Information Services and Technology

FY2012 was the second year of the Information Services and Technology (IS&T) three-year strategic plan. Our department goals (new this year) were to improve customer experiences, optimize the effectiveness of our operations, reduce risk, and energize and motivate employees.

Area and individual goals cascaded from department goals as we continued to work toward "one IS&T." Our collective efforts enhanced experiences for faculty, students, and staff. In partnership with sponsors and customers, we continued to focus on advancing MIT's mission and delivered services and projects that simplified processing and reduced costs.

MIT now has online registration for all students. The undergraduate admissions process is paperless, and grades are submitted and accessed online. MIT learners now have a seamless experience when using the new Enterprise Learning solution. Forecasting and reporting became easier for the MIT (research) community with the introduction of RAFT (reporting and forecasting tool). After choosing a new reporting tool (Cognos), we have been working closely with departments, laboratories, and centers (DLCs) to help them understand their data and redesign their reports. Mobile websites and modules were implemented, bringing key tools to the fingertips of community members. The redesigned IS&T website allows users to access the new IS&T Service Catalog on the device of their choice. Ubiquitous mobile/cell phone coverage is closer to reality across our campus, with in-building cellular having been implemented in over 50 buildings.

When Israel Ruiz was appointed as the new executive vice president and treasurer, he challenged each of his departments to analyze environmental scenarios and their potential effects on community needs and services over the next five years. IS&T senior management identified seven key technology trends: hyperconnectivity, self-service, data, collaboration, open access, security/privacy, and sustainability. For each of these trends, we focused our analysis on the potential impacts on research, education, administration, and information technology (IT) support in general. During the second half of FY2012, IS&T used these trends as guidelines around which to focus our work.

In FY2012, IS&T made contributions to major MIT strategic programs: Digital MIT, Global Initiatives, the Massachusetts Green High-Performance Computing Center (MGHPCC), and the MIT Energy Initiative. Below we highlight our work supporting Global Initiatives, MGHPCC, and the MIT Energy Initiative. Digital MIT accomplishments are highlighted throughout the report.

In support of MIT's Global Initiatives, IS&T implemented the SAP fixed assets module for assets held in Singapore under the Singapore-MIT Alliance for Research and Technology (SMART) program. This implementation enabled real-time reporting for assets and multicurrency reconciliation of full financial statements.

IS&T supported the development of the new MGHPCC, a collaboration of five Massachusetts research-intensive universities, the Commonwealth of Massachusetts, EMC, and Cisco. Construction of the 90,000-square-foot LEED (Leadership in Energy and Environmental Design) facility is moving along smoothly with a targeted completion by the end of 2012. Currently more than 400 computer cabinets are being installed, and the data center is scheduled to open in the first quarter of 2013.

IS&T has fostered use of more efficient equipment and operating practices to promote energy conservation for the MIT Energy Initiative. We participated in the W91 data center energy efficiency study aimed at implementing energy-efficient cooling systems as part of the MIT-DOE (Department of Energy) Commercial Buildings Partnership program with the Department of Facilities and Lawrence Berkeley National Laboratory, and we have identified several energy conservation measures to address air flow management. By consolidating single-function devices to multifunction devices and implementing a "hold and release print" infrastructure to minimize unclaimed print jobs in public Athena clusters, we promoted more efficient printer practices. IS&T hosted several seminars and provided web resources to promote increased energy- and resource-efficient computing and printing.

The IT Governance Committee reviewed the FY2012 IS&T budget and the Telephone and Network Service Center (TNSC) capital budget (with a focus on network deferred maintenance) and determined the allocation of IS&T's $9.5 million software development (SWD) budget. For the past several years, we have underspent the SWD budget and have been adding to the carry-forward budget (currently $5.4 million). In FY2012 IS&T spent $11.1 million on SWD (the $9.5 million budget and $1.6 million of the carry-forward budget), indicating improved execution and strengthened partnerships with our customers. The MIT Network Security and Data Centers roadmaps were reviewed and approved by the IT Governance Committee this past year. Updates to the Education Systems, Data, and Mobile Computing roadmaps were also reviewed.

The IT Governance Committee worked closely with the Student Systems Steering Committee and the Administrative Systems and Policies Coordinating Council, which determined software development priorities and recommended and oversaw, respectively, the Education Systems and Administrative Systems investment portfolios.

The Research Computing Advisory Committee was established at the end of FY2012. The committee's first priority is to determine MIT's use of the new MGHPCC facility.

The Governance Committee approved proposals for the retirement of the following systems and services:

- Brio Query reporting tool
- Thalia Image Management service
- Oracle Techtime Calendar application

- Legacy SAP Travel application
- Tether Remote Access service
- Cyrus IMAP Email service

New/Expanded Services

IS&T provides a dynamic environment for our customers and stakeholders. Over the past several years, IS&T has expanded its offerings to respond to increasing demands for new IT services across MIT. Some of those services include:

- Drupal Cloud (website construction service)
- Enterprise Learning
- IPTV for students
- lynda.com (online training service)
- Online grading
- Online Learning Center for Environmental Health and Safety
- Online registration
- Pharos printing (public student printing system)
- RAFT (reporting and forecasting tool)
- Secure wireless
- Unity Voicemail and unified inbox feature

Decommissioned/Eliminated Projects, Services, and Systems

In order to meet growing demands and the needs of the community, we decommissioned or eliminated the following services and systems in FY2012, reducing risk and allowing for more support of newer technologies:

- MIT's remote access dial-up service (Tether).
- WebLogic from the admissions environment.
- Association of Student Activities application.
- SAP transaction authorization ranges to provide more specificity in reporting user access controls.
- Support for Mac OS 10.5.
- insideMIT portal.

- E40 F5/legacy MIT Student Information System (MITSIS) backend network. Eliminating this eight-year-old equipment greatly reduced the risk of outages to the development, test, and quality assurance environments for MITSIS, undergraduate admissions, and administrative web applications (environmental health and safety/events/SAPweb).

- W91 CX-700 SAN (storage area network) array, reducing the risk of hardware failure.

- Student personnel action form.

- 10 Sun SPARC/Solaris systems with Intel/Linux-based equipment and operating system, providing improved performance for the Data Warehouse server.

Following are highlights of work completed in IS&T's operational areas.

Administrative Systems

Administrative Systems focuses on enterprise-wide systems that are critical to administration at MIT. This area works in partnership with the Office of the Vice President for Finance (VPF); Human Resources (HR); Facilities; the Environment, Health, and Safety Office (EHS); and other key community groups to automate manual functions and support business process redesign to achieve a "digital MIT." Administrative Systems provides systems for payroll, benefits, employee data, appointments, travel, purchasing, general ledger, custodial and grounds, and other functions.

Metrics

SAP, our enterprise resource planning system supporting Finance, HR/Payroll, EHS, and Facilities, closed 1,300 support and enhancement tickets in FY2012, with a back log reduction of 49%. In addition, more than 450,000 paychecks/direct deposits for employees, students, and retirees were processed, along with 140,000 purchase orders, 330,000 vendor invoices, 60,000 requests for payment, and 350,000 journal vouchers.

Highlights

Enterprise Learning

Enterprise Learning went live in March 2012. MIT learners can now view their training histories, see their required and recommended training, register for classroom courses or take web-based training, and see real-time web-based training progress updates, all in the "MIT Learning Center."

Enterprise Learning includes a training needs identification engine to support compliance training requirements, including reauthored Office of Sponsored Programs and EHS web-based training. This implementation enabled IS&T to retire EHSWeb and replace the third-party web-based training provider, TrainCaster.

Hourly Student Appointments

IS&T worked with Student Financial Services, the International Students Office, VPF, and administrators to develop an application that automates creating, changing, and approving over 7,000 hourly-pay student appointments per year. The new application eliminates duplication of effort by administrators and service center staff. Built-in validations help reduce errors, save processing time, and improve process flows. The application has enhanced reporting and allowed the Student Personnel Action Form to be retired. Within one month of rollout, more than 80% of all hourly student appointment transactions were being processed through the new application.

Appointment Process Redesign 2.0

The Appointment Process Redesign (APR) 2.0 project added features to the APR system to streamline the way MIT manages its HR/Payroll transactions for faculty and staff and reduce the use of paper-based forms. A collaborative initiative between HR, IS&T, the DLCs, and VPF, the project added document attachment functionality to the "hires" and "termination" applications, enhanced the APR inbox to simplify user navigation, and changed "hires" to support the new I-9 compliance process.

Support and Enhancements

At the beginning of FY2012, IS&T met with its business partners to discuss improvements to the ongoing support and enhancement model. As a result, we established two primary goals: significantly reducing the backlog of issues and establishing an ongoing, sustainable staffing and procedure model.

During FY2012 the backlog of open issues was reduced from 650 to 330 in number (a reduction of 49%), and 1,300 issues were resolved. Support processes were simplified and streamlined, and a portion of the work was outsourced to achieve efficiencies and develop a sustainable support model.

Other Accomplishments

- Analyzed the key distribution process from end to end and made recommendations for improvements

- Completed documentation of interactions (people and processes) with Administrative Systems in regard to day-to-day operations

- Established a new governance committee tasked with approving and prioritizing new Administrative Systems initiatives

- Started work on a series of initiatives (Facilities realignment program) aimed at improving customer interactions and the processing of work orders

Education Systems

Education Systems focuses on enterprise-wide educational systems, including student systems and the Stellar course management systems. The systems included are Learning Management Systems, Student Gateway, MITSIS, Financial Aid, Admissions, and systems supporting other student, faculty, and course-based activities. Key sponsors are the departments reporting to the dean for undergraduate education, the dean for graduate education, the dean for student life, and the MIT Council on Educational Technology (MITCET).

Metrics

The Stellar course management system includes 931 active class sites, 1,249 active project sites, 251 active physical education sites, and 93 active wiki sites.

WebSIS/MITSIS, the student information system that provides access to personal records, course information, and scheduling, is used regularly by all MIT students.

Highlights

Enhancing the Student and Faculty Experience

A little over a year ago, if one asked faculty, students, and staff to describe their experiences with MIT's student information systems, one would probably hear words like *paper-based*, *outdated*, *time-consuming*, and *inflexible*. Today, significant progress has been made to modernize these systems and enhance the user experience. If one asked faculty, students, and staff the same question now, one would hear something very different: *digitized*, *online*, *paperless*, *robust*, *efficient*, *flexible*, and *streamlined*.

Why the difference? The Education Systems Roadmap, developed jointly by the Office of the Dean for Undergraduate Education, the Office of the Dean for Graduate Education, the Office of the Dean for Student Life, and IS&T and approved by the IT Governance Committee in September 2010, prioritized nine key areas for improving the user experience and increasing self-service.

Online Grading

Each semester, more than 39,000 final grades are submitted. Online grading replaced the paper-based submission process with an efficient and flexible web-based application.

In the new online system, grades can be reported 24 hours a day, seven days a week, and they are posted every 15 minutes. Defined roles allow many users to enter grades while ensuring that all grades are vetted by approved faculty. The system also enforces the faculty rules and regulations on grading, such as limiting each subject's grading mode and the student's grading option (e.g., junior-senior P/D/F).

Twenty-four departments participated in the pilot, and feedback from faculty and administrators was positive. During the pilot, 23% of grades were submitted outside of business hours. All grades are now submitted online.

Online Registration

In September 2011, phase 1 of online registration was piloted with seven departments. Participants were surveyed, and 88% found the system easy to use and navigate. Students and advisors make changes to an online registration form containing preregistration data, and advisors formally approve the selections online. Continued face-to-face meetings between students and advisors during the registration window enable informed academic planning.

Online registration was opened to all departments beginning in spring 2012. Thirty-two percent of registrations were submitted outside of business hours.

Paperless Undergraduate Admissions

For the class of 2015, Admissions moved to a paperless process. Paper applications were converted to scanned documents and all applications were reviewed online via the eFolder model, which opens an entire application with one click.

The new system has significantly reduced paper and processing time in the review process. Each year 190,000 pieces of paper are saved, and the time needed for admissions folders to be ready for review has been reduced from 15 minutes to one second.

All-Electronic Graduate Admissions System

Last year, MIT had 22,220 graduate applications, the largest number in its history. Across more than 40 graduate programs, a variety of electronic, paper-based, and hybrid admissions systems were used. In considering these diverse processes, departments raised many systems issues and noted an urgent need for an improved infrastructure.

A web-based system developed in and supported by the Department of Electrical Engineering and Computer Science (EECS) provides a customizable platform that improves efficiency, reduces processing times and paper use, streamlines the review process, and improves the applicant experience.

The transition began during summer 2011. In addition to the four graduate programs that already had the EECS system in place, 10 graduate programs moved to the system during fall 2011 admissions intake. Feedback from faculty and administrators has been positive, and plans to continue migration are in place for FY2013.

Electronic Ordering and Delivery of Transcripts

In the past, students and alumni had to submit paper forms to request paper transcripts, and these requests were processed during business hours. An online transcript system launched in October 2011 allows either paper or electronic transcripts to be ordered 24 hours a day, seven days a week. Transcripts are delivered within 15 minutes to one day using the new online transcript ordering and delivery system.

Financial Aid

This year, IS&T and Student Financial Services partnered on a study of the current use of PowerFAIDs, the system used to administer financial aid at MIT. The goal of the study was to provide a list of business and technical recommendations that would reduce risk, improve system performance and availability, and provide enhanced service to students. The top two technical recommendations—enabling the email functionality within PowerFAIDs to streamline electronic communications to students and virtualizing the underlying hardware to increase system reliability and performance—were implemented this year. Work on the final two recommendations has begun and will be completed this year.

Learning Management System

MIT has been considering options for a more robust learning management system to replace Stellar. At the direction of the MITCET Steering Committee for Learning Management Systems, IS&T conducted an evaluation of Blackboard in spring 2011. The evaluation highlighted systemic issues coupled with limitations in core functionality and extensibility. Details can be found in Blackboard 9.1 Experiment: Analysis and Recommendation.

Based on these findings, a modular service framework is being developed as the foundation for learning management at MIT. The framework will gradually replace Stellar functionality with a set of discrete, flexible web services.

The first two modules, Gradebook and Attendance, were piloted this year. Gradebook will be fully available to the community in fall 2012, with Attendance following later in the year. Work has begun on next two modules, Membership and Early Warning, and these will be piloted in the coming year.

Classroom Scheduling

The technology that supports MIT's classroom scheduling is outdated and needs to be replaced. Staff from the Office of the Registrar and IS&T have completed the requirements phase for a new system. Design and implementation will start in FY2013.

Digital Forms and Petitions

The effort to digitize forms and petitions is ongoing, with the goal of reducing paper use and streamlining processes across the Institute. To date over 30 academic forms have been identified, and during the next year five forms will be digitized. Requirements have been collected for the five highest priority petitions, and implementation will start in FY2013.

Freshman Online Financial Aid Award Letters

Last year freshman students learned about financial aid decisions via paper mail. In March 2012, a new system was put in place for incoming freshmen to provide access to decisions online, eliminating paper and reducing the processing time required to distribute award notifications. As a result, students will receive their awards sooner

through their MyMIT accounts. Moving to online financial aid award letters for freshmen eliminated 1,600 pieces of paper, and moving to online notifications to freshmen who are missing financial aid information eliminated 750 pieces of paper. Decisions for continuing undergraduates and graduate students will be online in 2013.

Data Management

Data Management pulls together functions from across IS&T to enhance the value of information at MIT. The role of the Data Management area is to work with the MIT community on the development and execution of plans, policies, and practices to collect, protect, deliver, and make better use of the Institute's data and information assets. Key responsibilities include reporting and analytics, metadata management, business intelligence, data modeling and administration, data access management and security, managed data services, and data governance.

Metrics

The Data Warehouse, the primary reporting platform for Institute-wide administrative data, averaged 16,850 total end user sessions per week, and 34 source systems feed data into the warehouse.

Highlights

Evolution of Data Usage

A three-pronged data interaction model focused on delivering, acquiring, and using information helped transition MIT from a function- and processed-based approach to a person-centric one, from a focus on reports to a focus on information delivery, and from canned static reporting to an easy-to-use self-service model. The Data Roadmap approved by the IT Governance Committee established the directions and plans for Data Management.

Delivering Information

Data Management worked with members of the DLCs to focus on data issues and reporting in the areas of finance, environmental health and safety, and human resources. These focus groups provided input on high-priority reports and helped define data that will make life easier for administrators. The groups define data and reports, identify drill-down paths and choices for subscriptions and notifications, and identify areas where data issues need to be addressed. New reports are being constructed in Cognos (the Institute's new reporting tool).

Acquiring Information (Managed Data Services)

Managed data services provide the community with tools for entering department data and extending enterprise data. This includes tailored solutions for specific needs, such as faculty honors and awards, abandoned property, and space economy. A unified architecture for data acquisition from various DLCs and central offices is the key to achieving increased automation and self-service.

Using Information (Planning/Analysis)

Administrators responsible for research accounts at MIT need to plan, forecast, and perform predictive analysis. The RAFT tool is focused on enabling forecasting and reporting. Phase 1 (read only) reported on actuals, budgets, and commitments. Phase 2 focused on forecasting and enhanced reporting. Phase 3, in planning, will simplify data entry and provide a principal investigator view.

Other Accomplishments

- Prototyped a new space management system for the associate provost
- Built a faculty database in partnership with the School of Engineering
- Migrated the Data Warehouse to a virtualized environment
- Upgraded approximately 70 Oracle databases to the new release of Oracle
- Eliminated the building of community reports in Brio Query

Systems Engineering

Systems Engineering supports application development and promotes the interoperability of MIT's applications and systems. This area is a consolidation of complementary functions including Quality Assurance, Technical Services, Web Services, Mobile Computing, Departmental Consulting and Applications Development (DCAD), Training, Kerberos Development, Software Release Management, and User Interface Design.

Metrics

MIT Mobile Web has approximately 45,000 active users, and there are 42,000 iPhone app and 5,000 Android app users. In addition, there are 684,000 mobile web page views per year (not including native application traffic). More than 68,000 instruction sessions were delivered through lynda.mit.edu (online training).

Highlights

A redesigned IS&T website went live in April 2012. This was the first major website at MIT to use responsive design, a method that enables the site to adjust based on the resolution of the device being used. This new website is built around a customer-facing service catalog, with 67 IS&T services presented in an approachable, consistent format. The new site was recognized—with a tweet—by Ethan Marcotte (who coined the term "responsive web design"). We have redone various affiliate sites with the new design. Completed sites include 3down, the Certificate Test and Certificate Server sites, and Athena Account Registration.

The Software Release Management team discontinued support for eight software versions, including Office 2003, Office 2004, and OSX 10.5. We have released 11 software versions, including Windows 7 SP1, Mac OSX 10.7, Office 2010 SP1, and new versions of

VMware on Windows and Mac platforms. In addition, we engaged in foundational work on the next operating system releases for Windows and Mac platforms (Windows 8 and OS X 10.8) and the desupport of Windows XP, Windows Vista, and older versions of Microsoft Office.

The DCAD team completed 66 projects in FY2012. The team also assisted with 25 FileMaker service-level agreements (SLAs) and facilitated another 39 web SLAs.

Among other projects, DCAD:

- Led the analysis of a new National Collegiate Athletic Association (NCAA) eligibility and compliance system, which will help the Department of Athletics, Physical Education, and Recreation (DAPER) and the registrar ensure MIT's continued compliance with NCAA Division I and Division III regulations.

- Completed a comprehensive discovery process and created the information architecture for the Capital Projects site. The goal of this site was to visually display MIT's renewal and renovation projects as part of the MIT 2030 framework.

- Provided a comprehensive roadmap and detailed web strategy recommendations for MIT Medical. DCAD is currently implementing many of these recommendations.

- Led the release of FileMaker 12 and organized several related events, including two full-day conferences for the FileMaker user group communities at MIT, Harvard, and Brown.

The Training team led 120 classes on MIT enterprise applications delivered to 950 attendees. In addition, they developed a library of 24 courses customized to MIT.

The Campus Preview Weekend mobile website went live on April 19–22. The mobile site enables admitted students to get a taste of life at MIT on their handheld devices while visiting the campus.

Several members of Systems Engineering participated as judges and mentors for 6.570, the developing mobile applications competition, over the Independent Activities Period (IAP). The first- and second-place winning teams were hired by IS&T as student employees to continue their work.

Drupal Cloud, a free service launched in June 2012, allows members of the MIT community to create their own independent websites in our centrally managed infrastructure. This service enables faculty, staff, students, and DLCs to take advantage of the powerful Drupal content management system without requiring them to have their own equipment or technical expertise. Drupal Cloud provides customers with a basic theme (layout) and functionality that makes it easy to create a website within hours complete with an MIT URL of their choice.

Other Accomplishments

- Implemented a software release and derelease process
- Accelerated automated quality assurance testing (QA wrote 224 automated tests)
- Implemented mobile modules for Facilities and Libraries
- Developed user experience and accessibility principles for SAP WD4A (SAP's standard user interface technology for developing web applications in the ABAP environment)
- Released Mac OS X 10.7, Windows 7 SPI, and Kerberos 1.11 to the MIT community

Customer Support

Customer Support provides the primary entry point into IS&T. Through the Help Desk, Usability and Accessibility, and Faculty and Student Experience teams, staff members work closely with customers and other IT staff to ensure delivery of a positive customer experience. Customers have a single starting point for help with computers, mobile devices, telephones, networks, data, hardware, and software. Usability and Accessibility staff engage with projects to ensure that services are easy to use for all community members. The Adaptive Technology Lab advises on adaptive solutions both in and out of the lab. Faculty and Student Experience staff work closely with groups such as the Office of Educational Innovation and Technology (OEIT) in the Department of Undergraduate Education to nurture innovative partnerships and advocate for IT services that meet the specific needs of faculty and students.

The digitalization, globalization, and consumerization of IT have resulted in increased expectations and needs for support, including greater demand for accessibility/usability consultations, expanded access to technical help, and enhanced self-service options for help (e.g., The Knowledge Base) and training.

Metrics

Each year, Customer Support tracks 45,000 Help Desk tickets, provides 225 assistive technology consultations to people with disabilities or temporary injuries, and reviews 300 projects/products for the Usability and Accessibility team.

Highlights

Customer Support's efforts for 2012 centered around three themes: working across IS&T to understand and manage our services through their life cycle (IT service management), improving our understanding of customers' needs in order to improve the customer experience, and adapting our services to meet increasing digital, global, and consumer expectations.

Customer Experience Improvements

- Relocated the Help Desk to a more accessible east campus location

- Enhanced the MIT Alert/Emergency website, creating notification email lists that include all MIT cell phones and adding the ability to text "mitalert"

- Explored a remote usability testing service to provide off-campus and international user feedback

- Explored a collaboration with accessible book repositories to include MIT General Institute Requirements course textbooks

- Led the development of a new Athena release for the 2012–2013 academic year

- Expanded assistive technology services to include the ViewPlus Premier Braille Embosser and the Note-Taker (a low-vision camera tool that makes it easier to see a blackboard and take notes)

- Created student "laptop spaces" in public clusters for students

- Worked with residents to improve wireless access in dorms

- Rolled out Pharos printing, leading to a dramatic drop in Athena printing support tickets

- Deployed a self-service document and image scanner in W20-575

Communications and Outreach

- Conducted two satellite help clinics at the beginning of each semester

- Encouraged video captioning of content published by MIT News, BLOSSOMS, and the Abdul Latif Jameel Poverty Action Lab (J-PAL)

- Presented "How to Get Help from the Help Desk" at a lunch attended by members of the Working Group on Support Staff Issues

- Worked with the MIT Campus Activities Committee on the Red Sox ticket lottery

- Presented four sessions at the annual IT Partners Conference

- Worked with the Center for Mobile Learning to roll out App Inventor, a tool for developing Android apps, to the MIT community

- Collaborated with OEIT to explore the use of Android and iOS devices as replacements for audience response clickers

- Assisted with CSAIL course 6.S196 Principles and Practices of Assistive Technology (Seth Teller/Rob Miller), presenting lectures on usability and on the Adaptive Technology Lab, and 21W.785 Communicating: Web-Based Media (Ed Barrett), delivering lectures on usability and accessibility and guiding 26 student project teams through usability and accessibility evaluations

- Conducted back to school events, including orientations to computing and Athena mini-courses

- Updated and distributed the popular Computing at MIT maps

- Facilitated the IS&T Student Town Meeting during IAP

- Helped fraternities begin the process of upgrading software for all network devices

Foundational Improvements

- Increased awareness of Customer Support services through Usability and Accessibility outreach and Help Desk orientation and observation opportunities for staff across IS&T operational areas

- Gathered and incorporated service definitions and content into the service portfolio prototype, increased adoption of structured escalation templates, engaged a cross-directorate knowledge management team in documenting best practices and establishing next steps for broader collaboration, facilitated department-wide training on Information Technology Infrastructure Library operational support and analysis, and began leveraging Request Tracker functionality to assist in managing trends or major incidents and relating them back to service families

- Expanded channels and streamlined the process for recruiting and training alternative staff (MIT students, non-MIT students, temps) for Help Desk roles

- Expanded Customer Support's capabilities by consolidating more products under the software distribution umbrella; taking on support previously coordinated by other teams for FileMaker, Oracle Client, Microsoft MCSA, and ChemBioDraw; and obtaining broader Moira permissions for Help Desk staff, enabling quicker diagnosis and problem resolution with fewer escalations

Operations and Infrastructure

Operations and Infrastructure provides MIT's foundational technologies, such as the network, email, calendaring, data centers, and servers. This area enables delivery of services, provides communication and collaboration services, and advances computing support services in partnership with DLCs. Key responsibilities include network operations, network installation (including support of key construction projects across campus), server and system administration, distributed IT support of desktops and servers, desktop virtualization, security systems and services, and research computing support.

Metrics

Approximately 90% of MIT students arrive on campus with a laptop and/or mobile device, and 40,000 unique devices are in use each day (with a 50/50 split between wireless and wired). There is a 2-to-1 ratio of Windows to Macintosh machines across campus.

Network and Infrastructure

- 4,000 wireless access points across the campus
- 3,000 switches deployed throughout the campus, providing wired network connectivity
- 10 Gb dedicated connections to Internet2, National Lambda Rail, the Energy Sciences Network, and the Large Hadron Collider Network research and education networks
- 1,200 virtual servers
- 1 PB of spinning disk storage and 2 PB of tape backup storage
- 2,500-mile optical ring (MIT Regional Optical Network) connecting Boston, New York City, and approximately 10 other locations
- 24 miles of cable and 5,221 miles of single-mode fiber in the ground for our outside fiber plant

Email

- 1.6M total per day inbound (1.1M spam, 500K legitimate)
- 240K total per day outbound (20K spam, 220K legitimate)
- 453K messages per day sent within MIT
- Approximately 75 TB of total email storage allocated, and more than 50% in use

Support: Distributed IT Resources

- 33 managed IT service SLAs with DLCs (27 hourly and 6 via the per user model)
- 74 on-site support service VIP clients
- 109 short-term SLAs completed in FY2012
- 1,205 systems deployed in 2011 (802 Dells and 403 Macs)
- 7,707 Request Tracker tickets resolved

Highlights

Server virtualization affords MIT flexibility and allows us to better meet rapidly evolving IT requirements. The network migration and virtualization of the development, test, and production tiers for Environmental Health and Safety (EHS), events, SAPweb, and undergraduate admissions environments provided additional redundancy/capacity, a modernized operating system platform, and the ability to eliminate six physical servers, resulting in reduced cost and improved compliance.

Email and calendaring are key services for the MIT community. An enhanced campus email/calendaring environment—with an infrastructure upgrade to Microsoft Exchange 2010—provided critical improvements and new features, including the Outlook Web App interface.

Keeping the MIT community electronically safe and mitigating risk is an ongoing process. We addressed this through retirement of legacy systems, evaluations of network access, and physical security for equipment and the campus.

- *Secure wireless:* MIT implemented secure wireless networks, and the Institute plans to retire its open wireless networks, MIT and MIT N, and assist users making the move to MIT Secure.

- *Retirements:* MIT restricted off-campus IP addresses from unauthenticated access to its outgoing email server to minimize risk from spammers, worms, and other unauthenticated use of our campus network.

- *STOP tagging:* IS&T partnered with the MIT Police to host regular laptop tagging sessions to deter theft.

- *Physical security:* IS&T is working with the Security and Emergency Management Office (SEMO) to improve physical security; IS&T upgraded CCURE (MIT's security card system) and tested a new wireless lock and proxy card system.

- *Identity Finder (IDF) and encryption:* To remove unnecessary PIRN (Personal Information Requiring Notification) data and protect sensitive data, IDF is being used along with PGP and FileVault.

Indoor Cellular Coverage

The MIT community noticed dramatic improvements in AT&T mobile coverage and signal strength in some of the Institute's buildings over the course of the year. The service was activated in the first batch of 50 buildings. The project (which will span more than three years) will coordinate the planning and installation of equipment to provide indoor coverage for cellular and mobile signals on the MIT campus. The effort began in July 2010 with a concept discussion and contract negotiation. The construction phase began in October 2010 with a survey of MIT buildings. Carriers will be working together to take advantage of this future carrier-agnostic solution.

IPTV

IS&T worked with students and Comcast to bring the XFINITY TV app to MIT. Initially this was a trial to better understand how IP video can be used on campuses. IP television (IPTV) is now open to everyone on campus. Students can download the XFINITY TV app and watch live TV on their PCs or laptops (from on-campus locations only).

Other Accomplishments

Communications

- Integrated Unity voicemail system with MIT 5ESS (traditional telephone switch)

- Integrated Unity with Exchange system to provide unified inbox functionality

- Migrated individual users from the old Iperia voicemail system to Unity

- Evaluated E911 solutions and selected Conexeon's 911 Enable Product, which will help the MIT telephone system provide accurate location information to the Cambridge Public Safety Answering Point

- Migrated 5ESS long distance and international calls to IP-based Session Initiation Protocol trunking

- Installed undergraduate emergency and analog wall phones

Security

- Maintained the 30 Payment Card Industry type D systems, proactively monitoring security seven days a week

Academic Services

- Provided additional capacity and redundancy to the production Stellar environment at the web and app server tier, minimizing the possibility of any significant outages to the main application during critical times (e.g., registration or finals week)

Connectivity/Network

- Installed a network in the OC11 expansion space (OC11 is an off-campus data center) and Maseeh Hall (W1)

- Upgraded Building 9 network

- Upgraded 16 WiSM2 controllers to support scale of network and 802.11n.

- Installed an optical node at Chicopee to support initial MGHPCC network connectivity to Holyoke

- Expanded MIT's metro optical network in support of our OC11 data center expansion space

- Migrated Haystack Laboratory to MITnet via optical network connectivity at 300 Bent Street

Operations

- Virtualized all three tiers (development/test/production) of the administrative web app environment (EHS/events/SAPweb) in August and the administrative web app environment (undergraduate admissions) in November, giving them additional redundancy/capacity, modernizing their OS platform, and eliminating a total of six physical servers, bringing network configuration into compliance with our current best practices

- Relocated and upgraded the Tivoli Storage Manager environment from W91 to OC11, providing improved performance and scalability

- Upgraded Hypervisor to vSphere 5 in December, bringing virtualization environments to current supported vendor levels, and introduced several new features, including higher resource limits for individual virtual machines and support for automated storage migrations in response to high latency (Distributed Resource Schedule)

- Migrated SAN storage (W92 and OC11 hypervisors) from 3PAR to EMC Clariion arrays, Mailman storage from 3PAR to EMC Clariion, Windows Distributed File System home directories from 3PAR to EMC, and Internet Small Computer System Interface systems to Fiber Channel

- Replaced uninterruptible power supply batteries in the machine room facilities of Buildings 24 and W92

- Installed a monitoring and modeling system in W91 as part of an MIT-DOE study

- Upgraded the Citrix environment to the latest version, enabling support for remote application access on mobile devices

- Upgraded the Altiris system to support remote management of Windows computer systems

- Installed a Casper system for remote management of Macs and iOS mobile devices (the rollout is in progress)

- Set up automated monitoring and notification of Athena public workstations through Nagios (our open source computer system and network monitoring software application)

- Automated the deployment process for desktops/laptops using FileMaker Go to enable customers to sign for deployed systems on an iPhone

- Virtualized and upgraded IXOS/OpenText software to facilitate usage in the appointment process and in other departments

- Built out Citrixapps to provide an up-to-date environment for virtual servers

- Deployed IP-based storage (network attached storage) and tiered drive technology in the enterprise SAN environment, allowing use of less expensive drives for workloads with fewer performance requirements

- Upgraded data domain storage, allowing for faster restore times and reductions in tape usage
- Completed network construction, renovations, and upgrades for edX offices (NE35), N9, N10, and FSILGs (fraternities, sororities, and independent living groups)

Productivity/Change Management

- Deployed the Remedy OnDemand Change Management module for production use
- Completed remote virtual private network connectivity between the cloud Remedy (change management) system and MIT and configured the system to send and receive MIT email
- Worked with Doreen Evans Associates to map processes for a variety of change processes in Server Operations and Network Operations that will form the basis for codifying those processes in the Remedy System
- Completed an integration with the MIT Touchstone system for single sign-on to the Remedy web application

Support Services

- Automated the Distributed IT Resources (DITR)/Managed IT Support Services SLA process for efficiency and standardization. The SLA process is now paperless and completed in a timely manner.
- Continued to roll out Active Directory to DITR-supported users for desktop/laptop management.

Administration

In support of our operations, IS&T Administration—Finance, Human Resources, Communications, Process Development and Improvement, and Administrative Services—worked closely with the associate directors, managers, and staff to develop standard work processes to improve the consistency of project and service delivery; streamline accounting and administrative processes to make it easier for IS&T to measure, manage, and account for our services; provide transparency through communications to our community and staff; and engage employees through the development of skills that align with the direction of our customers' work.

Process Improvements

Doreen Evans Associates, a consulting firm that specializes in business analysis, assisted with an assessment of our finance and procurement functions through documentation of current processes and assisted the other operational areas through process documentation and project support. As a result, we implemented several process improvements. Namely, we:

- Created standard software development budgeting guidelines

- Analyzed IS&T internal charge backs

- Eliminated purchasing and consulting approval forms

- Worked with Sourcing and Procurement to standardize the requisition/purchase order creation process

- Created IS&T procurement card issuance guidelines

- Reviewed all IS&T Procard (procurement purchasing card) and spend-and-commit authorizations

We improved the consistency and reliability of project delivery by transitioning the Project Management and Business Analysis Working Group to a community of practice consisting of self-identified volunteers who provided coaching and mentoring to other project team members, made available tools and templates specific to the planning and initiation phases of a project, began holding "Café Talk" sessions with topics agreed upon by the group, and held monthly peer support meetings.

In an effort to increase transparency and accountability, we conducted biannual operational reviews to track our progress against the operational plan and monitored and tracked the budget monthly.

Energizing and Motivating Employees

IS&T continues to support the growth, development, and engagement of our employees. We hired 25 new staff members and promoted 11 employees. We held 16 internal training sessions with a total attendance of 150 participants. Training topics included change management, managing for excellence, active listening, interviewing for success, vendor management, leveraging customer relationships, and project planning estimation. We created an action plan for addressing employee engagement issues; eight meetings were held to share employee feedback data, and we are in the process of collecting ideas and activities that will enhance and improve the engagement of all IS&T employees.

The Online Registration team, which included seven IS&T staff, was recognized with an MIT Excellence Award for Innovative Solutions. Over 190 staff members were recognized by colleagues and customers with spotlight awards and/or Infinite Mile Awards.

Through renovation and space improvements, we increased capacity and created a more optimal workspace. In our efforts to keep employees safe, we worked with EHS to develop an emergency preparedness plan for IS&T and published an updated emergency evacuation plan.

Communications

IS&T focused on improving communication and outreach activities externally and internally to make customers and IS&T staff aware of products, services, and changes/enhancements.

We created two key communication documents—the IS&T FY2012 Mid-Year Update and IS&T Facts—to make IS&T more transparent and comprehensible to the MIT community and to show how the work we do positively impacts the work going on in the community.

We were able to take advantage of multiple streams of media to provide community members options for receiving news and information from IS&T. Examples include our monthly HTML newsletter (with over 400 opt-in subscribers), our website, articles published on MIT Campus News, and news items posted on Twitter and Facebook.

As part of our outreach activities, we participated in the MIT Vendor Fair and MIT Event Fair, and we collaborated with additional areas reporting to the executive vice president on the resources component of the Essentials of Managing course.

We replaced our internal newsletter with digital signage throughout our buildings. In addition, we produced a biweekly email message from the head of IS&T to communicate key information with staff. We hosted quarterly IS&T department meetings that included guest speakers from across the Institute showing how the work of IS&T supports the research and education that are core to MIT's mission.

IS&T staff participate in, contribute to, and play key formal and informal leadership roles in various professional and industry organizations such as Internet2, Educause, the Common Solutions Group, the Northeast Regional Computing Program (NERCOMP), College and University Information Security Professionals, the Boston Consortium, the Ivy Plus groups, the Internet Engineering Task Force security and calendaring standards groups, SAP, and the Association of American Universities Data Exchange, among others. Also, staff members collaborate with a wide range of vendors and outside groups. Some of these collaborations are highlighted below.

- *Ivy Plus:* IS&T hosted sessions for the Ivy Plus CIOs and infrastructure groups.

- *NERCOMP:* IS&T chaired the annual conference in March, which was the second-best-attended annual conference in 18 years. Members of IS&T participated in several presentations and discussions.

- *FileMaker:* In October, DCAD's FileMaker User Group (FMUG) coordinator ran the first of two regional user/developer conferences. These events, held at MIT and jointly hosted by FMUG, the Boston Area FileMaker Developers Association, and Harvard's ABCD FileMaker Working Group, each drew over 50 attendees. In addition, FileMaker 12 was released to the community in June. A FileMaker 12 preview event was sponsored by FMUG during January IAP. FileMaker Inc. sent its North America systems engineering team director to present new FileMaker 12 features to the MIT user community. At the June IT Partners Conference, DCAD presented a session on conversion issues. Later that month, another full-day, regional FileMaker user conference was held on MIT's campus and attended by more than 50 regional users from MIT, Harvard, and Brown.

- *New Media Conference:* IS&T assisted with the programming of the 2012 conference, and staff attended the conference.

- *Boston Consortium:* IS&T collaborated with Boston Consortium partners in reviving the User Services group and partnered with the IT/Libraries Group to create IT Security Day at Babson College.

- *Usability Professionals Conference:* IS&T participated in the User Research on the Cheap and Building Out a User Experience panels.

- *InCommon:* IS&T completed a contract and instituted the InCommon Certificate server for unlimited usage among MIT users and DLCs.

Summary of FY2012 Financials

IS&T has a complex financial structure supporting the central IT work of the Institute. IS&T's gross expense budget for FY2012 totaled $75.1 million, of which $74.9 million was spent, resulting in a favorable variance of $126,000. IS&T provides its IT services through various funding models that include the general Institute budget (GIB), software development, revenue recovery, and service centers.

In FY2012, IS&T spent its recurring GIB of $29.7 million. IS&T was given one-time carry forward funding in the amount of $2.5 million, of which it spent $55,000. This carry forward funding was intended to support a variety of IS&T organizational initiatives. IS&T was able to self-fund the majority of those initiatives due to significant savings in GIB salary, wage, and employee benefit expenses as a result of a shift in work to software development funded projects and positions that were or became open during the fiscal year.

IS&T spent $11.1 million in software development dollars, compared to an initial budget of $9.5 million. The IT Governance Committee initially approved SWD spending of $9.5 million at its August meeting. This spending level was later increased at its March meeting, with the increase in spending funded partially through the SWD carry forward budget. Approximately 45% of the total ($5 million) was spent to develop Education Systems projects, including Gradebook Rewrite, online grading,

the Workflow and Assignment Revision Project, student account implementation, and IAP. An additional 37% ($4.1 million) was spent to support software development projects for Administrative Systems, including the Appointment Process Redesign 2.0, Enterprise Learning Phase 2, and Hourly Student Appointments projects. The remaining 18% ($2 million) was used for software infrastructure projects including the MIT Mobile development app, Kerberos, the RAFT tool (phases 2 and 3), and IBM Cognos implementation projects. In addition to the $11.1 million, IS&T spent $560,000 on Digital MIT funded projects and $379,000 on HR/VPF funded projects.

Approximately 31% of IS&T activity ($23.1 million) is funded from services that are billed to departments for telephone and network services, server management and collocation services, and other rate-recovered services such as desktop support, software distribution, and departmental website and database consulting and development. In FY2012, funding from these sources was $745,000 higher than budgeted.

The Telephone and Network Service Center ended the year with an operating deficit of $973,000, $303,000 higher than the FY2012 budgeted deficit of $670,000. This unfavorable variance, which was due to higher-than-budgeted operational expense settlements and lower-than-anticipated revenues for demand-based services, was partially offset by lower interest rate charges. Investment in new capital assets totaled $10.6 million, or $572,000 less than the FY2012 capital budget of $11.1 million. TNSC operating and capital expenditures provide funding for telephone and network infrastructure maintenance and upgrades, including building network upgrades, telephone and data communications room renovations, Voice over Internet Protocol (VoIP) rollouts, and data center expansion and upgrades.

The Server Operations Service Center (SOSC) ended the year with an operating surplus of $59,000, which represents a favorable variance of $2,000 compared to the budgeted surplus of $61,000. Higher-than-budgeted depreciation and settlement expenses for SOSC were more than offset by higher-than-budgeted revenue. This favorable revenue variance is primarily due to increased demand for server operations services. Capital investment expenses in SOSC for FY2012 totaled $2.6 million and consisted of server equipment, automatic tape library, and SAN storage.

Looking Forward

IS&T is proud of its achievements over the past year. Working closely with the community, we have improved services and the customer experience. We have contributed to optimizing operational effectiveness, reduced technical and security risks, and engaged our employees by offering challenging work and growth opportunities. There is much more work to do to evolve toward a more customer-focused organization and toward "one IS&T." As we look to the future, IS&T is committed to advancing the Institute's mission by providing foundational IT services that make it easy for the MIT community to communicate, collaborate, and interact with MIT and beyond.

Marilyn T. Smith
Head of Information Services and Technology