



# 2016

ITS Annual Report

Enabling Innovation

Yale *Information Technology Services*

# table of contents

YALE INFORMATION TECHNOLOGY SERVICES | ANNUAL REPORT 2016

## MESSAGE FROM THE CIO 3

### INSIGHTS 4

IT Support of Research Grows at Yale 4

A Stronger, More Usable, and More Accessible Yale Web 7

Journey to the Cloud: Opportunities, Challenges, and Risks 9

### TECHNOLOGY FOR THE COMMUNITY 13

Bringing HD Streaming, Recording to Yale Squash 13

Piecing Together the Life of the Buddha 14

More Accomplishments 15

### CORE SERVICES 17

Unifying University Business With Workday@Yale 17

Protecting Yale's Data with Multifactor Authentication 19

More Accomplishments 21

### PARTNERING AND OUTREACH 23

Nurturing Young Technologists Through Internships 23

Connecting Doctors and Patients Through Video Technology 25

More Accomplishments 26

### NEW & IMPROVED SERVICES 29

### CIO SPOT AWARDS 31

Yale Information Technology Services  
Yale University  
[its.yale.edu](mailto:its.yale.edu)

25 Science Park  
150 Munson St., New Haven, CT 06520

ITS Help Desk: 203-432-9000  
[helpdesk@yale.edu](mailto:helpdesk@yale.edu)

For additional media, visit  
[fy16.itsannualreport.yale.edu](http://fy16.itsannualreport.yale.edu)



# Message from the CIO



Welcome to our Fiscal Year 2016 ITS Annual Report. In these pages, you will find stories of how ITS has enabled, and continues to enable, innovations throughout the University. From the Child Study Center, to The Life of the Buddha project, to the Brady Squash Center, ITS has worked with members of the community to find solutions to meet the university's wide-ranging technology needs.

In recent years, President Peter Salovey has emphasized the importance of innovation at Yale in his efforts to build a more excellent university. The 2015 Yale Technology Summit highlighted many of these innovations, and more will be featured at the 2016 Yale Technology Summit on October 28.

At its core, Yale ITS is a service organization. We aim to provide high-quality technology services to the Yale community, and in doing so we recognize how we directly and indirectly enable and support the innovations happening at Yale.

On behalf of IT professionals across campus, I invite you to peruse the 2016 ITS Annual Report and encourage you to learn about the many ways we support a more connected, open, innovative, and excellent Yale University. I also encourage you to browse the extensive list of ITS services available to you by visiting [its.yale.edu/services](http://its.yale.edu/services).

A handwritten signature in blue ink, appearing to read "Len Peters". The signature is stylized and fluid.

Len Peters  
University Chief Information Officer  
Associate Vice President



## IT Support of Research Grows at Yale

### **Kiran Keshav**

Executive Director  
Yale Center for Research Computing  
Senior Director  
ITS Research Technologies

As the Yale community forges ahead in conducting cutting-edge research across disciplines, research computing support at Yale must continue to innovate to support these research breakthroughs.

### The Yale Center for Research Computing's Inaugural Year

With the creation of the Yale Center for Research Computing (YCRC), FY 2016 marked the beginning of a new era in research technology support at Yale across the Faculty of Arts and Sciences and the Yale School of Medicine. In response to the needs of the research community, the center focused on advancements in four areas: cyber-infrastructure, education and training, advanced support, and community development.

In order to serve its mission and maximize accessibility to the broader scientific community, the YCRC moved into a creative space near Science Hill at 160 St. Ronan Street. The center's new space came equipped with its own auditorium for

seminars and workshops. In addition, the YCRC solidified its governance structure by creating the YCRC Steering Committee. This governance board includes faculty from a broad range of disciplines, and is helping guide the direction of the YCRC initiatives.

### Cyber-Infrastructure

The YCRC helped keep researchers at the forefront of their computationally demanding fields by taking advantage of newer High Performance Computing (HPC) technologies. Two HPC clusters were refreshed in FY 2016.

The first, Ruddle, named after famous Yale biologist Frank Ruddle, is a refresh of BulldogN, which serves the Yale Center for Genome Analysis. Ruddle was acquired through a successful National Institutes of Health award, and has significantly enhanced computational power compared to BulldogN, adding 400 cores and roughly a petabyte of additional high-performance storage.

The second cluster, Farnam, named after Louise Whitman Farnam, the first woman admitted to the Yale School of Medicine, is a refresh of the Louise cluster, which serves the general Life Sciences community.

In addition to these refreshes, the HPC team created Milgram, named after the Social Psychologist Stanley Milgram, for use by the Department of Psychology. Milgram's deployment is a milestone for Yale research infrastructure, as it represents the first HPC cluster specifically designed for the privacy requirements of HIPAA-protected data. This small, 12-node cluster with roughly 150 terabytes of storage is serving as a pilot for HIPAA alignment and could be expanded in the coming years.

The YCRC also has been partnering with researchers in the Department of Computer Science and with Yale ITS to expand the Yale Science Network, a high-speed network specifically designed for large data transfer. Currently, there are more than 15 research labs connected to the Science Network.

As the network infrastructure expands in FY 2017, the project also will aim to create an intelligent network using software. The development of this software-defined network, led by Yale researcher Richard Yang, will allow the current campus network to interface seamlessly with the Science Network and, as the Science Network grows and becomes more widely used, will allow for intelligent utilization of the network to keep data transfers speedy and efficient.

## Education and Training

Researchers need continuous updating of their skills in order to use the most innova-

tive and advanced technologies. The YCRC ran its first set of skill-building workshops in FY 2016, taught by YCRC members and experts from our vendors. Topics included Introduction to HPC, Scripting with Python, Amazon Web Services for Research, and HPC training through XSEDE.

Recorded training sessions and announcements of upcoming events are available at [research.computing.yale.edu/training](http://research.computing.yale.edu/training).

## Advanced Support

Many members of the faculty need to work collaboratively with computational researchers to make the most efficient use of the research computing infrastructure on campus. The YCRC continued to provide dedicated advanced support for the Yale Center for Genome Analysis, as well as

increased levels of support for several departments and disciplines, including Geology & Geophysics. The YCRC supported Rosenkranz grants involving

an orbital simulator and Mathematica tools for the demonstration of genetic drift, and it served as a resource for faculty hires in Psychology, Genetics, the Systems Biology Institute, and Chemistry.

The Science Research Software Core (SRSC) also was made available as part of the YCRC's service offerings. The SRSC was implemented previously by the Provost's office in recognition of the demand for cutting-edge software for use in analytical and experimental research, design, and analysis. The software supported by the Core is specifically applicable to the fields of Physics, Applied Physics, Chemistry, Computer Science, Geology and Geophys-

*"The constant exchange of ideas across disciplines is crucial to fostering innovation and creating opportunities for intellectual surprise."*

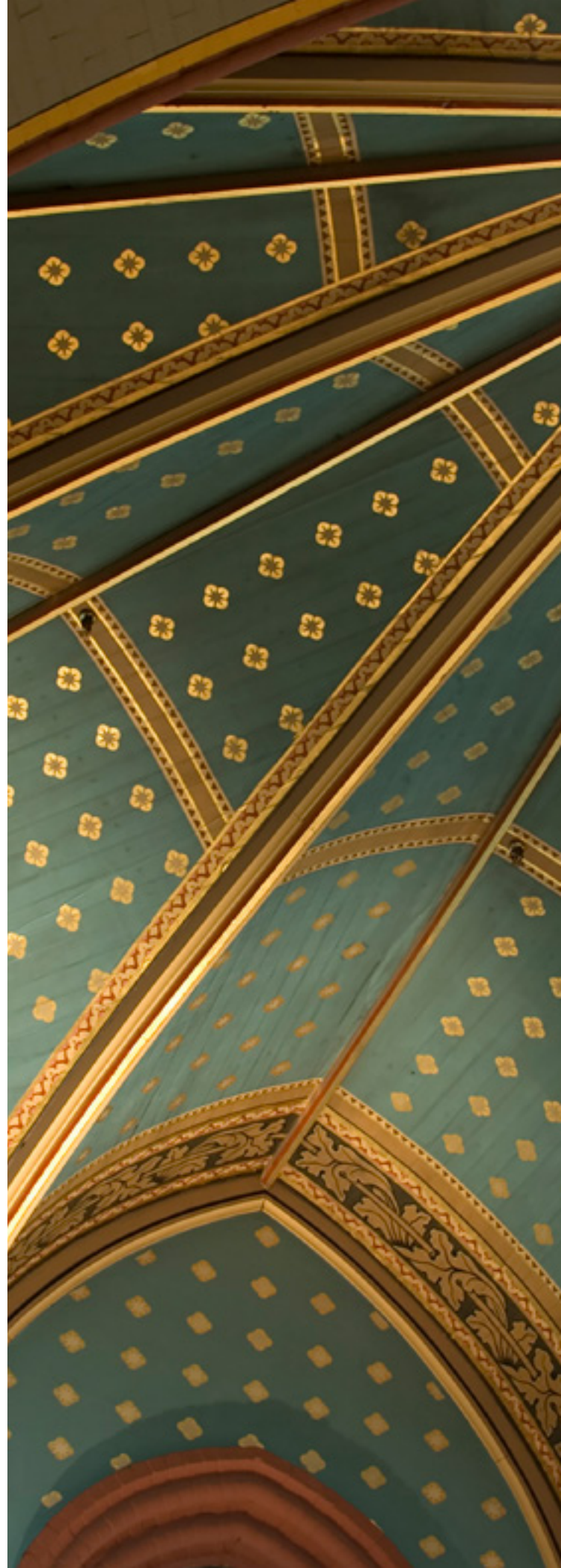
ics, and Engineering. A full list of supported software titles, and the support contact, are available at [research.computing.yale.edu/science-research-software](http://research.computing.yale.edu/science-research-software).

## Community

The constant exchange of ideas across disciplines is crucial to fostering innovation and creating opportunities for intellectual surprise. As part of its efforts to build an interdisciplinary research computing community, the YCRC was involved in the Day of Data 2015: Innovation through Collaboration. Keynote speakers Robert Grossman (University of Chicago) and Chaitan Baru (National Science Foundation) presented, respectively, on Big Data Analytics: Five Trends and Five Challenges, and Data Science R&D: Current Activities, Future Directions.

The YCRC also has been involved in national developments on the role of the cyber-practitioner, the Northeast Big Data Innovation Hub, and various faculty-led working groups to better understand and align with the computational needs on campus.

Contact Kiran Keshav at [kiran.keshav@yale.edu](mailto:kiran.keshav@yale.edu)





# A Stronger, More Usable, and More Accessible Yale Web

**Jane Livingston**

Associate CIO  
Campus Community Technologies

*This essay was co-written by Michael Harris, Information Architect, Campus Community Technologies.*

An excellent web is integral in supporting Yale's mission of creating, disseminating, and preserving knowledge. Yale ITS's support for the web enables the University to effectively communicate with the community and the larger world. As Yale continues to improve the way people experience Yale's online environments, sharing and accessing information will only become easier. We're proud of the strides we made in the past year and of the value we have contributed to Yale through supporting the community in building better online spaces.

## Better Websites, Better Content Management

Effective stewardship of Yale's web increasingly requires a strong content management system, and Yale has increased its commitment accordingly. In FY 2016, the Web Technologies team migrated hundreds of websites from outdated, non-re-

sponsive, static formats to YaleSites (built on Drupal) or CampusPress (built on WordPress) platforms, making them easier to maintain, update, and govern.

YaleSites, as our primary web content management system, continues to be a critical asset for the university, powering most of its academic, administrative, research, and communications websites. ITS supported the Office of Public Affairs and Communications in the redesign and building of the new Yale.edu website, providing the YaleSites platform and technical expertise. The new site powerfully communicates to the world Yale's mission and personality, thanks in large part to the maturity, versatility, and robustness of YaleSites technology.

YaleSites released set of updated themes inspired by Yale.edu's visual design that allow any website around the university to align with the university's new look and feel. Formally announced at YaleSites DrupalCamp, the new themes are already being used on sites such as the Office of the Secretary and the Department of Physics.



Yale has also improved the web technologies that power search functionality on its websites. In addition to the native search engines available in YaleSites and CampusPress, now available are Google Custom Search and Apache SOLR.

SOLR is a powerful technology that allows for faceted searches and powerful filters to return more helpful results. With these technologies, people using Yale's web will be better able to find the information they need.

### More Usable and Accessible User Experiences

Yale's Campus Community Technologies teams have built high-profile websites for the university, including sites for Yale College Undergraduate Admissions and the Yale Divinity School. These websites, built on the YaleSites platform, reflect Yale's commitment to superior user experiences and custom visual designs for their audiences. The User Experience & Digital Strategy team also provides consulting and design services on projects across the university.

In FY 2016, Campus Community Technologies released an updated and vastly improved Online Directory, allowing users to quickly search individuals and organizations across campus. The directory automatically provides search results based not just on name but also job title, place of work, and institutional affiliation. Finding the contact information for anyone at Yale is much easier than it used to be, and Yale's directory leads its peers in terms of its usability.

Yale Campus Community Technologies also built a new and improved campus map that provides easy and more modern access.

Yale ITS has increased its commitment to ensuring that its web is accessible for users with disabilities. ITS improved the accessibility of three important student-fac-

ing websites—Student Life, Resource Office on Disabilities, and Center for Teaching and Learning—and will continue to improve web accessibility across the university as part of its ongoing mission. As a result of those efforts, users with blindness, low vision, deafness, and motor difficulties can access information on these sites as effectively as users without disabilities can.

In order to promote the value of user experience throughout the university, ITS launched a Usability and Web Accessibility website. The website is designed to help all of Yale's developers, designers, and editors learn about and implement best practices on all of their web projects, and the project has already garnered praise from around the university.

### Continued Improvement for Yale's Web

The next fiscal year will bring even more improvements to Yale's web. Yale ITS will begin a new version of YaleSites built on Drupal 8, the newest release of Drupal. Leveraging Drupal 8 will increase the power and flexibility of YaleSites, leading to ever-easier website creation. In addition, ITS is moving the remainder of the web infrastructure to the Aquia Cloud. ITS will also engage with a vendor and consultants to improve the accessibility of high-priority university websites and applications, helping users with disabilities to take advantage of all Yale has to offer, while also developing Yale's own capacity and talent to sustain a permanent commitment to accessibility.

We are looking forward on building the work we have done over the past year to make Yale's web stronger, more flexible, more usable, and more accessible.

Contact Jane Livingston at [jane.livingston@yale.edu](mailto:jane.livingston@yale.edu)

Contact Michael Harris at [michael.w.harris@yale.edu](mailto:michael.w.harris@yale.edu)



# Journey to the Cloud: Opportunities, Challenges, and Risks

## **Vijay Menta**

Associate CIO  
Infrastructure Services

*This essay was co-written by Rob Starr, Principal Solution Architect, Infrastructure Services.*

We are in the midst of exciting times for technologists around the globe. Infrastructure technologists in the higher education space are especially invigorated with the opportunities that are being presented by the vendors in the cloud space. The opportunity to provide computing, storage, and resiliency at an unprecedented scale for researchers, faculty, staff, and students is opening new doors for possibilities in research and collaboration that could not have been imagined in the past. With the ever-rising costs of education and financial constraints surrounding the IT services in higher education institutions, it is becoming increasingly difficult to manage data centers or provide infrastructure at levels that researchers demand.

Yale ITS has been on the path of a “Cloud First” strategy for more than five years and has deployed many Software as a Service (SaaS) solutions that live entirely in the cloud. These include ServiceNow

(IT ticketing system), Workday (Human Resources ERP), Slate (student admissions), Qualtrics (survey tool), and Office 365. In the past two years, we also made heavy investments in PaaS offerings such as Salesforce (contact center), Quickbase, and Acquia (Yale websites), and have been making steady progress towards our Cloud First strategy. For all our IT solutions, we have been evaluating SaaS solutions before considering Platform as a Service (PaaS), then Infrastructure as a Service (IaaS), and finally on-premises solutions.

A few years ago, Yale ITS was managing more than seven data centers; that number has been reduced to two data centers. The management and upkeep of data centers is a considerable financial burden, and it has become increasingly difficult to provide reliable 24/7 support to our ever-growing IT infrastructure demands. Until recently, we were on a path of virtualization and had virtualized more than 80 percent of our infrastructure. However, the agility, reliability, and flexibility provided by cloud vendors cannot be achieved within our current data centers without

significant financial investments.

We recently started our journey of our infrastructure to the cloud and have initiated the migration of our data-center-hosted infrastructure to the cloud. We anticipate this journey to take a minimum of three years, but are excited by the countless opportunities migration to cloud will offer. These include:

- ◇ Self-service automation for storage and computing
- ◇ Ability to expand and reduce compute and storage capacity with geo-redundancy and resiliency
- ◇ Metered pricing
- ◇ Staff development training to foster the development of a culture of creativity and innovation

Let us examine the above in additional detail as we make our journey to the cloud.

### Self-service Automation

Self-service is at the heart of the Cloud First strategy. When most technical leaders think about the cloud, they are not envisioning an environment with multiple ticket handoffs and an administrator deploying a system at the end; they are hoping for fully automated deployments.

Automation is the key to realizing the benefits and building a solid culture of engineering and innovation. Spinup, a portal and API that gives individuals the ability to provision virtual machines and application environments on a variety of infrastructure ecosystems, is our first attempt at self-ser-

vice and will continue to add capabilities and grow. Although the number of services available today are small, we have developed an architecture that allows us to scale and add new services easily and expose those services behind an API for users to consume.

While public and private clouds offer automation, Spinup aims to fully automate the configuration of systems to make them directly consumable by the end user.

Self-service is really about enabling IT consumers to get things quickly and reliably. We want to enable innovation, maintain security, enhance resiliency, and remove barriers.

### Ability to Expand/Reduce Computing and Storage Capacity

To make the cloud most effective, we need to deploy applications that can shrink and grow based on utilization and that can replicate across zones or regions for resiliency. We need to build applications based on services instead of servers. Users need to have the ability to delete or turn off environments when they are done using them and view these resources as disposable. We need them to build application environments that take advantage of auto-scaling





to use only the computing resources needed. This is a complete shift in paradigm of our usage of our hardware resources where our non-production instances are practically up 24 hours a day and 365 days a year.

### Metered Pricing

The pay-for-what-you-use model allows us to consume computing resources similar to our utilities and allows

us to be more fiscally responsible. Vendors offer deep discounts for infrastructure that can be reserved for a significant length of time when the usage is predictable. Cloud vendors such as Amazon and Azure, major players in this space, have been able to offer reduced prices year after year due to growing demand and a practically unlimited supply of infrastructure facilities that are in their control.

### Staff Development

Moving an on-premises data center to the cloud presents an opportunity for traditional infrastructure system administrators, database administrators, network engineers, and application developers to develop new skills and provides an opportunity for creative and innovative ways to test new scenarios not possible in an on-premises environment. For example, a developer who wanted to simulate a production instance could easily stand up and dismantle the infrastructure for testing at minimal cost and avoid having to guess if the application and infrastructure could stand up to the anticipated load. In the

coming years, we are looking forward to developing staff members who can collaborate across various IT groups and break down the barriers between infrastructure and application teams to build a strong DevOps culture.

### Staffing and Service Alignment

Using the cloud as a catalyst to reorganize internal operations has been a popular strategy. But the idea that using the public or private cloud will result in simplifying operations is misguided. Each cloud has an entire ecosystem that accompanies it, and to fully take advantage of the cloud we need to build expertise in the cloud tooling and architecture.

The following key factors will help drive staff and service alignment:

- ◇ Services are not limited to those provided to clients; services can be internal, such as backup, monitoring, patching, storage, compute, and network
- ◇ Every service needs an owner (team or person) and that owner drives the strategic direction
- ◇ Service owners are responsible for the availability, resiliency, and security of their services
- ◇ Each cloud service we offer either internally or externally needs a service owner and a support structure

### Cloud Risks

Migration to cloud comes with its own set of risks that are quite different from managing on-premises data center infrastructure. They range from data storage and transmission risks to fluctuating operating costs to legal and compliance risks. The list below is a high-level summary of risks that we will evaluate during our journey.

### Security Risks

- Infrastructure security
- Data storage and transmission
- Incident response
- Proliferation of infrastructure
- Control verification

### Operational Risks

- Disaster recover
- Vendor lock-in
- Third-party vendor relationships

### Financial Risks

- Fluctuating operating costs
- Financial complexity
- Business case and justification

### Legal and Compliance Risks

- Protection of intellectual property
- Notification of legal process
- Software licensing
- Indemnify institutions

Source: *Cloud Strategy for Higher Education: Building a Common Solution*. Research bulletin. Louisville, CO: ECAR, November 5, 2014.

### Exit Strategy

To discuss about our exit strategy before we have even completely migrated into the cloud may seem premature. However, having a solid exit strategy that provides a well-documented process for moving data and applications back to on-premises infrastructure or even to a different cloud vendor is something that we plan on paying particular attention to in our journey to the cloud.

Contact Vijay Menta at  
[vijay.menta@yale.edu](mailto:vijay.menta@yale.edu)

Contact Rob Starr at  
[robert.starr@yale.edu](mailto:robert.starr@yale.edu)



## Bringing HD Streaming, Recording to Yale Squash

AV systems broadens audience, enhances coaching

Yale Athletics may not come to mind when thinking of departments with a demand for technology at Yale. Technology in sports, however, is booming, from wearables that help athletes and fitness enthusiasts track effort, to software and systems that assist athletes in optimizing their performance, to websites and mobile apps that build fan engagement.

In FY 2016, Yale Squash coaches engaged Yale ITS for help in bringing new technology into the squash courts at the Brady Squash Center in Payne Whitney Gymnasium. The coaches wanted to implement high-definition recording and online streaming of practices and matches.

ITS AV Engineering consulted on the project and managed the installation and upgrades. The project included installing high-definition cameras on 14 of the facility's 15 courts, streaming and recording equipment, a central command station, and a public address system in each court that allows a coach in the command station to communicate with the players. In addition, the project team installed screens that can display scores from each court at the facility and game play on other courts.

The squash team's short-term goal was to be able to stream the Ivy League Squash

Championship, hosted by Yale, over the Ivy Digital Network, allowing thousands more viewers to enjoy the matches. However, the benefits of the new AV system went far beyond expanding the team's audience. The system has enhanced both coaching and recruitment of top athletic talent.

"We wanted to really up the way we teach," said Pam Saunders, Yale Squash Associate Head Coach. "We thought this would be helpful in terms of teaching our kids the tactical errors they are making, as well as the technical errors they are making. You need to really see what you're doing in order to change."

The project team completed the installation in time to stream Yale Squash's victory in the Men's Squash National Championship.

The system will be used to stream other tournaments, such as the U.S. Junior Open, Saunders said. "This is going to allow a lot of parents access and will help give the sport much better visibility."

Several other squash facilities are looking at Yale's system as they plan their own upgrades to offer similar capabilities.

Watch the related video at [fy16.its.annualreport.yale.edu](http://fy16.its.annualreport.yale.edu)



# Piecing Together the Life of the Buddha

## Technology allows online study of Tibetan murals

*The Life of the Buddha* is a ground-breaking project to study a series of monumental Tibetan murals that tell a story of the Buddha's life. Led by Andrew Quintman, professor of religious studies at Yale and scholar of Tibet and Tibetan Buddhism, and Kurtis R. Schaeffer, professor of religious studies at the University of Virginia, the grant-funded project includes the creation of a digital tool that will bring together images and text, allowing students and scholars online access to materials and the ability to study the murals and literature in context. The murals, created in the early 17th century, are located in a monastery in Central Tibet and have never been visually documented. Their narrative spans the Buddha's life from birth to death, detailing his teaching and wanderings.

ITS's Campus Community Technologies collaborated with the project team to adapt Mirador, a platform developed at Yale and Stanford that enables online collaborative annotation of text and images, to meet the needs of the Life of the Buddha

project. Mirador had not been used to handle images as large as the murals, and the system needed to be configured to handle multiple layers of annotations and link to text sources. ITS took on the painstaking task of preparing the digital images for study. The work involves stitching together high-resolution photographs of the murals, which cover 1450 square feet, and correcting differences in color and perspective.

"The Life of the Buddha will create a platform that is not only an exciting environment for researchers and scholars, but also for teachers, students, and classroom learners, and eventually the broader public community," Prof. Quintman said. "That's the kind of multimodal use that would have been very difficult without the collaboration with a top-notch IT team."

Work is continuing to annotate the 15 panels and prepare them for Mirador. To learn more, visit [lifeofthebuddha.yale.edu](http://lifeofthebuddha.yale.edu).

Watch the related video at [fy16.its.annualreport.yale.edu](http://fy16.its.annualreport.yale.edu)

# TECHNOLOGY FOR THE COMMUNITY MORE ACCOMPLISHMENTS



## Dynamic Digital Displays for CSSSI

The South Reading Room of the Center for Science & Social Science Information (CSSSI) features a large multi-screen display that showcases Yale history, research activity at Yale, and University projects and initiatives. Curated by the center’s librarians and created by a senior designer on the ITS User Experience & Digital Strategy team, the dynamic exhibits incorporate images, text, and video. “The Africa Initiative at Yale: Research in the Sciences and Social Sciences” is on display through October 2016.



## Clover Mobile Point-of-Sale System

ITS facilitated the rollout of Clover, a mobile point-of-sale (POS) system that has been adopted by departments across campus that perform sales transactions. The platform offers a range of hardware, from a traditional cash register to a fully mobile handheld terminal with wireless network or 3G connectivity. Features include inventory tracking, a web-based administration portal, and support for the new EMV (chip) credit cards and Apple Pay.

## New Platform for Admissions Decisions

ITS Student Academic and Support Systems and Undergraduate Admissions (UGA) partnered to move the admission decision process from a custom ITS-managed application to a vendor product, Technolutions’ Slate. The first decision release through Slate was on December 15, 2015. ITS has been building integrations to allow applications to be read in Slate starting with the Class of 2021.

## Change Management Community Resource

ITS Organizational Change Management (OCM) introduced a website for ITS and members of the Yale community in need of change management information and support. The site provides an overview of the framework and methodology used to implement change at Yale, and includes checklists, templates, and samples from past projects. The site also provides information on the Change Community of Practice and on how to engage the OCM team for services.



## Yale Aviation Club Flight Simulator

ITS Public Computing Services partnered with the operations manager of Saybrook College to find a new home for the Yale Aviation Club’s two flight simulators, which were to be put into storage and inaccessible to the public during renovations at Saybrook. Public Computing Services moved the simulators to a new permanent home in the Morse/Stiles College cluster space, where students interested in aviation can continue their test flights.



## Visiting Scholars Appointment Tracking

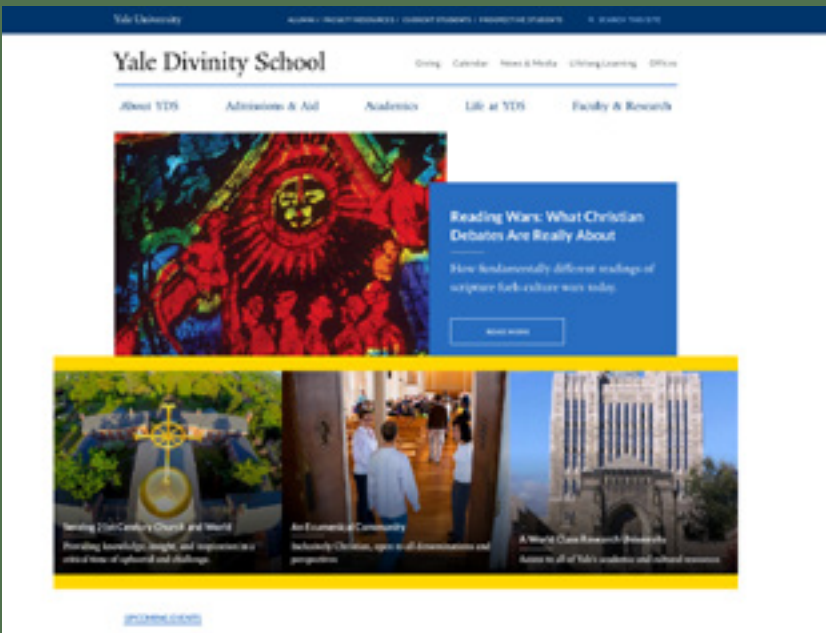
ITS Campus Community Technologies assisted the MacMillan Center for International and Area Studies in developing a new way of monitoring visiting scholars from appointment to departure. The VS Appointment Request Tracking System, developed on the Salesforce platform, replaced manual processes and consolidated information in spreadsheets, email, and text documents into a single repository. The system, which was delivered in only 75 hours, offers a consistent and more efficient approach, at-a-glance request status, and enhanced reporting capabilities.

## Application Virtualization for the School of Public Health

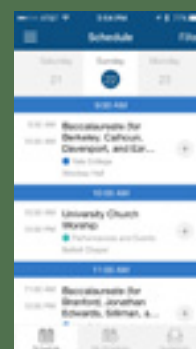
ITS Public Computing Services has created a partnership with the Yale School of Public Health to learn about the school's desire to delve into the world of virtual applications. Application virtualization is technology that delivers application software to client devices. Working collaboratively with the school to evaluate application virtualization offerings from several vendors, the ITS team eventually piloted the virtualization of an application used in an epidemiology class taught during the summer.

## Support for a National Study on Aging

ITS Research Services is providing the technical and infrastructure support for the Comprehensive Evaluation of Risk Factors in Older Patients for the AMI (SILVER-AMI) Study. The national study, which is supported by a \$12 million grant, is dedicated to observing patients over 75 years of age in more than 80 institutions in order to develop and validate risk stratification tools for older adults who recently have had a heart attack. Within five years, the study will have contacted 3,000 patients with the help of more than 450 trained staff who work at recruitment sites.



## Mobile Event Management Service



The ITS Medicine and University IT Partners team collaborated with functional leads from the Graduate School, Yale College, and School of Management to select CrowdCompass as Yale's new Mobile Event Management service. The CrowdCompass platform

has been used to create mobile apps for student orientations and conferences on campus. It helped visitors navigate and plan itineraries for Yale's Spring 2016 Commencement and the 2015 Yale Technology Summit.

## School of Divinity Website Redesign

The ITS User Experience and Digital Strategy Team worked with the Yale Divinity School (YDS) to plan and build an updated website optimized for mobile devices. The redesign also updated the website's look and feel, taking visual and content cues from Yale.edu. "We appreciated the rare combination of technical and process precision on one hand and creative flair on the other," said YDS Director of Communications Tom Krattenmaker of the collaboration with ITS.

# Unifying University Business With Workday@Yale

ITS supports implementation, integration with campus systems



The first of July 2016 marked the one-year anniversary of the launch of Workday@Yale, which has revolutionized how University business offices and Human Resources, Payroll, and academic staff get their work done and maintain their personal information.

Since go-live, more than 60,000 business process transactions have been completed using Workday functionality—10,500 of them were job changes; almost 7,000 were related to academic appointments; and 6,700 were employee and student new hires.

The transition to Workday represented a significant advance from the university's legacy systems, including Oracle E-business, a functionally rigid platform that was installed more than a dozen years ago. In contrast, Workday's state-of-the-art cloud system provides the Yale community with the user-friendly tools needed to accomplish the administrative work of the university efficiently.

Workday offers a host of benefits related to Yale's administrative and business processes, including reduced paperwork, and improved access to information and data.

More than 120 staff members from units across campus collaborated with the Workday@Yale team to prepare campus departments for the switch, and pre-launch training sessions were offered to more than 2,300 community members.

"With the prior system, we never knew where an approval was in the process and who was next in line to review it," said Theresa Pierson, Director of Business Operations, FAS Division of Humanities and Social Sciences. Now it is possible "to see what stage, and with whom, a business transaction is in with just a glance," she added. Pierson also noted that the organizational charts in Workday "are extremely useful, especially for new employees and for those who need to research which employees are assigned to specific units. Plus, the Workday directory is great because names pop up easily, even if you don't know the exact spelling to use."

"Workday has helped us get our work done more quickly as processing requests is much more efficient in this new system," said Lauren Slater, Human Resources Gen-

eralist, Employee Relations. "I think the easy accessibility to Workday is its biggest benefit. I can log in on my iPhone, iPad or laptop, wherever I am, and get work done efficiently."

As one of the major project players, Yale ITS worked on the technical implementation of the system and the integration of Workday with other campus

systems. The team currently is configuring Workday Financials for a planned July 2017 launch. "Yale's continuing optimization of Workday functionality is closely aligned with

President Peter Salovey's commitment to a more unified Yale," said Ryan Schlagheck, director of Enterprise Program Management for the ITS Business Systems Group. "To that end, for the first time ever, Yale's human resources, academic, payroll, and financial businesses will be under one umbrella, the cloud-based business solution software by Workday."

For more information about the project, visit [workday.yale.edu](http://workday.yale.edu).

*"Yale's continuing optimization of Workday functionality is closely aligned with President Salovey's commitment to a more unified Yale."*



# Protecting Yale's Data with Multifactor Authentication

## ITS partners with campus to roll out added security

The security of Yale's data is the primary concern of the Office of Information Security Policy & Compliance, part of Yale Information Technology Services. In FY 2016, the office determined that multifactor authentication, known as MFA, was needed to safeguard against the growing problem of unauthorized access to Yale's data. Multifactor authentication requires anyone off campus logging in to Yale's network and resources to use an external device, such as a mobile phone, to verify his or her identity.

Multifactor authentication posed a unique and formidable challenge: In a very short time frame, how could Yale ITS successfully introduce and encourage the adoption of a necessary change that impacted how staff, faculty, and students do their work?

A team of ITS staff and members of the Yale community accomplished just that, enrolling more than 40,000 users in MFA to provide the critical added layer of security.

Yale ITS's Organizational Change Management (OCM) utilized three key strategies to usher in this major change:

- ◇ Securing an active and visible sponsor
- ◇ Taking a cross-departmental, University-wide collaborative approach
- ◇ Engaging and communicating with the campus community through many channels

Under the guidance of Chief Information Security Officer Rich Mikelinich, the team developed a brief but informative sponsorship video that helped the campus community understand the need for

increased security measures to protect Yale's data. The sponsorship message was utilized during initial outreach meetings, at MFA information sessions, and in face-to-face meetings with university leaders in faculty and administrative departments, all with the purpose of setting context, making the case for change and building awareness.

ITS teams incorporated feedback from university leaders, administrative and faculty units, and IT Partners in our outreach and deployment strategy. For example, the team fostered a close working relationship with the Faculty of Arts and Sciences Dean's Office to support the enrollment of faculty members. MFA was introduced at the first faculty chairs meeting in September, immediately followed by a communication from Dean Tamar Gendler to all FAS faculty outlining the change.

Organization Change Management worked in tandem with lead administrators and operations managers in each academic department to provide detailed information, answer questions, and troubleshoot issues. The feedback provided by our partners, coupled with our preparedness and flexibility to listen and modify our approaches, was a crucial component in the refinement of our plan and ultimately allowed ITS to successfully implement this service.

Partners in the external community who supported our efforts included our IT Partners, Lead Administrators and Business Operation Managers, department heads, Office of the Provost, and the Faculty of Arts and Sciences Dean's Office.

Our three-pronged strategic approach to organizational change management, along with our ability to work collaboratively with IT Partners and our colleagues in the administrative and faculty support organizations, proved a recipe for success. We will be using this approach for future initiatives.



## CORE SERVICES

### MORE ACCOMPLISHMENTS



#### **IPTV: 100 Channels of Streaming Content**

Yale ITS replaced legacy wired cable TV services with on-demand streaming television services through Xfinity on Campus. The IPTV service, available to eligible students and Yale affiliates, provides more than 100 channels of streaming content while on campus, in addition to many off-campus offerings such as ESPN and HBO-GO. The application can be used on a variety of Android and iOS devices, as well as on conventional desktop or laptop computers through the use of a web browser.

#### **Spinup Portal and API**

ITS Infrastructure Services developed an in-house, self-service portal and application program interface (API) called Spinup. Spinup allows individuals the ability to provision virtual machines and application environments on a variety of infrastructure ecosystems. Spinup is currently in its pilot phase and is scheduled to be launched in FY 2017. Spinup will offer cloud storage options, databases, containers, and Platform-as-a-Service (PaaS) options for Java, Ruby on Rails, PHP, Node.js, and more.

#### **24-Hour, 7-Day Help Desk Support**

In September, the ITS Help Desk began offering technical support by phone 24 hours a day, seven days a week. Calls made after hours to 203-432-9000 are handled by an outside vendor. ITS expanded the Help Desk hours in response to requests from the Yale community expressed in the 2015 Yale Technology Survey and customer service surveys.

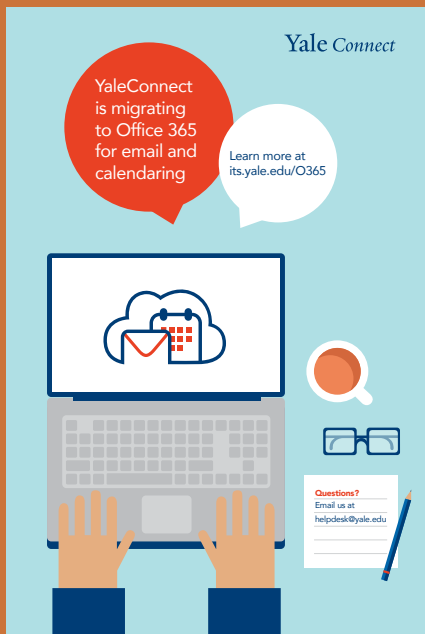
#### **Antivirus Replacement**

ITS upgraded its antivirus service's software component to IBM BigFix Protection on more than 15,000 computers. The transition occurred with very few errors or problems. IBM BigFix will save the University more than a million dollars over the next five years and will make it easier and faster for ITS to respond to malware issues and collect security data.



#### **Storage@Yale Central File Service**

ITS implemented Storage@Yale as the central file service offering for the University. It replaces slower and costlier options with three tiers of storage designed to meet individual needs. The standard tier provides an inexpensive everyday solution for 90 percent of users; the enhanced tier provides high-speed, high-I/O capabilities; and the archive tier provides a location to keep data for long periods of time at a very low cost.



## Office 365 Implementation

ITS moved 40,000 mailboxes to the Office 365 platform in approximately two months. This project standardized the use of the mobile Outlook client to enhance calendaring reliability and performance. With the community's needs in mind, ITS transitioned the mailboxes to a new mobile-friendly cross-platform web interface. Future plans include the introduction of additional Office 365 platform services such as Sharepoint, OneDrive, and OneNote.



## CEID Hardware Refresh

ITS Public Computing Services completed the first hardware refresh of the Center for Engineering and Innovative Design (CEID). This involved taking inventory all of the devices as well as moving them to the Windows 10 operating system. Public Computing Services staff worked closely with the CEID to ensure they were meeting the center's needs and keeping them informed on progress.

## Nurturing Young Technologists Through Internships

ITS's career-building programs have become models for Yale

The ITS Internship programs continue to grow, strengthening our connections to the local community and the next generation of information technologists. The three programs—Yale ITS High School Internship Program, the Yale ITS Summer College Internship Program, and Brian J. Wolson Early Career Development Program—have brought more than 110 curious and enthusiastic young minds into our organization to work in a wide range of areas, from project management to information security.

The 18-month rotational Wolson Early Career Development Program for recent college graduates has proven a great success. Five current staff members are alumni of the program, which launched in 2013. To date, seven people have graduated from the program, four will complete the program in January 2017, and six new participants began in August 2016.

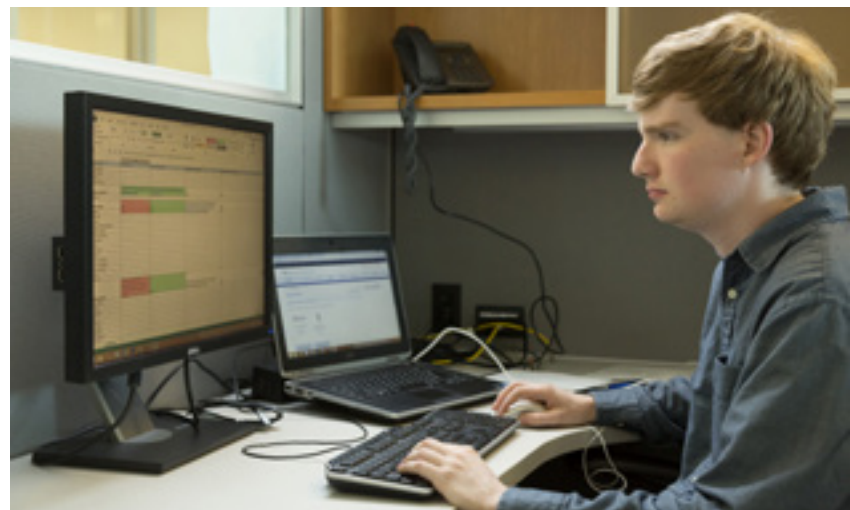
David Goerger, who graduated from Yale in 2014 with a degree in mathematics, finished the program in January 2016 and joined ITS as an operating systems programmer in the Systems Administration group. His six-month rotations included positions in the Unix and Design Services divisions of Infrastructure Services.

“By the end of my third rotation, I

felt I had reached a place where I could confidently make independent technical recommendations on a handful of ITS systems,” David said. “This depth of knowledge speaks to the quality of mentorship and diverse opportunities for growth in the program and at Yale.”

In addition to earning a salary and Yale benefits, participants in the Wolson Program receive on-the-job training, one-on-one mentorship, and career development guidance.

“It’s difficult to tell who benefits more from the Wolson Program, ITS or the participants,” said Roger Ngim, who ended his three-year tenure as director of Yale ITS Internship Programs at the close of







FY16. “We strive to help them find their place in the information technology world and grow as IT professionals, and in return we get to work with some of the brightest, most capable new graduates. Everyone is invigorated by their presence.”

Since its inception in 2014, the ITS Summer College Internship Program has invited 42 college students into the organization in diverse areas such as communications, business intelligence, mobile and web technologies, client support, and research technologies. The students spend the summer gaining hands-on experience, acquiring professional experience, and learning about IT functions in higher education. In addition, ITS invites the interns to attend career-building workshops, campus events, and networking activities.

As the program has grown in stature, other organizations on campus, such as the School of Law, School of Architecture, and Yale College, have asked for ITS’s assistance in recruiting and hiring college interns for their IT units. As word has spread, ITS has shared its career-development programming with interns from the School of Medicine and the Finance and Business Office.

ITS works in partnership with non-profit scholarship program New Haven Promise to ensure that college students from the local community interested in technology are aware of and apply for summer internships.

The ITS High School Internship Program, founded in 2014, has placed 53 local students in ITS for the summer. Created by a team from ITS, New Haven schools, Yale Human Resources, and vendor partner Golden Compass, the program immerses students in a professional office environment and gives them a feel for careers in technology.

“These programs allow us to contribute directly to students’ education, and to contribute to future of our profession,” Ngim said, adding that the rewards extend far beyond getting help with summer projects.

“Ask any manager who has worked with interns: There’s nothing more gratifying than helping these talented and motivated students discover their passion and grow as professionals.”

Watch the related video at [fy16.its.annualreport.yale.edu](http://fy16.its.annualreport.yale.edu)

# Connecting Doctors and Patients Through Video Technology

## Conferencing system enables telehealth at Child Study Center

The Yale School of Medicine's Child Study Center worked with ITS to bring telehealth technology to its child psychiatry services.

Telehealth is a term that describes the use of communications technology to provide direct patient care or enable care providers to consult with each other remotely.

"Telehealth is something that's been around since 1990 and is not a new modality, even though it's new within the state of Connecticut," said Laine Taylor, an assistant professor of psychiatry with the Child Study Center.

"It's not something to be scared of. It is something actually that delivers health care on par with the quality and efficacy that you get from face-to-face interactions."

Mark Lazarus, the ITS support provider who works with the Child Study Center, helped bring the video conferencing technology needed to support telehealth at the center, where it will be used to connect individuals worldwide for consultations,

doctor conferences, and teaching.

"My job for the Child Study Center was basically to provide that technology and to do it in a way that is HIPAA compliant and meets our standards," Lazarus said.

According to Andres Martin, Riva

Ariella Ritvo Professor in the Child Study Center and professor of psychiatry, child psychiatry is one of the least served medical specialties. "Because of that, we need to find better ways of making ourselves available to the many patients who need our care—not only

individual patients but also schools, school boards, detention centers, any number of other stakeholders who have to do with caring for children.

"Against that backdrop, telehealth really provides us an opportunity to be present in many distant places," Prof. Martin said.

Watch the related video at [fy16.its.annualreport.yale.edu](http://fy16.its.annualreport.yale.edu)



## PARTNERING AND OUTREACH

### MORE ACCOMPLISHMENTS

#### Linda K. Lorimer Award ITS Honorees

Two ITS staff members were among the 2015 recipients of Yale's Linda K. Lorimer Award for staff excellence and distinguished service. Elvin Torres, Operating Systems Programmer for Endpoint Engineering, received the award for his work identifying and deflecting a major cybersecurity risk to Yale's systems. Marc Ulan, Associate CIO, Business Systems Group, is part of the Workday Project Leadership Team, which received the award for its guidance of the Workday project.

#### Women in Technology Programs

Women in IT @ Yale (WIT), a career-focused shared interest group founded by Yale ITS staff members, announced its new executive sponsors: Susan Gibbons, Deputy Provost and University Librarian; and Jane Livingston, Associate CIO, Yale ITS. WIT seeks to recruit, build, empower, and sustain a community of women in information technology at Yale through mentoring, educational programs, speaker events, and networking.



#### Banners Celebrating the Kings' Legacy

ITS Illustration & Design Services created banners honoring the legacy of Dr. Martin Luther King Jr. and Coretta Scott King to display in the Sterling Memorial Library nave during the month of January. Created in collaboration with Christine Weideman, the library's director of manuscripts and archives, the banners' design included historical photos and documents exploring the Kings' connections to Yale and their work for social justice.

#### 2015 Yale Technology Summit

Yale ITS partnered with the departments and organizations across campus to present the second Yale Technology Summit, held in October at the School of Management. More than 80 faculty members, students, staff, and alumni discussed topics such as interactivity in the classroom, digital archiving, healthcare, online learning, research data management, and using technology to address social and environmental problems. Yale's Brian Scassellati, Professor of Computer Science, Cognitive Science, and Mechanical Engineering, delivered the keynote address.



### Business Intelligence Community of Practice

Working closely with the Yale community, ITS Business Systems Group (BSG) has established a Business Intelligence Community of Practice. The Community of Practice provides a space to share Business Intelligence knowledge, build relationships, and leverage a shared support structure for common activities, such as license and environment management. Supporting the Community of Practice are monthly newsletters, office hours, brown bag sessions with internal and external speakers, a central license and environment management, and expert support services.

### User Research for Better Websites

Every month, the User Experience & Digital Strategy team runs “Testing Thursdays,” providing hands-on user research for a wide variety of web projects, such as the Yale Directory and School of Divinity website. The team works with clients to identify tasks they want improved on their sites and observes users as they attempt to complete them. After a review of the findings, the team creates expert recommendation reports for the clients.

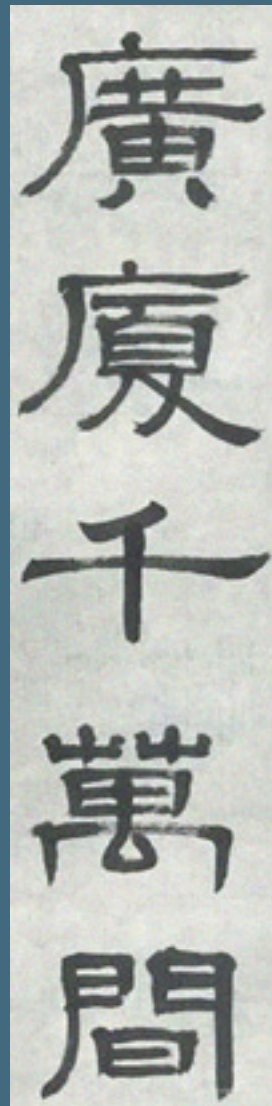


### Technology Lifecycle Management Training

At the annual Professional Schools Plus IT Partners retreat In July 2015, ITS Medicine and IT Partners collaborated with the ITS Office of the Chief Technology Officer to lead a workshop on Technology Lifecycle Management. Using techniques presented by ITS, IT Partners assessed their own application portfolios, which enabled them to think more strategically about the technology they support. This workshop captured divergence from and alignment with ITS’s plans for the broad University application and technology portfolio.

### Online Study of Chinese Texts

For the Ten Thousand Rooms Project, ITS is building an open-access platform to enable textual work on pre-modern Chinese sources. ITS’s Web Technologies team is working with the Department of East Asian Languages and Literatures to support the technical evolution of the Mirador Viewer developed by Stanford University. The Mirador is a platform that enables individuals to upload images and organize projects oriented around those sources’ transcriptions, translations, or annotations.

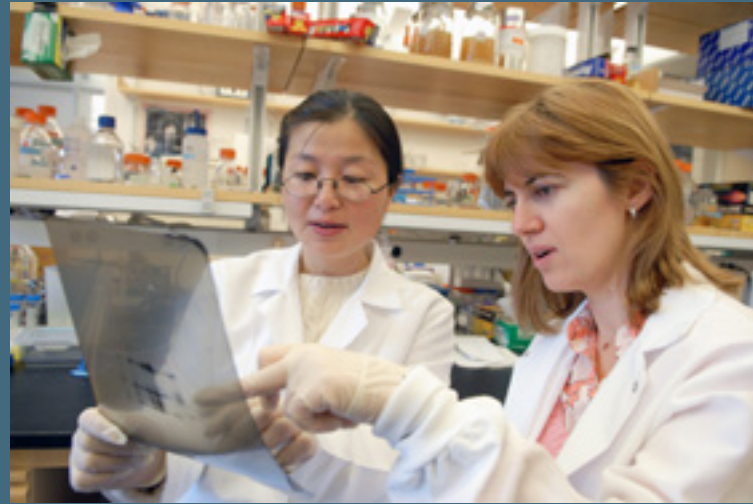


### Research Computing Technical Advisory Group

To address a pressing need for researchers to provide external (non-Yale) access to internal resources more efficiently, the Yale Center for Research Computing (YCRC) Steering Committee convened a Technical Advisory Group to provide recommendations. Led by the Office of the Chief Technology Officer, the Technical Advisory Group includes Yale faculty; research scientists from the YCRC; staff from ITS Information Security, Policy and Compliance; ITS Infrastructure Services; and the University Library. Through deep discussions with leaders from other universities and research consortia as well as the Yale Office of the Provost, the Technical Advisory Group developed recommendations to address one of the most significant issues facing Yale researchers. The recommendations were reviewed by the Yale Center for Research Computing Steering Committee in June 2016.

### Campus-wide Cloud Working Group

As IT organizations across Yale take steps to invest in cloud services, the ITS Technology Architecture Committee (TAC) formed a Cloud Working Group and invited broad participation from ITS leaders, the School of Architecture, the School of Medicine, the University Library, the School of Management, Yale Center for British Art, and Yale College. The TAC Cloud Working Group provided a forum for understanding assessment criteria for selecting public cloud providers of Infrastructure as a Service (IaaS) and Platform as a Service (PaaS); for reviewing plans for shared services across various cloud providers such as network, firewall, account management, load balancing; and for developing strategies for selecting vendors.



### Expanding IT Partner Outreach

Within Yale's expansive and diverse IT environment, ITS's Medicine & University IT Partners team provides a vital service in helping ITS accurately address University needs and providing an active voice for the distributed IT community at Yale. Medicine & University IT Partners maintains regular support meetings and forums with the University IT community, the professional schools, library, museums and galleries, and West Campus.

### Yale-HP Blended Reality Project

Hewlett-Packard (HP) and Yale have joined forces on an applied research project called Blended Reality. Its goal is to improve access to 3D design tools, augmented reality, digital imaging, and 3D fabrication technologies in order to open new creative outlets for Yale faculty and students. HP Inc. is contributing funding, equipment, research travel, equipment discounts, and in-kind services. Planning began in June 2016, with project research to be conducted during the 2016-17 academic year.

# new & improved services

Yale ITS is committed to supporting the University with the latest and best technologies available. We invite you to browse this list of some of the new and improved services provided by Yale ITS. Learn more about the services that Yale ITS provides to the community at [its.yale.edu/services](https://its.yale.edu/services).

## NEW

Application Virtualization for the School of Public Health

Business Intelligence Community of Practice

Laptops for International Students

Mobile Event Management Service

Multifactor Authentication

Self-Service Portal and API

Storage@Yale

Usability & Web Accessibility Website

Workday@Yale

Yale Squash HD Streaming

## IMPROVED

Online Alumni Services | *New platform, alumni directory, and email forwarding*

Antivirus Replacement | *New cost-saving solution utilizing existing resources*

AV Systems Design | *Updated equipment and expanded service offerings*

Campus Map | *Modernized user interface and functionality*

Cyber-Infrastructure for Researchers | *Two new High Performance Computing clusters and expanded Yale Science Network*

Data Self-Scan | *New application with improved usability*

Desk Phones On Campus | *Updated technology*

Directory Redesign | *New look and better search functionality*

Hardware Refresh at Center for Engineering Innovation and Design (CEID) |

*Equipment inventory and operating system upgrades*

Improved Search Across Yale Websites | *New platform with better search results*

Mailing Lists | *Moved to a more stable environment*

User Research and UI Design Consultation | *Services to help the community build better websites*

Virtual Servers | *Expanded and improved offerings*

Wired Infrastructure | *Equipment modernization*

Wireless Network | *Upgraded infrastructure with increased coverage*

YaleConnect (Office 365) | *Enhanced collaboration and mobile features; cloud technology*



## Recognizing excellent service

To improve customer satisfaction and celebrate the hard work of ITS staff members, Len Peters, University CIO and Associate Vice President, created the CIO Spot Awards. This distinction recognizes those who are “spotted” delivering world-class service or going beyond the call of duty.

CIO Spot Award Hall of Fame honorees are staff members who have received

Spot Awards multiple times and continue to demonstrate an exceptional level of high-quality service.

Nominations are accepted from all members of the university community. To nominate an ITS staff member, visit [its.yale.edu/spotawards](http://its.yale.edu/spotawards).

### August 2015

#### Individual Awards

Simon Lai  
Jesse Salce

### September 2015

#### Team Award

Ernie Marinko  
Lou DeAngelo  
Dan Tinari  
John Lee  
Luis Ribeiro  
Aaron Greene

#### Team Award

Nancy Flowers-Mangs  
Sanjana Singh  
Shawn Styfco  
Marwa Khaboor

#### Hall of Fame Awards

Lauren Kerrigan  
Chris Burkhalter  
Bob Mazzola  
Walter Szpakowski  
Josué Rodriguez  
Mike Rinaldi  
Phil Barello

### November 2015

#### Individual Awards

Bin Blackwood  
Michael DeSalvatore  
Suzanne Feola  
Brian Funaro  
Michele Greenhouse

Dan Franko  
Rebecca Hoffman  
Ken Hudson  
Nathaniel Lewis  
Fan Li  
John Ferraiuolo

#### Team Award

Michael Harris  
LaShawn Bushay

### February 2016

#### Individual Awards

David Hazall-Farrell  
Janet Jeddry  
Michael Macary

### April 2016

#### Team Award

Nancy Flowers-Mangs  
Marwa Khaboor  
Kimberly Pasko

#### Team Award

Nancy Flowers-Mangs  
Kimberly Pasko  
Josué Rodriguez  
Sanjana Singh

#### Team Award

Amy Lohman  
Claire Savoie

### June 2016

#### Hall of Fame

Thomas Minior



Produced by Communications & Organizational Development, Yale ITS  
Designed by ITS User Experience & Digital Strategy

Copyright © 2016 Yale University

