architecture for future administrative systems;

- Implementation of additional reporting tools for data retrieval for the campus;

- Implementation of monitoring for critical services;

- Considerable training for Information Systems staff.

Network Group

The Network Group provides and maintains a reliable, cost effective data network capable of meeting the University's academic and administrative needs. The primary tasks of this group are:

- To ensure the correct and efficient operation of the campus network;

- To maintain the University's access to the Internet and other external networks;

- To manage the various remote access facilities;

- To evaluate new network technologies for deployment on the campus.

In addition, the Network Group works closely with other CIT groups, as well as academic and administrative departments, to assess network-related needs and to apply network technologies to address those needs.

The campus network, the foundation for electronic mail, world wide web access, scientific collaboration, and campus client-server applications, has approximately 17,000 hosts including 4,635 Dormnet subscribers. Approximately 97% of all students capable of connecting to Dormnet currently subscribe. In addition, approximately 1,680 people per month connect to the campus via CIT's dial-in remote access service. The amount of data transferred between the Internet and the campus increased by 60% between September 2000 and May 2001.
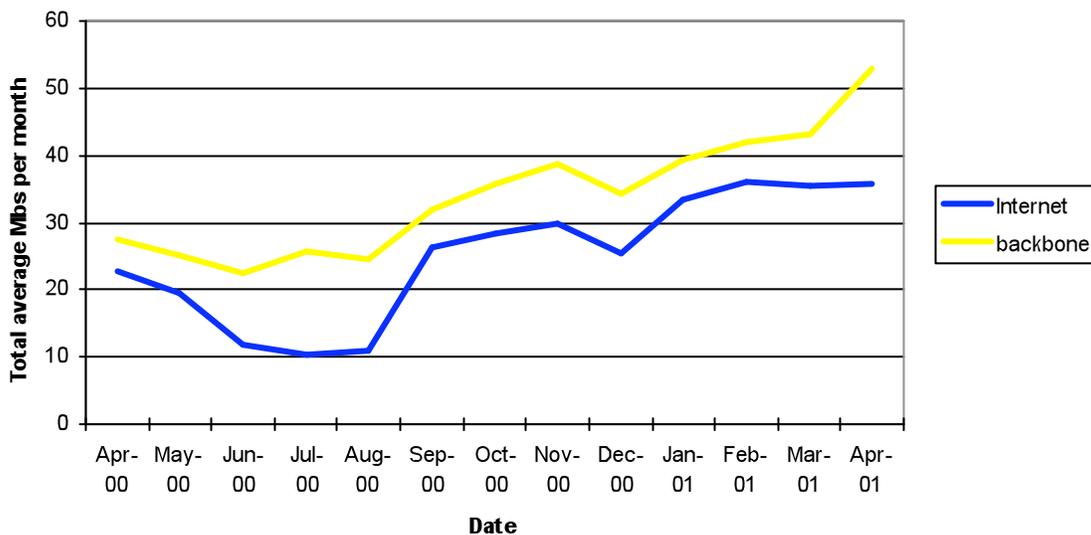
During the past fiscal year the Network Group focused on the following activities:

Building Network Upgrades

During FY01, Network Services upgraded the internal network structure of several campus buildings, including Frick, Hoyt, Lewis Thomas, Guyot, Eno, Shultz, Moffett, portions of Green, Fine, MacMillan, Woolworth and two dormitories. In addition, Network Services has brought online Wallace and Frist, the campus's two new buildings. In conjunction with the Facilities Department, Network Services staff have established the schedule for upgrading buildings during FY02.

Microwave to PPPL

Network Services established a new 100Mbs microwave link to connect the campus with the Forrestal Princeton Plasma Laboratory. The link, the first direct network connection to be established between PPPL and main campus, will aid PPPL researchers as well as PPPL users of administrative applications.

Gigabit core

Network Services completed phase one of a two phase project that will upgrade the campus core electronics. The upgrade will support applications such as video-on-demand and teleconferencing that need high-speed data communications within the campus.

Wireless LAN

Network Services extended the use of wireless LAN equipment to several new locations. During the summer of 2000, staff altered the host registration process. Users are now able to connect to the campus network more easily with both wired and wireless set-ups.

Internet and Internet 2 access

During FY01, the introduction of yet more new applications and services encouraged further campus use of the Internet. To accommodate the demand for Internet access, the University purchased additional bandwidth for the campus. Princeton updated its total Internet bandwidth from 32 Mbs to 41 Mbs. Princeton maintained its participation in Internet2, which provides high speed access to other Internet2 sites throughout higher education.

CIT Survey

Network Services participated in the preparation, administration, and follow-up of the first campus-wide user survey. Survey results are posted on the Princeton University web site at http://web.princeton.edu/sites/citsurvey/

Disaster Recovery Plan

During FY01, Network Services expanded the scope of the University's Disaster Recovery Plan to encompass a Backbone Cell Plan (locating critical servers outside of 87 Prospect) and a LAN Plan (to permit rapid recovery of critical administrative applications). Plans have been refined and budgetary allocation has been requested to permit projects to move towards implementation.

Platform Services

The Platform Services Group supports the University's central computing requirements by providing reliable, responsive, and consistent computing services. Such services include installing, maintaining, and supporting central hardware, operating systems, and databases for both administrative and academic computing. The focus of the group's activities has been in four main areas: Database Administration, IBM Mainframe, PC Systems, and Unix Systems.

Database Administration

The Database Administration group provides installation, configuring, monitoring and tuning of the central Oracle database systems. The database administrators (DBAs) are also responsible for the backing up and, as necessary, recovering of the data stored in these systems.

During FY01, the group has sustained a stable, reliable database environment, with proactive monitoring and maintenance. The group has also improved security and made substantial infrastructure improvements, such as providing a highly reliable server configuration.

The group supports 35 different applications, approximately 90 databases under 3 different Database Management Systems - Oracle, Sybase, IDMS. These applications and databases are stored on 15 database servers and support a campus-wide customer base.

IBM Mainframe

The IBM Mainframe group provides the campus network backup service and a highly reliable and efficient environment for the remaining mainframe production applications.

During FY01, the group installed an IBM P/390, began moving the backup system from mainframe to Unix, and worked on making the mainframe shutdown scheduled for 2002 as seamless as possible.

The mainframe still serves 450 active users and runs at nearly 90% utilization. The current backup system uses nearly two thirds of the mainframe's computational resources.

During FY01, the University's Tivoli Storage Manager service coverage has grown from 5,200 users to nearly 7,000 and contains approximately 32 terabytes of storage.

PC Systems

The PC Systems group provides a stable, reliable, scalable platform for file, print, and application services.

The PC Systems group supports the shared CIT Microsoft Windows NT and 2000 servers for file sharing. The group also provides general PC system guidance as well as support for the remaining CIT Novell servers. This group works with others throughout CIT to provide a platform on which to build systems and services offered to the University community.

PC Systems is responsible for 80 central systems with more than five terabytes of disk space. The central printing support provides coverage for more than 400 campus printers.

During FY01, PC Systems focused primarily on supporting the greatly increased number of central servers and storage on campus, notably including the following projects:

Microsoft Systems Management Server (SMS) 2.0

This major product upgrade to SMS was specifically designed to provide support for Windows NT and Windows 2000 workstations. The latest version is much more stable and scalable and provides much greater flexibility in support of targeted software distributions.

Norton Antivirus (NAV) Server

The establishment of a local NAV server permitted the group to distribute Norton Antivirus software campus-wide more frequently and reliably.

Tivoli Monitoring

In the past, network monitoring tools reported only whether a machine was on and working. Use of Tivoli monitoring for all Microsoft NT and P2K servers also permits staff to monitor the system health of our servers, including CPU, memory, disk, network utilization, and a vast array of other areas.

UNIX Systems

The UNIX Systems Group supports a Unix computing and file services environment that hosts the distributed database systems, mail service, web services, as well as general Unix services. In support of both academic and administrative computing at the University, the group provides a stable, reliable and scalable environment with minimal disruptions for

file, print, and application services.   The group also serves as a consulting resource for other campus departments running Unix systems. In total, the group supports more than 18,000 users of the academic central computing servers at Princeton.

During the past fiscal year, Unix Systems staff focused on the following key activities:

- Installed 35 new servers

- Provided new support for RedHat Linux -- Last year the group deployed the "hats" server group, a Linux public computing facility analogous to the "Arizona" (Sun Solaris) and "Sesamest" (SGI Irix) server groups. These systems are available for general University-wide computing use.

- Provided new support for AIX (IBM's version of Unix) -- The group deployed an IBM AIX TSM backup server to begin the migration of ADSM/TSM backups off of the mainframe onto a Unix-based platform.

- Provided new support for Storage-Area-Network [SAN]-ready RAID storage. These are disk arrays attached through a network to be allocated to a number of hosts. The group currently has two implementations: one for the central mail service and one for administrative systems (P2K).

- Provided new support for Apache on Administrative systems -- To simplify installation and maintenance, the Unix Systems group now provides direct support for the Apache web server software on the administrative systems (P2K). This provides a single point of contact for projects asking to have systems with web servers installed, rather than requiring customers to ask for system installations from the Unix Systems group and web server software installation from the Web Services group.

The Unix Systems group is now responsible for more than 200 systems, including Sun, IBM and Apple computers.   The group also provides coverage for five operating systems in eight different versions, all involving more than 10 terabytes of central disk space.

The following gives more detailed statistics on what the Unix Systems group maintains:

- Servers: 100 Sun servers (not including those maintained by Network Systems), 4 SGI servers, 4 Linux servers, 1 IBM server and 5 Mac servers

- Workstations: 86 Sun workstations (including the 30 CS101 machines that were recently retired), 24 SGI workstations, 3 Mac workstations, 1 IBM workstation

- Storage (raw): Approximately 4 TB Sun A5x00, 5 TB Hitachi 5800 and 9,200, 800 MB Clarion, 12 TB StorageTek L700 tapes

- Public login servers: 3 Sun E4500's, 3 SGI Origin 200's, 3 Dell poweredge

- Cluster systems: 30 Sun (were just decommissioned), 20 SGI

- Supported operating systems: Solaris 2.6, 7, 8, Irix 6.5.x, RedHat Linux 6.2, AIX 4.3, Mac OS 9.x, X

Administrative Systems Integration Group (ASIG)

ASIG integrates the multiple computing environments that support Princeton's administrative applications into a single comprehensive Princeton-wide computing environment. ASIG has taken the lead in Java development of administrative systems, in implementing a portal for departmental managers, and in taking steps to make PeopleSoft more user-friendly. All of these activities are expected to result in improved services to University users, and in turn, permit them to serve the University more efficiently.

The primary tasks of this group are:

- To provide application "middleware" such as security, messaging, database access, and computer architecture;

- To transfer knowledge in new technologies to Information Systems staff by providing basic training in these technologies;

- To research and evaluate new technologies and tools.

During FY01, ASIG focused on the following activities:

Time Collection

Time Collection is a web application that serves as a front end to the PeopleSoft Human Resources Management System. Time Collection enables the collection and approval of time for biweekly, casual and student employees for both main campus and the Princeton Plasma Physics Lab. Time Collection includes all the business rules regarding pay for these groups from Princeton University and six unions, making the process of collecting and approving time both more efficient and more accurate.

Staff built the Time Collection system on a Java J2EE architecture. The Java 2 Platform, Enterprise Edition (J2EE) defines the standard for developing multi-tier enterprise applications. J2EE simplifies enterprise applications by basing them on standardized, modular components, by providing a complete set of services to those components, and by handling many details of application behavior automatically, without complex programming.

uPortal/Demand

Staff continue to work with the JA-SIG uPortal Consortium, a group of institutions of higher-education focused on developing a free, sharable portal.   Using this uPortal framework, ASIG has built a portal, DEMAND (DEpartmental MANager Data), for Princeton University departmental managers. DEMAND gives managers a customized web view and access from their desktops to the business functions they need to do their jobs. The DEMAND portal will be deployed as a prototype to 50 departmental managers in September, 2001.

Java Wrappers for PeopleSoft

During FY01, staff built a prototype for "wrapping" small pieces of PeopleSoft functionality. The new prototype provides users with an easy, Princeton "look-and-feel" interface to PeopleSoft Financials, by layering a web interface on top of the PeopleSoft Financials application. To date the team has completed wrapping requistions ("EZ Requisitions) and work is in progress with "EZ Purchase Order", "EZ Approval" and "EZ Receiving".

Production environment for Java application

During the year, staff built a reliable, responsive, and consistent production environment for Java applications. The effort involved obtaining new hardware, software, researching tools, and building the robust architecture needed for Time Collection.

Training/Mentoring

During FY01. staff taught an in-house series on computer architecture and HTML and mentored other IS staff in Java and Oracle Reports.

Project Development Group

The Project Development Group is responsible for the implementation of new administrative information systems that support the University's business goals. Typically, a business project manager supervises each project in collaboration with a technical project manager from the CIT's Information Systems, all with support from a cross-functional team.   Most are Partnership 2000 (P2K) projects.

The FY01 projects are summarized below:

Development Information Systems (STRIPES project)

STRIPES is being developed to improve the productivity of volunteers and staff involved in alumni relations and fund raising. The project has two phases, STRIPES I and STRIPES II.

Implemented last year, STRIPES I replaced full data inquiry, reporting, prospect and event management. STRIPES II will replace the mainframe Development Information System, ADVANCE, in 2001. STRIPES II officially began following the close of the University's 250th Anniversary Campaign and follows a year of full production service from the STRIPES I application that supported the most successful fundraising effort in University history.

STRIPES II, the Advance Mainframe Replacement Project currently underway, is charged with the following objectives:

- Replacing the Advance/IDMS mainframe system by moving biographic and gift data maintenance tasks toAdvance client/server.

- Achieving efficiencies with internal operations and in data exchange with other administrative systems.

- Providing data access for the alumni community at large and alumni volunteers through the Advance Web Community.

In order to meet these objectives, the STRIPES II project was itself divided into 4 phases:

Phase I: Additional reports for front-line fundraising staff

Staff completed this first phase in November, 2000.   Achievements included an automated re-alignment of the prospect pool and re-engineering of associated reporting systems to support post-campaign and mini-campaign fundraising initiatives.

Phase II: Implementation of Gift Stewardship

In March, 2001, staff delivered the second phase. Deliverables included market value reporting for planned giving and extensive automation of the scholarship stewardship program. The automation is expected to save at least 2 weeks of staff time in letter production and tracking of award status. Staff also implemented an acknowledgement subsystem using a seamless interface from STRIPES to a departmental Access database. The new system will support additional recognition of $1000+ Annual Giving donations,

Phase III: Biographic and Gift maintenance and associated interfaces

The third phase is in progress and is targeted for completion in September, 2002. The first deliverable will be a policies and procedures guide for data maintenance, accessible via RoboHelp. Vastly improved proofing subsystems are being implemented to reduce data errors and to improve staff efficiency. Staff will develop reporting and query functions in order to support data research and quality assurance tasks. The new functions are expected to consolidate the current report inventory. Interfaces will be developed with Campus Community, PeopleSoft Student Records, and University

Financials. The result will be a substantial decline in paperwork, improved workflow, and a higher degree of data synchronization.

Phase IV: Advance Web Community (AWC), year-end reporting and production cutover

The fourth phase is scheduled for completion in December, 2001. AWC will end all reliance on the University mainframe in the Alumni/Development business areas. At the beginning of FY02, staff will initiate the project plan for the Web Community implementation. Plans include a project team organization, an LDAP authentication scheme, a portal integration strategy, and a framework for a "fit/gap" analysis. The AWC product has already been licensed and installed on a CIT server to support "fit/gap" testing.

PeopleSoft Student Administration Project

The objective of the PeopleSoft Student Administration Project is to implement an integrated Student Information-system for the Office of the Registrar, Student Life, and the Graduate School.

Owing to the size and scope of the Student Administration business processes and the need to accommodate system rollouts with the academic calendar and the availability of functional resources in the business offices, the project is following a phased implementation approach that spans approximately two years.

During FY01, staff placed the Graduate Admissions and Course Information System modules into production in October 2000 and January 2001, respectively. The development team, a cross functional group of technical and business staff from the University as well as outside consultants, has been providing technical support to these production applications. Appropriate IS staff are being trained to support the new systems.

Graduate Admissions

The Graduate School has successfully used the Graduate Admissions system module to perform all its admission activities during FY01. The system will be used to process approximately the 535 new graduate students who will enter Princeton in the fall. All requested reports and an interface to the legacy IDMS Student status system are in production. The interface that transmits data to legacy IMS Student records will be needed until PeopleSoft Student Records goes live.

Staff created numerous additional reports for the Woodrow Wilson School, which has been using the Graduate Admission module in conjunction with its legacy databases.

During FY01, staff completed the development of a financial support sub-system within PeopleSoft. As a result, the University will be able to track all financial support for new and readmitted graduate students. The new sub-system replaces several shadow systems

and provides an interface to the Labor Accounting system. System users are expected to experience a substantial reduction in the manual effort previously required to enter data.

Admission applications are received as both paper (to be scanned) and as electronic web forms. The web vendor, Embark, provided a new, unproven product that was not fully tested and some problems were experienced with these new technologies. The vendor has promised changes and the staff anticipate that the application process will improve in FY02.

Depending upon resources and schedules, the project team expects that the entire graduate readmission process will be done electronically via the web in FY02.

Course Information System (CIS)

Operationally successful since January, 2001, the Course Information System (CIS) replaces several legacy sources, the IMS Courses database and the DBASE III (Clipper) CIS system. CIS supports central office requirements but also provides distributed updating and reporting capabilities in academic departments.

CIS is now the repository for the Princeton Course Catalog. CIS contains an electronic history of courses taught during the last 32 years and contains sufficient information to produce student transcripts.

Staff have completed many of the reporting capabilities. Many more, notably those pertaining to the Undergraduate and Graduate Announcements (catalog) publications, are due for delivery in late summer, 2001. Other critical publications, including Course Offerings in various forms, Classroom Assignments, and worksheets for departmental use are in production.

An interface to the legacy IMS Courses database will be maintained for reporting and transcript purposes until Student Records goes live. Interfaces also exist for feeds to the Registrar's web site, the student course guide, and the CourseInfo web site.

Resource 25 and Schedule 25, a package that will provide classroom scheduling capability to the Office of the Registrar, will be in production this summer. The new software will use the facility data stored in the Archibus system as its source of building and room information and will involve a feed from PeopleSoft.

Student Records

IS estimates that Student Records will be in production in the summer of 2002. IS staff have coded the University's business processes. The user community is now reviewing the required customizations as a precursor to functional specifications and development.

The system will permit students to use the web to choose courses, to register at the University, and to request transcripts. The system will use PeopleSoft Student

Administration HTML Access (SAHA) as well as locally designed and developed enhancements.

Student data conversion is well under way. Data mapping and cleanup activities have commenced. Two full time employees from the Office of the Registrar will augment the project team this summer.

Like CIS, most of the new functions will be distributed, giving departments more responsibility for data update. The result will be faster availability of data at the University.

PeopleSoft Human Resources Management System (HRMS)/Time Collection Project

Staff successfully implemented PeopleSoft Human Resource Management System version 7.6 in June 2001. The new system, an integrated Human Resources, Benefits, and Payroll system using PeopleSoft, replaces Tesseract, the University's former centralized mainframe system.

The new PeopleSoft system improves data integrity and data control because it shares information among all central offices. For the first time, departmental managers are able to view critical job information online about all the employees in their departments. The system also provides new and improved ways to communicate changes to all authorized parties via automated workflow. Further, the Time Collection system that was developed by CIT and IS staff as a web front end to PeopleSoft HRMS permits the complete automation of the payroll process by electronically exchanging data between two systems.

The complete online documentation incorporates all Princeton specific customizations and processes and is available via the Web. All 70 central office users and 200 - 250 departmental managers were trained before the system went live on June 25.
The complete conversion of Tesseract data (all job history and 4 years of payroll and benefit history) into PeopleSoft was successful.

The project team enhanced the delivered PeopleSoft by creating 48 customizations ranging in effort from a few hours to several months per modification. The customizations addressed such Princeton-specific processes as Tuition Grants, FTE, and Medical benefits as well as the ways in which the University processes I-9s, issues checks, uses positions, etc.

The team also wrote more than 50 interfaces to external vendors such as medical benefit providers, pension and unemployment providers, banks, states, as well as internal systems including Campus Receivables, Benefit Billing, Accounts Payable, Labor Accounting, PPPL, etc.

The team vigorously exercised system functionality through unit tests, integrated tests, and finally full parallel testing for 6 weeks (included reconciling 3 payrolls). Staff

devised and implemented an extensive security scheme to permit only authorized users to access appropriate information. Staff created a reporting strategy that ensures fast online response in the operational transaction database. In order to stay current with PeopleSoft, staff applied more than 90 fixes during FY01.

During FY02, staff will strive to maintain system stability and complete the transition to production, support open enrollment over the Web, ensure successful year-end processing and move towards self-service via the Web.

Campus Receivables

The new Campus Receivable System has replaced all legacy receivable systems with a flexible and efficient Client/Server system. CIT and IS staff are providing project management, data conversion, interface requirement, reporting, system integration support, and the development of an application environment.

The following receivables have been in production for the last year: Student Accounts, Student Loans, Short Term Computer Loans, Princeton Parent Loans, Monthly Payment Plans, Rents, and Summer Rooms. Each has run through all cyclical processes for that receivable.

During FY01, staff coded and installed critical functionality for Mortgage Loans, Short Term Emergency Loans, Outside Scholarships and Fellowships, Outside Loans, Employee Parent Loans, and Unique Loans.

In July 2000, staff converted the Mortgage Loan portfolio of $162 million representing more than 700 loans. In October, 2000, staff applied the backlog of transactions since January, 2000 permitting day to day activity to begin. Today, more than 1000 open Mortgage Loans are being maintained.

New Short Term Emergency loans were opened as needed in September, 2000. Approximately 80 new accounts were opened this year. All will be paid off before the fall.

New Outside Scholarship and Fellowship accounts were opened as needed in September, 2,000. Approximately 1,000 new accounts were opened.

New Outside loan accounts were opened as needed in September 2000. Approximately 1,000 new accounts were opened.

The Employee Parent Loan portfolio of $3million representing more than 300 loans was converted in October, 2000. In January, 2001, staff applied the backlog of transactions since January, 2000 and day to day activity began. 20 new loans have been opened since then.

Unique Loans were manually converted in November, 2000 and new loans have been opened as needed. Today, there are approximately 60 open accounts.

New Automated interfaces replaced mainframe or manual data entry of financial transactions from Sallie Mae, McCosh, and Atheletics.

During FY02, staff expect to bring the application to steady state by freezing SPL code as soon as the last problem fixes are delivered in July. Staff will then complete the transition process and turn the application over to Production Support. Staff will also upgrade the ORACLE database to version 8.

Departmental Charges Project

The Departmental Charges project will replace the Legacy IDES, a system used to pass Financial Transactions to Bookkeeping, now PeopleSoft UFINSI. The new system will accept charges from University departments via a WEB front end or interface files, generate JVs for UFINSI, and send transaction details to a store on the Data Mall. University departments will use the Mall to review interdepartmental bills for items and services.

During FY01, CIT and IS staff determined the scope of the effort required to replace IDES with a client/server system. An independent contractor, Hexaware, is facilitating the application development sessions with user departments for the Business Analysis Phase.

During the next fiscal year, Hexaware will work with the University to prepare the System Design and Development Project Plan. Once all stakeholders have agreed to the Project Proposal, a contract of work will be signed. Contracted and in-house work should begin in September.

Implemented of the new system is expected in FY02 before the shutdown of the mainframe.

Assets & Equities {A&E] Project

The new Assets and Equities system will manage Princeton University investments. The Office of Investments will be able to use the new system to track the performance of the investments, to ensure that the funds are used for specific purposes as specified by donors, and to re-allocate funds as necessary to meet the given objectives.

The current Assets & Equities system exists in an IBM mainframe environment. The new system runs on a Unix server using an Oracle database. The web-based, Java application will permit users to employ a Graphical User Interface environment.

Hexaware, carried out most of the system development. Testing by IS staff and users in the Investments Office will continue until after the FY01 closing.

Princeton programming staff attended a two-part course in Java to ensure that future modifications and long-term support can be performed in-house. IS retained a Hexaware consultant during FY01 to provide mentoring services, advanced Java training, and additional operational support for the project.

During FY02, A&E will move fully into Production Control.

Telephone Management System [TMS] Project

The new Telephone Management System is a vendor-purchased administrative software package that maintains all records for University telephone services. The system maintains inventory, tracks cable routing, manages trouble-ticket reporting and work-orders, collects all call activity from the telephone switch, updates the switch as necessary, and tracks and bills all student and administrative office telephone charges.

During FY01, the Telephone Office used the application processes that load new student data into production for the first time. With help from Information Systems staff, the Telephone Office also developed new procedures to handle the concurrent and complex timing of summer billing, new housing loads, and creation of data for the printed Directory.

Information Systems staff redesigned the Quality Assurance (QA) instance so that all scripts and processes duplicated the production instance as closely as possible. Staff also upgraded the Progress and MySoft software to the versions that were most current at the time.

The Information Systems team also began working with Campus Community to develop new interfaces for student and administrative user information needed in TMS. The work will continue while Campus Community implements its system components. TMS will become a fully supported production system during the first half of FY02.

Administrative Application Support

The Administrative Application Support Group contains five teams: The Production Support Team, the Production Control Team, the Data Mall Team, the Documentation and Standards Team, and the Training Team.

Production Support

The Production Support Team maintains, enhances, and provides operational support for all current University production administrative systems.

During FY01, the team played a major role in upgrading the PeopleSoft Financials System to version 7.5. Staff helped to rewrite year-end financial reports using SQR in order to remove these reports from the mainframe.

Production Support assumed responsibility for supporting the Telephone Management System and worked with Production Control to help with the transition of other P2K systems to production status.

Production Support staff assisted with the implementation of several P2K projects including PeopleSoft Student, Resource 25 and the Asset and Equities System.

Production Control

The Production Control Team is responsible for the administrative production environment, including operations staff, as well as facilitating the transition to production of systems under development. The team works both within CIT and with other University customers to build a controlled production environment. Staff are also responsible for asset management and configuration management.

During FY01, the team took responsibility for a number of services including hardware and software inventory, host database updates, IS lists, local account management, and the administration of the Leaves Calendar system. The team acquired licenses for PVCS, STAT and Pl/Sql Developer.

During the year under review, staff received training to assist their transition from mainframe operators to production control specialists.

Data Mall

The Data Mall Team is responsible for creating and maintaining Data Mall Stores for administrative applications. During FY01, the team migrated all existing Data Mall stores to WebDb. The team created Data Mall stores for administrative applications that do not yet have stores, including P2K applications. The team created the Undergraduate Housing "data store" and the eCommerce "data store."

To assist Data Mall reporting, the team replaced all nVision (a PeopleSoft product) reports, with Oracle Reports and converted all of the existing "data stores" to Oracle WebDb, a supported Oracle product. The team also converted financial "data stores' to the PeopleSoft 7.5 format.

Documentation & Standards

The Documentation and Standards Team develops accurate and usable documentation in partnership with technical and administrative staff for systems in development.

The Documentation & Standards team provided the following documentation for the new PeopleSoft systems:

Student Administration -- Graduate Admissions module
    Departmental User Guide
    Departmental Training Guide
    Quick Reference Card
    Graduate Office User Guide.

Student Administration -- Course Information System module
    Academic Departmental User Guide
    Training Manual
    Central Office User Guide
    Quick Reference Card

University Financial System
    Departmental User Guide
    Central Office User Guide
    Quick Reference Cards
    Reporting Guides

Training

The Training Team provides training on each of the "core competencies" identified by IS managers for both administrative customers and technical staff. The team also supports P2K initiatives. In support of these activities, staff have created numerous training materials and teach classes on administrative systems.

During FY01, the Training team planned and oversaw the renovation of the Training Room at 120 Alexander. CIT staff were trained in SQR, Perl, Unix, Oracle Reports and Pl/SQL. In addition, staff provided training for the Time Collection system and several PeopleSoft systems including the Course Information System, Financials 6.0, Financials 7.5, Graduate Admissions, and the Human Resources Management. During FY01, the Training Team provided more than 500 hours of training, offered 172 classes, and delivered training to a total of 1,538 University staff.

Enterprise Services [ES]

Enterprise Services delivers mission-critical computing services, including web and streaming media services, departmental personal calendaring, netnews, e-mail, directory services, authentication, desktop deployment, job scheduling, output management, and enterprise systems management.

ES delivers these services transparently, reliably, and securely as possible. Enterprise Services contains four groups:

- Enterprise Systems Management [ESM]
- Collaboration Services [CS]
- Technology Integration Services [TIS]
- Web Services [WS]

ES completed its second year of operation with many accomplishments. The long-delayed consolidation of staff to offices in 87 Prospect finally occurred. Office space remains sub-optimal, but co-locating all of the groups has greatly facilitated interaction and productivity.

Staffing

Staffing remained a challenge during FY01. There are industry-wide difficulties in filling technical staff positions; Therefore, it has been difficult to locate and attract qualified staff. With the addition of staff to Enterprise Services Management, Web Services, Technology Integration Services, and soon Collaboration Services, the group for the first time will be at full strength. Unfortunately, TIS will be losing one of its staff to pursue an MBA this fall. Enterprise Services expects that staffing will be a continuing challenge.

Space

With the consolidation of staff into 87 Prospect, all Enterprise Services staff occupy two floors in a single building. Quality space remains a problem. Several staff share an office, including a web designer who shares his office with a busy departmental administrator. One office has had continued environmental issues.

Email

Working with colleagues in Platform Services, overall reliability of the campus mail server has increased. The installation of additional servers will enhance availability and reliability of this highly visible and vital University service. More than 13,000 unique connections are made daily to the IMAP, POP, and webmail services provided by the central server. At peak load, the system supports nearly 5,000 simultaneous connections. In addition, ES began the effort required to increase the security of services using

authenticated mail delivery (AUTH-SMTP) and pilot testing of encryption and digital signatures for web and email.

Calendar

While the University awaits the emergence of a calendar standard analogous to our email service, the OnTime calendar usage has grown to nearly 1,000 users in more than half the University departments. In addition, palm devices, many of which synchronize with the OnTime calendar, have become increasingly popular.

Enterprise Systems Management

The Tivoli Enterprise Console (TEC) now monitors more than 150 Unix and Windows systems and several applications, including OnTime, Fax Gateway, the HelpDesk ACD, and key web pages.

Job Scheduling

Tivoli Workload Scheduler runs an average of 1,150 jobs daily that are crucial to the operation of the new administrative systems. A new development domain and improved security will be deployed in FY02.

Output Management

Last-minute fixes kept the SUN-OS printserver machine running through Y2K. During FY01, staff assembled a new printing platform for Unix users who submit more than 10,000 print jobs a month.

ES is migrating printing for the NT-based administrative systems (nearly 40,000 jobs annually) to the Dazel print report system. Filling a key staff position during FY01 has moved both projects ahead and provided needed depth and experience.

Student Computer Initiative (SCI)

In FY01, the University's SCI vendor, GE Capital, withdrew from the program at the last minute. The University's fall-back vendor, CUC, announced that it was going out of business shortly after school started.

Thanks to diligent staff efforts, no money was lost and all 833 students who ordered machines received them. Staff developed an XML-based business-to-business application with Apple and IBM. The new application permits students to order SCI machines directly from the vendors via the web.

Windows/Office 2000 Migration and Training

During FY01, Technology Integration Services [TIS] led a massive effort to upgrade software and, where necessary, hardware, for more than 2,000 DeSC computers. As a result, the DeSC machines will now be able to run Office 2000 on Windows 2000. In consultation with groups across CIT and through the DeSC Council, TIS staff helped to convert more than half the machines. Complete conversion should occur by Fall, 2001. In addition, TIS coordinated, contracted, and, in some cases, delivered updated software training for the new environment for more than 600 users from more than 100 departments.

Web Services and Outreach

Web Services has expanded web support for departments. During FY01, there individual consultations with 17 departments and training sessions for 70 users, including representatives from 12 departments and 27 SCAD staff. Web Services also provided support for several on-going and new applications including the student and faculty computer programs, special events lotteries, and survey facilities. Web Services upgraded DBToolBox to be Windows 2000 compliant. Web Services staff also played an active role in staff searches for the offices of Development and Communications and participated in teams and taskforces for Web Strategy, CourseInfo, APT Events, and portal and content management evaluations.

Streaming Media

ES expanded support for streaming media for all the major formats including QuickTime, WindowsMedia, RealMedia, and MPEG-1. ES now provides support for up to 1,500 simultaneous users.

FY02 Goals

PKI and Authentication

The University is moving towards Public Key Infrastructure (PKI) and Authentication in order to provide campus users with secure forms of electronic communications. While the hardware for a PKI is now in place, additional work will be required to put it into production, in addition to user training and judicious selection of pilot projects. A second mail server for students will partition the University's exposure to hardware and software failures. Authenticated SMTP should greatly reduce SPAM and mail impersonation and provide increased reliability.

Windows 2000

Windows 2000 and Active Directory conversion will require continued dedicated staff efforts and solid technical planning and coordination with departments to meet the planned July 2002 cut-over date.

Enterprise Systems Monitoring

The basic framework for Distributed Monitoring (Tivoli), Output Management (Dazel/printserver), and Job Scheduling (Maestro) is now in place. Priority for monitoring will shift from operating systems to applications and services, beginning with Oracle, the DataMall, and PeopleSoft. Oracle, PeopleSoft, and client monitoring are now being implemented. In addition, the user base for event reporting will be expanded to include the Help Desk and other application staff. A more flexible and secure version of Maestro and migration of the fax gateway conversion to the new printserver platform are also scheduled for FY02.

Web Services

Staff in Web Services have been involved in the Web Strategies Task Force and will play a large role in deliverables from the group. Testing and evaluation has begun on several content management systems, and implementation and deployment of such a system, if deemed feasible, will be a major effort. In addition, a major review of the main web site, e-commerce initiatives, and interfacing with the multiple portal initiatives will compete with ongoing support, maintenance, and service needs.

ES remains committed throughout to its goal of providing responsive, robust, reliable end-to-end infrastructure service for all its users.

Enterprise Systems Management [ESM]

Enterprise Systems Management is responsible for system monitoring, job scheduling, and printing. During FY01, ESM made significant improvements in all three areas.

Tivoli Systems Monitoring

ESM extended Tivoli system monitoring to all CIT production systems in September 2000 and monitored nearly 150 Unix and Windows NT systems throughout the academic year. In addition to monitoring basic operating system health, ESM used Tivoli to monitor a set of critical Web pages including the OnTime service, the FAX gateway, the Help Desk ACD system, and the Maestro job scheduling system. ESM developed and documented a procedure to send events into the Tivoli system from any Unix script. ESM is now using the procedure to monitor disk space and as part of the monitoring strategy for the new Time Collection system.

In FY02, ESM will extend Tivoli monitoring to services and applications. ES will install the Manager for Oracle this summer. ESM will implement Tivoli Application Performance Monitoring and the Web Services Manager in the fall. To support the transition to application monitoring, ESM will implement a major extension of Tivoli's notification capabilities. A web front end will permit users to define when and how they want to be notified of Tivoli events.

<u>Workload Scheduler</u>

Tivoli Workload Scheduler (Maestro) is currently scheduling a daily average of 1,150 jobs for 11 application systems on 21 Unix and Windows NT systems.

During FY01, ESM created the development and production Maestro systems and IS project leaders began planning for the migration of jobs and schedules into the development Maestro system. Maestro is now running in the development domain. Upgrade to the production domain should be completed by the end of the summer.

<u>Output Management</u>

ESM converted the Unix printing service, Printserver, from obsolete hardware and software. The service processes approximately 10,000 print jobs a month. ESM has completed the installation, configuration and customization of the software.   The transition to the new service will begin in early July. The campus FAX Gateway also runs on the Printserver platform. Conversion to the new platform will begin in the fall.

ESM also manages the Dazel system, which primarily supports administrative printing and faxing. IN FY01, Dazel processed approximately 39,000 jobs, including 31,000 FAX jobs sent from the FAX Gateway. During FY02, ESM will improve the Dazel implementation in order to support operator mounting of special forms, to install the Dazel client on all administrative Unix and NT servers, and to standardize on Dazel for administrative printing.

Technology Integration Services [TIS]

Technology Integration Services provides computing technologies, enterprise-wide services, and second tier assistance to colleagues, faculty, staff and students. TIS strives:

- To provide project management, coordination, and "packaging" for several specialized programs that relate to standardized computers for faculty, students, and departments;

- To provide project management and supporting services for activities of the Desktop Systems Council (DeSC);

- To provide project management, coordination, and "packaging" for the technologies and applications delivered by the Collaboration Services Group;

- To respond to questions from the Help Desk and other computing support staff on campus.

Student Computer Initiative

The Student Computer Initiative is a cross-campus effort to make available for purchase specially priced computers for University students. Through the efforts of the offices of the Provost, Treasurer, Admissions, Financial Aid, and Computing and Information Technology, incoming undergraduates and Ph.D. students can acquire standard, high performance personal computers from selected vendors. The computers are pre-registered for use on the campus network, have a core set of software productivity tools, and a Princeton-specific customization tool. The program, now in its third year:

- Alleviates long lines of new students requiring help with the configuration and set up of personal computers

- Ensures that a significant proportion of the incoming undergraduate class use the same level of technology and software, easing electronic sharing of information and creating an environment of peers helping peers

- Encourages a standard hardware and software platform which helps contain the increasing costs for computer support resources

Technology Integration Services provides the coordination and project management for this complex undertaking.

During FY01, the SCI vendor was IBM Corporation. Students purchased a total of 833 computers, a decrease of 1.2% from the previous year. Table 1 summarizes SCI purchases. For FY01, the ratio of laptop to desktop purchases was 4:1.
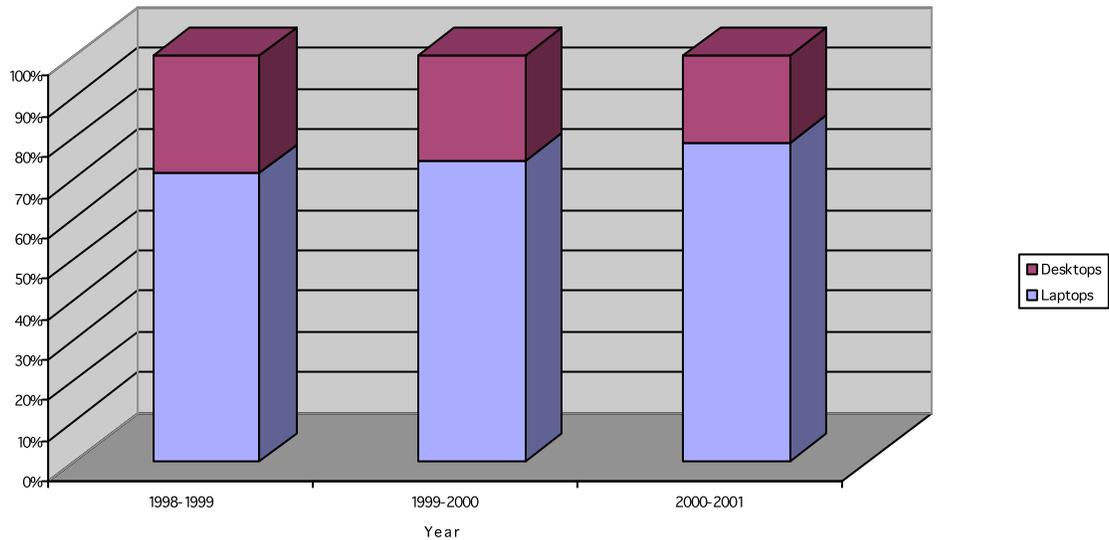
Table 1. SCI Purchases, 2000-2001

Class		Laptop	Desktop
00	1	0	1
01	10	7	3
02	24	21	3
03	20	19	1
04	655	508	147
Grads	123	100	23
Total	833	655	178

Table 2. SCI Purchases, 1998-2001

| Program Year	Total	Laptops	Desktops
1998-1999	1012	721	291
1999-2000	978	725	253
2000-2001	833	655	178

Laptops to Desktops

Dormnet Services

During FY01, TIS worked closely with the Help Desk to improve the operation of many Dormnet services.

Dormnet subscriptions rose 2.3% FY00, totaling 4,598 members (4,246 undergraduates, 352 graduate students). See Table 2 for additional subscriber details. Figure 2 illustrates the total increase in undergraduate subscribers from FY1995 through FY2001. Table 3 shows the subscription rates for each class during the same period. In previous years, Dormnet subscription growth was the result of significant increases in undergraduate student participation. During FY01, graduate students were responsible for the increase in subscriptions. Graduate student subscriptions rose 3.6% to 352 members from 257 in FY00.

Table 2. Total Dormnet Subscriptions, 2000-2001

Class	Members	New	Renewing	Computers	Macs	PCs	Others
2001	1047	51	996	1068	117	948	3
2002	1012	28	984	1024	57	965	2
2003	1081	25	1056	1090	86	998	6
2004	1106	1106	0	1114	50	1062	2
Grads	352	243	109	361	39	319	3
Totals	4598	1453	3145	4657	349	4292	16

Figure 2. Undergraduate Dormnet Subscribers, 1995-2001
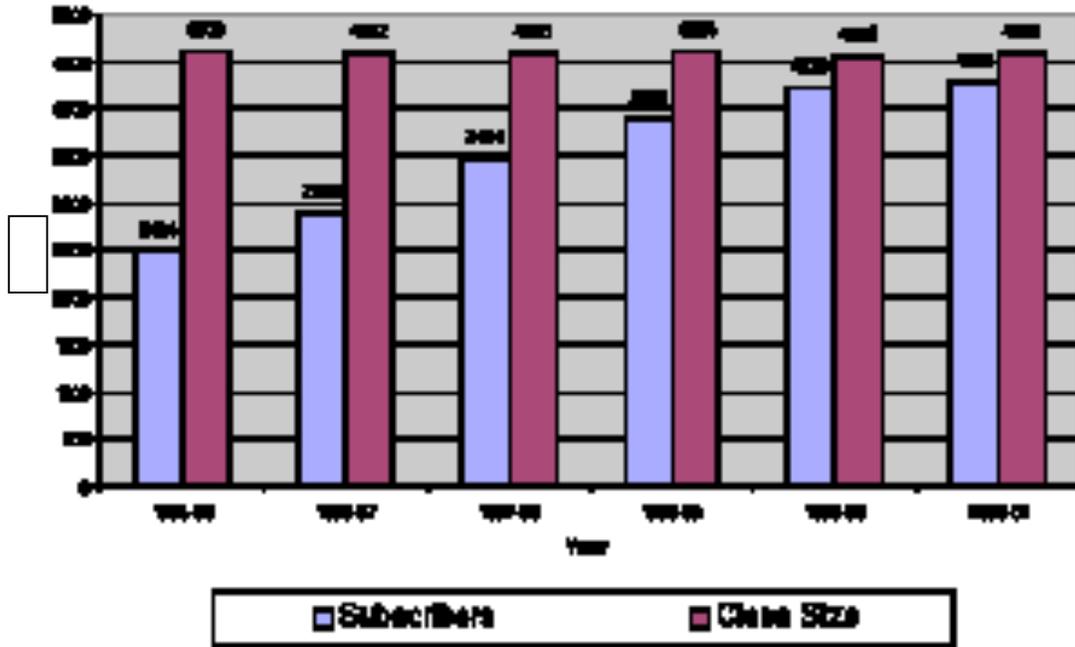
Table 3. Dormnet Undergraduate Subscription Rates, as a percent of total class size, 1996-2004

Class	Year					
	2000-2001	1999-2000	1998-1999	1997-1998	1996-1997	1995-1996
2004	95%	-	-	-	-	-
2003	94%	96%	-	-	-	-
2002	86%	95%	93%	-	-	-
2001	93%	92%	89%	85%	-	-
2000	-	89%	84%	82%	79%	-
1999	-	-	70%	67%	68%	73%
1998	-	-	-	69%	64%	69%
1997	-	-	-	-	41%	41%
1996	-	-	-	-	-	32%

Hardware Replacement and Windows 2000/Office 2000 Migration of DeSC Computers

TIS coordinated the rollout for the hardware replacement and migration to Windows 2000/Office 2000 within the DeSC program. During FY01, TIS accomplishments included:

- Worked with the Purchasing Department, Desktop Systems Council and vendors in the RFP process and on vendor selection for hardware and training.

- Spearheaded the analysis of the RFP responses for new hardware.

- Led the standard image development and testing for DeSC hardware.

- Coordinated DeSC Training Project as well as department-specific training requests.

- Developed and delivered Princeton-specific workshops on the "two browser world" and intermediate e-mail tips and techniques.

The ongoing end-user DeSC training began in late May and will be completed by December 2001. TIS staff coordinate the training schedule and manage the contracted trainers. TIS staff have also developed a Princeton-specific workshop on the browser software. The course will help the University community to work with web-enabled University applications.

During FY01, 629 staff from 105 departments participated in the DeSC training. Table 4 shows the registration rates for the program's classes.

Table 4. DeSC Training, May 2001 – July 2001

Course Name	Times Offered	Length (hours)	Training Hours	Seats Available	Registrants	Registration Rate
Netscape and IE (2 Browser World)	4	1.5	6	56	55	98%
Introduction to Access 2000 - Part 1	1	3	3	12	8	67%
Introduction to Access 2000 - Part 2	1	3	3	12	8	67%
Introduction to FrontPage - Part 1	10	3	30	125	120	96%
Introduction to FrontPage - Part 2	9	3	27	113	108	96%
Special Topics in Microsoft Word 2000	3	3	9	36	28	78%
Windows 2000/Office 2000 Updating Skills	39	3	117	514	302	59%
Totals	67		195	868	629	72%

Authentication and Security Strategies

TIS staff coordinated and participated in the technical work group for evaluating and planning the Windows 2000 Active Directory rollout. The work involved testing and planning the deployment of the Windows 2000 Active Directory software in the Princeton (DeSC) domain. The project will extend beyond the DeSC computer program. The Windows 2000 project aims to work with those departments that rely upon Windows domains for local resources and service.

Faculty Computer Program

During FY01, TIS staff began to streamline the Faculty Computer Program substantially. During the year, TIS staff provided the following program support:

- Recommended computer/printer bundles;

- Worked with the Purchasing department to establish FCP computer kits for ease of purchase;

- Redesigned the FCP web pages to include more complete instructions.

Desktop Systems Council (DeSC)

The Desktop Systems Council (DeSC) maintain and enhance the desktop computer environment that was established by the 1997 Princeton Desktop Initiative.

During 2000-2001, the council focused upon replacement of hardware and migrating systems to Windows 2000/Office 2000 software.

In support of DeSC, TIS staff made enhancements to the DeSC core software set and coordinated the efforts with the Purchasing department and the vendor. During FY01, owing to the complexity of the migration, the disk image service was not outsourced to the hardware vendor. Rather, TIS provided imaging services and coordinated new image deployments. As a result, TIS was able to introduce fixes and additions rapidly to the disk images for the DeSC hardware rollout. The image version change time was cut from 30 business days (6 weeks) to 1-3 days.

Second Tier Support: SCI, Dormnet, E-mail, Remote Access

During FY01, TIS staff responded to 686 CIT Help Desk problem tickets in several TIS-specific "queues" in the problem tracking system. These problems are typically questions that cannot be answered via existing documentation or by Help Desk staff. Often these questions have led to new documentation or interface improvements.

TIS staff regularly maintain several web sites, notably DeSC, Faculty Computer Program, SCI/Dormnet, and E-mail, in order to disseminate general information about services and to contribute to the Help Desk Knowledge Database.

FY02 Goals

During FY02, TIS will provide the planning and rollout coordination for the decommissioning of Novell file services (migration to Windows 2000 Server File Services). TIS will also provide the planning and rollout coordination for digital certificate technology. Finally, TIS will develop, plan, and rollout a campaign for improved computing security on campus (authenticated SMTP, password care, SSH, Kermit).

Collaboration Services Group [CSG]

The Collaboration Services Group (CSG) provides first-class e-mail, directory, and authentication systems for the University. CSG staff also contribute second tier assistance to colleagues, faculty, staff and students. Throughout, CSG strives to provide reliable, robust, and scalable applications and systems.

E-mail Services

During FY01, CSG maintained and enhanced the University's central IMAP e-mail service. Much work focused upon increasing the stability of the service. The University uses Netscape Messaging Server software. Staff installed upgrades and patches, which fixed several known and reported bugs.

There are more than 8,000 active IMAP accounts. Most staff connect via a desktop client using the IMAP protocol. The University also supports POP connections.

During the year, there were, on average every day, 3,000 unique users read mail via the webmail interface. Throughout the day, University users make approximately 110,000 connections. Table 1 summarizes the extent of central e-mail services used each day.

CSG uses Netscape Directory Services software (LDAP) for the campus directory services. Several core services, including e-mail, rely heavily on the LDAP infrastructure. There are 1.5 million LDAP transactions per day.

Table 1. E-mail Usage

Average daily usage of e-mail services on campus:
8000 unique IMAP connections/day
2500 unique POP connections/day
3000 unique Webmail connections per day
500,000 IMAP connections/day (total)
50,000 POP connections/day (total)
110,000 Webmail connections/day (total)
2GB+ mail arriving at Princeton.EDU every day

E-mail Reliability

http://netmonserver.princeton.edu/mrtg/servers.index.html shows CIT Networking provides utilization statistics showing uptime of the various servers that comprise the e-mail infrastructure. In addition, CSG staff developed utilities to publish daily e-mail

statistics: http://imap.princeton.edu/mail-stats-summary.html. 99% of the intra-campus messages were processed within one second and 100% were processed within one hour. The average processing time per message was less than 2 seconds.

Computer Security with SSH, Kerberos, SSL

CSG staff continued the development work for an improved computer security environment. The projects underway are designed to achieve three goals:

- Eliminate sending passwords in the clear;

- Eliminate other ways that hackers might crack passwords;

- Provide the option of synchronizing passwords across centrally managed systems.

In conjunction with other CIT units, CSG is working towards these goals by developing the "back-end" software for widespread use of three security features: SSH, SSL, and Kerberos. The main SSH work was finished in September 2000. The SSL and Kerberos systems are now in place.

Lists Service

During FY01, CSG staff evaluated new List management software to replace the current system. The current system, Listproc, is no longer being actively developed or supported by its vendor. The main criteria for a new list management system include:

- A system powerful enough to handle the 1,600 lists hosted by Princeton;

- A graphical user interface for list owners and subscribers.

CSG identified LISTSERV from L-Soft International as the replacement software for ListProc. Through the second half of the year, CSG staff developed and tested migration utilities to facilitate an easy migration to the new list management software. The migration to the new software should occur before September, 2001.

Webmail

Students are the main group using CIT's current webmail service. Towards the goal of providing a more fully featured and faster webmail client, CSG staff evaluated several webmail clients for the central IMAP e-mail service:

- IMP
- Silky Mail
- TWIG
- Netscape Messenger Express 4

Webmail clients are designed for users who are away from their main computer. As a result, Webmail clients do not have all of the features of the popular desktop clients for IMAP access. Most do not support two desirable features, filters and roaming address books. However, Netscape Messenger Express 4 performed well during tests. In the coming months, CSG will finish the testing of the four products.

Second Tier Support

During FY01, CSG staff responded to 411 tickets from the Help Desk. These were questions that could not be answered by existing documentation or by Help Desk staff. Such questions often lead to new documentation or interface improvements.

FY02 Goals

In addition to the work of maintaining and enhancing the core services, CSG will participate in the Authentication Project, provide authenticated SMTP service; increase campus usage of security protocols for access to centrally managed servers (SSL, SSH, Kerberos); deploy web-based electronic mail list management software; and bring up a production PKI infrastructure.

Web Services Group [WSG]

The Web Services Group [WSG] provides consultation, technical support, and leadership in the creation of web-based materials and technologies for the University. Web Services supports the software infrastructure of the University's main web site, as well as enterprise-wide services that support administrative and academic web sites. The group also serves as the gateway for public inquiries that come to the University by way of the main web site.

Web Services undertakes projects requested by the campus community, including web site design and development, web application development, technical consultation, and training. Web Services members also frequently serve on committees and advisory panels that require technical or "historical" perspectives on the web at Princeton.

Departmental Web Sites

Requests for assistance with departmental web sites continued to grow FY01. WSG added a new hire to meet the demand and several additional staff devoted much of their time improving specific sites and assembling tools for departmental webmasters. Requests ranged from simple advice and consultation to complete development starting at the conceptual phase. WSG assisted more than twenty departments, including:

McGraw Center for Teaching and Learning: WSG performed all design work and implementation.

Princeton Blairstown Center: WSG staff overhauled the existing site.

Society for Intercultural Comparative Studies: WSG launched a complex site with an online registration system and an online bibliography system that permits registered users to edit submitted papers.

Academic Managers Group Guidebook: An APT team was charged with creating print and web versions of departmental data. WSG brought forward several approaches.

Table 1 lists the departments that WSG assisted during FY01.

Table 1. – Web Site Projects

Department/Site	Work Done
McGraw Center for Teaching and Learning	Worked with McGraw staff on complete site design and development.
Student Computing Initiative	Worked with TIS staff on concept; did graphic, user-interface design and implementation.
Society for Intercultural Comparative Studies	Worked with content owners on initial concept; Graphic design and rendering; Application programming for online event registration and interactive bibliography.
Princeton Blairstown Center	Advised on two-phase plan. Phase one improved existing site. Phase two included completely new design and implementation.
James Madison Program in American Ideals and Institutions	Complete site design and development.
Department of Politics	Redesign and improvement of existing site.
Facilities	Graphical design and templates.
Environmental Health and Safety	Advised on process and graphical design.
Development	Rendered outside designer's concepts; Provided original graphic design and implementation.
Office of the Dean of Undergraduate Students	Provided assistance, templates for Princeton "look & feel".
American Studies Program	Provided assistance, templates for Princeton "look & feel".

Visa Services	Consulted with staff responsible for web site update.
Office of the VP for Campus Life	Provided assistance, templates for Princeton "look & feel"; Consulted on pages already developed.
Office of Loans and Receivables	Worked with group responsible for application to represent appropriate adoption of Princeton "look & feel".
Office of the Vice President and Secretary – Presidential Search	Met with staff charged with Presidential search; Provided initial page for staff to maintain.
Academic Managers Group Guidebook	Gave several presentations to related groups on strategy; Moved on-line version forward.
University League	Provided assistance, templates for Princeton "look & feel".
Honors Committee	Created web pages for new Honors Committee members.
CIT Survey Project	Created web site to communicate results of CIT customer satisfaction survey.
PeopleSoft Documentation	Provided technical consultation in initial sessions with outside vendors; Posted final versions to the web.

Front Page

As a result of requests for support of Front Page and DeSC's agreement with Microsoft to include Front Page on DeSC machines, WS made Front Page the supported HTML editor. WS's Front Page training served approximately 70 participants (27 SCAD staff, 20 CIT staff and representatives from 12 other departments) before Technology Integration Services integrated such training into their main Windows and Office 2000 course. WS staff also developed University templates in Front Page (and Word 2000) for use by departments.

Web Applications

During FY01, WS developed a significant number of web applications for departments.

Clinton Lottery: Three separate web-based applications permitted faculty, students, and staff to register in lotteries for tickets to attend President Bill Clinton's keynote address in Richardson Auditorium. The web applications successfully logged 6,000 registrations.

Winners were randomly selected as needed by the Woodrow Wilson School, the Office of the Graduate School, the Office of the Undergraduate School, the Office of the Dean of Faculty, and the Office of Human Resources.

Commencement and Hooding Ceremony Online Reservation System: A web-based application provided a secure online reservation system for Baccalaureate, Dean's Brunch, the Hooding Ceremony and Commencement.

Surveys: WS assisted many surveying efforts, including a CIT Customer Survey, an Ombuds Survey, Relationship and Questionnaire Surveys for Psychology studies, Woodrow Wilson School surveys, a Management Diversity Conference Survey (Human Resources), a PAW Survey, and three Princeton Experience Surveys (sophomore, senior, and grad) for Survey Center.

WS also enhanced or updated existing applications included the Faculty Computer Program, the Annual Giving Online Pledge System, and Financial Aid Estimator Calculator.

In support of the Student Computing Initiative (SCI), WS worked with Technology Integration Services to construct an online ordering system that was independent of vendor applications. The project reused existing code but also created a software infrastructure that would support most of the other computer ordering systems (Faculty Computer Program, DeSC, etc.).

Database assistance

WS provided database consultation to the Molecular Biology ("Reprints"), Astrophysics ("Serials Tracking") and CIT ("IT Reclassification Survey").

WS assisted Firestone Library in load-testing new software. WS provided advice and assistance to CIT Support Services for a "Dormnet SWAT Team Survey."

During FY01, WS enhanced its own productivity applications DBToolbox, Survey and WebAnnounce. WS enhanced WebAnnounce to run in an NT environment. As a result, the Woodrow Wilson School can use the system on their home page. WS upgraded WebDB, the physical server that hosts all of the DBToolbox applications, to accommodate Access 2000 databases. WS upgrades to the Survey System included the following features: tabulate and graph; randomized questions and randomized answers; automatic (numeric, letter, Roman) labeling of questions; granting of survey privileges; alternate authentication source via Survey Password List; "JumpTo Survey" feature; automatic hidden responses loading.

Streaming Media

In response to increased interest in the use of streaming media, WS assembled a comprehensive plan to upgrade capacity.

First, during FY01, WS installed servers, encoding computers and software to add support for the Microsoft Windows Media, Apple QuickTime, MPEG-1 and RealNetworks format. To accommodate the live and on-demand Webcasting of various formats, WS increased the total available streaming media content storage capacity from 50GB to 1TB. In support of academic projects, WS added a dedicated Academic Streaming Media RealServer and upgraded RealNetworks licensing from 200 to 600 streams. The new MPEG-1 streaming license is limited by the current 600 RealMedia streams. Windows Media and QuickTime streams are limited only by network bandwidth. A total of more than fifteen hundred streams can be delivered simultaneously.

Second, WS improved streaming reliability by placing servers and encoders on their own switched network in the 87 Prospect Computer Room. As a result, the service is less vulnerable to denial-of-service attacks and all of the hardware is now located in a secure, conditioned environment. Antennas for AM and FM reception were installed on the roof of 87 Prospect Ave. and tied to encoders in the computer room to obtain the strongest reception of WPRB FM 103.3. As a result, the University radio station is now continuously streamed on the Internet.

Web Statistics

WS added the net.Genesis net.Analysis Pro web statistics application service. Users are now able to analyze months and even years of Web statistics. WS initially offered the service to "power-users" and departments that needed a high-end tool to evaluate Web site usage but has since extended the functionality to the whole campus.

Support Services [SS]

CIT Support Services provides the core, end-user IT support for the campus community. In every metric, SS is showing a significant increase in the amount of service delivered to the campus community, better response time (and better responses), and overall improvement in service, all with the same level of staffing. To continue to support the ever-growing use of information technology and to continue to improve on the services being offered, some additional staff resources will be required.

Four groups provide this core, end-user support:

- Desktop Computing Support (Hardware and Software Support) provides infrastructure and in-office computing support.

- The Help Desk provides support through direct telephone, e-mail, and appointment consultations and through an extensive web site with a complete Princeton IT knowledge base.

- Student Computing Services provides support for students through the Residential Computer Consultant program and provides IT resources in CIT-sponsored computer clusters.

- Distributed Computing Support (DCS) provides a liaison and coordination role for departmental IT staff. The cornerstone of DCS is the Provost-supported SCAD program, which has placed support staff in 43 academic departments and programs.

Dormnet

During FY01, Support Services coordinated the Priorities Committee request to eliminate the direct, separate charge for student Dormnet access. On the recommendation of the Priorities Committee, the University combined the Dormnet fee with the general housing fee for all undergraduates and most graduate students living in Dormnet-capable housing. The action takes the campus much further forward toward a ubiquitous computing environment.

During FY01, Dormnet was extended to Lawrence Apartments and the Grad College Annex. The University agreed that all new living spaces for graduate students would be data capable. Within two years, the University will upgrade Dormnet to switched 10Mb network service.

Computer Clusters

CIT has the most experience on campus in providing computers in a shared lab or clustered environment. During FY01, Student Computing Services made available a

"standard cluster image" to academic departments who choose to run their own labs. The new approach permits departments to take advantage of site and group licenses for software. Users appreciate that most campus computing clusters have a common desktop and common features.

Distributed Computing Support

Participation in the Distributed Computing Support (DCS) program, the parallel program to the very popular SCAD program, accelerated during FY01. Thirteen academic departments joined the program. More than 20 support staff from these departments participated. Similar growth is expected in FY02.

Wireless

Support Services also promoted the limited expansion of wireless computing on campus. During FY01, the major additions were in front of Nassau Hall and within the Frist Campus Center, where most of the center's 200-level floor and the courtyard outside the 100-level floor are now covered.

Desktop Computing Support [DCS]

DCS provides timely walk-in and in-office hardware and software computing support as well as Cable Television services to the University community. Other related services include in-depth computing needs analysis and guidance on strategic planning. DCS also provides analysis and advice on new technologies and determines the best methods for providing ongoing support.

Software Support Group [SSG]

During FY01, SSG created, edited, responded to, and/or dispatched 5,864 jobs relating to support issues in 141 different campus departments. The top five departments served were CIT, Mechanical and Aerospace Engineering, Athletics, the Graduate School, and the Office of Dean of the College. Some of the highlights of this year's activities included:

Needs-Analysis Consultations

SSG conducted a thorough analysis of existing computing hardware and software as well as networking for the Blairstown operation in Warren County New Jersey.

SSG completed a similar analysis for the Princeton Alumni Weekly, which had relocated its operation to 194 Nassau St. during late summer 2000. SSG recommended and helped to implement a high-speed remote access service (NAS DSL) service as the means of communicating with the main campus network.

SSG continued to make ongoing recommendations for the office of Government Affairs in Washington, D.C.

Training Activities

SSG provided several formal Windows NT and 2000 training sessions for SCAD/DCS members and other groups. SSG staff also provided numerous one-on-one training consultations with faculty and staff in their offices.

Special Assistance for the user community

SSG developed and tested the procedure for migrating DeSC machines from Windows NT/Office 97 to Windows 2000/Office 2000. The procedure became the basis for the DeSC migration and was used internally as well as externally by SCAD/DCS and other technical staff.

With the assistance of PC Systems, SSG developed an internal support website for querying the DeSC SMS data for support purposes. SSG staff developed Windows 98 redeployment images for older DeSC machines. Staff developed quicker procedures using a special CD for restoring a machine from ADSM backup.

Special Projects

SSG worked jointly with the Hardware Support group and other computing support staff to migrate more than 2,200 DeSC computers to new minimum hardware standard, the Windows 2000 operating system and Office 2000 applications suite. The project began in March, 2001. By the end of the year under review, the SWS/HWS teams had completed the replacement and upgrade of more than 800 computers.

SSG assisted with the network resubnetting of the Green Hall Complex.

SSG collaborated with the Help Desk and PC systems to devise and implement procedures for tightening Linux security on campus.

Based on direction set by the Enterprise Services department, SSG visited many offices for the purpose of "converting/upgrading" Ontime calendar users. The calendar project involved installation of a new client. The project also involved eliminating departmental servers and redirecting many users to the centralized CIT Ontime calendar server. On a related front, SSG supported a large increase in Palm Pilot usage with the Ontime client.

SSG assumed full responsibility for ongoing maintenance of the Armory Training Room computers. As a prerequisite SSG worked with IS and P2K on development of a standardized desktop image for that facility.

SSG assisted CIT Hardware Support with several Faculty Computer Program installations.

SSG assisted Student Computing Services on the planning, selection of product, testing and installation of kiosk systems.

SSG continued to advise and support Public Safety on its upgrade of the University fire alarm systems.

Finally, SSG worked with PC Systems to convert current Novell print queues to NT print queues.

Hardware Support Group [HSG]

During FY01, the Hardware Support group provided a range of daily services to a growing community of computing and Cable TV clients including: installation, upgrade and repair of microcomputers, connections to the campus data and Cable TV networks, and maintenance and ongoing improvements to the Tigernet infrastructure.

Building Renovation/New Construction Support

HSG routinely supported the Facilities department during the renovation and construction of campus buildings. Such support usually involved removing old data wiring, network equipment, and/or PC clusters, and eventually reinstalling such infrastructure. Renovations often provided the opportunity to upgrade the wiring infrastructure. The list of the most noteworthy efforts during FY01 is in the appendix.

CIT Initiated Wiring and/or Network Upgrades

The group continued to improve the design and performance of the campus data network. Project highlights are in the appendix.

Computer Cluster Support

HSG continued to be CIT's and other departments' labor resource for the upgrade, replacement, and/or first-time installation of computing equipment in campus computer clusters.

Mathey College

HSG installed a new cluster in the basement of Madison Hall. All computers are connected to 10meg switch ports with a 100 meg uplink back to the core. HSG installed a new Etherlock alarm for security. Staff removed the Old Madison and Joline computer clusters.

New Grad

HSG installed a new DMC cluster in the basement of entry 34.   All computers are connected to 10meg switch ports with a 100 meg uplink back to the core. Staff installed a new Etherlock alarm for security.

Frist Campus Center

HSG installed nine new Dells in public areas on the 2nd and 3rd floors. 10 new IBM's were installed at walkup locations on the 100-level of the building.

Bendheim Center for Finance

HSG installed two new private computer clusters. Etherlock alarms were installed for security.

Equad

HSG wired the J-wing atrium area for private computer cubicles. Etherlock alarm was installed for security.

Kiosk

HSG moved the East Pyne Kiosk to a new location in Jadwin Gym.

Preventative Maintenance

HSG continued to serve various preventative maintenance plans throughout the year. Such plans are aimed at ensuring the integrity of computer cluster equipment and alarm systems, the Tigernet Broadband, the Cable TV backbone, the Tigernet uninterruptible power supplies (UPS), and the wiring distribution closets. Such efforts help to allay potential problems before they have an impact upon University users.

Special Projects

HSG was involved in several special projects during FY01including:

Dormvideo

During FY01, HSG installed 319 Limited Basic, 647 Basic and 120 Total video connections and completed 422 video repairs.

Dormnet

HSG replaced missing Dormnet hub components in dormitory rooms in August 2000 and completed 183 repairs during the year.

DBS Dish Installation

HSG installed another 30-inch DBS dish in the satellite yard for foreign programming and worked with Dishnetwork (Echostar) to provide 4 additional foreign channels. HSG piped these channels over fiber to the Cable TV headend in McCormick. HSG installed a channel switch to rotate the six foreign channels on two channels in four-hour time blocks.

Faculty/Research Computers

HSG delivered hundreds of computers to Faculty and Research staff as scheduled.

Wireless Computing

HSG setup CIT wireless computing zones in front of Nassau Hall and at 120 Alexander.

Classroom Wiring

HSG continued to add data connections to all Registrar scheduled classrooms.

SCI Project

HSG ordered, received, imaged and delivered 25 SCI laptop computers after the original SCI vendor declined the business.

DCS Goals for FY02

The Software and Hardware Support groups will work together and with other campus computing Support personnel to complete the DeSC migration project.

The Software Support group will continue to play an integral role in the successful implementation of administrative computing standards (DeSC) and deployment of new P2K applications. SSG will also play an instrumental role in the conversion from Novell to NT for printing and filesharing. In FY02, staff will augment support for the ever-growing Linux user community and developing support skills and experience in Mac OS X.

The Hardware Support group will complete many summer '01 wiring initiatives including expansion of Dormnet service to Lawrence apartments and Graduate Annexes as well as installation of wiring upgrades in several undergraduate dormitories. HSG will also work closely with CIT's Network Systems staff on several major network infrastructure upgrades including complete rewiring of Architecture, McCosh Hall and Dickinson Hall. HSG will also implement network upgrades and converting users to switched 10Mbps and 100Mbps Ethernet in several other buildings.

Also this summer, HSG will work on several Facilities department projects including the Genomics building and a new dormitory. Other exciting goals include support for a continuing deployment of wireless technology, and extension of the core services from 87 Prospect to New South for the purpose of improving disaster recovery.

Help Desk

The Help Desk provides quality and timely telephone, appointment, walk-in, e-mail and web-based computing support for the University community and serves as the single point of contact for all campus computing inquiries. During FY01, the Help Desk experienced an 87% increase in direct customer contacts (Academic Year '00 customer contacts totaled 49,526, Academic Year '01 customer contacts totaled 92,821).

New Infrastructure

Staff completely re-wrote the ticket escalation system (OPM) including automating statistics recording. The Help Desk redesigned the Appointment Center to permit more efficient support of customers' needs.

Disseminating Information

Staff re-wrote all training materials for student consultants and incorporated all training materials into our web site for all campus community members. Help Desk staff published four short newsletter for students.

Help Desk staff began the implementation of the "Help Desk Road Show," introducing Help Desk services to seven departments across campus as well as soliciting feedback on the effectiveness of the support the Help Desk provides.

Web Site Activity

The Help Desk deployed a new web site that provides real-time data on outages, computing news on campus, and a searchable knowledge base of answers at helpdesk.princeton.edu.

During the year, the web site received 6,546,485 hits from nearly 27,000 unique IP addresses. The requests represent more than 200,000 visits (visits are quantified as a series of hits separated by more than five minutes from non-Help Desk machines). The activity represents an increase in all areas when compared with the period of the previous year; web hits increased 179%, web visits increased 45% and individual IP addresses accessing our site increased 72%.

Training for Departmental Users

The Help Desk arranged training for all new SCAD/DCS members.

Help Desk staff assisted the Partnership2000 project teams with implementations of the following systems (provided training assistance as well as direct customer support):

- PeopleSoft Financials 7.5
- PeopleSoft HRSA (Graduate Admissions and Course Information Systems)
- PeopleSoft HRMS
- Time Collection
- Oracle Reports

Help Desk Goals

During FY02, the Help Desk expects to improve service to the campus computing community by increasing the average percentage of incoming calls handled by live consultants to 86%. The Help Desk will continue the growth and development of the Help Desk Road Show program and pursue greater staff development avenues for all consultants.

Student Computing Services [SCS]

Student Computing Services provided computing and printing facilities in 37 locations with a total of 231 Windows machines, 59 Macintoshes, 56 UNIX workstations, many mobile networking drops, and 34 printers. During FY01, 6.6 million pages were printed on SCS cluster and dormitory printers.

Computer Clusters

During FY01, new computer clusters were opened in the New Grad College serving Graduate Students and in Lower Madison serving the residents of the Rocky and Mathey Residential Colleges. Both facilities have Macs, PCs, a scanner, and at least one printer.

18 workstations, a printer, and 10 CIT kiosks were installed in the Frist Campus Center.

SCS assumed responsibility for the two MECA clusters at the Engineering Quad and for the distributed media clusters in Wilcox and Forbes College.

High speed streaming video service is now available on the SCS cluster machines in the Frist Campus Center, the Lower Madison cluster, McCosh B59 and the New Graduate College.

SCS clusters workstations were upgraded to Windows 2000 on the Intel based machines. This upgrade resulted in the need for less software maintenance. Cluster Macintoshes were upgraded to OS 9.0. During the year, there were more than 500,000 logins on the Windows 2000 machines. Logins on the Macintoshes are not recorded.

Most cluster hardware upgrades occurred during the summer of 2000 in preparation for the academic year. New PCs were installed in the clusters located in 1942 Hall, Butler Apartments, Lawrence Apartments, and the McCosh B59 cluster as well as in the two new facilities (Lower Madison and New Grad College). In addition, equipment was distributed to assure that new technologies are evenly spread across facilities.

Twelve new 21-page-per-minute Xerox N2125 printers were also installed in various facilities. In response to requests from students, Epson Perfection 1200U/1240U scanners were installed in eight locations.

The Windows 2000 computer cluster image was installed on 31 machines in five departmental student clusters.

Residential Computing Consultants

During FY01, 32 students worked as Residential Computing Consultants (RCCs) and successfully responded to 2,436 requests for assistance. The student assistants provided computing support to their peers in the dormitories, including the Graduate College. The 20 new RCCs at the beginning of the academic year underwent a two-day intensive training program. Working collaboratively with Desktop Support and the Help Desk, the RCCs staffed a "Dormnet" booth at the Frist Campus Center during the week preceding classes to assist students with Dormnet registration and installation. In addition, the RCCs visited every room in the Residential Colleges during the first full week of classes to ensure the successful connection of all first and second year students subscribed to Dormnet.

To assist with network troubleshooting, the RCCs used Compac Aero 1550s with Ethernet cards. As a result, the RCCs were more easily able to perform a wall plate (connectivity) check.

Goals

SCS will continue to reduce paper waste in the clusters and dormitories. SCS will also develop additional training opportunities for the RCCs.

During FY02, SCS will open five new clusters in the Friend Center replacing facilities in the E-Quad and Computer Science. One new cluster will be opened in Hibben-Magie Apartment Complex. The cluster in the Forbes Residential College and the cluster in the New Grad College will be renovated. SCS will oversee the installation of 48 new desktops and seventy-two laptops in various other computer cluster locations.

Ten new double-sided printers will replace outdated printers in 7 locations. SCS will create and support a temporary cluster in the Frist Campus Center for a special summer camp coordinated by Community House.

Distributed Computing Support [DCS]

DCS provides computing support directly within the Academic Departments.
During FY01, Distributed Computing Support augmented interest in the program among University departments. Nearly all academic departments and programs are (or soon will be) participating in the SCAD program. 34 support staff are serving 43 academic departments.

During FY01, for the first time, DCS extended the support program to administrative departments. 13 administrative departments and 20 staff are participating in the new program. DCS expects that the administrative program will double in size during FY02.

In addition to monthly meetings, which have been part of the programs since their inception, there are now monthly technical breakfasts, monthly training opportunities, and a subgroup that has assembled and now maintains a list of core competencies for Information Technology support staff on campus.

Participating Departments in SCAD Program

Applied & Computational Mathematics
Architecture
Art & Archaeology
Astrophysics
Atmospheric and Oceanic Studies
Center for the Studies of Religion
Chemical Engineering
Chemistry
Civil Engineering
Classics
Comparative Literature
Computer Science
Council of Humanities
Creative Writing
East Asian Studies
Ecology and Evolutionary Biology
Economics
Electrical Engineering
English
Geosciences
Hellenic Studies
History
Jewish Studies
Latin American Studies
Mathematics
Molecular Biology
Music

Near Eastern Studies
Office of Population Research
Operation Research Financial Engineering
Philosophy
Physics
Politics
Psychology
Princeton Environmental Institute
Princeton Material Institute
Religion
Romance Languages and Literature
Sociology
Theater & Dance
Visual Arts
Woodrow Wilson School

Listing of Departments that joined the SCAD program within the last year:

Center for the Studies of Religion
Council of Humanities
Creative Writing
Hellenic Studies
Jewish Studies
Latin American Studies
Physics
Princeton Environmental Institute
Romance Languages and Literature
Theater & Dance
Visual Arts

Departments that are members of the DCS Program:

Alumni Council
Art Museum
Dinning Services
Firestone Library
Frist Campus Center
General Council
Health Services
Human Resources
Princo
Telephone Office
Undergrad Admission
University Financial Systems

Training provided for SCAD members:

Adobe Acrobat
Front Page (Three Training Sessions)
Windows 2001 Networking (Two Training Sessions)
Basics Unix
Basics Linux (Two Training Sessions)
Advance Linux (Two Training Sessions)
Microsoft Office 2000 Upgrade Overview
Windows 2000 Professional Overview
Outlook
Power Point
Access (Two Training Sessions)
Excel

Appendix

Desktop Support Major Building Projects

Little Hall: Installed 170 of the 270 data cables. Termination of both room and closet end cables is in progress.

Blair Hall: 210 data cables were installed and terminated. Dormnet and Dormvideo services were activated in every bedroom and common room.

Frist Campus Center: Installed and terminated more than 500 data cables. Installed switched network infrastructure throughout the entire building. Two 100meg uplinks were connected back to the core.

Wallace Building: Installed and terminated more than 500 data cables. Installed switched network infrastructure throughout the entire building. A 100meg uplink was connected back to the core.

Henry House: Installed and terminated 40+ data cables. Installed a switched network infrastructure with a 100meg uplink back to the core.

New South: Data cables were installed and terminated on floors B, 1, 2, 3, and 6. Installed switched network infrastructure throughout the whole building.

Robertson Hall: Installed and terminated 300 data cables on the 1st, 2nd, 3rd and 4th floors. Installed switched network infrastructure throughout the whole building with 100meg uplink back to the core.

83 Prospect: Installed and terminated 60+ data cables. Installed switched network infrastructure with a 100meg uplink back to the core.

91 Prospect: Installed and terminated 40+ data cables. Installed switched network infrastructure with a 100meg uplink back to the core.

Dial Club: Installed and terminated 90+ data cables. Installed switched network infrastructure with a 100meg uplink back to the core.

Friend Center: Installed 350 of the 550 data cables. When complete, this building will have more than 830 active data connections.

Parking Garage: Installed 20 security cameras on all 4 floor of the garage. Each camera was wired back to web servers located in a centralized mechanical room.

Green Hall: Removed all equipment from the 2nd and 3rd floors. Cable pulling should begin in August of 01.

East Pyne: Removed all CIT equipment while building is being renovated.

Dod Hall: Removed all CIT equipment while building is being renovated.

Cuyler Hall: Removed all CIT equipment while building is being renovated.

Spelman Hall: Removed all CIT equipment while building is being renovated.

CIT Initiated Wiring and/or Network Upgrades

Moffett/Schultz Labs: Installed and terminated 254 cables. Installed new switched network infrastructure with a 100meg uplink back to the core.

Lewis Thomas Labs: Installed and terminated 401 cables. Installed new switched network infrastructure with a 100meg uplink back to the core.

Guyot Hall: Installed and terminated 375 cables. Installed new switched network infrastructure with a 100meg uplink back to the core.

Eno Hall: Installed and terminated 82 cables. Installed new switched network infrastructure with a 100meg uplink back to the core.

Frick Labs: Installed and terminated 525 cables. Installed new switched network infrastructure with a 100meg uplink back to the core.

Hoyt Labs: Installed and terminated 104 cables. Installed new switched network infrastructure with a 100meg uplink back to the core.

Corwin Hall: Installed and terminated 110 cables. Installed new switched network infrastructure with a 100meg uplink back to the core.

Fisher/Bendheim Hall: Installed and terminated 231 cables. Installed new switched network infrastructure with a 100meg uplink back to the core.

Fine Hall: Installed and terminated 350 cables. Installed new switched network infrastructure with a 100meg uplink back to the core.

Sayre Hall: Installed and terminated 50 cables. Installed new switched network infrastructure with a 100meg uplink to GFDL.

Lawrence Apartments: The installation of new wiring systems is currently in progress. Dormnet service will be available in all living rooms and bedrooms by the end of summer, 2001.

Graduate College Dorm Annex buildings: Installation of new wiring systems in currently in progress in all eight Annexes. Dormnet service will be available in all living rooms and bedrooms by end of summer, 2001.

Woolworth: Upgraded all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

Witherspoon Hall: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

Hamilton Hall: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

Macmillian: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

58 Prospect: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

Forrestal Hangar: Changed all networking from 10meg shared to 10meg switched. The building pipe remained at 10meg

Patton Hall: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

Joline/Campbell Halls: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

Walker Hall: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

1927/Clapp Hall: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

Feinberg Hall: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

Edwards Hall: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

Scully Hall: Changed all networking from 10meg shared to 10meg switched. Upgraded the building pipe to 100meg.

Equad: Converted Civilnet from private wiring to the new 10switched network. Upgraded the uplink to 100meg.

Old Grad: Upgraded the building pipe to 100 meg for DMC cluster bandwidth requirements.

New Grad: Upgraded the building pipe to 100 meg for DMC cluster bandwidth requirements.
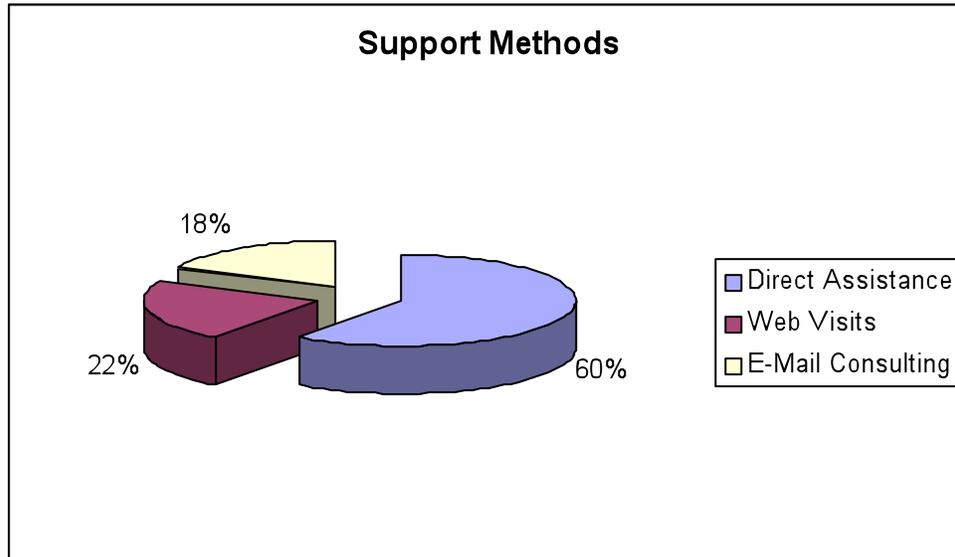
Help Desk Support Methods

Month	Phone Tech Support	E-Mail	Front Desk	PeopleSoft	Appts	Data Recovery	Postmaster/ Restores	Total
Jul-00	3,356	1118	644	548	110	34	12	5,822
Aug-00	4,265	1343	764	518	109	8	33	7,040
Sep-00	6,757	1,814	1256	563	311	24	69	10,794
Oct-00	4,835	1,562	666	422	90	26	151	7,752
Nov-00	3,622	1,086	465	354	113	42	111	5,793
Dec-00	3,109	878	323	320	105	8	59	4,802
Jan-01	4,540	1162	505	766	129	30	56	7,188
Feb-01	4,516	1,466	500	1198	100	19	93	7,892
Mar-01	4,260	1362	497	1060	123	50	56	7,408
Apr-01	4,882	2768	552	1633	59	68	75	10,037
May-01	4,197	3078	547	915	147	55	253	9,192
Jun-01	3,922	3099	553	1205	126	3	193	9,101
Total	52,261	20,736	7,272	9,502	1,522	367	1,161	92,821
Percent	56%	22%	8%	10%	2%	0%	1%	100%

Customer Contacts by Type
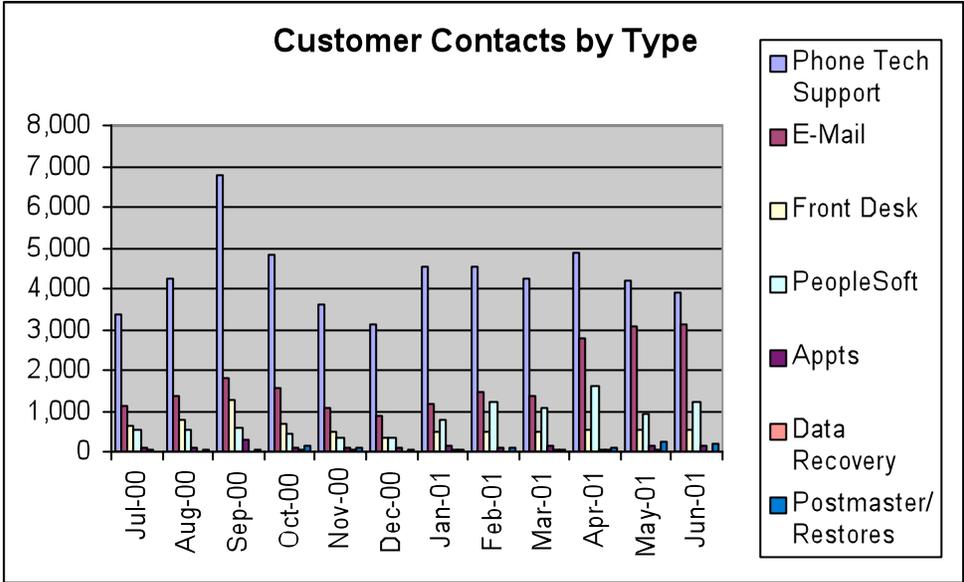
Automatic Call Distribution (ACD) Statistics

Group	Calls Recv'd	Calls Answ'd	Percent Answr'd	Calls Aban'd	Percent Aban'd	x'fer to Vmail	% X'fer to Vmail	Abvg Time to Answr	Avg Time to Aban'd	Avg Talk per Call
Technical Consulting	27031	22512	83%	2862	11%	1638	6%	0:36	1:18	5:24
Front Desk	7272	5961	82%	855	12%	391	5%	0:26	2:14	2:01
PeopleSoft	7346	4991	68%	968	13%	895	12%	0:40	1:35	3:52
SCI	664	466	70%	111	17%	58	9%	0:56	2:22	2:35
Totals	42313	33930	80%	4796	11%	2982	7%	0:34	1:31	4:34

Routing Activity