

## Information Systems and Technology

Information Systems and Technology (IS&T) underwent a change in leadership in fiscal year 2019. John Charles retired as vice president for IS&T at the end of 2018, after five years of dedicated service to the Institute. His report, *The Future of IT at MIT: Achieving MIT's 2020 IT Vision*, embraced cloud technology and agile processes in the development of a diverse ecosystem of information technology (IT) services and platforms to support a faster pace of innovation. His tenure marked one of the most significant periods of change in IT at MIT, and the foundation he built has put MIT in position to make future advances and innovation.

In March 2019, Israel Ruiz, MIT's executive vice president and treasurer, announced the appointment of Mark V. Silis as the new vice president for IS&T. Silis has been with IS&T for 15 years in roles of increasing responsibility; he had been associate vice president of IS&T since 2015.

### Governance

The Information Technology Governance Committee held three meetings. The agendas included:

- Stephen A. Schwarzman College of Computing infrastructure committee updates
- IT Infrastructure Steering Committee updates
- IT Policy Committee updates
- Description of the annual process for distributing funding for IT projects
- Transfer of the IT portfolio from capital expenses to operating expenses and consumption-based licensing
- Next Generation MITnet project updates
- Administrative Systems Steering Committee and Student Systems Steering Committee updates

The newly formed IT Infrastructure Steering Committee held its first meeting on February 14, 2019. Members from IS&T include Mark Silis, vice president for IS&T, and Garry Zacheiss, director, Platform and Systems Integration.

Mark Silis served as a member of the Infrastructure Working Group for the Stephen A. Schwarzman College of Computing, which is scheduled to begin operations in September 2019.

### Highlights for Information Systems and Technology

IS&T continued to provide support for the Institute in advancing MIT's strategic priorities. Most prominent among these is the launch of the Schwarzman College of Computing. These efforts included partnering with the Department of Facilities on physical IT infrastructure requirements for the college and developing the foundational elements required to support the college's business processes.

IS&T is nearing completion of the final phase of rearchitecting the MIT campus network, bringing to a close an effort that began in 2017. The new network architecture ensures the efficient use of MIT's Internet Protocol Version 4 (IPv4) address assets and provides the foundation for the campus transition to Internet Protocol Version 6 (IPv6). This transition effort has been a collaborative effort across MIT's departments, laboratories, and centers (DLCs). IS&T extends its recognition and appreciation to the MIT community for their support in this endeavor. The transition from IPv4 to IPv6 is now complete; MIT's network infrastructure stands ready to serve the future needs of the MIT community.

As part of the continued modernization of MIT's telecommunications infrastructure, IS&T is migrating MIT's voicemail and telephone services from a number of legacy systems to a cloud-based solution using Cisco's BroadCloud. MIT's Committee for Renovation and Space Planning has provided significant funding for modernizing network infrastructure in support of this transition to a new telecommunications platform. The completion of this transition will also mark the retirement from service of MIT's Class 5 telephone electronic switching system (5ESS), which has satisfied the Institute's telephony service needs since the 1980s.

Information technology provides opportunities to enhance and transform the administrative experiences of the MIT community. This past year IS&T worked with the Office of the Vice President for Finance and MIT Facilities to redesign MIT's parking process. These changes and improvements provide the MIT community with a completely revamped parking process, and have also greatly simplified one of the most widely used business processes at MIT. The once ubiquitous MIT parking stickers have now been relegated to antiquity.

The past year was marked by a wide variety of additional accomplishments in support of the Institute's priorities.

### **Delivering Applications in Partnership with the Community**

IS&T leveraged MIT's foundational investments in the evolving IT ecosystem to develop solutions that support the needs of MIT's DLCs and central offices. These solutions are the result of extensive collaboration and partnership between IS&T and the MIT community.

The following platform-based projects and applications were completed in FY2019:

- *Atlas Program*: Atlas is an online gateway for administrative processes at MIT. New applications and capabilities were added in support of the Atlas vision:
  - *Atlas Service Center*: Online scheduling of appointments for the Atlas Service Center
  - *Atlas Online*: A streamlined full catalog with improved search functionality and a responsive design to improve the user experience for the Atlas application on mobile devices

- *Children’s Scholarship Plan*: An application that digitizes the children’s scholarship employee benefit program, allowing participants to renew scholarship applications, electronically submit tuition bills and other documentation, and monitor the progress of applications or payments
- *MIT Childcare Scholarship Program*: An application that enables eligible Institute employees to apply online for scholarship benefits to MIT’s Technology Childcare Centers
- *New Hire Letters*: Automation of the onboarding process, enabling real-time creation of the new hire’s digital identity and subsequent access to employee new-hire-related services, ensuring a much-improved onboarding experience
- *Sick Reporting*: An application in compliance with the new Massachusetts Paid Family Medical Leave Act
- *First-Year Experience*: Provided support for the Office of the Vice Chancellor in transforming the MIT student first-year experience with a program that enables first-year students (Class of 2022) to designate up to three science core General Institute Requirements to be graded on a pass or no-record basis after their first term
- *Commencement*: Provided support for changes to MIT’s annual Commencement exercises, with the doctoral diploma now being awarded at the Thursday Hooding Ceremony
- *Admissions*: Started the modernization of the Undergraduate Admissions process by supporting the Admissions Office in a migration to Slate, a cloud-based system designed and developed exclusively for higher education.

## Providing IT Support and Services to the MIT Community

IS&T fulfills an essential role at MIT, ensuring that the MIT community is able to effectively use technology in support of their activities. IT support at MIT is a multi-faceted effort engaging a network of IT providers across the campus, working collaboratively to enable the use of technology in advancing MIT’s mission.

### IT Support Services

IS&T’s multimodal method of support delivery encompasses IT help (online, by phone, or in person), on-site support, and endpoint management.

- In FY2019, IT Support Services resolved more than 75,000 tickets, completed more than 1,800 repairs in the Atlas Service Center, and fulfilled more than 1,500 computer orders, renewals, and recoveries.
- The Service Desk formally announced its move from a pilot program to full telephone and email support with Artech in July 2018. Full support is 24 hours a day, 7 days a week, 365 days a year.

IT Support Services also performed many specialized assignments during FY2019. Team members engaged with the MIT community in a variety of efforts:

- Brought MIT Solve, the Department of Aeronautics and Astronautics, and the Department of Civil and Environmental Engineering onboard to IS&T's managed deskside support services
- Reconfigured network settings of more than 8,000 devices across the MIT campus in support of the transition to a modernized campus network architecture
- Finalized an implementation of iManage, for secure document management, for use by MIT's Office of General Counsel
- Prepared and deployed secure technology solutions for the MIT senior leadership's trip to China
- Assisted with the migration of multiple IS&T teams from a legacy ticketing system (Request Tracker) to ServiceNow
- Provided endpoint management to more than 50 DLCs using Jamf Pro and Microsoft System Center Configuration Manager; more than 5,000 computers and 350 mobile devices were updated
- Supported 231 DebAthena machines and 32 Apple Macintoshes in campus Athena clusters, adding and updating software throughout the year

The IS&T organization provided the MIT community with a wide range of learning and development opportunities in FY2019, including:

- Hosting IS&T eLearning courses in the Atlas Learning Center, taken by more than 6,600 community members
- Supporting the Lynda.com platform at MIT, which had 115,450 video viewings in FY2019
- Continuing to offer training in elements of the evolving IT@MIT ecosystem, with offerings on Quick Base, Tableau, Cognos, and a wide variety of platforms and
- Providing leadership for the Women in IT Employee Resource Group

IS&T continued to actively engage with the MIT community through Twitter, Facebook, Instagram, and Snapchat. The IS&T social media platforms' collective follower count grew by 32%, to almost 10,000 people, by the end of FY2019.

## **IT Security**

IS&T works to integrate information security into the daily business of MIT, striving for a balance between MIT's need for openness and its need for IT-related security. In addition to responding actively to cybersecurity threats throughout the year, the IS&T security team:

- added two IT security engineers, improving IS&T's ability to respond rapidly to security events;
- collaborated with the MIT Facilities to conduct a cybersecurity assessment of the Central Utilities Plant;

- improved the automation and analytics of the phishing reporting system (via phishing@mit.edu), allowing IS&T to reduce response time to MIT community members who report phishing emails and to process the emails more efficiently; and
- met with DLC members—including the Computer Science and Artificial Intelligence Laboratory, the MIT Libraries, Human Resources, the School of Engineering, the Abdul Latif Jameel Poverty Action Lab, the Office of Insurance, the Office of the Vice President for Finance, the Consortium on Financing Higher Education, Institutional Research, and the Sloan School of Management—to discuss information security initiatives at the Institute.

## **Campus Safety and Security**

IS&T focused as well on the IT aspects of physical security at MIT. IS&T staff updated all of the parking gate infrastructure and introduced license plate recognition technology to make MIT's new parking system possible. They also added video surveillance and access control infrastructure on selected rooftops across campus.

## **Software Asset Management**

IS&T has implemented a number of processes over the past year to manage the Institute's software portfolio more effectively. Through improved contract management practices and the elimination or redistribution of licenses that are no longer being used, IS&T has been able to add titles to the portfolio and increase the availability of in-demand software. IS&T continues to partner with the IT Governance Committee to evaluate opportunities to expand the portfolio, negotiate software license contracts, and determine the core software titles that should be provided across MIT.

## **Network Improvements**

### **Network Infrastructure**

- Completed the two-year Regional Optical Network Project, replacing end-of-life optical network equipment and upgrading to the latest supported software. The MIT optical network supports the Massachusetts Green High Performance Computing Center in Holyoke, MA, and campus connectivity to major cloud providers and research networks.
- Replaced aging wireless controllers with Cisco 8540 wireless controllers, which modernized MIT's original campus wireless infrastructure, providing the capabilities needed to meet the growth in wireless devices and technology.
- Upgraded 180 edge switches, connected 56 buildings to the new campus network architecture, and supported the transition of the network settings of more than 8,000 devices.
- Improved wireless network coverage on campus, adding 499 additional access points (for a total of more than 7,054 access points).

- Installed rack-mount uninterruptible power supply systems on more than 160 racks connected to network equipment on campus, to help improve the network's resiliency to power-related events.
- Extended MITnet services to the new MIT Federal Credit Union headquarters in Lexington, MA.
- Completed the Kendall Wi-Fi Project, which provides outdoor wireless coverage to more than 1,000,000 square feet in and around Kendall Square.
- Provided services in support and operation of the Northern Crossroads, New England's research and education network, expanding interconnections to Google, Apple, and Facebook.

### Telephone Infrastructure

- Moved more than 1,000 telephone accounts to the new platform.
- Transitioned legacy phones and upgraded the network in Buildings NW16 and NW17 to support calls by voice over internet protocol (VoIP). VoIP upgrades included new telecommunications rooms, wiring, and electronics, increased throughput speeds, and better overall performance on the wired and wireless networks.
- Moved all existing call centers to Cisco's Customer Journey Platform (CJP) for cloud-based call centers. CJP offers enhanced functionality and additional flexibility (self-service model, cloud-based resiliency, remote office capabilities, and better reporting features).

### Administration

IS&T supports the development and engagement of its employees—hiring 14 new employees and promoting six employees. IS&T presented 187 Spotlight Awards and 60 Infinite Mile Awards to employees in FY2019.

### Staff Development

IS&T staff participated in, contributed to, and played leadership roles in various professional and industry organizations. These included Internet2, Educause, the Common Solutions Group, the NorthEast Regional Computing Program (NERCOMP), the Boston Consortium, the Ivy Plus groups, and the Association of American Universities Data Exchange, among others. Staff also collaborated with a wide range of vendors and groups outside the Institute.

IS&T won two distinguished awards in FY2019. The department's submission, "Improving Life for the Campus Community: Three Impactful Success Stories" (about the Community of Stewardship, Mobilization of Service, Graduate Appointment Portal, and parking projects) won a 2019 SAP Innovation Award. The MIT Federal Credit Union (MITFCU) presented its Strategic Business Partner Award to three IS&T staff members for their support in the MITFCU's buildout and move into a new headquarters in Lexington, MA.

IS&T staff also gave presentations at the SAP SAPHIRE NOW conference and the SAP Higher Education and Research User Group conference.

### Summary of Financials for FY2018

IS&T provides its IT services through various funding models that include the General Institute Budget (GIB), software development, and revenue recovery. In FY2019, IS&T was given a net budget allocation of \$97.6 million. IS&T spent \$78.6 million—\$18.9 million less than budgeted. Of the unallocated \$18.9 million, \$9.7 million was submitted as a carryforward request to pay for future IT modernization project expenses.

Year-end GIB gross expenses totaled \$86.8 million and were under budget by \$20.2 million. The main driver of the \$20.2 million variance in GIB gross expenses was savings from open positions that were not filled and positions that were on hold throughout the year, lower than anticipated cloud storage and software licensing costs, onetime depreciation savings, and infrastructure and hardware maintenance expense reductions. The breakdown of the \$86.8 million in IS&T gross expenses is as follows:

- Network connectivity, cloud connectivity, infrastructure, and network-security-related expenses: \$31.1 million (36%)
- Enterprise software products to support administrative, student, and infrastructure systems and platforms: \$25.6 million (29%)
- Systems implementation and integration, user experience and design, and data analytics and data science expenses as a part of the Emerging Solutions team: \$17.8 million (21%)
- Provider and consumer support costs, including the IS&T service desk and distributed IT resource team: \$7.1 million (8%)
- Operational and administrative support costs: \$5.2 million (6%)

IS&T spent \$7.0 million in software development consulting dollars. The breakdown of the \$7.0 million in expenses is approximately as follows:

- Non-project support work for MIT's core enterprise systems: \$2.3 million (32%)
  - Student systems: 47%
  - Administrative systems: 35%
  - Departmental systems: 18%
- Support software development projects for the administrative systems roadmap: \$2.2 million (31%)
  - Continued development of the SAP HANA Data Warehouse 2.0
  - Atlas Enhancements Release
  - Phase II: Data Governance—PI (principal investigator) Monthly Expenses Dashboard, and Sick Leave and Vacation Time Collection App

- Enhancements and discovery work on internal IS&T IT projects: \$1.3 million (19%)
  - BroadSoft Transition and Provisioning projects
  - ServiceNow Incident Management Rollout
- Student systems roadmap projects: \$780,000 (11%)
  - First-Year Experience grading mandate
  - Cross registration for Harvard University subjects
  - Enhancements to student systems platforms
- Development work for DLCs: \$482,000 (7%)—IS&T received outside funding to cover these project expenses. Excluded from these project totals is an additional \$877,000 in expenses related to the parking process redesign project; these expenses were transferred to the Parking and Transportation Office at the close of FY2019.

Approximately 5% of IS&T activity, or \$4.7 million, was funded from cost recovery services, which are billed to DLCs for telephone and network infrastructure services, desktop support, and software distribution.

### **Looking Forward**

As MIT embarks on a new era with the launch of the Schwarzman College of Computing, the role of IT has never been more pervasive or important across all the Institute's activities. IS&T will work to ensure it is ready to support MIT in this next generation of innovation by continually updating its service portfolio and delivery model, embracing a new delivery approach, and developing a vision for consultative engagement with the MIT community in the development of technology solutions.

**Mark V. Silis**

**Vice President for Information Systems and Technology**