# Vice President for Information Systems and Technology

Fiscal year 2014 was a time of transition for Information Systems and Technology (IS&T) and an exciting time for IT@MIT.

Anthony P. Sharon, deputy executive vice president, served as interim leader for IS&T while cochairing the search for the next IS&T vice president. Search committee members included Hal Abelson, Class of 1922 professor of electrical engineering and computer science; registrar Mary Callahan; vice president for finance Michael Howard; Frans Kaashoek, Charles Piper professor of electrical engineering and computer science (cochair); professor Robert Redwine, director of the Bates Linear Accelerator Center; and associate provost Martin A. Schmidt.

Based on input from the listening tour that was conducted to help frame the search for the next leader of IS&T, the search committee recommended that the title of the IS&T leader be changed to vice president and that the department name be changed from Information Services and Technology to Information Systems and Technology. Both changes reflect the feedback highlighting the important role information technology (IT) plays within the MIT community. In December 2013, John Charles was selected as vice president for IS&T.

## Establishing the IT Vision

From January through June 2014, the vice president for IS&T assessed the state of IT@MIT and conducted an extensive listening tour to gather input from faculty, staff, and students representing research computing, student systems, digital learning, libraries, and administrative systems. Listening tour participants included:

- Administrative Systems and Policies Coordinating Council
- Constantino "Chris" Colombo, dean for student life
- Christine Ortiz, dean for graduate education and Morris Cohen professor of materials science and engineering
- Computing Research Committee
- David Schmittlein, John C Head III dean, Sloan School of Management
- Dean for undergraduate education leadership team
- Deborah Fitzgerald, Kenan Sahin dean, School of Humanities, Arts, and Social Sciences, and professor of the history of technology, Program in Science, Technology, and Society
- Dennis Freeman, dean for undergraduate education
- Ian A. Waitz, dean, School of Engineering, and Jerome C. Hunsaker professor of aeronautics and astronautics
- IS&T senior staff
- IS&T staff

- IS&T Student Technology Advisory Board
- IT Governance Committee (ITGC)
- IT leaders
- Maria Zuber, vice president for research
- Mark Jarzombek, interim dean, School of Architecture and Planning, and professor of the history and theory of architecture
- Michael Howard, vice president for finance
- Michael Sipser, dean, School of Science, and Barton L. Weller professor of mathematics
- MIT Council on Educational Technology (MITCET)
- Other key stakeholders, including faculty and staff members of the search committee for the IS&T vice president
- Risk Council
- Student Information Processing Board
- Student Systems Steering Committee

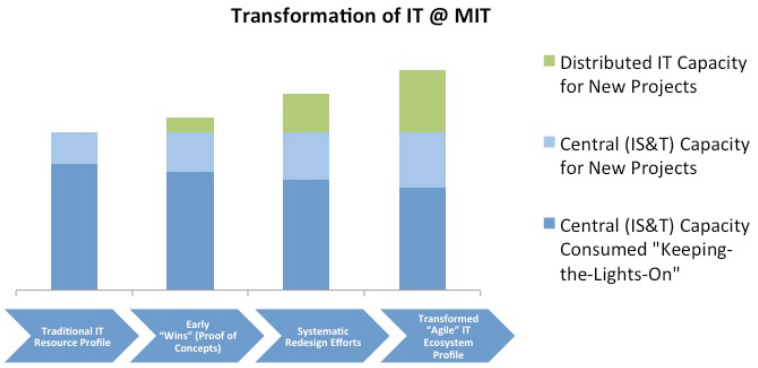
The vice president for IS&T worked closely with members of ITGC and with each of the established IT advisory committees to craft a 2020 vision for IT@MIT, along with a set of goals and priorities and guiding principles. The vision, goals and priorities, and guiding principles were developed in response to comments and recommendations outlined in the IT External Advisory Council's report (2012), in the IT assessment conducted by the Office of the Executive Vice President and Treasurer (EVPT) (2011), and by the Institute-wide Planning Task Force (2009).

## MIT's 2020 IT Vision

MIT's 2020 IT Vision has two complementary and mutually supporting elements: IT excellence through modernization and a strategic focus on enabling members of the MIT community to innovate IT services in response to the diverse needs of their respective research, education, student life, and administrative functions.

- IT services will be packaged for intuitive, mobile, self-service use by faculty, students, and staff.
- Faculty will be able to easily and securely leverage open application programming interfaces (APIs) and data to create new services and platforms for teaching and research.
- Students will be able to easily and securely leverage open APIs and data to create new applications and sites by properly using institutional data that can be made available to them.
- Departments, labs, and centers (DLCs) and administrative units with suitable capability will be able to quickly, securely, and independently create new services and platforms that address their specific needs, and they will have easier access to essential institutional data.

- DLCs and administrative units in need of greater assistance from IS&T will be better served by IS&T's enhanced capacity, capacity freed up by adoption of open APIs and data access tools, modern "platform-based" infrastructure, and "agile" software development methodologies.
- Individual members of MIT's extended and increasingly global community will be able to easily create new data and applications that can be shared with others.
- IS&T will have greater capacity for supporting innovation and will be better equipped to keep pace with the rapidly evolving Institute-wide needs of the schools and central units.




*The expansion of IS&T, DLC, and administrative unit capacities for innovation will be facilitated by the adoption of open APIs and "platform-based" models that are designed to create and connect ecosystems of diverse participants as producers and consumers of IT services.*

## Goals and Priorities

In order to achieve MIT's 2020 IT Vision, the vice president for IS&T's strategic focus is on achieving the following goals and priorities.

- **Strategy:** develop and maintain a set of appropriately vetted guiding principles for linking the IT Vision with a collaboratively developed, well-articulated, and easily understood technology strategy for IS&T and, more broadly, for IT@MIT
- **Service delivery**: rationalize, clearly define, and communicate central and distributed IT service delivery roles and responsibilities in order to reduce confusion within the community about who to call for what and to provide the level of cross-organizational coordination and partnerships necessary for meeting the evolving academic and administrative needs of the Institute
- **Cultural alignment:** embrace the use of commonly accepted and emerging application and integration platform services in faculty-driven, student-centered ways by providing and supporting innovation-enabling open APIs and data access tools that can be easily leveraged by MIT's diverse community of IT service providers and consumers
- **Leadership:** transform internal IT governance and advisory structures and processes by improving decision-making transparency and consistency, giving appropriate voice to key stakeholders within the MIT community, and facilitating the cross-organizational leadership and partnerships necessary to address the IT issues affecting our ability to evolve rapidly

- **Talent:** retain and attract top talent, strengthen project management competencies, and expand externally facing IT leadership roles and capabilities
- **Communication:** ensure that IT service and project communications are well coordinated, effectively managed, accurate, consistent, timely, and responsive to the diverse information needs of the community and create the infrastructure and partnerships necessary to support the growth of an active community of IT service providers

***Strengthen MIT's culture of excellence in execution and innovation by harnessing the full potential of the Institute's combined central and distributed IT staffs.***


## Guiding Principles for IT@MIT

The following principles will guide MIT's future IT planning by linking the IT Vision to strategies that best support the needs of faculty, students, and staff today and in the future.

- **Align with the MIT culture.** MIT will continue to operate in a federated IT deployment model that creates the appropriate balance in the integration of differentiating and commoditized services and facilitates collaborative deployment of shared infrastructure and services.
- **Adhere to commonly accepted and emerging IT practices and standards.** To ensure and improve the synergy of federated IT solutions and core infrastructure services and platforms, local and central IT deployments will adhere to commonly accepted and emerging application and integration IT architectures, open interfaces, and usability and accessibility standards whenever possible.
- **Balance strategic IT investments**. Our need for widely varying, rapid, and responsive deployment of IT in support of innovation and discovery must be carefully balanced with strategic investments in institutionally managed common use, standards-based, collaboration-oriented information technology infrastructure and IT-enabled processes.
- **Leverage core communications and network connectivity.** MIT's communications and data network infrastructure will be planned and developed to create a robust shared institutional connectivity capability.
- **Treat data as an Institute asset.** There should be a consistent Institute-wide policy and behavior addressing the requirement for appropriately provisioning, accessing, storing, securing, and preserving institutional information, regardless of where it is collected or stored.

- **Innovate with an appropriate tolerance for risk.** Innovation should be encouraged and supported locally and institutionally with an appropriate tolerance for risk, and agile project management methodologies and approaches should be employed to help mitigate risk.
- **Govern with transparency and foster IT excellence.** The purpose of IT oversight and governance at MIT is to provide clear processes for IT decision making, foster IT excellence across the Institute, and facilitate Institute-wide IT planning in support of the vision and mission of MIT.

### Progress

The first phase of the transformation process was completed in May 2014 with the ITGC's approval of the vision, goals, and guiding principles document. The Future of IT@MIT website was launched and included a short community survey focused on validating goals and priorities, identifying gaps, and expanding our information set about the ways IT enables the education, research, and administrative functions of the Institute. Additionally, IS&T, in partnership with community members, initiated several proof-of-concept projects to facilitate the transition to "platform-based" IT service models designed to better meet the needs of MIT's complex ecosystem of IT service providers and consumers. The next phase of the transformation began in June 2014, with a focus on formulating the findings and developing multiyear strategic plans for realizing the vision.

## IT Governance

The IT Governance Committee held meetings with agendas that included the following: software development and IT modernization funds, deferred maintenance of IT systems in MIT buildings, recommendations related to reducing or eliminating fees and chargebacks, a review of the Student Systems Steering Committee, faculty effort reporting, the Bitcoin project, and approval of the vision, goals, and guiding principles for IT@MIT.

## Highlights

In partnership with sponsors and the community, we continued our focus on advancing MIT's mission and delivered services and projects that simplified processes and reduced costs. Below are highlights of work aligning with EVPT's FY2014 themes.

### Enabling MIT's Mission

In response to the cyber attacks of the past 18 months, IS&T has hardened MITnet against future attacks in several key ways:

- To defend against future distributed denial of service attacks, Prolexic (an attack mitigation service) has been contracted to monitor for and mitigate attack traffic originating on the Internet.
- To protect MITnet's critical infrastructure against attack, IS&T contracted with Akamai to provide external domain name services and has hardened the MITnet infrastructure using technologies such as multifactor authentication.

- To gain more insight and visibility into attack traffic, IS&T has deployed network monitoring and analysis tools such as Lancope Stealthwatch and RSA Security Analytics. These tools have been integrated with MITnet to detect and block potential attackers before any damage can be inflicted.

## Laying the Foundation for the Future

### *Reporting and Forecasting System*

IS&T deployed a new release of the Reporting and Forecasting System (RAFT), available to all departments, integrating critical user-requested enhancements.

### *Managed Data Services*

IS&T designed and delivered a number of managed data services, including a sponsored billing solution in coordination with the Office of the Vice President for Finance and a pilot faculty database project with the School of Engineering. The faculty database service was moved to the Office of the Provost and will become an enterprise service in FY2015.

### *Elimination of Chargebacks*

The Telephone and Network Service Center (TNSC) proxy charge that units paid to IS&T for network and telephone services was eliminated. Processing this chargeback engaged hundreds of people at the Institute annually but, upon examination, did not yield value that justified that effort. As a result, TNSC chargeback was eliminated, freeing up MIT administrators to work on higher value activities.

### *IT Business Service Cost and Baseline Benchmarking Assessment*

IS&T completed an assessment to better understand the overall business value and benefits of current IT services. The assessment provided a clear and complete view of IT spending and business services, created a useful foundation for future resource decisions, and established frameworks and methodologies based on standard cost models for ongoing transparency of IS&T service costs and business service alignment.

## Advancing MIT's Administrative Excellence

### *Openstack Private Cloud*

IS&T initiated a pilot project to explore Openstack as a "private cloud" solution for providing self-service computing, storage, and networking resources for the MIT community. This builds upon the "private colocation" project initiated in FY2013 and provides additional functionality via an open-source platform that is being broadly adopted at many institutions.

### *CrashPlan*

IS&T introduced CrashPlan, a new desktop/laptop backup service for the MIT community that provides a greatly improved user experience over Tivoli Storage Manager (TSM), IS&T's previous product. As part of the service introduction, all cost recovery for backup services provided by IS&T was eliminated, and these services are now available to the community at no cost.

### *Dropbox*

IS&T completed a pilot deployment, contract negotiations, and purchase of Dropbox as a next-generation file storage service for the MIT community. The service will be available community-wide at no cost in FY2015.

### *ServiceNow*

IS&T implemented ServiceNow for IT change management, replacing the BMC Remedy platform, which was retired.

### *Upgraded and Expanded MITnet*

IS&T provided off-campus fraternity, sorority, and independent living group locations with direct connectivity to MITnet. This upgrade increased connection speeds to MITnet and the Internet by a factor of 100, improving the user experience and bringing off-campus students "closer" to their on-campus counterparts.

As MITnet users continue to rely more heavily on the wireless network, the Institute has committed to staying at the leading edge of wireless technology. As part of this commitment, a campus-wide upgrade of the entire wireless network was initiated in late FY2014. This effort will continue through FY2015 and will provide dramatically greater bandwidth to users.

MIT assumed the operational and architectural support role for Northern Crossroads (NoX), an Internet2 point of presence serving New England. NoX provides direct high-speed connectivity to most higher education institutions, K–12 schools, and research institutions in New England and interconnections with domestic and international research networks, ensuring that Institute researchers are able to collaborate with their peers in the region and beyond.

IS&T completed the build-outs of the Institute's two newest data centers: the Massachusetts Green High-Performance Computing Center (MGHPCC) in Holyoke and an additional OC11 suite.

MGHPCC is a collaboration among five research universities (MIT, Harvard, Boston University, Northeastern University, and the University of Massachusetts), the state government, and private industry. The center supports research computing, which is already under way in the newly provisioned space.

The additional OC11 suite extended the Institute's existing footprint at 1 Summer Street in Boston. This newly provisioned space allows for expansion of IT resources and service offerings without the need for a larger on-campus footprint.

### *911 Campus Service*

IS&T implemented a new, enhanced 911 campus service. This new service references multiple data sources, such as phone directories and IP addresses, to provide more accurate location information for public safety personnel. The enhanced 911 service expands notifications of 911 calls automatically to the MIT Police.

### *Unified Communications*

IS&T piloted Cisco's Unified Communications Manager phone system. This new system expands device support to desk phones, video systems, and software-based clients such as desktops, tablets, and cell phones. The MIT community will be able to use Mac and Windows software clients for instant messaging, voice, and video communications. Faculty, staff, and students will be able to make expanded video calls, both on campus and globally, using Internet-based dialing.

### *In-Building Cellular*

IS&T installed the AT&T neutral-host in-building cellular system in 23 additional buildings on campus, bringing the total number of buildings on the system to 73.

### *Cabling Upgrades*

IS&T completed building-wide network cabling upgrades and installed new networking equipment to improve both wired and wireless network service in Buildings 24 and 37.

### *New Cloud Applications*

IS&T collaborated with Human Resources to deliver two new cloud applications: Performance Development and Review and Application Tracking.

### *Training*

IS&T delivered 472 in-person courses, 1,382 custom online courses, and 111,218 modules of instruction through the Lynda.com platform as a service.

### *Digital Events*

IS&T digitized the event registration process, replacing paper forms and manual processes for event planners, hosts, approvers, space owners, and service providers.

### *Online Add/Drop Petition*

IS&T digitized the add/drop petition process, with 12,643 petitions submitted online in spring 2014. Less than 1% of the 6,000 system users placed an inquiry.

### *Real-Time Student Accounts*

IS&T provided real-time information on student account activity in the electronic billing and payment system. Students and their authorized payers (most often their parents) can now see student account activity in real time. Previously, students could see their real-time account activity (items not yet billed), but authorized payers were able to view only monthly billed transactions.

### *Charge Assessment Service*

IS&T delivered a standardized and user-friendly tool that allows departments to post charges and credits directly to student accounts. All charges, payments, and reversals of previously posted charges and/or payments are now processed in a consistent and standardized way. This service ensures that information is provided to students faster and with increased accuracy.

### *Enterprise Membership Service*

IS&T released a membership service module that provides federated membership and access permissions to Institute API-compliant services both inside and outside of IS&T.

## Transforming Experiences through Collaboration

### *Atlas*

IS&T implemented Atlas, a new administrative gateway, replacing the 15-year-old SAPweb and SAPweb Self Service, streamlining access to administrative functions, transforming the user experience, and better meeting community needs.

### *Facilities Work Request*

IS&T modernized the Department of Facilities work request system, leading to smoother and more effective access to information about disruptions, as well as collaboration on positive outcomes, between the department and MIT administrators.

### *New Hire Application*

IS&T delivered a new hire application that guides new employees through the onboarding experience.

### *Cognos Reports*

IS&T successfully completed the planned three-year Cognos rollout, continuing our customer-driven focus group model with more than 50 representatives from approximately 30 DLCs (from all schools) participating. These groups identified and designed over 100 reports that are now available to the community.

### *Space Management System*

IS&T released a new version of the Space Management System, integrating critical user-requested enhancements into the system.

### *Websites*

IS&T provided fundamental design and software engineering for several major initiatives across MIT, including the Taskforce for the Future of MIT Education, the Big Data@CSAIL Living Lab initiative, edX, the EVPT AdminConnect site, the New Employee Orientation and On Boarding site, and a directory of resources for MIT students.

IS&T launched the DrupalCloud, a free self-service website creation platform for the MIT community. A total of 956 websites were created for or migrated to DrupalCloud, including the websites for the Office of the General Counsel, the First Generation Project, Technology Childcare Centers, and the School of Engineering, among many others.

IS&T released a rebuild of the Offices and Services Directory application, replacing a 15-year-old public-facing, unsupported application.

### *Mobile APIs*

IS&T released the first mobile APIs to the MIT community. These APIs allow developers to integrate services such as campus shuttles, mapping, directory services, campus news, and the academic calendar into their own applications.

IS&T added Campus Dining to its popular mobile app, MIT Mobile, for iPhone and Android. This enables students to see the hours, locations, and menus of all campus dining options. MIT Mobile's user base continues to grow, with over 90,000 active installs.

### *OpenID Connect*

IS&T released MITREid Connect, an open source implementation of OpenID Connect, as an additional authorization and federated identity. This software, used by members of various MIT research teams, allows individuals to "opt in" to share personal data about themselves, such as their movements around campus.

### *Customer Support*

IS&T provided accessibility consulting to 115 MIT projects, consulted with 100 individuals needing assistive technology solutions, and provided accessible materials for 39 MIT courses. The help desk closed 45,000 tickets, provided services to 6,000 walk-in visitors, and answered a total of 20,000 calls.

IS&T worked to improve the overall IT user experience by:

- Developing user experience guiding principles incorporated into governance decision-making charters
- Successfully advocating for live-streaming text of commencement services and providing tablets to facilitate access to captions on Killian Court
- Identifying and implementing solutions that facilitate broader reach, such as cloud-based text to speech and remote usability testing tools and vendor partnerships that provide accessible math materials in audio and print
- Offering consulting advice to EdX on the accessibility of its online learning platform

IS&T also worked to ensure a positive IT support experience by partnering with IT colleagues across the campus. For example, we rerouted Sloan Technology Service calls to our help desk as needed, completed an analysis of and outreach to Windows XP users to assist them in mitigating their security risks and in migrating to newer operating systems, and provided site licensing and distributed Adobe Acrobat Pro and Creative Cloud at no cost to the community.

In order to prepare for future innovation and demand, IS&T engaged in a variety of foundational projects, including:

- Strengthening our expertise in IT service management and leveraging it to streamline processes

- Implementing a cloud-based customer satisfaction survey tool that enables collection of actionable user feedback as well as benchmarking against other service desks
- Continuing the migration from the aging Cyrus email infrastructure to Microsoft Exchange, reducing the Cyrus footprint from 7,000 to 700

## Information Systems and Technology Administration

In support of our operations, IS&T administration—finance, human resources, communications, and administrative services—worked closely with the associate directors, managers, and staff to streamline financial 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.

IS&T conducted a benchmarking effort to identify strategies to attract and retain top IT talent. Six peer universities and two for-profit IT-focused companies were contacted via telephone interviews to learn about best practices in attracting and retaining top IT staff. The objective was to gather information about how comparable schools and other organizations recruit and retain top IT staff in order to support, enhance, and develop ways to both attract and retain MIT IS&T staff. A summary report was created that included a list of the organizations contacted, questions asked, themes gathered (as aggregated responses), and recommendations.

IS&T continues to support the growth, development, and engagement of our employees. We hired 33 new employees and promoted 28 employees. Employees won 198 Spotlight Awards, seven Infinite Mile Awards, an MIT Excellence Unsung Hero Award, and an MIT Excellence Advancing Inclusion and Global Perspectives Award.

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, College and University Information Security Professionals, the Boston Consortium, the Ivy Plus groups, and the Internet Engineering Task Force security and calendaring standards groups, among others. Staff members collaborate with a wide range of vendors and outside groups.

## Summary of FY2014 Financials

IS&T provides its IT services through various funding models, which include the General Institute Budget, software development, revenue recovery, and service centers. In FY2014, IS&T underspent its recurring General Institute Budget of $38.6 million by $573,000. Year-end expenses were over budget by $1.5 million, while revenue and transfers to the service centers exceeded their budgets by $874,000 and $1.2 million, respectively. The main drivers of the $1.5 million variance in expenses are increased demand for Server Operations Service Center (SOSC) and backup services (both revenue recovered), greater than anticipated vendor network installation and repair services,

settlement and additional license purchases, additional fiber services, and ServiceNow implementation costs. These expenses were offset by a one-time carry-forward funding allocation of $755,000.

IS&T spent $9.3 million on software development ($2.2 million on recurring software development and $7.1 million on IT modernization). Approximately 50% ($4.6 million) was spent to develop Education Systems projects, including digitization of forms and petition implementation, enrollment management, Oracle forms replacement, and scheduling implementation. An additional 48% ($4.4 million) was spent to support software development projects for Administrative Systems, including plant maintenance, Atlas, faculty effort reporting, and performance management implementation. The remaining 2% ($217,000) was used for software infrastructure projects, including quality assurance test automation and MIT Mobile development applications.

Approximately 7% of IS&T activity, or $6.3 million, is funded from services that are billed to DLCs for telephone and network infrastructure services, server management and colocation services, desktop support, software distribution, and departmental website and database consulting and development. In FY2014, funding from these sources was $608,000 higher than budgeted, primarily as a result of increased demand for jack installation and network activation services. This increase was partially offset by a reduction in department consulting and analysis development revenue due to a shift in focus to nonbillable community-wide services, as well as a reduction in colocation rack revenue owing to a reduction of the rack charge rate.

The Telephone and Network Service Center ended the year with an operating deficit of $757,000, which is $1.4 million lower than the FY2014 budgeted deficit of $2.1 million. This favorable variance was due to lower interest rate charges as well as lower than budgeted operational expense settlements resulting from a one-time transfer of IT modernization budget dollars to fund a large wireless equipment purchase. This funding transfer will net out after three years as the depreciation from the purchase is expensed. Investment in new capital assets totaled $12.1 million, which was equal to the FY2014 capital budget. 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 equipment and upgrades, and data center expansion and upgrades.

SOSC ended the year with an operating surplus of $2.6 million, which represents a favorable variance of $566,000 relative to the budgeted surplus of $2 million. However, after removing SOSC and TSM charges (billed and charged within IS&T), this results in a favorable variance of just $86,000 for SOSC. Savings due to open positions were offset by lower colocation revenue resulting from a reduction in the rack charge rate. Capital investment expenses in SOSC for FY2014 totaled $767,000 and consisted of server equipment for virtualization, backup, and the SAP environment.

## Looking Forward

It is an exciting time for IT@MIT. We are at an inflection point in the delivery of IT services, with the focus shifting to "platform-based" models that are designed to create and connect ecosystems of diverse participants as producers and consumers of services. The first phase of the transformation process was completed in May 2014 with the ITGC approval of the vision, goals, and guiding principles document. The next phase of the transformation—formulating the findings and developing multiyear strategic plans for realizing MIT's 2020 IT Vision—is under way. The envisioned set of plans and roadmaps will address technology, financial, governance, and communications strategies for achieving the IT Vision.

**John Charles**
**Vice President for Information Systems and Technology**