Letter from the Vice President

I am pleased to present this annual report of the Office of Information Technology for the 2016-2017 academic year.

As our users and their experiences have become paramount in our every approach to IT service delivery, it too has become the theme of this year’s annual report. I think that you will see this demonstrated in the accomplishments highlighted throughout the pages of this report, as well as in each of our service areas across our organization. Whether it is in the User Experience Office, our service management initiative, or our web design and programming practices, we are committed to delivering accessible software and services designed first and foremost with our clients in mind.

During this year, we made important progress in advancing and completing the major initiatives of our long-range plan. This includes substantial investments in usability, accessibility, and research computing. We also further matured our integration of service management practices into our IT operations, resulting in faster response to major incidents, considerable efficiencies in the delivery of our field services, and metrics that provide insight into our services.

In all that we do as an organization, our ultimate goal is to provide technology services that enable Princeton to achieve its mission to advance learning through scholarship, research, and teaching of unsurpassed quality. This annual report includes just a sliver of the more than 230 services we proudly deliver as an organization to support that goal.

What is not readily described in these colorful pages is the passion that our staff bring to their work every day. We all feel the deep responsibility we have to this remarkable institution and it is a joy to be able to work with such extraordinary people. It is their dedication and passion for our mission that makes the Office of Information Technology successful.

Jay Dominick
Vice President for Information Technology
and Chief Information Officer
OIT Mission Statement

OIT delivers information technology services and resources that enable Princeton to succeed in its mission to advance learning through scholarship, research, and teaching of unsurpassed quality. We achieve this through continual improvement and by aligning our services to the changing needs of our campus.

Our services are delivered with a commitment to:

- **Enabling innovation and research** at the frontier of discovery through centrally-provided, high-performance computing services and support resources;
- Delivering technology, tools, services, and applications that **support teaching and scholarship in and beyond the classroom**;
- **Supporting the effectiveness of University operations** through IT solutions and processes that align with campus priorities and strategic initiatives;
- **Relentlessly protecting the University’s information**, while respecting the privacy of the members of our University community;
- Providing information technology services that **enrich the student learning and living experience**;
- **Delivering next-generation state of IT services** achieved through service management planning and practices that ensure responsible stewardship of University resources;
- **Fostering a diverse workforce and an inclusive culture** that leverages many perspectives in the creation and delivery of technology solutions and services for our campus community.
OIT as IT Services

OIT’s nine departments provide more than 230 services across more than 70 business service collections. The services are represented in 8 major IT categories, including infrastructure, administrative and business, communications and collaboration, security and identity/access services, teaching and learning, research computing, IT professional services and client computing.
User Experience Office (UXO): Promoting inclusive, user-centered design

UX is User Experience – the art and science of designing high-quality applications, products, and services. OIT founded its User Experience Office (UXO) in 2016 to provide training and consultation in user research, design, and accessibility. In the information age, technology is everywhere. Computers appear in the classroom, in research labs, in students’ pockets, and all around campus in the many devices that are a part of the Internet of Things (IoT). With this proliferation, building technology that meets the needs of its many users and is easy to use becomes ever more important.

Regardless of when or where technology is accessed, it must meaningfully align with people’s needs. In that sense, it serves not as an end, but as a means: the more evolved the technology, the more invisible and seamless it becomes, helping people to focus on their tasks and goals. Achieving this goal requires changing how OIT does business, which became the driving force behind launching the User Experience Office. By introducing principles that change the nature of how IT solutions are conceptualized and created, we are actualizing our OIT 3.0 mission of becoming a service-based organization.

That work still involves the delivery of exceptional technology and IT-enabled services. Yet, we are also advancing processes that inform the development of increasingly user-centered solutions that are well conceptualized, well designed, and accessible. In OIT, we call it: “Fit for purpose. Fit for people.”

As you will see throughout this report, a drive toward user-centricity and accessibility is infusing the business operations of OIT at all levels. UX analysis has become a part of OIT’s contracting and procurement process. IT projects seeking SAGIT funding provide plans to achieve broad user acceptance. Architecture and Security Review (ASR) sessions, which help evaluate proposed acquisitions or in-house projects, now include review for UX and accessibility issues. This trend will continue to accelerate. Indeed, we see it as a natural evolution.

UX for all

Although the UXO is most focused on software and websites, the UX process can be applied to the design of services, documents, business processes, and even physical spaces. Of course, creating more effective interfaces, services, and processes doesn’t just benefit the end user. It has demonstrated positive business impact. UX practices reduce development time, improve project team design decision-making, increase user adoption and customer satisfaction, and lower support costs. As people learn how to integrate UX techniques into their projects, they find efficiencies in the implementation process and an improved deliverable at the end.

To support OIT in adopting UX best practices, the UXO has developed the Envision framework. Additionally, the UXO launched a sequence of six training workshops to acquaint participants with basic UX techniques. By providing a framework, job aids, and hands-on training, the UXO helps colleagues understand that the benefits and principles of a people-centered approach not only produce better products and services, but foster a culture of design thinking. By broadening the community of user advocates at Princeton, OIT bridges the gap between our partners’ goals and the technology on which they rely.

Envision: UX as a standard operating procedure

The framework that the UXO developed is based around a process called Envision. The goal of Envision is to create an evidence-based design prototype that everyone can agree on before implementation takes place. Envision uses an agile design process that starts with a concept that can be tested and refined. A prototype is developed using wireframe drawings, a clickable prototype, or a sandbox implementation of a vendor’s product. The prototype can be reviewed by users and stakeholders and is usability tested to make sure the design is intuitive. When finalized, the prototype serves as the basis for the implementation phase.

The Envision process is as simple as it is transformative. It is built around three steps:

1. Learn. A project’s design team starts by researching the problem or opportunity from multiple perspectives. The team works with the end-user audience to understand what they want, how they work, and where there are pain points. The team also considers how the new product or service will mesh with existing processes and support the organization’s strategic goals.

2. Design. With an understanding of the problem at hand, the design team goes through an idea-generating process and then settles on an approach. A design prototype clearly and easily communicates the vision.

3. Test. The prototype is then shared with users and stakeholders. The design is tested for ease-of-use through usability testing. Feedback is gathered and analyzed, and improvements are incorporated.

Called a design sprint, these steps may be repeated several times, each sprint leading to a more refined design. While this may seem like a lot of front-end work, it saves significant time and effort in the overall project. Building and modifying wireframes takes less effort than implementation. It’s a lightweight process, so the design iterations can be completed rapidly. The end result is a prototype demonstrated to be intuitive and appropriate to its purpose, which is used by the implementation team as a specification. For examples of Envision in action, see the stories on the Princeton website redesign and Timeline.

Senior UX researcher joins team

User-research and usability-testing techniques are central to the Envision process. The UXO has recently added a senior UX researcher to guide these essential tasks.
Partnering in education: The NJ Commission for the Blind and Visually Impaired

The most significant accessibility gains are made in partnership: When people of different abilities work together toward a common goal, new thinking emerges. In FY17, the UXO forged a connection between the University and the New Jersey Commission for the Blind and Visually Impaired, which strives to help people “achieve full inclusion and integration in society through success in employment, independent living, and social self-sufficiency.” Established in 1910, the organization works on behalf of people throughout the state. As part of the UXO’s Fundamentals of UX Certificate, a monthly Introduction to Web Accessibility training course is offered to faculty, staff, and students. Over the course of four hours, participants learn theoretical models of disability, tenets of inclusivity, and the importance of contextualizing access as a civil right. Representatives from the Commission were added to the agenda. They have quickly become a key educational partner.

After learning how fairness can be built into the digital communications ecosystem, students are joined by members of the Commission. Not only do they showcase assistive technologies like JAWS screen readers for Windows that remove hurdles to access; they offer a real-world example of common barriers. During the session, two websites are loaded: one coded to work with the screen reader, one not. In comparing the two, the daily experience of non-sighted or visually impaired learners is brought to life.

“If it’s not coded or scripted correctly, the screen reader does not read or pick up the information,” explains Andrea Askie-Rosario, MS, CRC, business relations specialist for the Commission. “Demonstrating the software opens people’s eyes to how people who are blind and visually impaired access the internet and computers.” She also anticipates another benefit: When blind and visually impaired students come to campus, Princeton will be better prepared to offer equal access. “They’ll know what to do. They’ll know about the technology.”

In short order, work with the Commission has expanded beyond the boundaries of the classroom. In early FY18, Princeton attended a reverse job fair hosted by the Commission, where blind and visually impaired candidates networked with prospective employers. “It’s flipping the script on the traditional job fair,” Askie-Rosario explains.

Working together, the two groups look forward to bringing web accessibility training to more people on campus. “Giving people that firsthand experience really brings things into perspective,” Askie-Rosario says.

Prioritizing accessibility

Accessibility supports Princeton’s commitment to diversity and inclusion as well as OIT’s goal to improve the user experience for all people. At its heart, usability is about providing highly-usable and accessible IT to everyone. OIT is responsible for championing and delivering technology that is accessible to everyone relying on it to advance their work. Yet the calling to champion accessibility goes beyond responsibility. As technologists, we can change outcomes for students, faculty, and the staff who support them.

Senior web accessibility advisor – leading the charge:
As OIT evangelizes user-centered practices at Princeton, accessibility awareness and capability continue to grow. This marks the first year of a multi-year initiative to raise awareness, modernize our accessibility toolkit, and expand skills across the University. To lead that charge, the UXO brought on a senior web accessibility advisor in October 2016. As an advocate for design and processes that expand access, this specialist serves as both a partner to our customers and a guide within OIT.

Accessibility-informed Drupal templates: In migrating from Roxen to Drupal, Princeton is making accessibility gains. In FY17, the UXO teamed with OIT Web Development Services (WDS) to create a new, University-themed template that includes features such as unobstructed keyboard access for non-sighted visitors and for those using mobility systems. The new template will allow any department or office on campus to publish an attractive and accessible website, at no charge.

Office of Disability Services website upgrade:
Princeton’s Office of Disability Services serves as a frontline resource for students and others seeking equal access to University resources. The UXO worked with Disability Services to upgrade their website, implementing enhancements including accessible form design. The forms are designed using UX industry best practices, and will be used as the basis for upcoming enterprise form design projects.

Expanded reach for MOOCs: To support the continued growth of Princeton’s massive open online course (MOOC) offerings, the UXO partnered with the McGraw Center for Teaching and Learning to improve accessibility for its MOOC-related documents and background processes. While MOOCs have proven highly user-friendly, Princeton’s collection now raises the bar with accessible PDF content and captioning. In FY18, downloads including slides and reading material will be incorporated. The UXO also broke
new ground this year by offering the University’s first small private online course, or SPOC. Built on the edX platform, the course is designed for exam preparation for the Certified Professional of Accessibility Core Competencies. The course is available internally only, to staff who are enrolled through the UXO and who are preparing for certification. It is designed using the flipped model, where participants complete reading assignments, watch videos, and complete activities before attending in-person sessions.

Elements of web accessibility:
- Removes sensory, physical, and cognitive barriers
- Emphasizes ability
- Informs fair, inclusive user experiences
- Is guided by established standards
- Encompasses the entire digital ecosystem

Websites and matching blogs launched

User experience and accessibility have new homes online. Visitors to our revamped UXO and new Accessibility websites will find concise service listings, self-education resources, and information about upcoming events. The Accessibility website also offers easy access to our recently introduced Accessibility Assistance Service, which fields requests and helps resolve access issues to websites and other technologies. The Designing Experience and Accessibility blogs present articles written by UXO staff on emerging topics of interest, and are available from websites:
- ux.princeton.edu
- accessibility.princeton.edu

Outreach, education and training

As a voice for UX and accessibility on campus, the UXO team built out its education infrastructure in FY17 with the goal of creating broad awareness of user-experience principles and techniques. By offering broad-based learning opportunities, the intent is to cultivate a community of UX-minded peers who can bring UX design to a wide range of projects.

Fundamentals of User-Experience certificate launched:
FY17 UXO training centered on the launch of a six-workshop series that covers the spectrum of UX design. It helps participants build transferable skills and gain insights that they can bring back to their teams. Participants who complete all six workshops follow a curriculum that culminates in a certificate in UX fundamentals.

Courses provide theoretical knowledge and emphasize tangible skills and include:
- Introduction to User Experience Design
- Introduction to Web Accessibility
- Usability Testing: How to Conduct Tests at Any Stage of Your Project
- User Research: How to Conduct Research to Better Understand Your Audience
- Information Architecture Techniques: How to Organize and Present Information
- Wireframing: How to Create and Test Wireframes and Prototypes

The Employee Learning Center lists all upcoming training sessions: www.princeton.edu/training.

Twenty-one achieve CPACC certification: To cultivate a broad team of accessibility partners, the UXO led its first custom, three-day training program for the Certified Professional of Accessibility Core Competencies (CPACC) certification exam in FY17. Provided by the International Association of Accessibility Professionals, CPACC certification signals broad, cross-disciplinary knowledge of the theoretical and practical aspects of accessibility. By re-contextualizing disability as a reflection of social, versus individual, limitations, new frameworks for experiences are informed. The training emphasized the impact that accessibility has on people’s lives, while also covering legal and ethical issues and the benefits of inclusive design. Among the first CPACC-credentialed at Princeton were ten OIT staff, along with partners from SCAD/DCS. A second cohort of 22 staff from OIT and across the University are currently preparing for exams in January 2018, using UXO’s newly redesigned training class.

Design thinking and content strategy workshops: The UX techniques integrated into the Envision process are applicable across a diversity of applications, from the design of physical spaces to the creation of services. As part of its outreach, the UXO offers customized training sessions that break down in-demand topics.

- Design-Thinking Matters: To support the McGraw Center for Teaching and Learning in its mission to produce increasingly user-centered programming, the UXO facilitated an in-person training as part of the center’s annual retreat.
- Content Strategy: A presentation on content strategy was held for OIT’s Web Development Services team, which emphasized value-added techniques that can be employed as part of the Drupal migration process.
A move toward accessibility requires both a cultural and technological paradigm shift. Yet the true potential resides in what people achieve when they partner to prioritize access. This concept was vividly demonstrated during Princeton’s inaugural Global Accessibility Awareness Day event in April.

“Princeton is deeply committed to providing an inclusive educational and working environment for all the members of our community,” said Vice Provost Michele Minter in her opening remarks. “We must be a place where everyone’s perspectives, experiences, and talents are valued.” As GAAD demonstrated, that commitment extends beyond those who call Princeton home. During her keynote address, international disability-rights advocate Haben Girma received real-time audience feedback for the first time via a unique haptic feedback device. Created for Girma by a pair of Princeton undergraduate students, it was a profound and moving example of technology’s ability to empower.

Global Accessibility Awareness Day was inspired by a 2012 blog post written by Toronto web developer Joe Devon. There, he made the case that it was time for accessibility practices to be mainstreamed among developers. “For some people, an accessible Internet literally makes a world of difference,” he wrote, envisioning a day each year when developers would raise awareness.

During a keynote that emphasized the transformative capacity of inclusivity in higher education, Girma – the first deafblind Harvard Law School graduate and a Forbes 30 under 30 honoree – brought Devon’s point to life. Had the schools she attended not provided access, she would not have been able to complete her education. Of her time at Harvard she said: “They engaged in an interactive process. We brainstormed – what are the challenges, what are the potential solutions – and we found ways to make it work.” Girma described inclusion not as a project, but as a practice. “It’s a choice that we all make,” she noted. “Some small, some big, but that will impact how inclusive our communities are.”

In the past, Girma presented such talks by memory, unable to gauge or react to audience response. This time, things were different. With her input, Transformations in Engineering and the Arts (STC309) students Nora Bradley ‘18 and Max Greenwald ’17 devised a wearable device that audience sentiment could be communicated via vibrations. The students tracked audience reactions then transmitted the data to Girma via device signals. One buzz indicated positive engagement, two confusion, and three disengagement. Made possible with the support of the Keller Center, the project was conceptualized and kicked off by the UXO in advance of the event. Girma called the result history-making. “The potential to create devices is right here in Princeton,” she said. “You all can shape the future. We all have the power to make our communities more inclusive.”

During the event, Bradley ‘18 and Greenwald ’17 spoke about their approach, inspired in part by the feedback-mechanism within Facebook Live. “How can we take something that inherently doesn’t have meaning and then change it into something that does have meaning?” Bradley said. “There’s a lot of research into haptic information and haptic communication that really shows that if you give someone a message they can learn it the same way that they would learn a language.” In turn, Girma praised their vision. “There are many ways to engage with the world and when we’re creative and our communities choose to be inclusive then we can have full access to information.”

Princeton’s event was the first to be hosted by an Ivy League University as part of what will become an annual series. The Office of Information Technology, sponsored the event in partnership with the Office of the Vice Provost for Institutional Equity and Diversity, the Office of Disability Services, the Campus Conversation on Identities, and Princeton’s Employee Resource Groups. Community partner, The New Jersey Commission for the Blind and Visually Impaired, was also in attendance.

To make inclusivity tangible, the event featured creative experiences, such as a promotional poster written only in Braille, rendering it unusable to sighted participants. “If society hadn’t changed the rules, somebody who is deaf and blind would never have found success in school like this,” Sian says. “But Girma is brilliant, and has so much value to add, and she was able to find that because her university was accessible to her.” His hope is that events like GAAD will galvanize those who want to foster a culture of inclusivity at Princeton.

“Given how important technology has become for access to modern life, to access to the University, it’s incumbent upon us as IT professionals to think about how we erect barriers that prevent people from getting access to these tremendous resources that we have available,” said Jay Dominick, Vice President for Information Technology and CIO. “That’s the call for us as technologists. That’s the call for us as University employees. That’s the call for us as humans.”
Outreach and education events

The UXO team hosted and participated in numerous public and University events in FY17.

Website Wednesdays: Hosted by OIT Web Development Services, these monthly sessions continue to draw crowds. The UXO offered talks on evidence-based web design and web accessibility.

A11YNYC: PDFs are the most common document type online, yet are rarely accessible. As part of New York City’s monthly meetup for accessible, inclusive design, UXO’s senior web accessibility advisor led a session on practical workflows for document creation. A Princeton chapter, hosted in partnership with Educational Testing Services (ETS) and open to the public, kicked off in October 2015.

IT Unconference: OIT’s “Unconference” offers valuable skill-building in a participant-driven setting. The FY17 edition featured talks on UX and accessibility. “Simple Web Accessibility Tests” covered four easy checks, from accessible math equations to language identification for screen-reader pronunciations. “UX in Five Minutes” condensed the principles of user experience and demonstrated the simplicity of the Envision UX-design process.

United Nations Convention on the Rights of Persons with Disabilities (CRPD): In 2006, the convention was adopted by the UN with a stated purpose of “the rights of persons with disabilities in society and development.” As part of the 10th session of the Conference of States Parties to the CRPD, UXO-member Damian Sian participated in a session that explored the requirements to create a vital accessibility profession.

UXO projects in FY17

reCAPTCHA: Image-only captcha tools can impede users with visual impairments. The UXO assisted the University with a move to Google’s WC3-compliant alternative and industry standard, reCAPTCHA, which employs both images and audio.

CAS login redesign: The Central Authentication Service (CAS) login page, accessed by most of the campus community, was upgraded to eliminate confusion and simplify use.

Application design toolkit: The UXO supported the creation of a toolkit for custom application development in OIT, by providing guidance in usability and design. A more expansive toolkit that includes visual and interaction design patterns for developers is being created in partnership with OIT Web Development Services (WDS).

Library website: A heuristic review of the library’s online homepage helped establish design priorities and user-centered improvements. As FY18 started, UX design and testing for the Princeton Prosody Archive, a searchable database of digitized books from the sixteenth to twentieth centuries, was getting underway.

Graduate School financial aid management application and financial systems: Design sessions helped to inform the redesign of key student-facing systems.
Center for Data Analytics and Reporting (CeDAR): Leveraging data to go deeper

In FY16, OIT’s Center for Data, Analytics, and Reporting (CeDAR) worked to unlock new levels of data insight to help partners ask better, more incisive questions. Work in FY17 showcased the logical next step: helping our customers to go deeper, data serving as both a foundation and springboard by which to create new value. In part, that’s about continuing to support and upgrade business-critical tools, including Cognos and Tableau. It’s also about expanding on CeDAR’s educational mission by providing ongoing training opportunities to a range of data-curious constituencies, while building bridges between parties to promote an increasingly proactive, information-driven community.

Tableau visualizations take hold

In the year since CeDAR launched Tableau, Princeton’s centrally managed data-visualization tool, users have hit the ground running. The base has grown to include 127 desktop licenses across 23 departments, with production dashboards created by nearly every administrative department. The business impact can be seen in the numbers: visualizations grew from 250 at the fiscal year’s start to more than 1,500—a 500% increase. In a testament to the tool’s usability, most were independently generated by the departments themselves.

Tableau makes insight accessible by representing complex data relationships in a meaningful, visual format. As users engage data in new ways, new questions—and possibilities for new visualizations—emerge. In this second year, CeDAR witnessed an evolution toward ever-more complex inquiries, and assisted with the union of data from disparate sources. The resulting visualizations are being used to guide critical, executive-level decisions. The offices of Graduate Admissions and the Provost, among others, established dedicated departmental Tableau sites that will aid in their ongoing planning.

In a survey that garnered a 99% response rate, 82% of Tableau users already rated the tool to be “important” or “very important” to the performance of their job responsibilities. Moving forward, this survey will be the cornerstone of an annual desktop-license recertification process, enabling CeDAR to maintain insight into current and future needs.

Cognos prepared for a user-centric upgrade

Introduced to Princeton in 2005, Cognos is the University’s well-established and supported business-intelligence tool. The upgrade to Cognos Analytics v11.0.7 in early 2018 will provide users with a much better product. In April 2017, CeDAR moved into the development phase, preparing for enhancements that build on what is available in Cognos 10:

- A cleaner interface and a better user-experience, including improved dashboards and subscription services
- Native data visualization, exploration, and discovery tools, which can replace or supplement Tableau visualizations
- Professional report creation

Much of FY17 was spent preparing infrastructure, establishing expectations, and creating migration plans for key Information Warehouse packages. To improve performance, CeDAR also evaluated report usage, working with Cognos users to eliminate those reports that no longer serve a business function. Going forward, an extensive report testing plan will help drive a seamless experience. In tandem with this project, work on the Campus Solutions upgrade and PU Access conversion to Shibboleth continued. Expect more in FY18.

Training across platforms

As Princeton’s data-analytic capabilities expand, CeDAR continues to provide training to help customers reap high rewards. Efforts this past year can be summed up in a word: variety. From self-service and video training to CeDAR-led workshops and quarterly newsletters, our focus was to support customers where and when they need us.

Bi-monthly Cognos and Tableau outreach sessions: CeDAR invites Cognos and Tableau users to come together to exchange tips, tricks, and get answers to their questions. Information relevant to various CeDAR initiatives is also shared.

Tableau educational series: In a year, more than 150 people took part in 16 Princeton-led workshops focused on the skills needed to create informative, useful visualizations. To supplement CeDAR-led sessions, external organizations, including the New Jersey Tableau User Group, were invited to campus.

Raising the Bar Tableau workshops: Campus Tableau users came together to form a monthly, self-supporting knowledge-sharing session. Topics included dashboard navigation and survey-data analysis.

Self-service data preparation: In the past, data-blending for Tableau was a CeDAR service. Now, report users are being trained to take the reins, learning to blend their own data and prepare their own data joins and transfers. This helps them establish closer data relationships and prepares them to best capitalize on Tableau (and soon, Cognos) visualization potential.

Enhanced documentation: Beyond Business Intelligence, documentation and training materials for a number of smaller systems were created.

Buy-in from administrative partners enables CeDAR to establish a user-focused training paradigm. Expect more training announcements, including classes for data consumers.
Beta launch: Information Governance Catalog (IGC)

As campus partners make data analysis a standard operating procedure, the Information Warehouse continues to grow and grow. In an effort to enable creators and consumers to keep track of the data that is available, while uncovering useful information, a powerful metadata tool, Information Governance Catalog (IGC), was beta-launched in May 2017.

IGC allows Princeton to systematically catalog data resources in a manner aligned with our information security policy. Benefits include clear business definitions, role-based data-stewardship responsibilities, and fast access to data-classification levels. Moreover, it makes data usable by creating an information-rich description of each source. More than 400 IGC fields have been added: an impressive number in a short period. As parties continue to establish metadata in tandem with new Information Warehouse entries, the value realized through shared stewardship will only deepen.

In advance of launch, CeDAR brought together stakeholders from the Office of Advancement, the Office of the Registrar, Graduate and Undergraduate Admission, Finance and Treasury, Human Resources and other departments to establish data definitions, optimize the presentation, and test the tool. CeDAR looks forward to continued IGC enhancements.

CeDAR projects in FY17

Data integrity: The number of data sources and software packages that need to be integrated into the Information Warehouse and its related reporting tools continues to increase. CeDAR noted an acceleration in this trend and worked to support customers, not only through third-party vendor coordination and implementation, but in the creation of a clean data infrastructure. Additionally, CeDAR continued to develop strong partnerships with Princeton’s growing number of departmental data analysts.

Rewriting Financials: To promote report efficiency, a major effort to rewrite Financials Commitment Control in the Information Warehouse took place. The nine-month project resulted in one-stop shopping for financials data, along with improved logic for ETL processing.

Dimensional modeling: Moving past list reports into analytics, CeDAR partnered with Institutional Research to assist the Provost and Graduate Admission offices create a new, more streamlined reporting paradigm. By shifting time away from standard report creation, it enables more efficient, detailed analyses of graduate student cohorts.

Survey-data analysis: From Survey Monkey to Course Evaluations, surveys drive understanding. CeDAR built a new framework to collect and analyze survey data.

Hiring: Work is in progress to add Information Warehouse data sets to support new hiring systems for faculty and staff.

Interface hub support: CeDAR added two team members to support the Interface Hub, allowing biographic and demographic data to be served from a centralized source.

Sponsored research: New insight fostered through data visualization.

When it comes to data analysis, better information drives new possibilities. There is perhaps no greater proof than in the widespread Tableau buy-in from campus administrative departments, many of which continue to add visualizations at a furious pace. Several partners could well be described as super users, including the Sponsored Research, part of the Office of Research and Project Administration (ORPA).

Since creating their dedicated Tableau site, modeled after a similar resource at Johns Hopkins University, the group has generated no fewer than 60 visualizations. More than a way to satisfy baseline reporting requirements, these intuitive visualizations make key information clear at a glance. In turn, ORPA is better able to support the University’s globally prominent cohort of principal investigators, grant managers, and administration officials, helping them to manage sponsored funds in the context of a complex regulatory environment.

Among the insights fostered through Tableau is the ability to easily demonstrate funding trends year-over-year. Information can be sliced multiple ways through the incorporation of pre-award, post-award, and demographic data spanning a 10-year range. This can help to answer any number of compelling and budgetary questions:

- Which faculty attract high levels of grant funding?
- How many proposals are going out, and from which academic divisions?
- Which have proven most successful?

With CeDAR’s assistance, a massive data clean-up and security project was initiated to support the project. This involved work across three sources: PeopleSoft Grants, Coeus, and Human Resources. Now, the group is fully up and running on its own, and able to maintain their data independently.

More critically, they can easily separate reports designed for broader use from those with data restricted to a given department, such as faculty salaries or particular grant awards—the result of careful data roll-ups not native to Tableau. “There are tight security requirements, and departments can’t be given access to other departments’ data,” explains CeDAR Senior Director, Ted Bross. “In addition to creating documents to show the outside world, individual departments wanted to be able to catch secure glimpses of their own data.”

In achieving that aim, the project reflects a new frontier in the utilization of visual data at Princeton that directly supports the University’s teaching and research mission.
When teams move beyond “business-as-usual” thinking and examine the processes that drive their operations, new value is created. Increasingly, constituencies across campus are heeding that call to make technology investments that support streamlined processes. The Project and Technology Consulting Office (PATCO) serves as a knowledge base and consultant for these process improvements, whether a group is focused on IT system enhancements or the effectiveness of a given function within their organization. A source for methodical, repeatable techniques, PATCO helps departments to enhance their efficiency as well as identify solutions that produce better outcomes.

**New Business Process Improvement class**

PATCO has offered a popular Business Process Mapping class for several years, which empowers participants to identify their internal processes and establish more strategic workflows. This past year, an advanced class was added to the roster: Business Process Improvement. Building on the lessons of the first course, this two-hour session presents analytical techniques to identify pain points, reduce failure rates, and accelerate productivity. Conceptual and practical at once, the course includes hands-on exercises that make analytical techniques tangible. Based on enrollment, the offerings have struck a nerve; to date, nearly 140 individuals enrolled in one or both sessions.

**Improving the campus annual IT project planning process: Mid-year review**

In prior years, projects were approved and scheduled at the outset of each fiscal year. A new, mid-year check-in adjusts the project slate to best reflect the University’s latest priorities and maps them more realistically to resource availability.

**Joint project management / service management initiative: Seeking a cohesive methodology**

As OIT evolves into a service-delivery organization, we continue to refine our methodologies and examine how our teams work together toward a common purpose. In FY17, PATCO and the Service Management Office (SMO) kicked off a shared initiative to examine potentially overlapping processes and align them for greater effectiveness. The aim is to develop a uniform set of templates where appropriate, while evolving the project management methodology to accommodate the service lifecycle.

This requires careful consideration of the nuances that define the services that result from a project. For example, some projects center on product-related software updates; others spawn the development of new OIT service offerings. Though distinct, each may ultimately call for a subset of shared templates, whether in the form of requirements gathering documents, resource planning tools, or go-live checklists.

In FY17, a shared strategy was established and the first steps toward alignment were made.

- Service-related projects are now included on the OIT project slate
- New service-oriented questions have been added to the project initiation plan
- Service Management Office representation has been incorporated into the Architecture and Security Review

This new level of coordination within OIT ensures that services not only receive the same focus as “traditional” technology work; but that partners with projects that involve service creation are fully supported by the organization. Moving into next year, the two groups are developing a process and templates to aid service managers with designing/redesigning their services.

Read more about PATCO services and resources online at [www.princeton.edu/patco](http://www.princeton.edu/patco).
Research Computing: Powering Princeton to accomplish more

Princeton faculty guide some of mankind’s most groundbreaking research projects, with implications for everything from clean energy to voting. As a technology partner invested in their success, Princeton’s Research Computing team continues to redefine the frontier of the University’s high-performance computing capabilities. This begins not with bits and bytes, though those are vital, but with listening. By taking time to understand the vision of our faculty, we can in turn envision new technology solutions to power their work.

In part, that’s about creating efficiencies: as high-performance computing (HPC) systems grow more powerful, more – and more complex – questions can be answered faster than ever before. Yet at a fundamental level, we work to implement tools and processes that change the nature of what can be asked.

Software engineering program grows

OIT Research Computing launched its software engineering team in FY16 to advance faculty research through sophisticated, long-term support and the development of scalable, efficient code. Jointly funded by OIT and the departments, these engineers bring expertise in their disciplines as well as the design and construction of cutting-edge research software systems. As such, they represent a new approach to academic computational research, offering targeted expertise, from the development of highly sophisticated algorithms to performance tuning and optimization. In FY17, we welcomed two new members, who join our geosciences and physics engineer:

- Princeton Neuroscience Institute: Research software engineer
- Astrophysics: HPC software engineer

The program is a model for user-centricity in research, widening access to central programming, system administration, and resources that maximize productivity in ever-more complex software environments. As a result, faculty can do more, more quickly, whether it’s defining new models in high-energy physics or using virtual reality to examine the neural mechanisms behind courtship calls in fruit flies. A fourth engineer for the Center for Statistics and Machine Learning will join the eventual team of five in early FY18.

Redefining the frontier of data science

As HPC systems evolve, some of the world’s most compelling insights will be borne of data. Today’s systems can process previously unimaginable amounts of information at ever-higher speed and in new combinations, unlocking investigative paths that could never before be explored. In FY17, OIT Research Computing partnered with the Princeton Institute for Computational Science and Engineering (PICSciE) to support game-changing, big data research initiatives.

Politics: In many ways, the evolution of American policy can be tracked through subtle language shifts. Often, governmental decisions made in one jurisdiction are systematically influenced by those of another. Yet it can be challenging to uncover patterns hidden in vast amounts of policy data. Today, politics professor Kosuke Imai, with partners Jim Pivarsky of physics and Alexey Svyatkovskiy, of PICSciE, is leveraging big data processing and machine learning to more efficiently uncover those connections. More than 7 million bills that span nearly 25 years and all 50 states are moved through a distributed, text-processing pipeline that employs dimension reduction and natural language processing to assess content across multiple dimensions simultaneously. In doing so, insights that enhance our understanding of political mechanics are being surfaced for the very first time.

Deep learning for fusion energy: The tokamak fusion reactor, developed in the 1980s, is among the innovations that are paving the way toward a clean energy future. In essence, it models the behavior of the sun. However, it is critical to accurately forecast micro-disruptions and analyze time series to harness energy potential in a safe, self-sustaining way. William Tang of Princeton’s Plasma Physics Laboratory (PPPL) is among the foremost researchers in the field, and in FY17, Alexey Svyatkovskiy, of PICSciE, and the OIT Research Computing team supported his effort to define new, computationally intensive deep-learning methods. Tested on the new Tiger cluster (see story on page 17), the approach involved implementing a distributed, data-parallel, synchronous training algorithm across multiple GPU nodes at high speed. With proof of concept established, discretionary allocations were awarded on the nation’s supercomputers at Oak Ridge and Argonne.

CMS big-data project: The quest to refine the theoretical frameworks of particle physics is accelerating in tandem with the evolution of HPC. To assist faculty involved in the Compact Muon Solenoid (CMS) experiment using the Large Hadron Collider at CERN, a number of projects took place in FY17. Working in partnership with Oliver Gutsche of the Fermilab particle physics laboratory and Jim Pivarsky of Princeton’s physics department, Alexey Svyatkovskiy, of PICSciE, provided coding support for an algorithm that scales thousands of GPUs to the world’s largest supercomputers and enables new approaches in machine learning. A research-and-development project explored how high-energy physics software can leverage the open-source Apache format now standard in big data. The team also assisted Pivarsky in the creation of an open-source histogrammer. As a result, our colleagues at CERN are building on the Princeton-designed infrastructure to enhance their big-data cluster.

Read more about Research Computing online at www.princeton.edu/researchcomputing.
New HPC frontier: Tiger2 is Princeton’s most powerful supercomputer to date

Princeton’s supercomputing facilities took a significant leap forward in May 2017 with the launch of Tiger2, our most powerful high-performance computing system to date. Not including CPU-apportioned capacity, it operates at an incredible 1.5 petaflops, making it five times more powerful than Perseus. This aligns with our objective to provide 10% of the capacity of the nation’s supercomputers right here in Princeton. Bringing this powerful system online required several months of work from the OIT Research Computing systems and storage team. It adds the power, computational capacity, and throughput that researchers employing machine learning and data science require. As FY17 came to a close, the system was being deployed to foster discoveries among a range of groups, including graduate researchers working under assistant professors of computer science Barbara Englehardt and Olga Russakovsky, professor Athanassios Panagiotopoulos in chemical and biological engineering, and a number of different faculty members in the Princeton Neurological Institute. In FY18, expect additional capacity gains.

Jenkins comes online

Continuous integration is central to modern software development. As researchers work collaboratively across coding languages and platforms, opportunities for errors are many. Not only can this translate into lost time; it can jeopardize results. That makes revision control a tenet of good coding practice, from software being checked in or out as changes are made, to testing for early error detection. To assist with the latter, the Jenkins automated testing framework was introduced in FY17. Working in tandem with the GitHub Software Code Management service, which provides version control, it removes guesswork, running tests automatically on check-in through an intuitive web interface. This improved workflow will allow researchers to spend less time troubleshooting large, collaborative code bases and more time focused on their work. A mini-course that explores the basics of GitHub and Jenkins is now available through PICSciE.

Redefining Princeton’s cyberinfrastructure: FY17 update

Coming into this year, OIT observed swift uptake of the new Globus nodes installed in FY16. Additionally, a number of departments have installed dedicated nodes to facilitate rapid data transfers to and from the University’s high-performance computing center. In FY17, the Research Computing team continues to work with groups across OIT as part of a multi-year initiative to envision and design the network of the future.

PICSciE endowment expands training and outreach

In the HPC era, the potential to deepen knowledge through computational research will only grow. As such, it is incumbent upon the University to provide world-class training that positions the next generation for leadership. That requires expanding access to educational programming at the introductory level, alongside deeper training in high-demand topics that fosters research efficiency, from code design to mastery of specialized tools.

Outreach: Serving departmental needs

While OIT Research Computing is focused on technological innovation, outreach is central to our mission. It is not enough to provide software and supercomputers. We must ensure that our research partners are aware of and positioned to best apply those resources. As such, FY17 was a year of focused relationship building. Throughout the year, we met one-on-one with research groups to discuss their needs. This creates efficiencies in resource deployment, from allocations to scheduling. It also opens a communications channel to ensure that OIT continues to invest in the right solutions. As Python use grows, for example, we are continuing to improve our programming environment to make it easier to use. Working together, we will continue to evolve the OIT HPC and software infrastructure toward ever-greater utility.

Above: Ian Cosden, Manager HPC Software Engineering and Performance Tuning, teaches performance tuning and code optimization principles.

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Above: Ian Cosden, Manager HPC Software Engineering and Performance Tuning, teaches performance tuning and code optimization principles.
OIT supports second-annual PICSciE Research Computing Day

OIT was proud to be among the sponsors for PICSciE’s second annual celebration of all things computational research in FY17. A showcase of data-intensive projects from graduate students and postdocs, paired with presentations that showcase the University’s research-computing infrastructure and support services. It vividly demonstrates the potential unlocked when we meet our educational mission.

Outreach: Training the next generation

If OIT’s computational-research training paradigm for FY17 were to be summed up in a word, it would be “more.” As interest in high-performance computing gains traction across fields, OIT is continually seeking new ways to partner with PICSciE and invest in student learning opportunities across systems and skill levels.

Expanded workshop and mini-course offerings: With attendance numbers increasing with each year, new programs continue to be added to the PICSciE roster.

Course topics in high demand include:

- Getting started with HPC
- Geographic information systems
- Introductory and advanced Python training
- Performance tuning and optimization
- Introduction to big data with Apache Spark
- Scientific visualization

Help sessions: During twice-weekly walk-in office hours, students, and others conducting computational research or working with code, can seek guidance on research computing and visualization, without having to make a formal appointment.

Information about upcoming training and events is published online at www.princeton.edu/researchcomputing.

System administrator joins team

In addition to opening communications channels with campus research groups, OIT is investing in greater frontline support. To that end, a system administrator role was created in FY17. Working jointly with Research Computing and academic departments, they are able to share best practices in system management, filling in gaps and bolstering existing departmental knowledge. As groups invest in their own research computing infrastructure, or plan projects that progress from departmental resources to Princeton’s centrally managed cyberinfrastructure to the nation’s supercomputing centers, this will ensure that they remain fully supported throughout.
Information Security: Placing People at the center of risk management

OIT continues to invest in the protection of the University’s most critical asset: its information. Every member of the Princeton community plays a role in adopting sound security practices that enable appropriate access to the resources that power transformative teaching and research. Recognizing the importance of that human element, the Information Security Office (ISO) focused significant effort on the programmatic and cultural aspects of security.

This includes development of training and awareness resources to help to make security best practices second nature, from the classroom to the personal mobile device. At the same time, malicious actors grow ever more sophisticated, employing new techniques that require 24/7 vigilance. So alongside efforts to unite and activate the community, we continually evaluate and onboard new technology tools, methods, and protocols to stop bad agents from accessing our network and information.

The ISO team expands to five

Now fully staffed, the ISO team has grown to include a roster of five security-minded professionals. Working under the leadership of the University’s Chief Information Security Officer (CISO), who was brought onboard in FY16, they reflect OIT’s multi-pronged security strategy.

- Senior information security analyst: Guides risk assessment, incident communications, security reviews, disaster recovery and business continuity, research, policy, and documentation
- Senior security architect: Designs protocols to protect IT and information systems at the enterprise level
- Senior information security engineer: Leads compliance initiatives to ensure safe storage, sharing, and access of information
- Senior information security training and outreach specialist: Builds awareness of security best practices through media, content development and training

Architecture and Security Review: Supporting secure project outcomes

The OIT Architecture and Security Review (ASR) was revamped to place even greater emphasis on information security and risk management. Each week, a cross-functional team with representatives from networking, database management, security and other areas meets to review and discuss campus projects related to hosted or on-site IT products or services. The ASR helps campus partners ensure new IT products and services are compatible with the University’s network architecture, or take advantage of existing solutions of which they may not be aware, while keeping information secure with recommendations regarding encryption and data security. The mission is to proactively reduce risk, identifying issues early and serving as a review for secure configuration. Flexible and responsive, the ASR invites anyone planning to onboard a technology product or service to contact them for a review.

Outreach: Bringing security to the fore

When it comes to security, education is our best defense. The ISO crafts awareness campaigns and a year-round training curriculum designed to amplify security savvy across campus. In FY17, there were a number of incremental gains.

ISO website upgrades: In keeping with a commitment to serving as a frontline resource, the ISO website was relaunched in January 2017. Boasting a streamlined information architecture and enhanced content, it prioritizes action and engagement, from event listings and incident reporting to password changes. A clearinghouse that makes it easy to connect with topical information, the site serves as a go-to resource for all things security. See what’s new at informationsecurity.princeton.edu.

The Phish Bowl

On February 1, OIT took a great leap forward in beating would-be information thieves at their own game with the launch of The Phish Bowl. Housed on the Information Security website, at informationsecurity.princeton.edu, it offers a first line of defense against suspicious emails that could jeopardize personal or University information.

"Phishing is the number-one way to get to the users," says Daphne Ireland, Senior Information Security Analyst. "It seems like a silly activity, but it is a direct path into University systems. The Phish Bowl is the most important tool to combat the biggest threat."

Senior Information Security Training and Outreach Specialist Tara Schaufler agrees: "The whole idea around it was to increase awareness around phishing, and also to make this a user-friendly page for people to view the latest phishing alerts."

The solution, which is fully integrated within ISO security operations, was created in partnership with OIT Web Development Services and the Support and Operations Center, which handles customer response. Members of the University community, who were alerted to the launch through a concerted awareness campaign, are encouraged to bookmark the tool and use it often.
New position papers published: Certain situations require clear security guidance. Eight new position papers on the website meet that need, offering concise, clear positions on everything from emergency vulnerability patching to URL shortening. This collection of papers will continue to grow.

Communication suite expands: To further broaden outreach efforts, an ISO blog (iso.princeton.edu), which focuses on topics of concern throughout the year, and a Facebook page (facebook.com/princetonISO) were launched.

Training: Raising campus awareness. Protecting Princeton.

In an age of headline-grabbing data breaches and ever-evolving hacking techniques, OIT believes that investing in the security of each individual helps prevent risk more broadly. As such, the ISO has developed a year-round training calendar that emphasizes universal security topics. Together, the ISO team guides lunch-and-learn, brown-bag, coffee-talk, and morning-chat sessions open to the entire University community that emphasize need-to-know security topics, including:

- Privacy’s evolution and why it matters
- Phishing - Don’t get hooked
- Creating strong passwords
- Identity theft - It could happen to you
- Security tips for personal devices
- The internet of things

Other well-received topics include two-factor authentication for personal accounts, securing home wireless networks, end-of-year scams, safe browsing, and online reputation management. In parallel with these training sessions, the ISO has established a presence at high-profile campus events, setting up information tables at Freshman Move-In, the Benefits Fair, and the Campus Dining Resources Fair, among others. Departmental meetings are now offered upon request and at SCAD/DCS meetings, technical support staff can get answers to emerging security questions in real time. Additionally, a SCAD-specific training on secure system administration practices is also offered in partnership with OIT’s Support Services team. This empowers SCAD/DCS representatives to serve as security emissaries.

The more each individual within the community knows about risk, the safer we are as a whole. To learn about upcoming trainings, visit the ISO website at informationsecurity.princeton.edu

Outreach: conferences and events

In FY18, the ISO participated in National Cyber Security Awareness Month (NCSAM) for the first time. NCSAM is a global event, for which Princeton has been listed as an official champion. In support of NCSAM, the ISO launched a campaign and webpage, “Protect Yourself, Protect Princeton.” The webpage served to promote special information security events and resources (see it here: informationsecurity.princeton.edu/NCSAM2017).

The team also jointly attended the annual Educause Security Professionals Conference in May. The group was invited to talk about the benefits of attending together and learning across their respective areas of responsibility. An article encapsulating their insights can be found at: er.educuse.edu/blogs/2017/6/theres-no-i-in-team-come-to-think-of-it-theres-no-i-in-spc-either. The CISO, in partnership with the Office of Audit & Compliance, also led an interactive breakout session that showcased the development and execution of the University IT Risk Assessment framework.
IT Security: Toward a model of continuous risk assessment

In FY16, the IT risk assessment armed OIT with actionable insight into key improvement opportunities. Moving into FY17, OIT focused on targeted remediation, while working to make risk assessment a continuous initiative. Incorporating proactive and responsive elements, a consistent, ongoing approach drives superior safeguards, which are essential as the universe of risk continues to shift.

New 24/7 prevention protocols protect our information and critical infrastructure, signifying a formidable leap in the University’s security posture. The iterative and highly collaborative approach ensures industry-leading protection standards are in place across the infrastructure. As a marker of progress, OIT can proudly report that its security rating, as assessed by an independent reviewer, continues to rise—a unique achievement among our peer-benchmark institutions.

Cyberinfrastructure

Campus-wide multi-factor authentication

In FY18, student accounts were newly activated in Princeton’s multi-factor authentication system. With the addition of this last campus population, nearly all University accounts are now protected against unwanted access with an additional layer of identity verification. A key project win is the inclusion of VPN services, to guard off-campus network users.

Mobile device management: Protection on the go

University mobile phones, laptops, and tablets are now automatically enrolled in a new device-management solution. Should a person lose their device or suspect a compromise, the SOC can remotely lock it and wipe its contents, while backing it up for future access. Simple to use, the solution requires a 4-character pin and automatically encrypts devices at start-up. The solution can also be deployed if serious threats emerge.

From network endpoints to security devices

When you impede intruders at the device level, the network behind it is more secure. In FY17, we continued planning to transform network endpoints into de-facto security devices. OIT and the ISO have mobilized teams to stand together in guiding network risk reduction through an array of functions and tools that are continually being evaluated. Orchestrated by the ISO and encompassing a coordinated approach, from anti-malware and antivirus protection to The Phish Bowl, this is a direct reflection of our programmatic-meets-cultural philosophy, wherein best practices are applied across the University infrastructure.

Security projects in FY17

Department reviews: OIT partnered with numerous administrative units to conduct security reviews focused on practices, tools, and mitigation strategies.

Embedding security in vendor evaluation: This year, an independent security assessment tool was deployed as part of an enhanced security review for potential OIT vendors. It is also part of the toolkit available to Architecture and Security Review leaders as another data point in assessing risk.

Closer to home, monthly IT Security Team meetings create a bi-directional pipeline between OIT and the groups on campus who serve as a frontline resource.

Putting the pieces in place

With the ISO fully staffed, and EIS and SS areas becoming increasingly security-minded, OIT’s security response has tightened. “The coordination between OIT has always been there,” says David Sherry, CISO, who says the University’s security posture was already impressive when he came on board in FY16. Now, with greater emphasis on security-centric thinking, new best-practice informed policies and procedures, and emerging tools and techniques, the University continues to up its game.

“Closer to home, monthly IT Security Team meetings create a bi-directional pipeline between OIT and the groups on campus who serve as a frontline resource.”

Crowdsourcing attack-vector insight

Coordination is also occurring between universities. Through an alliance with Duke University and four other partners, OIT is both contributing and benefitting from a jointly fed list of malicious URLs. As one party identifies a site that may trigger a malware download or threat, all members receive an alert through an automated feed.

“There’s a feedback loop between us,” Tatro says. “If they’re coming after Princeton, they may hit us first, but they’re coming after higher ed,” Tatro says. “If someone’s personal information or the University’s confidential information will not be breached,” says Donna Tatro, Associate CIO, Enterprise Infrastructure Services. “We want to continue to do that as the threat landscape changes.”

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“If we could have a feedback loop between us, they might think that the first time they target Princeton they might hit us first, but they’re coming after higher ed,” Tatro says. “In joining together, everyone benefits. “It’s all hands on deck. Duke will help us, and we can help Duke.” Such cross-institutional knowledge sharing can be a game changer, and most potently, it is transparent.

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Service Management: Raising the bar and streamlining our approach

As service-delivery becomes OIT’s operational mantra, we are called on to prioritize customer engagement and strive toward continuous process improvement. Clarity, transparency, and efficiency advance customers’ goals and, in the process, redefine the services that can be delivered. In FY17, the Service Management Office (SMO) implemented a series of communication and process enhancements that enable OIT to reach people in more substantive ways while accelerating productivity.

A preventive, data-driven approach will minimize outages and disruptions over time for proactive event management. At the same time, sophisticated, predictive models will guide innovation within OIT, in partnership with SCAD/DCS, and among campus partners.

SN@P portal gets more powerful

In FY16, the SMO launched the first version of SN@P, the customer-facing portal for ServiceNow and the OIT service-management platform. Pulling together system information with outage alerts, knowledge, and individual action items, SN@P is a unified access point for all things OIT. In its second year, we implemented a series of user-focused upgrades.

Emphasis on utility: In its first iteration, SN@P brought together critical resources related to OIT service. Increasingly, it is becoming a place for action. In FY17, the SMO improved the search functionality and made it simple to view the status of open tickets. Contextual logic surfaces awaiting approvals and open tickets by individual or group affiliation, displaying them prominently on login. Additionally, the portal is now responsive, for a better user-experience on any device.

Upgraded forms: The SMO redesigned and consolidated forms within SN@P for ease-of-use and greater specificity. In the past, when OPM was our platform, requests were sent via email and then manually entered into work orders. New forms are structured, yet flexible, providing contextual understanding of customer needs and reducing back-and-forth communication. As campus needs shift, forms can be built using native fields and shared variable sets. With an eye on clarity and cross-project planning, they may also draw on centralized location, inventory, and other data.

Change notifications: With the implementation of OIT’s new change management process, streamlined communications are essential. SN@P change notifications offer a concise snapshot throughout a project’s lifecycle. Yes-or-no approvals allow stakeholders to move work forward, fostering accountability and transparency. Alerts keep parties apprised of progress from assignment through resolution.

Outages: Especially when they impact essential systems, outages must be broadly communicated. To advance that aim, details are now available on the SN@P homepage. Upon drilling down, users then find concise, additional outage information, alongside future (planned) outages, alerts, and verified Phishing attempts or legitimate emails.

Metrics work: New insight into service

ServiceNow is data-driven, with metrics for everything from monthly intakes to ticket types. As with all analysis, however, the greatest potential resides not in the generation of reports for their own sake, but in identifying inquiries with the capacity to generate results. Concluding our first year on the platform, we have baseline data in hand. To best employ that intelligence, service owners are now partnering with customers to identify their most pressing needs, examine related metrics, and strategically propose IT solutions.

Some will employ data to elevate quality by the numbers. Think fewer unanticipated incidents, improved mean response and resolution times, or at-a-glance project reports. Data will also provide intelligence regarding budgeting, resource allocation, and service planning within OIT. Overviews can be rolled-up by different time periods to show intakes by channel, request types, and volume. Armed with this insight, OIT enjoys a unique opportunity to tighten service delivery.

The Knowledge Base (KB) is the most popular SN@P offering, encompassing 475 general and 125 technical articles. From ServiceNow go-live, the KB has garnered more than 60,000 page views, pointing toward a trend of customers taking advantage of self-service.

To ensure high-quality KB content, an initiative has been launched by which content will be continually improved, including gains in utility and searchability. An expanding content team was onboarded in FY17, including Service Offering Managers, SCAD/DCS representatives, and members of the SOC. These subject-matter experts own their areas of knowledge, and are responsible for its accuracy and relevance. Within the system, versioning and review triggers assist in that endeavor. User-generated flags and comments, from clarification requests to improvement suggestions, also alert the SMO and Service Offering Manager to the need for further review. In tandem with the above, significant effort was dedicated to style reviews to instantiate a shared structure.

Geared toward our customers, Knowledge also generates benefits from a service-planning perspective. As needs shift, and as services are brought online or retired, knowledge-derived trends will provide yet another layer of visibility into Princeton’s technology needs.

Unified change management process enhances customer-centricity

When technology change is consistently handled through clearly defined processes, disruptions related to failed changes are minimized and synergies surface that can inspire new thinking. In FY17, a unified OIT change management process was defined and implemented in ServiceNow. The result of deep collaboration, it began with intensive requirements gathering, during which OIT’s diversity of projects and typical system changes were examined from an internal and outward-facing perspective. With that knowledge in hand, a clearly defined approach
New major-incident approach aligns OIT for rapid resolution

A major incident involves an IT service interruption that must be resolved as quickly as possible and deserves the priority of the entire organization. With a new process implemented by the SMO in FY17, OIT is in a stronger position to swiftly close incidents with higher impact and urgency. The enhanced solution involves several key components:

- Clear communication across OIT so teams are aware that others may be occupied with efforts to restore service as quickly as possible
- Designation of a major-incident owner empowered to guide the resolution and manage communications, ensuring customers remain informed about progress
- Deployment of full and proper resources to prioritize the incident and promote a fast-tracked response
- Formal after-incident review to identify the underlying causes and prevent recurrence

As the process was brought online, teams were encouraged to deploy it when needed; if issues impact OIT customers, they must be handled with utmost urgency. This has resulted in ancillary benefits, including greater visibility into areas of risk and opportunities for process changes and enhancements.

Characteristics of major incidents:

- Significant number of users and/or VIP users will be affected
- Cost to users or Princeton is or will be substantial
- Reputation of Princeton is likely to be damaged
- Amount of effort/time required to manage and resolve the incident is likely to be considerable and service levels will be breached
- Potential impact to campus safety

Field Services brings efficiency

The ServiceNow platform, implemented in FY16, advances OIT’s service-delivery mission by unifying workflows and priming greater understanding of the University’s fast-evolving technology needs. With the activation of the Field Service module going into FY18, its benefits are now enhanced among the organization’s frontline for requests ranging from endpoint to network infrastructure repairs to classroom IT support.

A start-to-finish workflow was created to combine several different processes, from request to fulfillment, parts acquisition, time tracking, and billing. In less than a year, multiple groups mobilized to analyze and redefine longstanding support, inventory, and billing processes, build out the module on the existing ServiceNow architecture, move open tickets into the new environment to prevent service disruption, and align ticketing, inventory management, billing and work tracking under a SN@P-powered umbrella that improves accuracy and introduces additional benefits for all.

Customers: Customers need only submit a single ticket for service using a vastly consolidated set of forms that incorporates qualifying questions and links common needs and supporting devices. Upon submission, customers enjoy streamlined, better-informed communications; upgraded quotes that reflect parts and effort; and seamless routing to nearby, and equipped with the right tools, to take on a task. Operationally, ServiceNow powers accountability through clear quotes and on-the-job time and parts tracking, with alerts when inventory levels hit pre-defined thresholds.

OIT: Integration with PeopleSoft and Prime unifies the billing workflow, while Archibus data provides accurate location information. Better job data enhance staffing and service overall, while shared access to systems and data streams fosters efficiency and enhanced collaboration.

An empowered workforce is more productive and positioned to serve as a responsive arm of the organization when and where customers need us most. Activation of the Field Service module revolutionizes OIT’s approach across a critical vector, and has the potential to greatly enhance customer satisfaction.
Administrative operations: Driving business success

As technology and data capabilities grow more advanced, OIT’s administrative partners continue to invest in innovative tools and solutions that in turn guide meaningful experiences throughout the University. We see it every day: From housing services to the day-to-day management of departmental business, administrators are leading the charge to foster better experiences for faculty, students, and staff. In FY17, OIT continued to serve as a sounding board and partner, guiding system upgrades and the creation of reimagined solutions that elevate productivity.

Planning for the next generation of PeopleSoft

In FY16, we reported on the re-architecting of the PeopleSoft Human Capital Management system, the digital backbone of HR management for the University. With that complete, focus has turned to a powerful Campus Solutions upgrade. Campus Solutions allows for strategic and streamlined administration of the complete student lifecycle, from enrollment to financing to alumni fundraising. When the upgrade is complete, we will be able to retire up to 30% of existing customizations, while taking advantage of previously untapped features. This is a large-scale project involving significant coordination between numerous campus partners and OIT teams, who focused this year on a comprehensive fit gap and scoping initiative. In so doing, we will be able to narrow the delta between the system’s potential and our ability to actualize it. Expect much more in FY18.

Core administrative tool for academic departments

Princeton’s academic departments are often the point of genesis for new thinking that benefits the University as a whole. This is as true for the back office as it is for the classroom, as evidenced by a creative academic unit system that caught OIT’s attention during an Architecture and Security Review (ASR) session. An academic unit had devised a refined backend administrative solution, the broader potential of which was immediately apparent.

Inspired by the system’s sophisticated approach, OIT teamed with the Office of the Provost to initiate a cross-departmental discovery project. The multi-week engagement identified gaps in service and uncovered opportunities. The result, impact-oriented recommendations and new projects, including the green light for an Academic Unit System (AUS). During the FY18 project planning cycle, SAGIT funding was approved for this first enterprise deliverable to the academic community. The AUS will provide accurate, convenient, and standardized access to Princeton data, from student and course data to fellowship and grant information. In facilitating new academic data contributions, it will also bolster the Information Warehouse.

In the design phase during FY18, the project is being led by the Provost’s Office, with contributions from the Office of the Dean of Faculty, the Registrar’s Office, the Graduate School, the Office of the Dean for Research, and Finance and Treasury. OIT looks forward to supporting them as this game-changing initiative evolves.

AHIRE system embraces the nuances of academic hiring

Faculty and academic hiring is highly specific, involving nuances uncommon to other areas. Moreover, each unit may have unique requirements, such as committee-based decision-making and nominee-driven hiring. To make the process more efficient and reflective of Princeton’s unique hiring approach, OIT partnered with the office of the Dean of the Faculty (DOF) to design and deploy a new departmental hiring solution called AHIRE in January 2017.

Detailed focus group sessions with nearly 60 academic units were conducted during the project’s early stages. Therein, it was determined that while a vended solution worked well for hiring staff, academic departments required greater flexibility. As such, a custom solution was approved. As with the departmental AUS solution, an academic unit provided the project inspiration: In the Department of Computer Science, applications were being elegantly routed via a custom solution that supported committee comments and easy application access. This solution became the blueprint for OIT’s development process, allowing fast-tracked development.

Offering a streamlined experience for applicants and departments, AHIRE presents a single job application page during the online application process. Behind the scenes, administrators enjoy an improved interface that allows for easy candidate searches, sorts, and reviews. This greatly improves departmental efficiency, while eliminating a previous need to devise in-house processes to supplement the core hiring system. Additionally, it now interfaces seamlessly with PeopleSoft and the Information Warehouse.

Building in added layers of security, multi-tenant capabilities, and structural alignment with OIT’s existing custom-development coding protocol, AHIRE raises the bar for one of Princeton’s most important processes. While the project was a cross-team effort involving numerous departments within OIT, it would not have been possible without DOF and departmental leadership, from design through testing and deployment.
Projects in FY17

**Faculty leave requests:** A new digital application within PeopleSoft HR enables faculty to submit sabbatical requests, which are then routed for approval through departments and on to the Office of the Dean of Faculty for final review.

**From applicant to new employee:** When staff members are hired, a bi-directional interface automatically loads new hire details into the PeopleSoft system.

**Improved donation-tracking experience:** A system upgrade allows the Office of Advancement to more efficiently record University donations.

**Support for the alumni community:** With the TigerNet community platform successfully launched, new services were added in support of alumni sub-committees. Additionally, enhanced authentication processes were enabled to allow subcommittees to onboard affiliates, including widows or honorary members.

**Student financial aid application gets a new look:** Financial-aid applicants now enjoy an updated, responsive interface that works across devices.

A modernized platform for campus housing services

OIT’s overarching mission is to provide our partners with superior, needs-aligned IT solutions. To do this, we position ourselves as an advocate, balancing business demands and technology requirements both internally and with third-party vendors.

In July 2017, OIT completed a multi-year initiative to upgrade the Princeton Housing and Real Estate Services platform in time for the new academic year. This significant milestone retired a long-standing solution, greatly enhanced in-house, the core foundation for which was being decommissioned by the vendor. As our community grew and demand for space expanded, it was critical that our housing platform remained technically sustainable and fully supported. Given its broad constituent base of students, faculty, and staff, the new solution needed to align with Princeton’s distinctive business practices and superior quality with regard to campus residential services. Moreover, significant investment in a modernized platform positions our campus to meet future strategic objectives including increased service automation and improved data analytics and business intelligence.

In achieving that complex yet critical aim, the University has secured a sustainable, upgraded solution, as well as changed the nature of the service model itself. To that end, OIT conducted a comprehensive survey of product requirements and customizations. The goal was not merely to deliver a solution, but to compel the vendor to incorporate key functionality into their core product made available to all customers. By taking time to delve into the intricacies, OIT was able to bring a DevOps mindset to our vendor team. This is an important win as it paves the way toward strategic, phased development, allows for streamlined maintenance, automated testing, and enhanced version control, and lowers risk through the adoption of development and software best practices.

At the same time, we powered internal service owners to secure ownership over the system processes that enable their work. The resulting solution, which will be less costly and labor-intensive to maintain, delivers benefits all around.

- **Fewer customizations:** OIT will no longer need to maintain a customized front-end or facilitate complex repairs to data anomalies resulting from insufficient or outdated data-validation protections.
- **Enhanced capabilities:** The vendor solution has a stronger, more feature-rich offering, with Princeton-inspired functionality that can be leveraged by other customers.
- **Improved data quality and scope:** The platform features enhanced reporting, with access to historical data; stronger data validation; and seamless integration with the data warehouse to offer trend analysis. Interfaces with systems such as Tigercard, CS Gold (the Dining management system), and Princeton Receivables enable the transfer of core data to support coordinated services, reconciliation of transactional information, and campus access.
- **Infrastructure vulnerability fortification:** With underlying server and database layers now at fully supported versions that can be continually patched with the latest security fixes, the system is compliant from a data-security perspective.
- **New end-user tools:** Self-service options like meal plan selection are available.

In joining a broader customer community of housing professionals utilizing the same vendor platform, Princeton will have greater insights into the shifting trends and challenges facing other higher-ed residential services professionals, while also serving as an engaged and vocal advocate for Princeton to influence and shape the future of this critical business solution. We expect to see additional enhancements in FY18.
Future-Focused: Preparing for Infrastructure as a Service (IaaS)

Princeton’s technology infrastructure rests on three pillars: the network, the data center, and the software architecture. As OIT modernizes all three, our guiding purpose is to become more responsive to the University’s rapidly changing needs. Ultimately, this will translate into the creation of Infrastructure as a Service (IaaS), and as of FY17, we are on our way.

When fully operationalized, IaaS will support the OIT 3.0 vision. A paradigm shift towards code-based or virtualized IT, it will encompass a scalable technology infrastructure that can evolve in tandem with the University’s real-time requirements. As compared to the investment in classic, hard-wired solutions, this will allow Princeton to bring solutions on- and offline as needed, rather than bearing amortized costs for investments that fall out of favor. More importantly, it will mark true responsiveness to user needs. Moreover, it will enable rapid onboarding of new IT solutions, shifting focus from the maintenance of servers and physical structures – though those will always be necessary – to continuous improvement and innovation.

To date, we have upgraded the data center to route vast amounts of data at ever-higher speeds. With that accomplished, a comprehensive network redesign is deep in the planning stages. It reframes the campus as a lab where wireless devices proliferate. It recognizes the needs of researchers who both rely on a world-class network and often redefine its bounds through their work. Moreover, it reflects the needs of the physical campus, where facilities systems incorporate the Internet of Things (IoT).

From there, reimagined software architecture will become the key to open this new frontier. Forming the heart of IT service, software used to be highly centralized. While that worked in the wired era, tomorrow’s network calls for technology to be seamlessly delivered where and when people need it, whether it’s the Amazon Web Services (AWS) environment, Microsoft Azure, Google, or elsewhere. As we establish that architecture, the future of IT at Princeton is coming into focus. Servers will be increasingly software-based, spun up on demand. Network traffic can be optimized through automation, allowing faculty and staff to work efficiently. New APIs will support growing numbers of data feeds. The infrastructure will eventually support millions of devices.

While the solution is complex, the promise is simple: we are re-architecting our IT philosophy so that our customers are free to innovate without being constrained by infrastructural limits.

Modernizing Princeton’s telephony infrastructure

Few long-time systems can boast the success of Princeton’s legacy telephony system. Implemented in the 1980s, it has well served our telecommunication needs for decades. In the age of the wireless device, however, the time for an upgrade has arrived. Over the past five years, communications methods have undergone an unprecedented shift, demanding flexibility and optimization. Beginning in FY18, this will be actualized through a 3-year project to overhaul the telephony system to reduce operational costs and introduce features that reflect the rapidly evolving needs of a modern University.

Elements of the three-year-project, planning for which was a major FY17 focus, include videoconferencing, enhanced collaboration tools, and alternate network endpoints. The latter allows individuals to route calls to any phone or mobile device simply by logging into a central website. Seamless mobile tools add value for everyone from librarians managing the help desk to faculty whose work brings them from campus to international laboratories and back again. Moreover, the transition to Voice-over-IP (VoIP) introduces significant cost savings that are already being realized in new buildings as land line use is analyzed and the new solution is put in place. Ultimately, the project is expected to pay for itself in three years.

Out-of-the-box thinking, in sync with research needs

The most exciting discoveries occur just beyond the “comfort zone,” where compelling ideas await. So, too, with technology: When we support faculty members’ most complex IT needs, the entire University benefits. As OIT 3.0 thinking infuses our organization, we are seeing potential unlocked through that transformation. Every time we say yes to an innovative request, we honor our goal to support faculty research. In the process, we are uncovering unique opportunities to advance scalable, forward-looking technology.

Powering Internet of Things (IoT) research: In the future, home devices will be increasingly Internet-connected. Many already are, which raises compelling research questions. Where is the line between convenience and privacy when devices “listen” for commands? How must policy evolve to protect personal data? What kinds of security protocols are called for? Through cutting-edge research into tomorrow’s IT-enabled home, Professor of Computer Science and Deputy Director of the Center for Information Technology Policy, Nick Feamster, is examining these questions. To help him model the context, OIT provided space where he could replicate a home user’s environment. Boasting both residential and research connections in a space that looks just like a house, it merges the power of a high-tech lab with a more organic simulation environment. The result of close, regular engagement between OIT and the Department of Computer Science, it reflects the kind of new thinking inspired when close working partnerships are cultivated.
Activating unprecedented computational power in the lab: In the past, data-intensive research faced limitations when it came to the alignment of qualitative and computational observations. Given the speed of high-performance computing systems, lab insights had to be vetted after the fact, creating lag time in the adjustment of a research model. In FY17, OIT devised a new networking paradigm for Assistant Professor of Physics and the Princeton Neuroscience Institute, Andrew Leifer, which closes that gap. Assistant Professor Leifer is developing a predictive model for worm behavior. Based on the activity of the entire worm’s brain as neurons fire in concert, or neural dynamics, his work aims to reveal the underpinnings of his work aims to reveal the underpinnings of thought, motion, and decision-making. As his lab was being renovated, OIT, in partnership with Research Computing, routed a previously unheard of 40 Gb/s connection into the building, with 10 Gb/s reserved for Leifer’s lab, which moves massive amounts of data. An additional 40 Gb/s connection was routed back to the high-performance computing center, where his calculations are processed. To convey the scale, this exceeds the bandwidth employed by the entire University less than a decade ago. As a result, microscopic measurements of phenomena are being paired with computational simulations in near real-time, amplifying research productivity and allowing Leifers’ team increasing agility.

Routing IPv6: Digital networks are in the midst of a shift to the IPv6 internet protocol, which assigns unique addresses that guide data packets between networked devices. While the global transition has not yet reached critical mass, a subset of Princeton researchers routinely collaborate with parties that employ the protocol, from government agencies to international laboratories. To support their work while we re-envision the network at large, OIT has provided them with IPv6 connections.

Collaboration with Campus Venue Services: A new vision for service delivery

In buildings with both classroom and event space, academic and administrative technology requests have traditionally been serviced by different parties. Some are handled by Campus Venue Services (CVS) or other groups within University Services; some are the domain of OIT’s Instructional Support Services (ISS). Yet from the perspective of the customer, those silos are irrelevant: Their goal is to secure a solution that facilitates their work, whether they’re bringing a guest speaker to class or planning a public lecture with a visiting faculty member.

“If you’re a faculty member or departmental administrator, your focus is: ‘I need this person to appear on the screen at two,’” says Steven Sather, Associate CIO of OIT Support Services. “I don’t care what color polo shirt the person is wearing who is going to make that happen.”

In FY17, ISS partnered with CVS to design and deploy a collaborative model that eliminates that pain point. Moving forward, customers in select locations will be serviced via a single ticket created in SN@P, OIT’s service portal. Behind the scenes, those tickets are seamlessly routed between the two groups and other parties as needed, eliminating the need for customers to concern themselves with operational minutiae, and reducing wasted effort and resource deployment.

The solution was conceptualized during renovation planning for the Julis Romo Rabinowitz and Louis A. Simpson International Buildings. “Previous models involved silos of groups doing similar, and sometimes different, types of support,” explains Nick Robinson, Director of Campus Venue Services. “They didn’t really talk to one another, and it resulted in huge amounts of resources being spent.” His team came to OIT with a visionary proposal to foster new efficiency while elevating service. In short order, the contours of a shared approach came into focus. Along with the onboarding of CVS team members into SN@P and mutual alignment around support requests, a close working relationship has developed, which has shown particular impact in the areas of special-event and course planning. The venue manager has also been deputized to guide project resolution. Taking on first-level customer communication, they serve as the point person on site and allow for close coordination between groups. Enriched by the close working partnership, they are even handling a portion of tasks that would have been routed to ISS, shortening the timeline for customers.

This model proved effective early on, allowing eventual building occupants to work through a single, cross-departmental team. It proved game-changing once they moved in, creating a one-stop gateway for service. The model has since been applied to the brand-new Lewis Center for the Arts, which opened in the fall of 2017. Yet the win goes beyond technology and resource deployment. The groups, who were already attending cross-team breakfast meetings, have aligned under a shared vision of service.

As a result, OIT has cross-trained CVS team members in OIT 3.0 processes. At the same time, ISS is gaining better understanding of the environment in which IT is deployed. “The communication and collaboration between our teams has changed dramatically over the past five years,” Robinson reflects. “It took a lot of work from a leadership level down to the folks right on the ground to break down those walls and create a new culture. It’s a coordinated effort, like it should be.” Going forward, the groups are examining the model’s potential both for existing spaces and those that emerge as the campus plan develops.
Princeton (RE)design: The University introduces a new digital home

On May 18, 2017, Princeton celebrated a major milestone: the launch of its revamped core website. Several years in the making, this modern, user-centric experience prioritizes audience needs, quickly connects people to relevant information, and showcases Princeton's vibrancy in a polished, media-rich presentation. As part of this game-changing multi-year initiative, OIT engaged in a highly collaborative process, supporting The Office of Communications in its pursuit of a digital presence that truly reflects the dynamism of our global academic community.

**Designed to engage:** Rich with video, graphics, news, and events, the reimagined site emphasizes storytelling, and Timeline integration makes it easier than ever for visitors to find events of interest (see story).

**Responsive:** From iPhones to desktops, Princeton.edu is now fit for every screen.

**Easier to search:** A Google-based search tool better surfaces relevant information.

**Simple to navigate:** As users explore, the navigation moves with them, while shortcuts for students, faculty, and staff surface commonly used links.

**Streamlined:** The improved content ecosystem went from 200 to roughly 65 pages.

"We're very pleased to release this new, modern design," said Daniel Day, Assistant Vice President for Communications, in a post-launch press release. In replacing a website built in 2008, Princeton's digital presence has moved into the present tense, honoring how today's users prefer to engage. The site also acknowledges those most likely to visit: 80% of page views in 2016 came from off-campus visitors, whether potential applicants or future faculty. The site tells Princeton's story to new and potential community members in a human way, while continuing to serve as an information gateway for all.

Web Development Services (WDS): New site, new templates

In FY17, WDS moved from the design-consultation to the build phase, leveraging enhanced Drupal templates that are already being applied to new-look Departmental websites. The site marks an early entry onto the Drupal 8 platform, which will help to inform future web-development roadmaps. Additionally, Princeton was able to leverage Acquia's new, open-source Lightning platform for Drupal, which fast-tracks development. "Lightning solves problems that would otherwise slow the development of content-rich websites on Drupal. I like that we can now focus less on overcoming technology hurdles and more on client needs," said Jill Moraca, Associate Director of Web Development Services, in an article on the Acquia site.

Future work includes a style guide for application developers in the near future that maps design elements from the site.

User Experience Office (UXO): Greater accessibility, greater experience

UXO served as a user advocate throughout the project, providing UX tools and techniques as well as ongoing audience research. In FY17, work included a comprehensive accessibility audit and usability tests with hundreds of subjects. In keeping with Princeton's commitment to diversity and inclusion, the website is also WCAG 2.0 AA compliant. This is a win for all: Accessible websites are more usable for everyone.

**Accessible design:** When Princeton orange-on-white failed the color-contrast minimum, UXO partnered with the Office of Communications to establish a solution.

**Elimination of keyboard obstructions:** For audiences that cannot rely on a mouse to navigate, keyboard access was reviewed and remediated.

**Accessibility Assistance Request service:** A new service was created, with a link added to every page.

**Ambient video expertise:** UXO consulted with the Office of Communications to establish recommendations for non-disruptive use of ambient video.

Looking ahead

The credo for Princeton.edu going forward is "continuous improvement." In that spirit, OIT looks forward to an ongoing partnership with the Office of Communications to keep our digital presence as impressive as our real-world community. Have an idea? Head to the (RE) design whiteboard and make your voice heard: re.princeton.edu/put-your-ideas-our-whiteboard.
Timeline transforms student planning

With the FY17 release of Timeline, student schedule management just got a major upgrade. Timeline inverts traditional calendaring, serving as a discovery tool that fosters engagement with a range of academic and social opportunities. Aligned with the needs of students and administrators, it was informed by extensive research. The result is a comprehensive application that showcases everything from course-registration dates to athletic events.

Timeline was first launched in a beta phase in February 2017. Based on student and administrator feedback, a design and functionality revamp launched in time for fall, officially living up to its mantra: “Getting the right information to the right people at the right time and in the right way.” Not only does the tool boast a new, bolder interface that aligns with the University website design, it offers a new way for administrators to share time-sensitive information while helping students manage their lives in a single, highly usable place.

Fast-track development

The Timeline enhancement project serves as a model for application design and development. Following a beta rollout, potential enhancements were designed, tested, and implemented during a rapid, agile development phase conducted in consultation with user experience and web design expertise. A prime example of the power of the UX process, in which research-informed prototypes achieve stakeholder buy-in prior to build, this efficient development cycle enabled more features to be incorporated in less time.

Designed to inspire: Timeline’s interface is colorful, polished, and crafted for impact.

Accessible: Usability for the broadest audience, users choose from light, dark, and high-contrast themes.

Mobile: Designed for on-the-go use, Timeline is available as a mobile application for Android and iOS.

In-sync: The app syncs with Google and Apple calendars, so users can see courses, precepts, appointments, and deadlines, while also adding personal events.

Student-centered

Simple. Straight-forward. Highly usable. Timeline offers true schedule management, allowing students to explore events of interest, while tracking day-to-day engagements.

Interconnected: Feeds from Blackboard, TigerHub, the Academic Calendar, and WASS/WASE make it easy to track academic deadlines and dates, office-hours appointments, concentration-specific requirements, and more.

Deadline-driven: Students see important dates on their home screen up to a month in advance, so critical milestones remain top-of-mind.

Personalized: Students can opt to see posts based on their interests alongside those based on group affiliation noting key events, deadlines, and announcements.

“Timeline’s really accessible because I don’t have to log in every time,” said Ming Wilson ’18 in The Daily Princetonian.

Easy on administrators

With a new way to reach students, Timeline helps campus administrators bring important information to the fore and offers true one-stop shopping for event promotion.

Secure: Strict authorization rules govern those who wish to create posts. This eliminates spam, and ensures that the right information reaches the right audiences.

Organized: An initial taxonomy for event categories was created with input from a Timeline Oversight Committee.

Informative: Event counts allow organizers to gauge response rates and interest.

Highly visible: Timeline feeds appropriate events into the main University website.

Just the beginning

In the run-up to the new semester, OIT engaged in a concerted outreach campaign focused on students and those who serve them. With their input, new features are already in development, and an accelerated release schedule means enhancements will be ongoing. Watch for exciting things to come, including an RSVP function, schedule sharing between friends, event check-ins, social-media promotion, and event planning for administrators.
Volunteerism is a longstanding tradition within OIT. Throughout the years, we have worked with a range of local organizations. These OIT-wide charitable projects are part of our commitment to serving not just our campus neighbors, but also the broader community in which we reside. In FY17, the OIT Leadership Advisory Group, which guides the partner-selection process, elected to work with Lawrenceville-based HomeFront. The group’s mission is to end homelessness in Central New Jersey by breaking the cycle of poverty, with initiatives ranging from emergency assistance for at-risk families to transitional housing, workforce skills development, and after-school children’s programs. The need for such support is clear: according to the organization, a full 37% of Mercer County children qualify for school-lunch benefits. Statewide, census figures show that the poverty rate is just under 11%. To do our part in promoting new beginnings for those in need, OIT engaged with HomeFront across several charitable initiatives.

**Fall Food Drive:** In the run-up to the 2016 All-OIT meeting in November, non-perishable food items were collected. Representatives from HomeFront were then invited to speak about their work in Mercer County. A second food-drive is planned for the 2017 meeting, with a friendly contest designed to inspire broad participation.

**Volunteer Days:** Following the All-OIT meeting, volunteer days were held at each of HomeFront’s four area locations. Food and household goods were sorted in Lawrenceville and Trenton. A team helped organize the Lawrenceville Community Center’s library and play rooms, and helped with light painting and touch-up work. In the wake of an OIT diaper drive, a fourth group prepared them for distribution at the Ewing location. All told, roughly 60 OIT team members participated.

**Holiday Gift Drive:** Inspired by OIT’s formal efforts, numerous individuals participated in HomeFront’s annual Holiday Gift Drive, shopping for gifts on a child’s holiday list. “A lot of people at Princeton live in the area, and felt like they were really helping the community in ways they hadn’t before,” says Kevin Miller, Manager of Budget and Accounting, Operations and Planning, and a member of the FY17 Leadership Advisory Group. “They felt like they were contributing to something.”

The HomeFront partnership will continue through at least December 2017. To learn more about the organization, visit: www.homefrontnj.org.
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<tr>
<td>812</td>
<td>graduate students requested activities funding through SAFE</td>
</tr>
<tr>
<td>615</td>
<td>individuals registration for PICSciE/Research Computing mini-courses</td>
</tr>
<tr>
<td>563</td>
<td>clients actively use OnBase as their document management solution</td>
</tr>
<tr>
<td>550</td>
<td>requests to borrow mobile technology from the Mobile Technology Loaner program</td>
</tr>
<tr>
<td>457</td>
<td>requests for video location shoots</td>
</tr>
<tr>
<td>387</td>
<td>UPSs</td>
</tr>
<tr>
<td>195</td>
<td>requests for new servers, of which 97% are requests for virtual servers</td>
</tr>
<tr>
<td>184</td>
<td>radio/TV station interviews</td>
</tr>
<tr>
<td>128</td>
<td>undergraduate groups requested funding through the Student Activities Funding Engine (SAFE)</td>
</tr>
<tr>
<td>127</td>
<td>individuals learn about user experience best practices in UXO-sponsored classes</td>
</tr>
<tr>
<td>105</td>
<td>Tableau licenses distributed across 27 campus departments</td>
</tr>
<tr>
<td>97</td>
<td>individuals participate in new accessibility training classes</td>
</tr>
<tr>
<td>77</td>
<td>miles of fiber optic cable on campus</td>
</tr>
<tr>
<td>75</td>
<td>percent of the total visits to the OIT Solutions Center Tech Clinic were by undergraduate students</td>
</tr>
<tr>
<td>47</td>
<td>network connections</td>
</tr>
<tr>
<td>31</td>
<td>centralized servers run 1,170 virtualized servers</td>
</tr>
<tr>
<td>24</td>
<td>major incidents managed and resolved using the SN@P service management system</td>
</tr>
<tr>
<td>21</td>
<td>University professionals awarded Certified Professional of Accessibility Core Competencies (CPACC) certification</td>
</tr>
<tr>
<td>7</td>
<td>accessibility classes in 2017, with 105 attendees</td>
</tr>
<tr>
<td>1</td>
<td>Services Now at Princeton (SN@P) system managing OIT services</td>
</tr>
</tbody>
</table>