

# TECHNOLOGY

Leading  
Strengthening  
Inspiring  
Securing  
Enabling  
Supporting

Office of  
Information Technology

2012-13 Annual Report



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# Letter from the Vice President

This has been a year of both change and stability at Princeton and in OIT. From the appointment of Chris Eisgruber as the 20th President of Princeton University, to the selection of David Lee as our new Provost, with the search for a new Executive Vice President, and with my own appointment as Vice President for Information Technology, there has been an historic amount of change in this single year. This change, however, takes place amidst a remarkable stability in terms of operational excellence for OIT. The story of this annual report is the story of high-quality, motivated, and dedicated staff that delivered an outstanding year despite change and unprecedented challenges.



Throughout this report, you will read about both the variety and complexity of the work achieved by this department. Our Administrative Information Services staff continued to create, maintain and support software applications that instantiate Princeton's unique business processes. Major projects like Princeton Prime and the Student Activities Funding Engine (SAFE) contribute to the University's mission of stewardship and strengthen the University's commitment to providing unique opportunities for our students.

Our Research Computing and Academic Services groups provided vast computational resources that facilitate world-class research and help create transformative opportunities for education through Massively Open Online Courses (MOOCs) and worldwide outreach.

You will also see through this report that our infrastructure and support services groups delivered unshakeable, rock-solid service through one of the worst natural disasters to ever befall New Jersey. Princeton University was able to sustain its operations and serve its students through Hurricane Sandy because the technology of the University—our network, our servers, and our communications systems—all operated without failure. We, of course, depend on other campus service organizations to meet the needs of our clients. In particular this year, we could not have achieved our objectives without the help of our key partners in Facilities Management—they kept the lights on and the power flowing so we could keep the campus IT going.

As a support organization, our ability to deliver quality information technology services depends on the commitment of every member of our staff. Whether it is a reassuring voice on the phone from our Support and Operations Center at 2AM or a quick repair of an ailing computer, or a consultation with our training, technology consulting, or project management services, each and every interaction we have with our clients is important. I hope that this report explains what we accomplished in a way that shows you who we are.

I would like to close this letter by thanking Betty Leydon for her eleven years of service to Princeton University as Vice President and CIO. During her time here, Betty built and nurtured a high-quality, service-oriented organization that embodies all of the best characteristics of this great University. Her leadership has left a lasting impression on this organization and she will long be remembered by her many friends and colleagues. I owe her my personal thanks for leaving me an organization that is well respected, collegial, and welcoming.

*Jay L. Dominick*



# OIT Mission and Core Values

## OIT Mission

The mission of OIT is to enable the effective use of information technology in support of the University. In pursuit of this mission, OIT strives to:

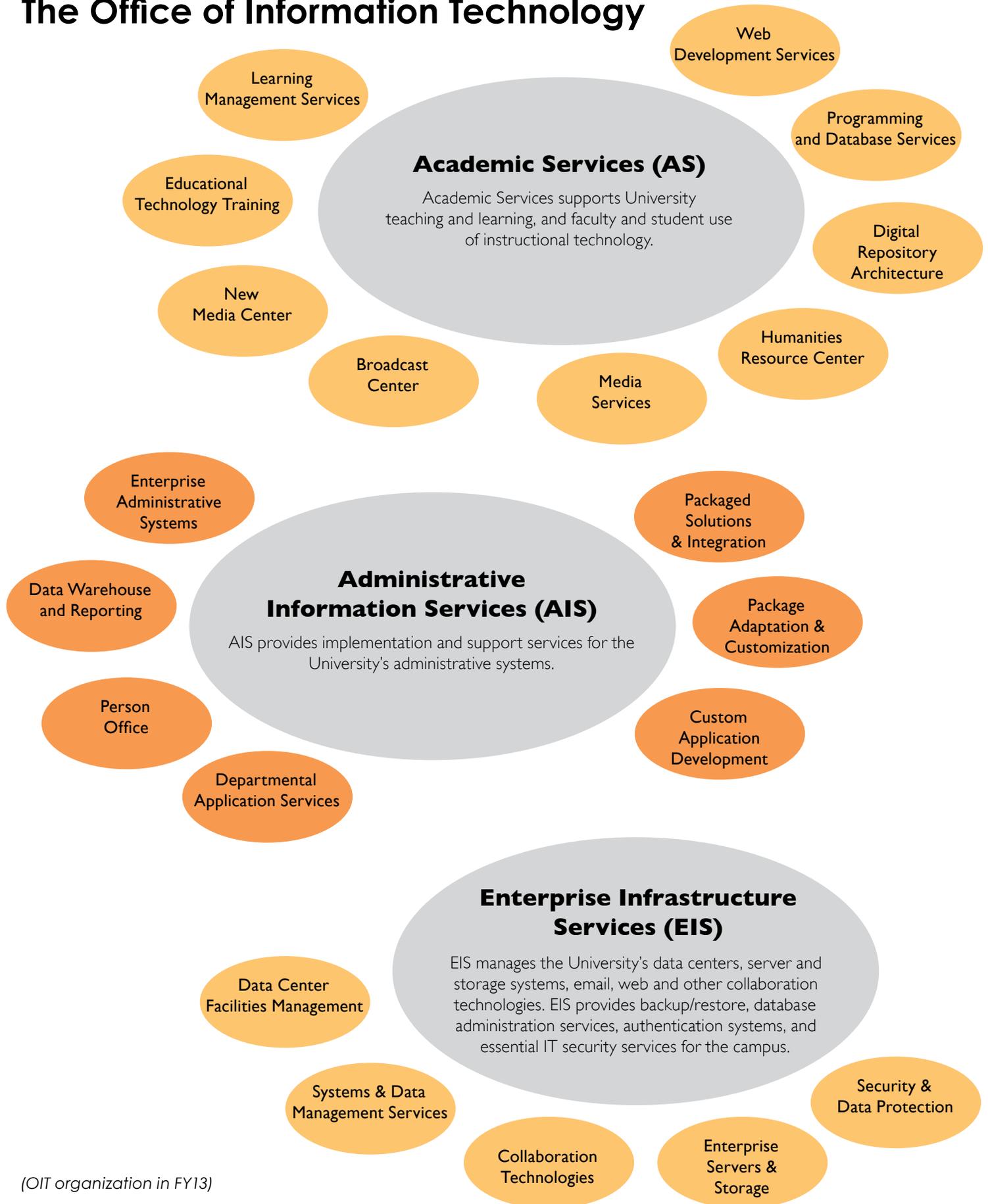
- Deliver information technology products and services that meet the needs of the University community and achieve the highest level of customer satisfaction;
- Support the use and development of information technology to enable innovation in teaching, learning, research, and scholarship;
- Provide leadership 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 Princeton.

## OIT Core Values

We strive to provide excellent service to the University community. We value professionalism, communication, respect, and integrity, and we commit ourselves to:

- |                     |  |
|---------------------|--|
| <b>Excel</b>        | We aim for excellence in all we do. We endeavor to exceed the expectations of our customers and colleagues. We recognize exceptional performance.                          |
| <b>Learn</b>        | We are committed to the professional development and personal growth of our members. We encourage collaboration and take advantage of learning opportunities.              |
| <b>Listen</b>       | We value the opinions of all stakeholders and give fair consideration to their perspectives. We listen and learn from each other, because good ideas can come from anyone. |
| <b>Inform</b>       | We disseminate accurate information in a timely manner. We promptly share decisions with those affected by them.   |
| <b>Participate</b>  | We strive for inclusive processes and to reach decisions by consensus when appropriate. We are responsible for staying involved and informed.                              |
| <b>Show respect</b> | We are honest, responsible, thoughtful, responsive, and well-mannered. We act with integrity.  |
| <b>Enjoy</b>        | We foster an environment where creativity, diverse ideas, humor, and fun are encouraged. We enjoy what we do and celebrate our successes.                                  |

# The Office of Information Technology



(OIT organization in FY13)

## Research Computing (RC)

Research Computing provides computing, storage, and software infrastructure and programming services to support faculty, professional staff, and students in their research.

Research Computing Systems

Research Computing Software & Programming

Research Computing Storage

Technology Consulting Services

Policy & Contract Administration

Strategic IT Communications

Software Volume & Site Licensing

## Operations & Planning (OP)

O&P is responsible for overall organizational operations and planning efforts and for facilitating major initiatives that strengthen campus-wide IT services.

O&P is also responsible for administrative strategic initiatives, including OIT staff relations, recognition and development.

Organizational Effectiveness

Training & Documentation Services

Collaboration & Conferencing Technologies

Budget & Finance

IT Security Officer

## Princeton Project Office (PPO)

The PPO supports the University IT governance process and facilitates the annual campus-wide IT project selection process. The office also provides standard project management methodology, training, and assistance to project managers to help ensure project success.

IT Project Portfolio Management

Project Management Consulting

Support & Operations Center

Project Methodology, Tools & Training

Student Computing Services

## Support Services (SS)

Support Services provides front-line information technology support to all members of the University community.

Department Computing Support

University Managed Computers

KnowledgeBase

Software and Hardware Support

Network Systems and Operations

Telephone Services

# Technology Leading Innovative and Forward Thinking

## Web Feed Registry responds to growing need and inspires student app development

Many students at Princeton develop mobile and web applications. The motivation driving the creation of these apps is often course assignments, such as Advanced Programming Techniques (COS 333); local and regional app competitions, such as the one organized by the Princeton Entrepreneurship Club (E-Club); and a general interest in enhancing campus life.

In many cases, student-developed applications need access to campus data. To support this growing trend, OIT collaborated with a number of offices and created a Web Feed Registry (WFR) website. Here, students and other developers at the University can discover and programmatically access data, such as campus locations, dining hall menus, athletic schedules, course offerings and public events. Students can also request new data feeds through the WFR, which a committee of administrators then reviews for possible inclusion in the WFR.

Students have already built apps using available web feeds. For example, a team of students in COS 333 built a user-friendly interface to OIT's ListServ service for their final class project. With a little added work, the student app can be made available by OIT to enable campus constituencies to more easily manage their ListServ lists. OIT looks forward to and expects to support more student-created apps that use University web feeds.

## OIT Clusters offer video editing and collaborative workstations

OIT usage statistics show that students use course-related resources at almost every hour of the day. This can sometimes make it difficult for students to find the resources they need once our technology 'places' like the New Media Center are closed.

To extend access to video editing software, two "media-rich" computers have been installed at each of the residential colleges. Students can now continue working on a project started at the New Media Center back at their home spaces 24/7.

Collaborative workstations with large screens have also been installed in OIT clusters at each residential college, which students can use to display their work and work as a team.

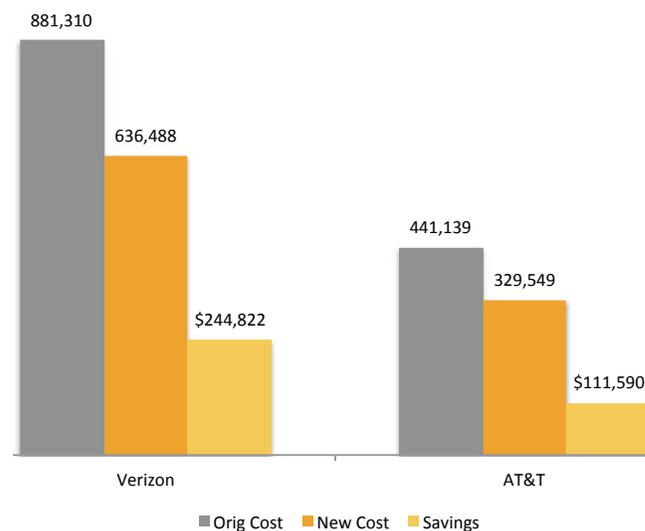
## Mobile consolidation project saves 350k and simplifies billing for departments

OIT and the Office of Finance and Treasury partnered on a project to simplify the management of mobile service plans and to reduce the growing costs for these services at Princeton.

At the start of the mobile consolidation project, University mobile services were handled by more than 300 departments and included more than 1,400 mobile devices. The management of mobile services was further complicated with payment methods that varied from department to department and included a mixed bag of payments by credit card, payments by white invoice, and payments processed through the Treasurer's office. This inconsistency sometimes led to misapplied payments and late payments, which then had to be resolved to get proper credits and debits applied to department accounts.

The project team learned about special plans with Verizon and AT&T for the Western States Contracting Alliance (WSCA) Group Purchasing Organization, for which the University was qualified. OIT and the Office of Finance and Treasury worked to restructure current billing practices to meet new plan requirements and enable adoption. Now in place, the new plans effectively reduce Princeton's overall cost for mobile services by more than \$350,000 annually.

### University Mobile Service Annual Cost and Savings



The new plans also simplify the management of mobile service plans at Princeton. All mobile accounts are consolidated into a single account, by provider, that is centrally managed by the OIT Telephone Services group. The OIT Finance department receives a single detailed 'University' bill from each provider, Verizon and AT&T, which is then uploaded to the Departmental Charges system. Mobile service billing simply appears on each department's monthly project grant statement, freeing departments from the administrative work required to process individual bills and payment to a vendor.

The University's new mobile plans offer 400 minutes, unlimited data, and unlimited texting. By consolidating the minutes of all University accounts and offering unlimited plans to everyone, the average cost per user was lowered 25% to 28% and overage charges the University was previously paying have been eliminated.

## e-Learning enhances training and offers just-in-time learning

OIT is exploring the use of e-learning videos as a means to complement and expand the current training curriculum offered to the University by the OIT Training and Documentation Services group.

By determining the best fit for e-learning within a particular training curriculum, the use of videos can be appropriately applied to supplement classroom learning and provide on-demand video reference material that can be assigned as a prerequisite for, a follow up to, or in place of classroom training. Strategically developed e-learning can increase productivity by optimizing the time spent in training classes, as well as providing users with real-time and continued access to related learning resources that can help improve retention.

E-learning formats also provide a method for extending limited training resources to a greater number of people. With e-learning options, students are also free to choose when and where they want to learn.

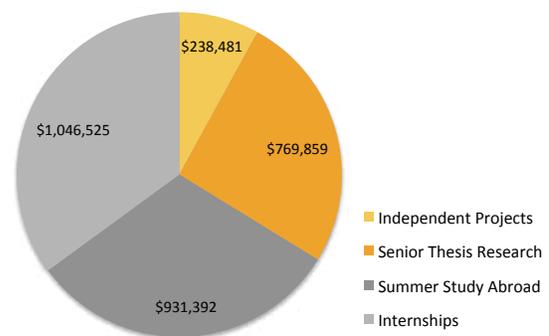
E-learning videos are also being assessed as a solution for delivering essential compliance-related training, complete with tracking and reporting functions.

## Student Activities Funding Engine (SAFE) automates application for and distribution of funding

The new Student Activities Funding Engine (SAFE) is a custom-built solution developed by OIT in close partnership with the Office of the Provost, the Office of the Vice President for Campus Life, and the Office of the Dean of the College. The project is an outstanding example of coordination and cooperation across campus and serves as a model for future technology efforts.

The new SAFE system coordinates the process for funding undergraduate student activities, providing an easy mechanism to use for both undergraduate students and University funding sources. SAFE brings both of these groups together and brokers student funding needs with funding opportunities, and helps ensure fair and equitable distribution of funds (such as those used for senior thesis, summer study abroad, and internships and fellowships) to the greatest number of students. SAFE increases transparency and improves the efficiency of the funding process. Before SAFE, no method existed for reporting on cross-campus funding allocations. SAFE enables the University to track and report on how funds, including endowed gift funds, are spent at the University on behalf of students and creates numerous other workflow efficiencies.

### Award Totals by Activity Type for the Spring 2013 Funding Round



Currently, there are 198 funding opportunities in the SAFE system. Students submitted 1,142 applications requesting funding. 970 student projects received funding totaling \$2,986,257. The students who used SAFE to request funding represent more than 35 concentrations of study.

Plans are in progress to extend SAFE to support additional processes, including funding for on-campus activities and group activities. The system is also being developed further to include integration with Concur, the University's new online travel booking and expense management system.

# Technology Inspiring Teaching and Learning

## Coursera online course production at Princeton

OIT has been working closely with the McGraw Center for Teaching and Learning to produce online courses for the fall and spring semesters. The Massively Open Online Courses (MOOCs) are offered through Coursera.org and are immediately popular, drawing tens of thousands of participants from around the world.

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*Princeton's 'Sociology 101' is the first social science course offered through Coursera*

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The OIT Broadcast Center also worked with the Council on Science and Technology to produce in-classroom recordings of introductory science courses for use as teaching resources at Princeton and, as appropriate, beyond our campus.

### Princeton Coursera Courses in FY12

Statistics One	Algorithms Part I	Algorithms Part II
A History of the World Since 1300	Computer Architecture	Networks: Friends, Money and Bytes
Analytic Combinations Part I	Analytic Combinations Part II	Introduction to Sociology

In total, the OIT Broadcast Center jointly produced approximately 880 hours of online video of lectures, seminars, discussions, and labs, and dedicated nearly 2,000 hours consulting with faculty on course design (lectures, assessments, etc.) and on the related work of pre- and post-video production, including course management.

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*880 hours of online video was produced to support online courses*

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In FY14, four of this year's courses will run again in the fall. Plans for the coming year include producing five new online courses to offer in the FY14 academic year.

## Digital Humanities Initiative for interdisciplinary vision

The Digital Humanities Initiative (DHI) fosters interdisciplinary connections across the humanities, computational sciences, and library sciences with participants from the Library, the Office of Information Technology, campus museums, and more than 20 programs and departments, including English, Computer Science, History, and Music. The initiative looks to inspire new research questions and new approaches to classic topics of humanities scholarship, while continuing to leverage the University's unique history and solid grounding in the humanities.

Group discussions identified four areas around which workgroups were formed to research and provide actionable recommendations for the short, medium and long terms for their area of focus. The areas being explored are research and teaching; programming (events); infrastructure and sustainability; and funding.

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*The Digital Humanities Initiative connects the humanities, computational sciences and library sciences*

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Immediate goals of the Digital Humanities Initiative are to:

- Inspire and facilitate new scholarship, knowledge, collaborations and resources for humanities projects at Princeton
- Build networks, skills and tools for novel forms of humanistic and computational interaction and interpretation
- Leverage Princeton's resources to inspire and facilitate the creation and innovation of new kinds of cross disciplinary discovery, research, and knowledge in the humanities and computational sciences
- Provide a nexus to showcase existing projects, best practices, and new cross disciplinary digital collaboration on campus (and beyond)
- Be project oriented, supporting individual tools, classes, departments and scholarship
- Seed, fund, support, promote and curate cross campus projects on digital humanities themes and topics

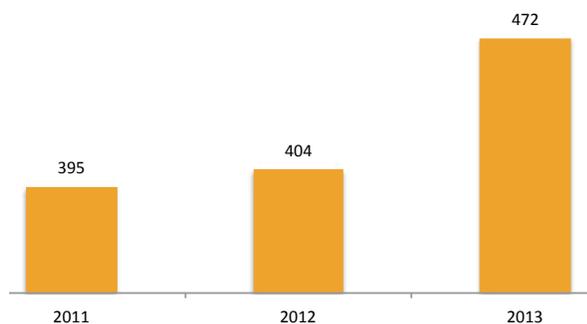
More information, including the full 'Proposal for a Digital Humanities Initiative at Princeton University' can be found online at <http://digitalhumanities.princeton.edu>.

## Video-on-Demand serves more courses and more disciplines

The OIT Video-on-Demand service of the Humanities Resource Center (HRC) provides online streaming versions of course video reserve materials. At its start more than 10 years ago, the HRC managed the delivery of video materials for 27 courses. In the past year, the HRC supported 472 courses and streamed nearly 3,300 individual films in support of teaching and learning at Princeton.

As one might expect, the majority of courses that use the Video-on-Demand service are within the humanities, but increasingly courses in engineering and the life sciences are incorporating video into the course curriculum.

### Courses Using Video-On-Demand Service Per Year



Videos streamed through Video-On-Demand are available through the Blackboard course website, where course participants can access the videos for the semester.

Working closely with the University Libraries, the HRC also houses and circulates a bulk of the University's collection of approximately 11,000 physical video materials, which includes valuable materials in legacy formats, such as video cassette and laserdisc. As equipment necessary to view obsolete formats becomes more difficult to obtain, the Video-On-Demand service ensures that these materials continue to be available for instructional use.

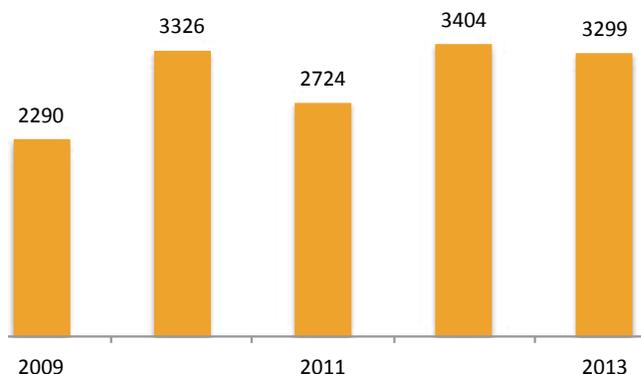
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*The HRC digitizes 730 new files per academic year, on average*

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New equipment in the HRC offers workstations and tools specifically designed for extracting and working with segments of a film: a trend we are seeing in faculty and student coursework and presentations. The Kaltura streaming service to the campus IT infrastructure further facilitates these new uses of video and allows members of our campus to upload and stream their own video clips.

### Individual Film Titles Streamed Per Academic Year



## Clickers in the classroom and in the bookstore!

The OIT Educational Technologies Center (ETC) manages a program that loans 'clickers' to faculty for use in their classrooms. Clickers are small personal devices that permit immediate, individual electronic feedback in the classroom.

Clickers are being used by numerous faculty members from various departments. This past fall, every clicker in the loaner program was on loan to a course.

The use of clickers as an instructional method in teaching and learning is growing in popularity, with several departments purchasing their own clickers for loan to students. For the first time, clickers were also listed as a requirement in the 'Course Reading List' tool for several courses.

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*Instructors use clickers to administer quizzes and get student-specific graded results*

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Clickers are also being used to administer graded clicker quizzes. Once a student registers his or her clicker, any clicker exercise the student participates in can be recorded and uploaded by course instructors as a submitted assignment for the course.

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*Clicker-for-loan program adds enough clickers to support a clicker exercise in Princeton's largest classroom*

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The clicker program was expanded this year to include enough clickers to serve the University's largest classroom, McCosh 50.

# Technology Enabling Computational Research and Sustainability

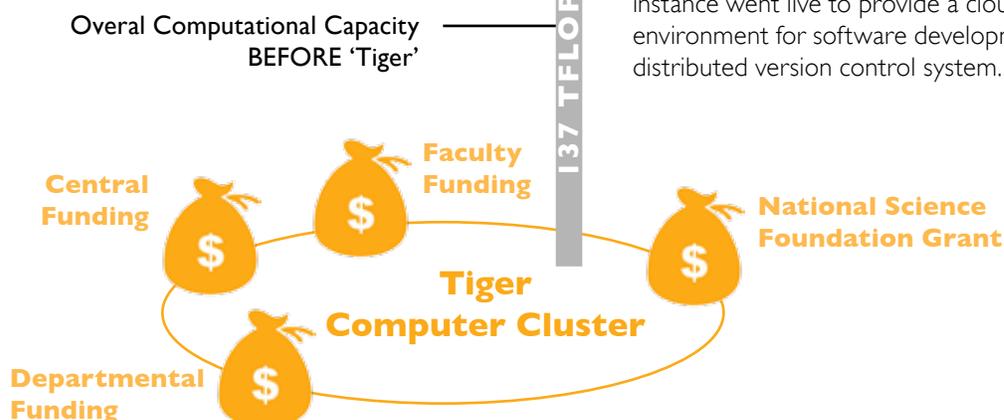
## TIGER: Princeton's largest research computing system

Princeton's newest high-performance computing cluster, Tiger, is by far the University's largest research computing system to date. Tiger increases Princeton's overall computational capacity by a factor of 3 to 4. With a theoretical peak performance of 451 teraFLOPS, it is also likely that the benchmarked performance of the Tiger cluster would fall within the top 200 on the TOP500 Supercomputer Sites list.

The cluster, which went into production in phases between January and April of 2013, is composed of 644 servers or "compute nodes." There are four different types of compute nodes. 544 of the nodes, manufactured by Dell, represent the standard base platform with two Intel eight core processors running at 2.6 GHz, 64 GB of RAM, and a 250 GB internal disk drive. 48 of the nodes, also manufactured by Dell, double the RAM from the base standard to 128 GB and significantly increase the internal disk capacity to 1.8 TB.

The second phase adds 52 nodes to the cluster, of which 50 of the nodes, manufactured by SGI, each add four NVIDIA Kepler K20 graphical processing units (GPU) to the base standard configuration. The remaining two nodes, also manufactured by SGI, replace the GPUs with four Intel Xeon Phi processors. These accelerators, GPUs and Xeon Phis will greatly enhance the performance of certain scientific and engineering models, in some cases by more than a factor of ten.

The Tiger cluster was funded with central funds, departmental funds, funds from individual faculty, and a National Science Foundation (NSF) Computer & Information Science & Engineering (CISE) Computing Research Infrastructure (CRI) grant, *A Platform for Data-Parallel GPU Computing at Princeton*, with David August as the Principal Investigator.



Joint funding supports the new 'Tiger' system and increases overall computational capacity at Princeton by a factor of 3 to 4

## Increased storage capacity for Princeton researchers

In October of 2012, Princeton was awarded an NSF Major Research Instrumentation (MRI) grant, *Acquisition of a Shared Parallel High Performance Storage System to Enable Computational Science and Engineering*, with Curt Hillegas as the Principal Investigator. Funds from this grant and required co-investment funds were used to purchase a storage system that increases disk capacity and i/o performance by a factor of more than 10.

*The Itigress filesystem offers an aggregate i/o bandwidth of more than 12 gigabytes per second*

The new file system is available on all of the centrally managed high-performance computing resources and provides an aggregate i/o bandwidth exceeding 12 gigabytes per second. The system is composed of 1,200 3 TB hard disk drives connected to four controllers and four servers. The disks are configured into a single 2.6 petabyte parallel filesystem using IBM's General Parallel File System software (GPFS).

This system, /tigress, went into full production and was made available to Princeton's research community on April 1, 2013.

## New 'GitHub' for collaborative software development at Princeton

In September of 2012, Princeton's GitHub enterprise instance went live to provide a cloud-based collaboration environment for software development based on the Git distributed version control system.

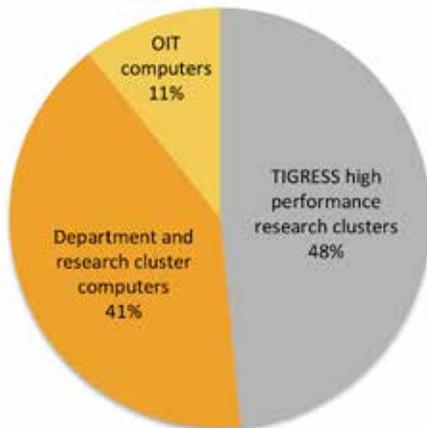
## Departmental systems move to the Princeton data center

The relocation of computers to the data center continues. This past year, 230 additional physical servers were moved from campus to the High Performance Research Computing Center (HPCRC), raising the total number of academic and administrative department servers finding residence at the HPCRC to more than 900. Servers moved this year come from nine departments.

At the central data center, the energy required to cool the relocated systems is half what was needed on campus (20 kW versus 40 kW). In fact, the overall energy required to run these systems at the HPCRC (34 kW) is less than the energy required to alone cool these systems on campus.

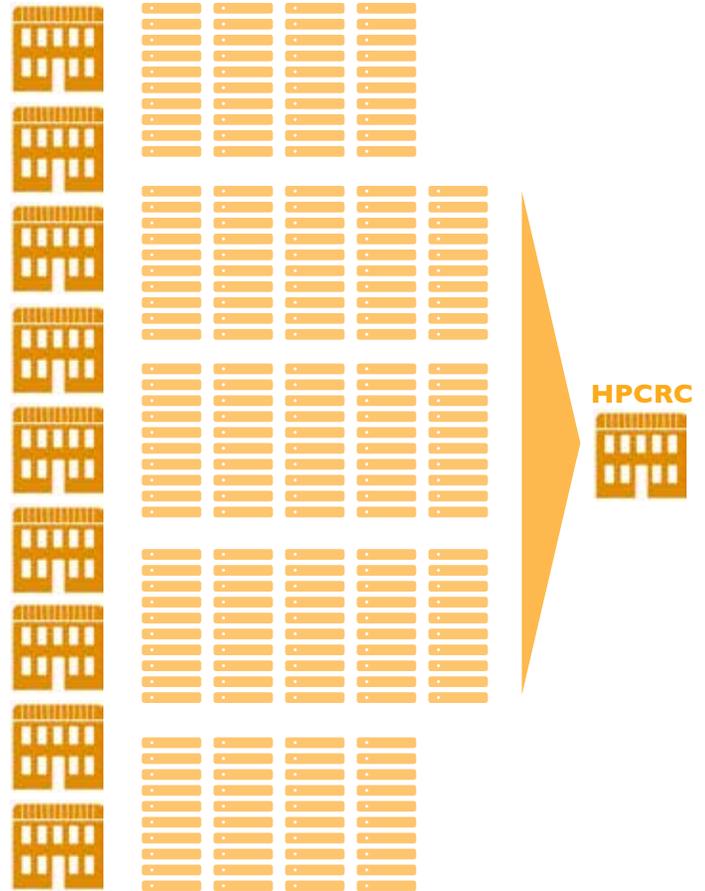
In addition to energy conservation benefits, the migration of servers to the HPCRC recovers physical space in campus buildings that can be repurposed for much needed office and lab spaces.

In total, the HPCRC now houses 2,345 computers:



- 1,175 are TIGRESS high performance research cluster nodes (more than 650 added in FY13).
- 910 are departmental servers and research cluster nodes.
- 770 out of the 910 machines are new to Princeton's centralized data center, coming from departments that chose to take advantage of the benefits of the new data center after it opened.
- 260 are OIT computers, of which 9 are centralized servers that run 400 virtualized servers in the HPCRC.

## 230 Departmental Servers Move to the HPCRC



The HPCRC houses 230 new servers that were relocated from nine departments on campus.

## Data Center Advisory Group (DCAG)

A Data Center Advisory Group (DCAG) was organized to provide a mechanism for OIT and departmental users to work together to set policies and troubleshoot issues that relate to the High Performance Computing Research Center (HPCRC).

The DCAG advisory group includes representatives from every department with equipment at the HPCRC, as well as representatives from the Office of Information Technology and the Facilities department.

For more information about the newly formed DCAG, refer to page 27.

# Technology Securing University Resources and Data

## 'IT Security Checkups' and training raise security awareness

In FY13, OIT made significant inroads in promoting IT security awareness among faculty and staff through the security awareness training and IT Security Checkup services of the Data Protection Initiative (DPI). To date:

- 63 University departments have participated in IT security awareness training sessions.
- The training sessions attracted more than 1,100 individual attendees.
- 80 departments have requested at least one of OIT's security assessment services. Available service options help departments assess the susceptibility of departmental systems and applications to attack, and locate any sensitive data on departmental shared file servers and workstations that may need to be better protected.

In addition to these services, the hard drive encryption offering of the DPI has been enhanced to offer self-encrypting hard drives, which simplify management and significantly improve system performance.

## Payment Card Industry (PCI) compliance

OIT assisted the Cash Management area of the Office of Finance and Treasury in developing policies, procedures, and the technical solutions necessary to ensure that Princeton University meets its obligation to comply with the Payment Card Industry's Data Security Standard (PCI-DSS).

Organizations that accept credit cards for payment must comply with PCI-DSS to avoid the possibility of increased service charges, and to protect against significant fines in the event that credit card numbers handled by our systems are ever exposed.

## Travel Strategy gives travelers access to what they need

OIT has established an iPad loaner service to limit the risk of data exposure when University faculty or staff travel to countries that restrict the use of encryption and have a reputation for compromising the data on computers, tablets, and smart phones.

To reduce the likelihood of exposing sensitive information, including a University traveler's Princeton netID and password, the traveler's electronic mail is forwarded to a temporary Gmail account that is set up for the duration of the travel. The account also includes Google Drive to hold the files that the traveler will need access to during his or her trip. Pulling it all together is an iPad that is pre-loaded with commonly used productivity software.



Upon return, the iPad is restored to its initial state to eradicate any malicious software that may have been added to the device in transit, ensuring the device is 'clean' and ready for the next traveler.

In February 2013, a group of thirty members of the University's administration and faculty successfully traveled to China using loaner iPads from the Travel Strategy program.

## New remote access service offers more security

OIT introduced Secure Remote Access (SRA) as the new remote access service at Princeton. SRA allows the Princeton community to remotely and securely access campus resources. SRA is easy to use, offers a higher level of performance, and is more broadly compatible with other networks, which means seamless connections to campus from conferences, hotels, and home networks.

The University Financial and reporting systems are already taking advantage of the added security benefits of SRA. Remote access to these systems is being controlled through SRA.

## Campaign raises student awareness of the importance of data privacy

A 14-member University team creates a first-ever campaign for “Data Privacy Month at Princeton.” Members from Campus Life, Communications, the Graduate School, OIT, the Registrar’s Office, and student representatives from the USG and GSG work together to develop the month-long campaign to raise student awareness of the importance of data privacy and one’s online reputation.

Campaign messaging and materials centered around ten principles for maintaining data privacy, and touted the slogan “Privacy Please.”

As part of the campaign:

- A “Data Privacy Top 10 image” was shared through social media and reached more than 8,500 facebook users; table tents were placed in dining halls around campus; Data Privacy door hangers and wallet cards were designed and distributed.



- A ‘Princeton Data Privacy’ website ([www.princeton.edu/dataprivacy](http://www.princeton.edu/dataprivacy)) was developed and had more than 500 visitors in September and October of last year.
- A ‘Top 10 Data Privacy Tips’ sheet promoting data privacy was distributed to more than 3,000 students at various back-to-school and Career Services events.
- More than 300 students learned more about data privacy at several outreach events planned throughout the month of October.

# TEN Privacy Tips

- Remember, what you post online becomes public information—it is no longer in your control.
- Be strategic about what you share with the world—think long term.
- Think before you Tweet—today’s rant, burn or flame may come back to haunt you.
- Regularly review your contacts, circles, friends and followers—they may not be your BFFs.
- Understand your privacy settings and terms of service—service providers can change them.
- Use hard-to-guess passwords and vary them from site to site—it wouldn’t take much to figure out “123456,” “password” or “GoTigers.”
- Protect your computer—maintenance and security tools are at your fingertips.
- Send private information over secure connections—an ‘s’ as in ‘https://’ in the address bar means secure.
- Monitor your name online—google yourself and set alerts to avoid surprises.
- Control your online reputation and create your personal brand—your future will thank you.

More information and special events:  
[www.princeton.edu/dataprivacy](http://www.princeton.edu/dataprivacy)

# Technology Strengthening Operational and Administrative Processes

## Custom query tools support development and alumni relations

'Custom Query' is a custom-built solution developed by OIT to offer advanced and flexible querying capability to users of the web-based version of Stripes—the University's enterprise alumni and development system. The tool provides interactive and dynamic querying capabilities that support ad-hoc query requests that are based on sets of entities or 'giving transactions' that meet very specific data criteria. The new tool also provides meaningful data presentations and flexible reporting that meets Princeton's unique business needs.

In particular, Custom Query includes query library management functions that standardize common queries to help ensure predictable outcomes. Additional options support individual working style and enable users to customize their view, set privacy settings, and establish a 'favorites' view for frequently run queries.

The tool also offers advanced parameterization tools that can be used to define generic query templates that can be shared among multiple departments. The query result set can then be used to drill down to more detailed information within the Stripes web application, or exported to spreadsheets using a variety of data views depending on the office and business need.

The query result set also supports access by other Stripes reporting tools that run under Cognos or SQL Server Reporting Services (SSRS).

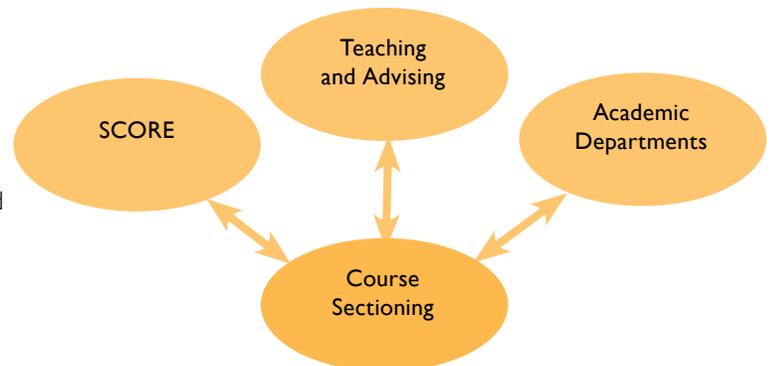
## 25Live opens event and space management to more of campus

The successful technical implementation of 25Live opens event and space management capabilities to the broader University community. The new web-based system allows users to access the system from any machine connected to the Internet. With 25Live, centralized event management is enhanced, space utilization is more transparent, and features allow for better handling of unanticipated events.

## Course Sectioning tool in PeopleSoft

The Course Sectioning tool is a custom-built solution developed by OIT in close partnership with the Office of the Registrar, the Academic Managers Group, and academic departments. The new tool makes it easier for faculty and administrative staff to manage section enrollments in precepts, labs, and other sections.

The new Course Sectioning tool replaces several disparate tools, including manual processes, that were used to manage course sectioning in the past. The tool simplifies sectioning assignment by bringing together all of the information needed to manage course enrollments into a single system. Changes in assignment no longer require manual data entry or data correction in a separate system. Sectioning changes are centralized, ensuring that the most accurate information about student schedules, room usage, and course enrollments is on record.



In addition to managing section enrollments, the Course Sectioning tool also provides reporting capabilities that can help facilitate course sectioning assignments.

The new Course Sectioning tool is centrally supported by OIT support and training resources. The training curriculum developed for the Course Sectioning tool by the OIT Training and Documentation Services group includes classes, how-to videos, and printable reference materials.

The Course Sectioning tool was successfully piloted in the spring of 2013. Additional departments are being introduced to the tool in September 2013 and then again in January 2014, at which time the new tool will be used in all courses.

## **'Absence Management' tracks absences and University paid-time liability**

OIT, in close partnership with the Office of Human Resources, implemented the Peoplesoft Absence Management system. The new system provides managers and staff a standard tool for centrally recording absences and tracking available balances.

Built-in functionality programmatically applies University absence policies to ensure equitable handling of absences for all employees. The tool also automatically calculates vacation, sick and personal time earned and adds it to employee time balances, ensuring University employees are accurately receiving their entitlements.

A self-service component of the tool enables employees to enter their own absences into the system. Custom reporting capabilities enable the University to estimate the annual cost of University paid-time liability, which supports financial stewardship, planning, and audited financial statements.

Since go-live on July 1, 2012, more than 4,000 employees from 200 departments use the new system to centrally record their absences.

## **Efficiencies added to interdepartmental cost transfers**

OIT developed a custom-built solution in Peoplesoft with new functionality that adds efficiencies to interdepartmental expense transfers. The new enhanced Electronic Interdepartmental Invoice (EII) cost transfer tool offers automated workflow to expedite approvals, built-in regulatory compliance to support sponsored project accounts, and online documentation. The new tool provides a paperless solution for Interdepartmental Invoice (II) department-to-department cost transfers.

Since the tool was first made available, more than 1,500 transactions have been entered and processed by the new EII cost transfer system.

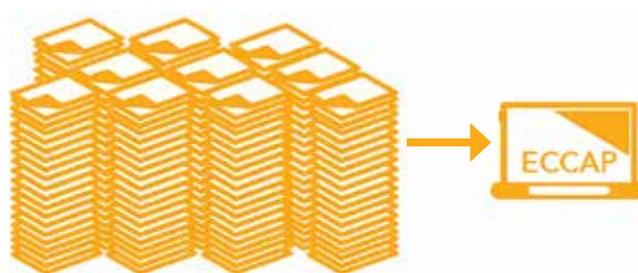
## **New tool manages Employee Child Care Assistance Program**

OIT, in close partnership with the Office of Human Resources, developed a custom-built solution in Peoplesoft to automate application, approval, and management of year-long enrollments in the University's Employee Child Care Assistance Program (ECCAP).

The new ECCAP tool replaces a manual, paper-based process that was maintained in an Access database application with a streamlined, paperless process that programmatically manages enrollment from application to approval, and interfaces with Dependant Care Expense Account and Payroll systems to automatically process ECCAP disbursements.

University employees use the tool to apply for child care assistance online and upload required documents to support eligibility, eliminating the need for paper folders to support program approval and distribution processes.

**ECCAP tool processes 200 applications for child care assistance online**



This past year, the new ECCAP tool was used to process applications and continues to manage more than 200 enrollment distributions for child care assistance. In the coming year, OIT is expanding this functionality to support graduate student application for child care assistance.

## **Conflict of Interest application ensures research compliance**

OIT completed a rewrite of the Conflict of Interest reporting system to support recent changes in reporting requirements established by the National Institute of Health.

The Conflict of Interest system provides new functionality that enables the Office of Research Integrity and Assurance (RIA) and the Dean of Faculty to modify and manage the Conflict of Interest process as sponsor reporting requirements change. It also gives RIA the ability to develop and track management plans for reported conflicts.

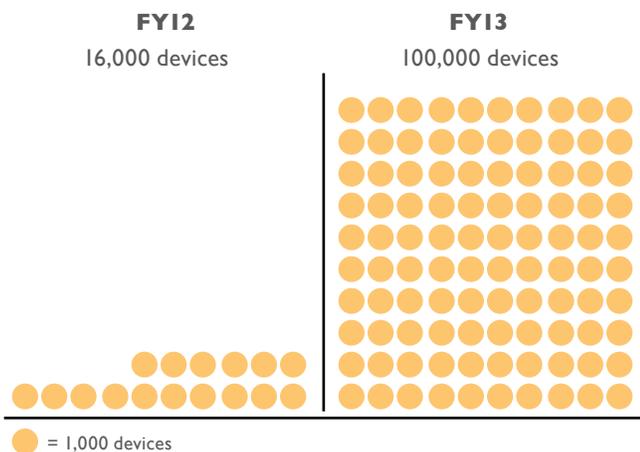
# Technology Supporting Access and Connectivity

## Network Enhancements

### Wireless network enhancements increase supported simultaneous connections 625%

The OIT wireless network service known as “puwireless” was moved behind a Network Address Translation (NAT) device. This move allows the service to support over 100,000 simultaneous wireless device connections to the network, up from the previous limit of 16,000. As part of the move, new dedicated DNS and DHCP server appliances were deployed for puwireless. These appliances take over for the original campus DNS and DHCP servers, splitting the campus-wide load and providing a more robust service to both wireless and wired network devices.

#### Supported Simultaneous Wireless Connections



### ISP bandwidth upgrade increases speed and ensures continued Internet service

The University maintains two commodity Internet Service Provider (ISP) connections to ensure continued Internet service should one of the ISP connections fail. To serve in this way, the aggregate network traffic load across the two provider connections must be kept below 50% so a single ISP connection can provide for all of the University's bandwidth needs.

Over the past year, day-to-day Internet usage has crept close to 75% of the combined available bandwidth. OIT upgraded the first ISP connection from 1 Gb/s to 2 Gb/s; the second upgrade is planned. The upgrade of both ISP connections will double available Internet speed and allow for a potential ten-fold increase over the bandwidth previously available to the campus.

### Reliable power for campus network hub

This year, the electrical system serving Princeton's core network equipment was revamped or “hardened” to include two large Uninterruptible Power Supply (UPS) systems and an emergency diesel generator to protect the University's network infrastructure from power failures like those that were experienced during Hurricane Sandy in October of 2012.

In the event of commercial electrical power loss, the new UPS systems and generator will work together to provide uninterrupted power to the network core equipment and the HVAC systems used to keep everything cool. The generator can run indefinitely, limited only by the availability of diesel fuel.

### 'eduroam' at Princeton provides visitor instant wireless service

OIT prepared the University network infrastructure for participation in the federated network access service, “eduroam.” eduroam is an initiative of Universities from around the world that provides “education roaming,” or a simple way for students, faculty, and staff from participating institutions to get instant and secure access to the Internet when visiting each others' institutions. eduroam participants need only enter their login credentials from their home institution to gain access to the eduroam service where they are visiting.

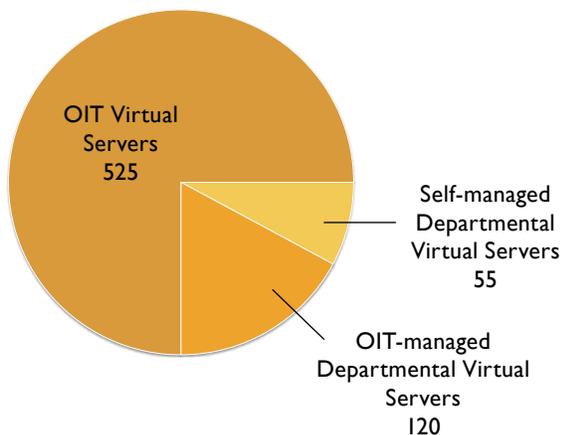
The eduroam service is offered at more than 5,500 institutions, in more than 50 countries. An added and essential benefit, all wireless network traffic for the eduroam service is encrypted, therefore providing secure, wireless communications for sensitive information.

## Server virtualization efforts deliver cost/energy savings

OIT's virtual infrastructure supports most central OIT services and provides a no-cost solution for departments to host dedicated virtual servers.

At the end of June 2013, more than 700 virtual servers were supported in the virtual server environment built with 114 CPU cores, 4TB of memory, and more than 100TB of disk space.

### OIT Virtual Server Infrastructure



To date, OIT has virtualized 75% of the centrally-managed administrative and departmental servers. 25% of all virtual servers belong to departments across campus.

Through virtualization efforts, the University avoids over 700 metric tons of CO<sub>2</sub> emissions and realizes an annual cost savings of more than \$300,000 per year in energy costs.

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*700 virtualized servers save the University \$300,000 a year in energy costs and avoid 700 metric tons of CO<sub>2</sub> emissions*

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More information on virtual server hosting can be found online at <http://kb.princeton.edu/9656>.

## Undergrads get new Princeton Gmail and helpful apps, too

Google Apps at Princeton was made available to returning undergraduate students in August 2012.

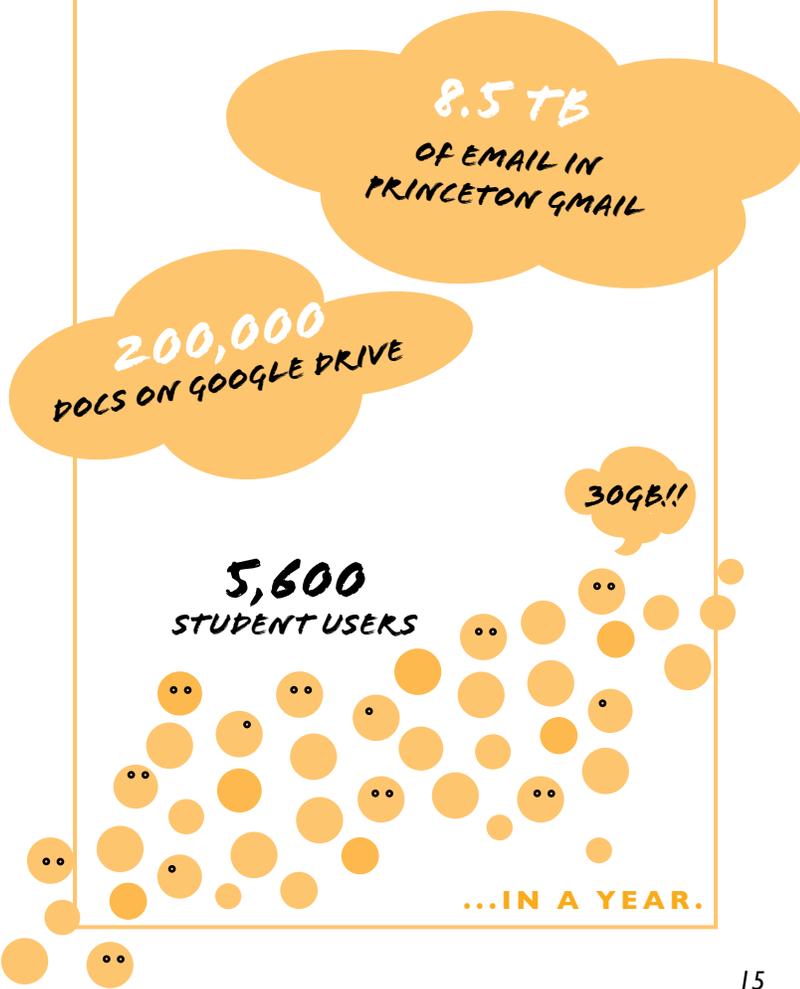
More than 5,600 undergraduate students are using the new Google Apps at Princeton service. To date, students are storing more than 200,000 documents in Google Drive and about 8.5TB in email messages in Princeton Gmail.

OIT fully supports the new Google Apps at Princeton suite. These new accounts provide students with 30GB of individual storage for their email and documents—an increase of 25GB from before. The accounts also offer access to a variety of collaboration applications, including Google Calendar, and Drive for document sharing.

Students have the ability to access Google Apps tools from all over the world on a variety of devices 24 hours a day.

More information is available at <http://google.princeton.edu>.

### GOOGLE APPS AT PRINCETON...



# FY13 Timeline

## July 2012

### **Unified Messaging (8-MSGS) becomes the new voice mail service on campus for all faculty and staff.**

Unified messaging brings together voice mail, email and calendaring functions, and makes messages and appointments from these services accessible by phone and from email inboxes. With the text-to-speech capabilities of UM, faculty and staff can listen to and reply to email messages and calendar appointments by phone. Voice mail messages and preview text versions of messages are also accessible from email inboxes. With the migration to UM soon to be complete, OIT is able to retire the outdated Octel system.

### **Then there were two: Drupal joins Roxen as a website development tool on campus.**

Departments interested in developing a website now choose between the University's Roxen or Drupal Content Management Systems for their sites. With the conclusion of the Drupal pilot, and the positive outcome for both department website customers and Web Development Services (WDS) in OIT, WDS now offers website development services for Roxen and Drupal websites.

### **Departments save with new mobile plans that are easier to manage.**

The University begins new agreements with Verizon and AT&T wireless services that reduce department mobile service costs by more than 20 percent. New smartphone plans include unlimited domestic calling, unlimited data, and unlimited text messaging. As an added benefit, mobile plan administrators have access to a simplified and consolidated online view of charges, which negates the need to process paper invoices. Service changes are transparent to mobile phone carriers with no disruption in service.

**New online "OIT Store" opens.** OIT announces the opening of the new online Software Store, which has a new name, a fresh look, and a few enhancements. The new "OIT Store" is a one-stop shop where campus can order software at educational discounts and hardware accessories in a single transaction from one online system.

**Account transition periods reflecting new account de-provisioning policies put in place to enhance data security.** The Oracle Identity Management system is used to implement these new policy changes that take effect July 1.

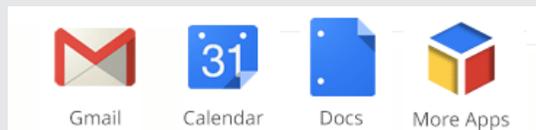
## August 2012

### **Jay Dominick joins Princeton as Vice President for Information Technology and Chief Information Officer.**

Dominick joins Princeton on August 13, 2012 to lead technology at Princeton and the Office of Information Technology organization. Dominick comes from the University of North Carolina-Charlotte, where he served as a top-ranking information technology administrator. He succeeds Betty Leydon, who retired after serving as VP and CIO at Princeton since 2001.

### **Returning undergraduate students get their Google Apps at Princeton accounts.**

With Google Apps at Princeton accounts, undergraduate students get Princeton Gmail as their Princeton email account, Google Calendaring and Google Drive for their files. Existing email is migrated to Princeton Gmail. Migrations are completed by class, with all classes over to the new system by October.



### **Nobel: a new entry-level computational resource at Princeton.**

The new Nobel cluster joins the ranks of high-performance computers at Princeton to offer an entry level for the continuum of computational resources provided in the TIGRESS High Performance Computing Center. Nobel servers share a common operation system with the higher-end resources that comprise TIGRESS. As researchers and students grow in their computational expertise and resource needs, they can easily transition from Nobel to higher-end computational clusters, and then eventually to the more powerful computational resources in TIGRESS.

### **Incoming students receive their TigerVoice Unified Messaging mailboxes.**

With the new TigerVoice service, voice mail messages are sent to a student's Princeton email inbox, where students can listen to and manage their voice messages. Students can also set up TigerVoice to forward Princeton voice mail (and calls) to their mobile phones. Student TigerVoice numbers are unique to each student and stay with students for as long as they attend Princeton.



## September 2012

**Residential Computing Consultants (RCC) hold their annual Dorm Storm event.** The multi-day event introduces the RCC computing support program to incoming undergraduate students and offers in-room and door-to-door computing support to help new students transition to computing on campus.

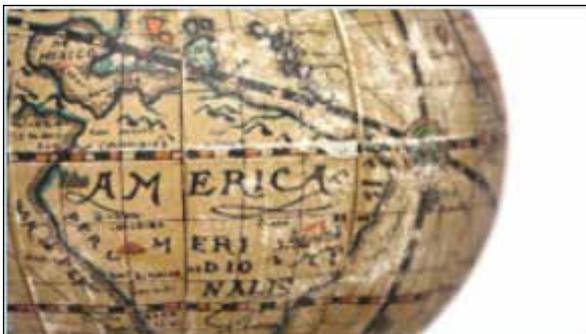
**New ‘Tiger’ high-performance computing cluster and the University’s largest research computing system to date is in production.** The new system increases Princeton’s overall computational capacity by a factor of 3 to 4. The first phase of the cluster is composed of 592 servers or “compute nodes” each having 16 computing cores and 64 to 128 gigabytes of RAM. A second phase is planned for March 2013.

**‘Statistics One’ and ‘A History of the World since 1300’ start the fall lineup of select Massive Open Online Courses (MOOCs) being offered by Princeton through Coursera.** Given by Professor Andrew Conway and Professor Jeremy Adelman,



Statistics One

respectively, the courses each consist of 24 lectures and a number of labs. The courses were recorded with the help of OIT Broadcast Center services.



A History of the World since 1300

**OIT boosts the number of simultaneous device connections the “puwireless” network is able to serve to 100,000 connections,** up from a previous limit of 16,000 connections. New dedicated server appliances are also deployed that split the campus-wide load and provide a more robust network service to both wireless and wired devices.

## October 2012

**OIT and the Alcohol Coalition Committee (ACC) create a mobile tool for students to take action.** Nicknamed STANDBY, the tool offers on-the-spot access to information for bystanders as they seek help for a friend or anyone else. The website is the University’s first website designed and developed by WDS in Drupal using a mobile-first approach.



With STANDBY students take action: [bystander.princeton.edu](http://bystander.princeton.edu)

**October is Data Privacy month at Princeton.**

The month-long campaign raises student awareness of the importance of data privacy now and in the future when they are seeking employment. The campaign coordinated communications and offered online information resources including a custom website ([www.princeton.edu/dataprivacy](http://www.princeton.edu/dataprivacy)), posters and table tents, and in-person outreach events, with a keynote by LinkedIn’s Lindsey Pollak.

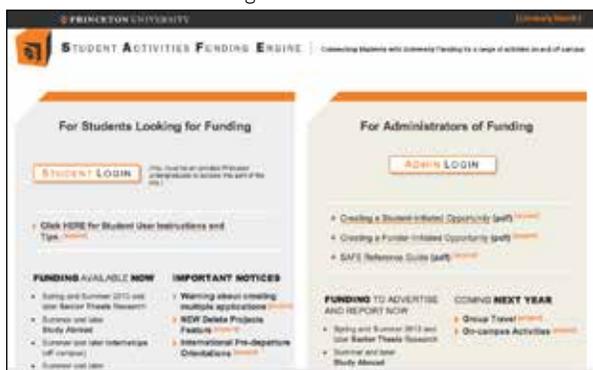
**PrincetonOIT now on Facebook.** OIT posts its first Facebook post in honor of Data Privacy Month at Princeton. The posting goes viral with the help of campus Facebook friends and reaches more than 8,500 Facebook users.

**Princeton is awarded an NSF Major Research Instrumentation (MRI) grant,** Acquisition of a Shared Parallel High Performance Storage System to Enable Computational Science and Engineering, with Curt Hillegas as the Principal Investigator. Funds from this grant and required co-investment funds are used to purchase a storage system that increases disk capacity and i/o performance by a factor of more than 10.

**OIT-managed central computing facilities keep campus computing and communication services running despite Hurricane Sandy and the 30-hour power outage.** Backup power systems go into service as designed and keep the University’s computing and communications services up and running without interruption.

## November 2012

The new **Student Activities Funding Engine (SAFE)** brokers student funding needs with funding opportunities and helps ensure a fair and equitable distribution of funds to the greatest number of students. Since November, SAFE manages funding for more than 900 spring and summer semester projects totaling \$2,986,257. SAFE is a custom-built solution developed by OIT in close partnership with the Office of the Provost, the Office of the Vice President for Campus Life, and the Office of the Dean of the College.



SAFE brokers funding needs with opportunities and helps ensure distribution to the greatest number of student activities.

The **Princeton Plasma Physics Laboratory (PPPL) website launches**. The new website is developed in the Drupal Web CMS by OIT's Web Development Services (WDS) group. The website url is [www.pppl.gov](http://www.pppl.gov).



November **Lunch 'n Learn presentations** explore Princeton's offering of Massive Open Online Courses (MOOC) through Coursera, the Kaltura media management system Media Central, and the various website development options available to the Princeton community.

## December 2012

**Admitted graduate students review and respond to their admission offer online using the new Electronic Decisions system.** Graduate students log into the new Electronic Decisions system to view their admit letter and financial details. For the first time, admitted graduate students can log in from anywhere in the world with a Princeton-given netID to accept or decline Princeton's admission offer online.

The newly redesigned **Department of English website** highlights featured courses, books, and topics by audience. An A-to-Z faculty directory also supports faculty searches by interests and the overall site is automatically tailored for the size of the device accessing the site, providing what is known as 'responsive design.'



The Department of English launches their Drupal website at <http://english.princeton.edu>

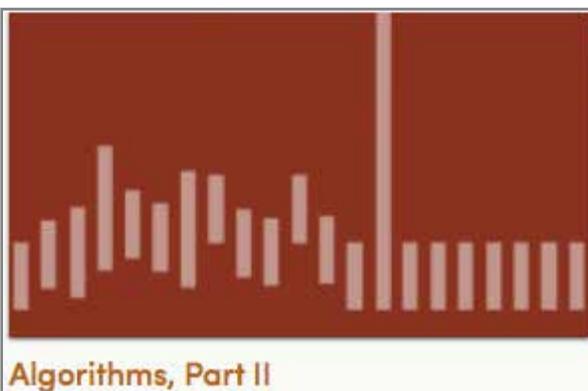
**eduroam: instant wireless access for visitors and Princeton travelers.** With eduroam, faculty, staff, and students get instant and secure wireless service while visiting participating campuses. Visitors to Princeton who participate in eduroam have access to the eduroam service here on campus. eduroam provides convenient, registration-free wireless access for visitors to campus, as well as added security when networking wirelessly.



## January 2013

**“FERPA and Data Privacy - Issues for Princeton Administrators,”** given by Hannah Ross of the Office of the General Counsel, presents the basics of the Family Educational Rights and Privacy Act (FERPA). The two-hour session is especially helpful to administrative staff who handle student information on a regular basis. The session was coordinated by OIT and the Data Privacy team.

**The ‘Algorithms, Part I’ online Coursera course with Professors Robert Sedgewick** consists of 24 lectures that cover algorithm and data structure essentials for programmers. Lectures for the 6-week course were recorded with the help of OIT Broadcast Center services.



The **Office of the Dean of the College (ODOC) website launches.** The very first website for the ODOC, the site showcases the office’s many areas of responsibility. The ODOC website address is <http://odoc.princeton.edu>.



## February 2013

**OIT begins the process to develop its roadmap for the next 3 to 5 years.** The roadmap will identify the OIT services and capabilities most relevant to Princeton’s long-term success and guide OIT in evolving to meet those emerging needs. The roadmap will also provide an ongoing mechanism by which OIT can sense the environment and modify its plans accordingly.

The new **Sexual Harassment/Assault Advising, Resources and Education (SHARE) website launches.** The site was developed by WDS for the SHARE office—a victim-centered, confidential resource on campus for the University community. The website features a ‘quick exit’ feature and is online at [share.princeton.edu](http://share.princeton.edu).



*The SHARE website provides resources to those in need.*

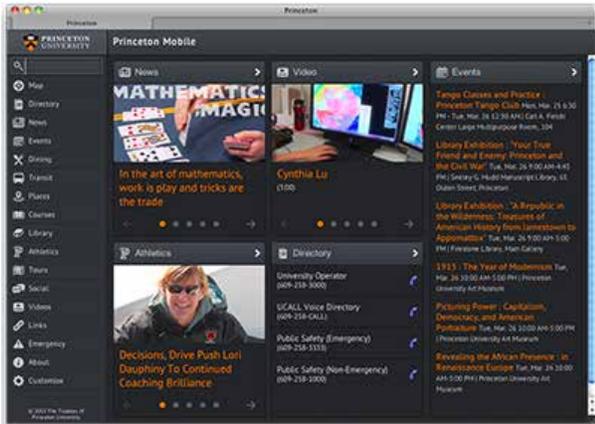
**DrupalCamp NJ 2013 brings together more than 200 attendees for 3 days of special Drupal events.** The conference draws both beginners and Drupal experts from the northeast who are interested in the open-source content management system platform. It includes training classes, sessions, and a day of code-sprints. DrupalCamp NJ was recognized as one of 10 top Drupal events in 2012-13.

**‘Algorithms, Part II, with Robert Sedgewick and Kevin Wayne and Analytic Combinations I and II’ with Robert Sedgewick are offered online through Coursera.** The courses each consist of 24 lectures and a number of labs. The courses were recorded with the help of OIT Broadcast Center services.

**The OIT data center router is moved to the new “hardened” network core area.** The new core area is supported by two large (100 kW) UPS systems, as well as an emergency diesel generator. In the event of commercial electrical power loss, the UPS systems and the generator work together to provide uninterrupted power to the network core equipment and the HVAC systems used to keep everything cool. The generator can run indefinitely, limited only by the availability of diesel fuel.

## March 2013

**'Princeton Mobile' is the new resource to stay connected to the who, what, when, where and what-to-eat on campus.** Faculty, staff, students and visitors can access utility information about Princeton on their smartphones, tablets or computers. Princeton Mobile is free and online at [m.princeton.edu](http://m.princeton.edu). Princeton Mobile replaces the University's iPrinceton app.



The new 'Princeton Mobile' can be viewed on a computer, tablet or smartphone.

**New training in Project Management provides an overview of project management at Princeton.** Given by OIT's Princeton Project Office (PPO), the introductory half-day course is designed for staff and managers who wish to learn more about managing projects at Princeton and the tools of Princeton's Project Management Methodology (PPMM).

**OIT Roadmap work identifies high-impact technology trends that will likely change the complexion of IT at Princeton over the next 3 years.** The trends are mobile computing, consumerization of IT, hybrid IT and cloud computing, strategic big data, new generation of enterprise and mobile apps, privacy and security amidst growing cyber-threats.

**OIT upgrades the first of two commodity Internet service provider connections from 1 to 2 Gb/s.** The University maintains two commodity Internet Service Provider (ISP) connections to provide continued Internet service should one of the ISP connections fail. The aggregate network traffic load on the two provider connections is meant to be kept below 50% so that a single ISP connection can provide for all of the University's bandwidth needs. Over the past year, day-to-day internet usage has crept close to 75% of the combined available bandwidth. This upgrade, in combination with the upcoming upgrade of the other service provider's connection, will double available Internet speed and set the stage for further increases of up to ten times the current capacity.

## April 2013

**High-performance computing disk capacity is 10 times greater with the introduction of a new storage system.** The new storage system increases disk capacity and i/o performance by a factor of more than 10, and provides 2.6 petabytes of formatted storage, and aggregate i/o bandwidth exceeding 12 gigabytes per second.

**OIT uses the OIT-managed iLinc video conferencing service to hold its first "Video Chat."** More than 100 OIT staff log in and 'attend' the video conference. The OIT video conference is the largest conference supported by the iLinc service to date.

The **Papers of Thomas Jefferson website launches on April 12** – the day before Jefferson's birthday. Since its first publication of Volume 1 in 1950, the Papers of Thomas Jefferson has been preparing the definitive scholarly edition of the correspondence and papers written by America's author of the Declaration of Independence and third president. The website was developed in Drupal by WDS and can be seen online at <http://jeffersonpapers.princeton.edu>.



The new Papers of Thomas Jefferson website launches.

**The OIT 'puvisor' wireless network service is enhanced before 2013 Reunions to support over 100,000 simultaneous wireless devices connections, up from a previous limit of 2,000.** The puvisor service now uses the same DNS and DHCP server appliances initially deployed for the puwireless service move, further reducing the load on original campus servers. The move also allows for much better support of a large influx of campus visitors, as often occurs during Reunions.

## May 2013

**OIT produces a “Student Technology at Princeton” video to take students on a tour of technology at Princeton.** Students learn about the many computing places and technology resources available to them on campus.



*The ‘Student Technology at Princeton’ video takes students on a technology tour.*

**Secure Remote Access, the new and most secure way to access campus resources.** Secure Remote Access allows the Princeton community to remotely and securely access campus resources, even from mobile devices. Replacing the Virtual Private Network (VPN) service, SRA is easier to use and offers a higher level of performance. SRA is also more broadly compatible with other networks, which means seamless connections to campus from conferences, hotels, and home networks. If you can access the web from where you are, you can access the University’s SRA service.



**Business Technology Certificate Program (BTCP) hosts its third program graduation.** Completing a 3-year curriculum, seven University staff take with them a new proficiency in many technologies used in departmental business.

**Exchange Mail users now have 2GB of free quota!** Default quota for all new and existing MS Exchange mailboxes has been increased to 2GB. Storage for mailboxes up to 2GB is now free.

## June 2013

**The new Web Feed Registry provides software developers at Princeton access to feeds of public University data.** These data feeds are provided in a programmer-friendly format, such as XML and JSON, that developers can easily incorporate into applications that provide up-to-date and timely information to University constituencies.

The **2013-14 Princeton Student Computer Initiative (SCI) program offers students a ‘convertible laptop to tablet’ option and an iPad as a bundle option** with SCI Apple computer purchases.

**Successful technical implementation of 25Live** to make Resource 25 system capabilities more accessible to the University community with better centralized event management, more transparent space usage, and better handling of unanticipated events. 25Live is the next generation of the existing Resource25 enterprise system for event and space management. This web-based system opens the application to a greater number of users. The user interface is contemporary in design, making it easier to use for the casual space manager/scheduler and provides users with greater flexibility for event management.

**“Introduction to Sociology,” with Professor Mitchell Duneier,** is offered through Coursera. This course was the first social science course offered through Coursera and was the pilot course that originally ran in the Spring of 2012. At least four of this year’s nine courses will be



### Introduction to Sociology

offered again next year.

**The multi-year project to upgrade the University’s wireless network continues.** The upgrade replaces the devices (access points) that provide wireless coverage on campus to newer network technology (802.11a/b/g/n) with a higher bandwidth. Each existing access point is also being replaced with multiple access points, increasing access speeds and the network capacity by almost an order of magnitude. To date, 65% of administrative and academic buildings and undergraduate and graduate dorm buildings are fitted with the upgraded wireless service.

**Three new cell towers extend cell phone coverage on campus and in Princeton.** Roof-top cell towers for AT&T, Cricket, Sprint, T-Mobile, and Verizon have been installed on campus increasing both the coverage and the capacity, meaning more service bars in more places.

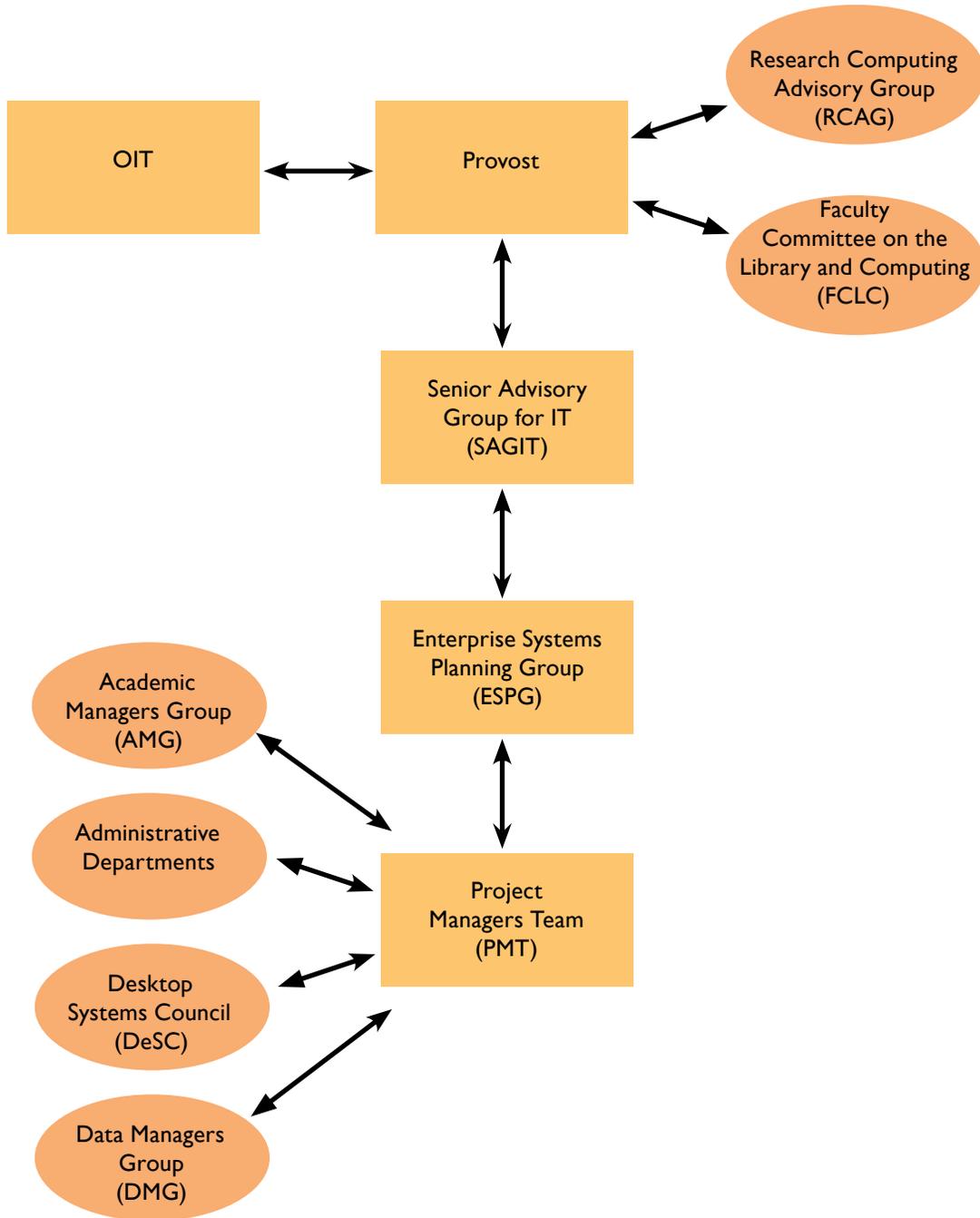
# OIT by the

- 3,996,798,392,375,420,000,000** floating point operations performed by the **TIGRESS HPC systems**
- 62,000,000,000,000,000** bytes of storage offered by the new **high performance storage system**
- 1,148,359,037,000,000** bytes of data kept safe by the **OIT backup system**
- 549,720,283,938,816** **bytes of data** stored in the /tigress High-Performance Computing facility
- 81,363,860,455,424** **bytes of RAM** on the TIGRESS High-Performance Computing systems
- 51,343,928,841,994** **hertz of processing power** in the TIGRESS High-Performance Computing systems
- 8,412,413,157,377** bytes of data in **OIT managed databases** that span three database environments
- 333,253,124** files stored on the networked **Central File Server**
- 2,986,257** **funding dollars awarded** through the Student Activities Funding Engine (SAFE)
- 2,035,278** jobs run on the TIGRESS high-performance computing systems
- 1,799,223** **incoming and 1,395,384 off campus calls** supported by the University's phone system
- 1,585,750** calls to the **Unified Messaging** system resulted in 578,799 voice mail messages
- 872,323** reports against data in the **Information Warehouse**
- 639,245** page views in the **Blackboard Learning Management System** on the busiest day
- 339,000** **savings in energy cost** to run 714 virtual servers on 17 centralized servers
- 316,781** hours the OIT **cluster computers** were used during the FY13 academic year
- 251,623** logins into **OIT cluster computers** across campus
- 132,160** **hours of film managed by the Humanities Resource Center** viewed by students for courses
- 111,808** page views on average per day in the **Blackboard Learning Management System**
- 102,530** requests for help through the **OPM system** 'resolved' (37,728 by the OIT Help Desk)
- 100,000** simultaneous **wireless device connections** possible with NAT devices (up from 16K)
- 88,181** visits to the **Princeton Mobile** website since its launch on March 26
- 42,487** network cables and 43,775 data connections support **network services** to 243 buildings
- 23,061** calls, 42,029 emails and 3,488 online chats for help were **answered by the OIT Help Desk**
- 9,262** Windows computers with **antivirus software provided by OIT**
- 8,837** **videos** housed at the Humanities Resource Center
- 8,398** Windows and MacOSX **computers managed** by Dell Kace K1000
- 8,262** members of the campus community use Blackboard
- 8,206** computers whose data is **protected by the OIT backup system**
- 7,839** **Windows clients managed** by Microsoft WSUS for security updates
- 7,246** customers printed 6,020,835 sheets on **OIT cluster printers** across campus

# ...Numbers

- 5,790 switches and 3,746 wireless access points** connect users to the Princeton's data network
- 3,200 students learn about data privacy** with 'Top 10 Data Privacy Tips'
- 1,542 transactions** in the new **Electronic Interdepartmental Invoice (EII) tool**
- 1,105 Windows clients encrypted** with McAfee Endpoint Encryption
- 1,098 Mac clients with antivirus software** provided by OIT
- 970 undergraduate activities** receive **funding coordinated through SAFE**
- 933 frosh enroll** in courses in the first minute of **SCORE open enrollment**
- 885 hours in labor** produced video lectures for nine **Coursera online courses**
- 684 films digitized for Video-on-Demand** for the 2012-13 semesters
- 472 courses use Video-on-Demand** during the F2012 and S2013 semesters
- 326 requests** for accounts in the new Personal cPanel environment
- 150 members** in the **SCAD/DCS program** support distributed computing
- 107 staff** from 23 University departments attended **Project Management training**
- 83 departments** request **OIT's security assessment services**
- 63 departments** participate in IT security awareness training sessions with over 1,100 attendees
- 61 physical servers virtualized this year** making 714 virtual servers in total
- 52 OIT-managed database servers** over three database environments
- 30 members** of University administration and faculty **travel using loaner iPads**
- 30 Gigabytes of storage** available to undergraduate students for Princeton Gmail and Google Drive apps
- 23 new webinar recordings** added to the **PULSe tutorial library**
- 17 centralized servers** run **714 virtualized servers**
- 11 Drupal websites developed** by OIT Web Development Services (WDS) and launched, an additional 11 sites are in progress
- 3 central computing centers protected by onsite backup power**, ensuring continuous operation during extended utility power outages
- 2 wireless networks available to visitors** with addition eduRoam service
- 1 new Vice President and CIO** leading our technology organization
- 0 minutes** of technology 'down time' during a 30-hour long power outage caused by Hurricane Sandy

# IT Governance at Princeton



## Senior Advisory Group on IT (SAGIT)

The Senior Advisory Group on IT (SAGIT) advises the Provost on budgetary matters related to IT systems projects endorsed by the Enterprise Systems Planning Group (ESPG), and other projects that are presented by the Vice President for Information Technology and/or the Provost. The specific charge of the group is to:

- Evaluate systems project proposals, and review the proposed funding mechanisms for capital and operating expenditures required for such systems;
- Assess steady state costs of maintaining current systems and required IT infrastructure;
- Identify systems opportunities that should be evaluated;
- Ensure projects are fiscally responsible, and assess whether proposed funding mechanisms are satisfactory;
- Advise the Provost with regard to budgetary or other issues posed by projects.

### Highlights

The SAGIT reviewed and funded the following project proposals:

- OnBase Support Resource
- Housing Technology Strategy Project to Replace CS Housing
- Business & Compliance Improvements for Animal Research
- Information Warehouse Data Management Tool
- University Travel System (Concur)
- Strengthening Appropriate Access to Electronic Information
- SAFE Phase 2

## Enterprise Systems Planning Group (ESPG)

The Enterprise Systems Planning Group (ESPG) critically assesses all IT systems efforts, determines existing needs, and identifies key opportunities to leverage University IT investments. The specific charge of this group is to:

- Ensure that the University's systems meet the needs of faculty, staff, and students;
- Evaluate current systems and identify gaps, needs, and opportunities;
- Recommend the appropriate allocation of OIT resources for maintenance, upgrades, and development;
- Endorse project proposals so that they can be passed to the Senior Advisory Group on IT (SAGIT) for further review, if needed.

### Highlights

- Provided oversight of the FY13 IT Project Portfolio and endorsed the FY14 IT Project Portfolio (IPP).
- Discussed strategic technology initiatives, including:
  - Collaboration tools at Princeton
  - IT resiliency
  - Princeton PRIME
  - Data governance at Princeton
  - Princeton's physical plant: reducing Princeton's ecological footprint
  - Using IT to support sustainability initiatives
  - Travel tools
  - Princeton's mobile strategies
  - m.Princeton: Princeton's new mobile app
  - Princeton's paperless admission project
  - Building the OIT Roadmap
  - Multi-year outlook on OIT-sponsored initiatives

## Project Managers Team (PMT)

The Project Managers Team (PMT) provides leadership and guidance on the delivery of administrative products and services, supporting the application and data management principles established under Partnership 2000. The PMT acts as the working group in support of the Enterprise Systems Planning Group (ESPG). The specific charge of the group is to:

- Identify, assess, and prioritize mandatory maintenance and enhancements to University systems;
- Coordinate systems requirements across offices and departments;
- Facilitate activities that foster the improved use of IT products and services at the University;
- Achieve the highest level of customer satisfaction in meeting the IT needs of the University community.

### Highlights

- Provided a forum for cross-departmental discussion of technology-related topics including all administrative systems, planned outages, disaster recovery, data center needs, information access best practices, document imaging, process automation, PRIME planning, and other related topics of general interest;
- Reviewed and updated the status of projects in the Interdepartmental Project Portfolio (IPP) and discussed project inter-dependencies;
- Assembled a comprehensive list of FY13 IT project proposals for ESPG review.

## Data Managers Group (DMG)

The Data Managers Group (DMG) is comprised of mid- and high-level University administrators who have stewardship responsibility for data stored within University business applications. Data Managers are responsible for the collection and maintenance of specific data in their functional areas, enforcing corresponding policy and procedures, and providing accurate analysis and presentation of their data for reporting. This group has been in existence for 11 years and has played a major role in the implementation and ongoing success of many administrative applications.

Data Managers serve as the primary source of information on their data; recommend security classifications and assign access rights for all their enterprise data; and are responsible for researching problems, recommending solutions, developing documentation, creating policies and procedures, and implementing processes required to address data administration issues.

### Highlights

- Provided continued oversight for the Information Warehouse, including the migration to Cognos 10;
- Provided oversight for the ongoing modifications to the Oracle Identity Management (OIM) suite of applications;
- Provided guidance and direction to multiple ESPG projects;
- Continually vetted and resolved data issues between disparate, central administrative systems within the University.

## Research Computing Advisory Group (RCAG)

The Research Computing Advisory Group (RCAG) advises and collaborates with OIT, PICSciE, and the Dean for Research on matters related to research computing in all academic disciplines at the University. The specific charge of this group is to:

- Advise on the research computing needs and priorities of academic units;
- Collaborate on and ensure broad input on projects related to research computing;
- Advise on the software, infrastructure, and support needs and priorities for research computing.

The Research Computing Advisory Group (RCAG) had two main focuses this year:

- Provide guidance for the design and implementation of the two major systems added this year: the 644 node Tiger computational cluster and the 2.6 PB /tigress parallel storage system.
- Consider the increasing role of data in research – securing restricted access, moving large data sets across our internal and external networks, planning for Big Data-oriented research on campus, and considering architectures to best support data intensive computing.

## Princeton University Training Team (PUTT)

The Princeton University Training Team (PUTT) aims to create a holistic and integrated framework for management development and staff learning. The group seeks to improve and develop the training infrastructure to meet institutional expectations.

The Princeton Deconstructed series offers the campus community the opportunity to better understand the key governing and operating structures within the University. The series includes three core sessions that introduce Princeton Governance (by Lianne Sullivan Crowley, VP for Human Resources), Princeton Finances (by Carolyn Ainslie, VP for Finance and Treasurer) and Student Governance (by Cynthia Cherrey, VP for Campus Life).

Newly added sessions explore Research at Princeton (given by A.J. Stewart Smith) and the Changing Landscape of Higher Education: Strategic Challenges for Princeton's Next Decade (by then Provost Chris Eisgruber).

Princeton Deconstructed continues to be very successful and popular among both current and new University staff with over 500 members of the campus community attending the sessions last year.

## Data Center Advisory Group (DCAG)

The Data Center Advisory Group (DCAG) was established in December 2012. DCAG collaborates with OIT, PICSciE, and other key stakeholders to advise the Vice Provost for Space Programming and Planning and the CIO and Vice President for Information Technology on matters related to data center space and resources supporting research and enterprise computing at the University. The specific charge of this group is to:

- Advise on the computing center needs and priorities of academic and administrative units;
- Provide input and data to assist OIT and Facilities in providing shared computing center infrastructure;
- Collaborate on and leverage common interests for various projects related to shared data centers;
- Provide ideas and feedback regarding University policies and guidelines affecting shared data centers.

The group is composed of departmental computing staff, OIT staff, PICSciE staff, and Facilities staff. The group meets each month.

### Enhancements to Data Center Security

DCAG endorsed several enhancements to the physical security of infrastructure located at the shared data center. New security measures include locked cabinets keyed by department, visitor log, and distress lanyards to alert Public Safety of emergency situation after hours. These enhancements will be implemented during FY14.

### Improved Communications

DCAG provided input regarding types and methods of communications with OIT and Facilities for critical and non-critical information about daily operations. Information sharing improved steadily during FY13.

### Improved Monitoring for Air and Power Conditions

DCAG members provided feedback regarding air temperatures and power condition in the shared data center. This information helped Facilities and OIT resolve temperature issues affecting certain racks in the data center and resulted in adding more sensors to confirm proper air conditions are maintained.

## Desktop Systems Council (DeSC)

The Desktop Systems Council works to standardize the University's administrative desktop computer environment. The Council provides a stabilizing influence so the various computing environments' organizational concepts, directions, and projects are established and maintained with a farsighted view. The Council provides insight on long-term strategies in support of University mandates and OIT initiatives. Members of the Council ensure that the University's business and academic objectives are adequately addressed, and information technology remains under control. The goals of the Council are to:

- Streamline the costs associated with hardware procurement, application development, software installation, computing support, system administration, and software licensing;
- Ensure that the standard administrative computing environment is sustained;
- Enhance the delivery of administrative systems and productivity tools.

In practice, the Council's responsibilities are carried out by performing the following functions:

- Conducting monthly meetings;
- Monitoring and reviewing activities and issues that impact managed environments;
- Controlling objectives as emergent issues force changes to be considered;
- Resolving conflicts and disputes, reconciling differences of opinion and approach;
- Accepting project deliverables;
- Establishing and enforcing policies and standards for DeSC Standard and MacDeSC Standard, and to a lesser degree, for DeSC Lite;
- Ensuring alignment with University schedules, policies, and services.

### Highlights

- Placed into production two (2) new managed environments: MacDeSC Lite and DeSC Non-SFI Managed
- Added support for OSX Laptops in the MacDeSC environment

# Cross-functional Teams

## The OIT Leadership Group

The OIT Leadership Group is comprised of OIT managers who meet monthly to carry out the mission of the group, which is to:

- Serve as change agents for improving the effectiveness of the OIT organization by evaluating and recommending initiatives to the OIT Cabinet and leading all such approved efforts;
- Foster collaboration among OIT leadership. The group participates in regularly scheduled meetings, and optional activities, and forms ad-hoc sub-groups as needed. The forums provide opportunities to strengthen relationships, inspire and exchange ideas, and promote dialogue among its members;
- Provide opportunities for professional development activities. The group enhances management and leadership competencies among members;
- Provide cross-organizational communication for OIT projects and operational issues. The group provides a forum to discuss projects on the OIT Interdepartmental Project Portfolio (IPP), as well as discuss OIT operational issues.

As a result of two task forces that were set up, the following projects are moving forward:

### Job Shadowing Program Development

This program is envisioned as providing OIT staff with relationship building and professional development opportunities by allowing one staff member to observe another in their normal daily work activity. Desired benefits include:

- Staff will better understand the organization as a whole;
- Enhance career development possibilities;
- Increased knowledge sharing, team building and cohesion among the 7 OIT departments.

The pilot program will run for 4 months in the fall. If successful, the program will be implemented.

### Further Engagement of Students Project

Further engagement of students is a project that began with the Leadership Group and has now been handed off to Leila Shahbender. Goals of the project include:

- More effectively identify the talents and skills of both OIT and the Princeton student body;
- Improve communications and enhance understanding between the groups;
- Expand efforts to collaborate in the development and delivery of technology products and services, and
- Better meet student technology needs and priorities.

### All OIT Meetings

The OIT Leadership Group organized two All-OIT meetings, which bring the entire organization together. The fall meeting included presentations on current topics: Coursera (by Clayton Marsh), Mobile Technology Strategy (by Serge Goldstein) and Disaster Recovery and Business Continuity (by Chuck Augustine).

The spring meeting provided OIT the opportunity to learn about the plans for an OIT Roadmap, as well as explore the results of the Senior Administrative Climate Survey with Romy Riddick, and learn about the role IT has planned in the Digital Humanities, as experienced by Professor Meredith Martin.

### Management and leadership

Over the past 6 months, the Leadership Group has focused on management and leadership topics related to:

- Leadership through Influence
- Managing performance on an on-going basis
- Navigating organizational evolution

The Leadership Group has identified the following management/leadership competencies to be further developed over the course of FY14:

- Planning/Project Management
- Business and customer relationship management
- Staff development and organizational change management
- Emerging technologies

## Disaster Recovery Team

The Disaster Recovery team was formed to maintain a disaster recovery plan in case of a major disruption to the computing services at the 87 Prospect or New South data centers. The team identifies the resources and actions needed to restore the campus network and computing infrastructure in the event current facilities are impaired. The team reassesses and updates the OIT disaster recovery plan by March 31 of every year. The plan includes:

- A time line for the restoration of campus network and Internet connectivity;
- A time line for the prioritized restoration of academic and administrative applications;
- A prioritized list of computing services and the steps needed to re-establish the operation of these services;
- Specific information about the location of backup data and restoration procedures for critical applications and services;

The team makes recommendations with regard to improvements to current physical and logical computing environments that would reduce the time needed to restore services in a disaster situation. The team also evaluates the existing network infrastructure, server deployment, and operational procedures to find ways of increasing the availability of computing service to the campus community (through reducing scheduled and unscheduled down time). In addition, the team consults with academic and administrative departments regarding their business continuity plans to continue University operations in the event of a major disruption to campus computing services.

## Architecture Review Board (ARB)

The Architecture Review Board (ARB) reviews the technical architecture of projects presented by customers planning to deploy or enhance University systems.

In FY13, the ARB consulted on a number of application/services/projects, including:

- Kaltura Media Management System
- Consortium on Financial Higher Education (COFHE) Student Outcomes and Retention Tracking Project (SORT) Project
- Hyperion Planning, Budgeting and Forecasting Tool
- Concur Travel and Expense Management Service
- OnBase Mobile Application Broker
- SciQuest procure-to-pay Service
- DataStage ETL Tool
- InfoED Human Subject Development

The team also developed additional sections in the ARB Outline to address Mobile and SaaS/Hosted applications.

## IT Security Team

The mission of the IT Security Cross Functional Team is to assist the IT Security Officer in developing and maintaining an IT security strategy. The IT security strategy and the implementation of its component programs seeks to minimize risks to the University's electronic information, to enable the University to comply with its institutional and legal obligations for electronic data, and to support the University's mission. The team is chaired by Anthony Scaturro, the IT Security Officer, and includes representatives from Academic Services, Administrative Information Services, Enterprise Infrastructure Services, Support Services, and SCAD/DCS.

To support its mission, the IT Security Cross Functional Team's goals are to maintain an inventory of IT security responsibilities, identify actual and potential IT security-related initiatives, identify cases where OIT and/or customer initiatives conflict with the IT security strategy, investigate and propose alternatives, and keep each other informed of the status of each OIT department's IT security-related efforts.

- The team added two representatives from the SCAD/DCS support community to bring more of a departmental perspective to the cross functional team. The SCAD/DCS representatives, Matt Marker and Sean Piotrowski co-chair a group of SCAD/DCS members who focus specifically on IT security-related topics, called the SCAD/DCS Security Team (SDST). Bringing Matt and Sean into the cross functional team provides another conduit of information between OIT and the departments through which IT security-related initiatives, issues, concerns and project status can be shared.
- The cross functional team amassed a list of application systems created, implemented and/or maintained by OIT including information regarding the authentication and authorization method(s) used and the types of personally identifiable information (PII) that the application collects, stores, processes, shares and/

or transmits. The information is stored in a database system that was developed by the AIS' Departmental Application Services team during FY13. This database is intended to serve as the system of record for all OIT supported applications in its initial phase and will be expanded to include non-OIT applications in the future.

- The cross functional team created an IT Security "State of the Union" presentation that was shared with the OIT Cabinet. This presentation highlighted the IT Security-related technologies that OIT has in place and the technologies that are either currently being implemented or are planned for the future. To turn the list of projects identified into a prioritized "IT Security Roadmap", the cross functional team developed a risk assessment procedure, called the "Day in the life of ...", that uses a variety of business process analysis techniques to help us better identify high risk business functions, to assess whether the security tools that are currently being provided by OIT are complete and effective, to determine what can be done to improve security where necessary, and to prioritize the proposed improvements.

