Building a Strong Foundation for the Future

2017
NYU IT ANNUAL REPORT
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Message from the CIO

It has been just over a year since I joined NYU. During this time, we have established our digital strategy and completed our organizational, financial, and operating models. In doing so, we have cleared the way to bring our vision, mission, and core beliefs to life, do our best work, and apply our financial resources where they count most. This inaugural NYU IT Annual Report will take you through a number of the projects and initiatives that underpin how we are seeking to improve our services and support as we continue to build our three-year roadmaps for all technology at NYU.

As 2017 draws to a close, the year has placed IT issues front and center in the public consciousness. From cybersecurity to data collection practices to virtual environments, and far beyond, IT impacts practically every life around the world. A global IT organization such as ours calls for a great deal of foresight and agility to stay on course and secure while preparing a new foundation of technology that will carry us far into the future.

These new technologies and breakthroughs constantly prompt us to reassess what we currently offer and what is achievable in order to prevail as IT innovators. Meeting the needs of our dynamic academic environment requires an ever-evolving IT organization. We must rise to new challenges and examine emerging risks with our eyes on modernization. At the same time, it is critically important that we maintain existing services and infrastructure.

Our strategy for advancing this mission is three-pronged: Envision IT, Plan IT, and Build IT.
Envisioning the Future

Our goal, in collaboration with our many IT Partners across the University, is to build a solid foundation for the future to meet the evolving needs of the NYU community. With a new digital strategy in place, our efforts to date have already resulted in some significant improvements. Notably, we have been working to modernize and streamline the core services that form the backbone of NYU’s IT infrastructure. This enables us to cut costs while increasing the quality and reliability of our services. It includes a reduction of our physical footprint, the migration of resources to the cloud, upgrading of essential network equipment, streamlining of data integrations, expansion of self-service data analytics, and the overhaul of our IT security protocols.

Planning an Accessible Global Network

A more streamlined, uniform environment means that we can be more responsive on an international scale. Since NYU’s emergence as a global University, NYU IT has pursued the task of making it a globally-networked University. We have undertaken several new initiatives alongside our Global IT Partners to improve the standard of IT service and support at NYU’s locations around the world.

We are also dedicated to making University data open and accessible. The move toward secure self-service data is a shift in the environment. Projects like Tableau and the API Library help move NYU toward this goal.

This also involves modernizing our web presence in an effort to provide all our users with a clear, accessible avenue to IT data and services. This means breaking away from long-standing assumptions about how and by whom data and services are used. NYU IT has to evolve more open, mobile-ready environments for everyone at the University. IT should not be a barrier; it must remove barriers.

Building our IT Future

Underlying these efforts is the true foundation for the future: people. One of NYU IT’s core beliefs is “People at the heart of everything we do.” NYU has a valuable pool of smart, innovative people — technologists, faculty, researchers, IT professionals, and a student body over 50,000 strong that inspires us to seek fresh ways of thinking about and implementing IT.

We are working diligently to cultivate a growing number of IT professionals who can deliver excellent service and make our vision for NYU IT a reality. We also recognize that Central IT should not make all the decisions. Partnerships are paramount to success, and we are seeking improvement in establishing and strengthening relationships between IT and the University at large. Collaboration is also at the heart of our Academic IT Strategy. We have a vibrant and growing partnership with instructional designers and technologists that are paving the way for new pedagogy while technology itself evolves to support improved learning outcomes and support for learner differentiation. Moreover, we are now working closely with a newly-formed Research Technology Faculty Advisory Board (The FAB). This group of interdisciplinary faculty researchers, in concert with sponsorship from the Provost’s Office, is helping to shape the future of technology offerings supporting research and scholarship.

Accomplishing these tasks is a substantial challenge, but it is one that all of us at NYU IT embrace. The way is paved for a very promising future, and the future is a modern core foundational technology that allows for rapid, frictionless IT architecture. This gives us the ability to move quickly and effectively as we evolve at the cutting edge of academia.

Len Peters
Vice President and Chief Information Officer
Insights
Change is a constant in information technology, and the ability to predict and react to change is a must. This has been especially true for one of NYU IT’s new units, Enterprise Data Management (EDM). We have to focus on keeping core systems running well while also innovating in ways that support NYU’s changing needs. This means keeping our collective finger on the pulse of emerging trends in the world of data management — a topic that is increasingly capturing the public’s attention.

Few subjects in IT, and perhaps none in the world of data management, have been as discussed and analyzed as the large-scale Equifax data breach that occurred in summer 2017. This incident affected millions of people, regardless of what cybersecurity measures they took for themselves. It also catapulted data management from developers’ inner circle into the mainstream. Data management itself can appear very technical, but at the highest level, it can be summarized by two essential concepts of interest: how to store, protect, and deliver data; and how to issue and protect online identities. In the wake of the Equifax breach, institutions entrusted with sensitive personal data have taken a hard look at responsible, secure ways to collect and store it.

The potential for identity theft being a by-product of a major breach is real. It is essential that we, as data custodians for a global University with tens of thousands of online clients, provide our global community with enhanced tools to safeguard their accounts from
unauthorized access. Organizations that conduct business online are increasingly gravitating toward a more robust method of authentication than the standard username/password system. For most, including NYU, this means the adoption of Multi-Factor Authentication (MFA), a new layer of security that provides thorough protection above an existing strong password policy.

On the surface, the trend toward a more secure data management environment might seem at odds with another emerging trend: users’ desire for easy self-service access to that same data. However, these two tendencies can be reconciled with a proper strategy. Application developers are becoming more savvy than ever before. The days in which they needed a guided tour to carefully dole out data are passing. They need data to build effective applications, and they prefer to access it themselves. Granting them access to large stores of curated data in a secure, governed, but convenient way has manifested primarily in the development of APIs (application programming interfaces). Similarly, there has been a move toward more self-service oriented access to data for the purpose of generating metrics, analyzing data, and creating reports.

In the pursuit of these core concepts — security, transparency, and independence — we anchor all of EDM’s work in a four-point strategy that will transform how we relate to data for years to come:

**Interconnect**
Connect, share, and manage data from various applications, both locally and in the cloud.

**Information Management**
Integrate information, structured and unstructured, from all business applications, devices, people, and the world around us.

**Analytics**
Gain insights via information from enterprise reporting, interactive dashboards, real-time streaming, and predictive and cognitive analytics.

**Risk Management**
Ensure we have the ability to visualize and manage our data ecosystem end-to-end, protect sensitive data, and have trusted sources of data.

As we expand on the existing foundation of data management, providing access while protecting people’s data demands the implementation of a system of governance developed with utmost diligence. We are working to build a digital ecosystem that is secure but accessible, solid but agile. Only then can it evolve to meet the ever-changing needs of developers, and adapt to the existing technologies and platforms of today and of the future.
NYU IT Infrastructure manages everything from servers and data centers to the underlying network technology that connects NYU’s hardware and software. We aim to bring greater efficiency to and usage of our IT systems while minimizing impact on the mission-oriented work of the global NYU community. Opportunities abound to expand and improve services, particularly in the areas of technology security, data network infrastructure, and local versus cloud application hosting.

When it comes to technology security, we face undeniable threats. Cyberattacks on large institutions are nothing new, but over the past year, several major breaches, hacks, and attacks across the country have raised unprecedented concern among the public and cybersecurity experts alike. As these attempts become more frequent, we must constantly reassess the security measures the University has in place to protect NYU’s global community from data breaches and service interruption.

While the number of attacks has increased, they have not necessarily grown more sophisticated. Some of the most notable attacks of the past year exploited basic security vulnerabilities. Others relied on the technique of social engineering — manipulating users into handing over information and credentials under false pretenses. While such breaches are frustrating, they have placed in the spotlight the need to improve security. Executing a more rigorous technology security audit and developing a set of well-defined security practices is paramount to averting breaches. Effective cybersecurity can no longer focus solely on technical solutions, but must include community outreach and education as well.
Another trend we have been following is the migration away from Ethernet-based “wired” networks as the default means of connecting to online resources and toward wireless connections. In a brief period of time, use of the NYU Roam Wireless network has skyrocketed. The resulting main challenge is making sure the wireless network infrastructure can handle large amounts of traffic in a predictable, reliable way.

The increase not only comes from the number of users connecting wirelessly; it also comes from the ever-increasing amount of bandwidth needed by many applications, such as streaming media services, and the number and variety of devices requesting a connection. How does NYU IT secure NYU’s network and users when so many different things are lining up to be a part of the wireless network? How does it build a wireless network that delivers the stability and speed that today’s devices demand? And next year’s devices, and the year after that?

Finally, Infrastructure has been building a strategy around a trend followed by many other institutions — moving away from locally hosting servers and applications and toward robust cloud-based solutions. This is a sizable opportunity and challenge for NYU in New York, where physical space is scarce and expensive. It becomes even more pressing when you take into consideration that NYU is a global University, with locations and campuses all over the world. Battling for scarce space and resources in a densely-packed urban environment is not a solution. We have turned to remotely-hosted resources in our effort to increase savings and ensure a more uniform experience for NYU’s global community. This helps eliminate dependence on limiting factors such as floor space, power supply, and physical infrastructure.

Moving more of these resources into the cloud means we must make sure our network is up to the task of handling more data.

None of these things exist in a vacuum. Each one is dependent upon the others to effectively deliver the level of service NYU needs and deserves. As technology increasingly becomes a significant indicator of excellence in academia, the Infrastructure unit within NYU IT is on a quest to ensure that NYU’s technology resources contribute to an unmatched experience for our students and faculty from around the world.

We approach this goal as a utility. In the measure that we excel in providing the basic computing power and storage capabilities that form the foundation of NYU’s enterprise IT environment, we help enhance academic programs, scholarly research, and University life.

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Over the years, many different design strategies have guided the evolution of digital and online services. Few, however, have placed accessibility and compliance with the Americans with Disabilities Act at the forefront of their considerations. Today, web and other online services are no longer considered optional, but are an essential part of everyday life. Similarly, technology’s role in higher education has expanded so that it is part of all aspects of NYU, and aligned with the University’s focus on equity, diversity, and inclusion. It is crucial that we ensure that digital resources and services supporting teaching and learning, research, and administration are available to all community members.

Pursuing accessibility goals is part of a larger shift toward IT services becoming easier to use and more integrated into nearly every aspect of work at the University. This shift requires IT to have a deeper understanding of the work of NYU and NYU Schools so that services resonate with needs. This leads to initiatives like an advocacy program where IT Partners have a point of contact who can communicate on their behalf about service strategies, needs, and priorities. It means building a more transparent presence where IT Partners know about IT services and understand IT strategies. And it means communicating in a clear and timely manner about IT-related
matters to the larger community to keep them informed and to avoid any surprises.

In a distributed IT environment such as NYU’s, while there is opportunity for improved communication and improved service, there is also an opportunity to leverage the distributed talent and investments made in IT across the University. It will be important to assess redundant services to identify areas for savings that benefit the University’s focus on affordability, and also consolidation of services that might eliminate the need for employees to learn multiple ways of doing one thing.

Working closely with many partners, our focus continues to be on ensuring that students at any of NYU’s global academic centers and portal campuses have access to the same services and same quality, regardless of location. NYU faces the same challenges as many organizations with community members around the globe. Developing and implementing a set of core standards for service delivery and accessibility across a global network benefits everyone.
Innovative Teaching and Emerging Technologies

Ben Maddox
Associate Vice President
Teaching & Learning with Technology

The intersection of technology, teaching and learning practices, and higher education brings together new and emerging opportunities with centuries of educational methods and approaches. It can be exciting, engaging, and sometimes confusing for faculty and students to navigate. NYU IT’s Teaching & Learning with Technology (TLT) teams collaborate with faculty, students, and instructional designers around the globe.

We help to explore the range of options and choose approaches and tools that fit their needs in order to enhance existing courses and learning materials or create brand new ones. Emerging technologies and practices, such as virtual and augmented environments, simulations, and learning analytics are now a part of the “toolkit” faculty have at their disposal for instructional innovation. Collaboration with faculty and instructional design colleagues is at the heart of our work across and outside of NYU. That keeps our focus on forward-thinking expansion into new areas in order to provide excellent, rigorous, and engaging learning experiences for our students. The future looks promising.

When deciding to incorporate technology into teaching and learning practices, we face questions such as: Will the technology improve the learning experience? Will it provide faculty and instructors with more information about how students are doing? How can we know, particularly in larger-format courses, if the material or
approach is helping them grasp and advance their understanding of the concept or topic?

Technologies can personalize learning for a student and provide faculty with insight into the pace of student progress and what their different interactions are. For example, a tool might provide insight into how a dental student is excelling at chemistry but struggling with their clinical work. The same tool can help instructors determine how to streamline the student through the chemistry clinical elements while adding an extra module for clinical study.

In much the same way that digital learning environments are becoming more responsive to individual student needs, they are also becoming more informative for instructors. Online courses generate a wealth of data that can be analyzed in a way that is not generally practical in a physical classroom. Analytical tools can take the data collected within a digital learning environment and use it to generate reports about individual student performance or the course as a whole. This enables the instructor to tweak the course in response to that data. Both learning analytics and adaptive learning can contribute to a nimbler, more responsive learning environment.

One of the biggest developments in teaching and learning technology has been the maturation of augmented reality and virtual reality (VR). Both tools made appearances in one form or another in the past, but neither the technology itself nor the network meant to deliver it was developed enough to make the concepts practical. That has changed, and with the technical limitations fading, it is up to us to investigate the efficacy of such tools. We think we are going to see more VR, games, and simulations, which is both a philosophical and a technical shift.

TLT is guided by the increasing interdependence between instructors, pedagogical choices, and the range of technology tools available. We are building trust and enthusiasm about technology’s capabilities to enhance teaching and learning. We are working with companies and developers to make sure tools are easier to use, accessible across disabilities and differences, and helpful to faculty and students in meeting their teaching and learning goals. NYU has twenty-one institutes, centers, and Schools on six continents. A single education technology solution cannot meet all those diverse needs. Thus, TLT is constantly exploring how to match technology to discipline- and School-specific requirements in ways that are efficient, effective, and visible. The key to that has been and remains the grassroots collaboration of faculty with instructional technologists at the Schools and NYU IT.
Expanding the Foundation of Learning with Research Technology

David Ackerman
Associate Vice President
Research Technology

One of the most exciting aspects of NYU IT Research Technology’s role is that breakthroughs in research technology lead to breakthroughs in the arts and sciences. A leap forward in high performance computing resources can result in a flood of new information with potential impact on anything from climate change to medical research. Advances in mapping technology reveal previously undiscovered civilizations deep in the Amazon.

Improved 3D printing enables researchers to share relics or print prosthetic limbs in astounding detail, while new methods of digitizing and archiving texts and artwork can put ancient libraries at your fingertips.

The internet’s increasing ability to move large quantities of data with speed is changing how researchers interact with technology. In the past, researchers were tied to physical locations where they had access to the high performance computing resources they needed to manipulate massive amounts of data. Processing that much data could not be done with efficiency across a network connection. But, as the bandwidth opens up, so does the potential for cloud-based high performance computing. This frees researchers from physical space and machine limitations, making high performance...
computing resources more accessible and affordable. It also frees service providers from those same limitations, enabling them to offer more and better resources without worrying about things like floor space, real estate, and the many logistics of building and running a physical data center.

Advances in VR and simulated environments are poised to have a major impact on research as well. That technology is growing more refined and intelligent, becoming an effective tool to conduct experiments and investigate possibilities in ways that would incur too much cost and risk in the real world. As network speed, processing power, and storage increase, we anticipate that this technology will become as common as the more traditional high performance computing resources.

Starting as a novelty, 3D printing has become an integral part of many research disciplines. Its applications in the medical field, such as the ability to print advanced prosthetic limbs, frequently make headlines, yet the potential for 3D printing and fabrication has only begun to be understood. As new machines and new printing materials expand the limits of the types of objects that can be printed, researchers across academic disciplines are exploring how this technology can be used in their field. We are committed to staying current on cutting-edge 3D technology that opens the door to all sorts of possibilities for NYU researchers.

The education community — students, faculty, and researchers — is realizing the potential that research technology holds for them. This is a trend in itself. Archivists are figuring out ways to digitize and make searchable vast stores of ancient writing in languages that have been traditionally difficult to digitize. Researchers are leveraging geographic information systems (GIS) and statistical mapping technology to do everything from predicting patterns of human migration in times of disaster, to creating incredibly detailed maps that can revolutionize the way city planners conduct their business. Globally-networked research technology means globally-networked researchers, all sharing information and discoveries with an immediacy that would have been undreamt of a dozen years ago.

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Global and Mobile

Jeff Capuano
Senior Director
Service Operations

We no longer live in a world where people get online by going to a specific location to sit down at a specific machine. People want to accomplish what they want, where they want, and when they want. This means that whether you are providing or supporting a service, you must do so every time, everywhere. This simple reality has become one of the guiding principles behind the direction of Service Operations, a newly-formed unit that has brought together three teams with similar goals: Client Services, the Global Command Center, and Academic Technology Services.

Service Operations’ new structure is more transparent and understandable. It will help reduce redundancies, improve service delivery, and increase efficiency by pooling our resources and implementing better resource management. More than ever, we will be focusing on usability, improved service delivery, and customer service. Delivering convenient, reliable service and support in a decentralized, on-the-go world is both our biggest challenge and biggest opportunity.

Aligned with that overall mission is the effort to pioneer cutting-edge academic technology centers.
The traditional computer lab no longer fulfills the technology needs of many students and faculty members. While a desktop computer and a desk might still form the foundation of a lab, it is important to design facilities around the evolving needs of the community. This means collaborative workspaces and access to technology like VR, 3D printing, video and audio production facilities, and a whole host of tools that are just emerging or have yet to emerge but are on the horizon.

Similarly, a globally-networked, always-up, mobile environment requires constantly-evolving methods of monitoring the infrastructure that such an environment entails. Multiple groups scattered across large geographical areas monitoring one small portion of the whole result in a fractured user experience, a difficult support model, and an inability to take in “the whole picture.” Units in charge of monitoring such a complex network of hardware, software, services, and locations need a centralized command center. With this approach, it is possible to coordinate efforts and ensure that the organization delivers a consistent level of service and support where and when users need them.
Accomplishments
Foundational Technology

API Portal Development

A major initiative this year has been planning the launch of an application program interface (API) portal. This portal will enable developers, faculty members, and students at NYU to securely access in-demand institutional data and build innovative applications and analytics solutions. This initiative exemplifies the NYU IT Enterprise Data Management (EDM) mission to provide to the NYU community the right data, to the right people, at the right time. The planning phase for this complex project involved consultation with many NYU Schools and units to assess the University's needs. The team evaluated multiple vendors before selecting one and is now moving on to the implementation phase. This entails a staged rollout of a comprehensive API inventory to ever-increasing portions of the University community over the next three years.

Data and Architecture Governance

All EDM projects have a common denominator: data governance. A mature data governance program will help NYU IT improve its ability to: create, preserve, and disseminate knowledge; support easier access to University data assets with proper protection; improve trust in data management decisions and data quality; improve efficiency in data management; and reduce risk through regulatory, policy, and procedural compliance. EDM is working with NYU's Institutional Research group as well as data trustees and data stewards to refine its data governance framework and approach. To that effect, EDM is identifying critical data elements for critical data domains, such as student data, space data, and development data. As part of this initiative, EDM will capture and share the data definition, data lineage, security requirements, and data quality metrics for the identified critical data elements. Many more exciting developments in this area are forthcoming.

EDM is also working closely with other groups in NYU IT to establish a framework for architecture governance.
The objective is to create a lightweight, adaptive governance framework for strategic architecture using standard technology and practices. As part of the framework review process, NYU IT is bringing together architects in areas of business, data, application, and technology architecture from various University units in New York and at NYU’s global sites. NYU IT plans to establish a governance structure, a process, and in-house expertise that ensure efficient workflows and compliant practices. As work progresses, enterprise-level architecture development will be driven by University needs and supported with technology standards.

Building a More Robust Wireless Network

In order to deliver a faster, more reliable wireless network and meet the increasing demands placed on such a service, NYU IT’s Infrastructure group has undertaken a large-scale research and refresh project. This includes fast-tracking upgrades to existing wireless access points and infrastructure. NYU IT also conducted a University-wide wireless signal survey to determine where inconsistencies in wireless signals exist and how they can be rectified. This survey was completed during summer 2017. Replacement of older wireless infrastructure and expansion of existing equipment to provide better coverage will continue throughout the early months of 2018.

HPC, Data Centers, and the Cloud

Parallel to physical infrastructure, the NYU IT Infrastructure group is working to implement cloud infrastructure to reduce data center demand, which is increasing at a vigorous rate. Today, there are numerous cloud-based solutions in the market that help organizations save valuable time, money, and resources. Introducing cloud solutions that can quickly scale computing resources up or down will generate cost savings and make the operation, development, and deployment of those systems more efficient. Given these exciting possibilities, NYU IT Infrastructure is currently configuring multiple cloud infrastructure environments for NYU. For the most part, this growth has been triggered by high performance computing (HPC) usage. Five years ago, there were approximately 400 researchers using HPC at NYU. That number is now nearly 2,000. Currently, it is not possible to migrate HPC to the cloud, as these services are mostly run on site. Work has begun to make room within NYU’s existing data centers by migrating common workloads to the cloud. The Infrastructure group is examining all possibilities for items that can be moved to the cloud to create more capacity for HPC. It is expected that more practical HPC cloud opportunities will emerge in the future.

Digital Accessibility

One of NYU IT’s largest policy and compliance projects has centered on University accessibility efforts that began in 2016. An accessibility working group was formed to develop and
share information about digital accessibility services, resources, and standards. The group developed student, faculty, and staff “personae” and a testing methodology to help reveal services with gaps in accessibility. Five services were tested with this methodology. An audit of the NYU core website was also performed, and a redesign of the site based on accessibility recommendations is currently underway.

For service teams, consultation regarding accessible design for NYUHome and NYU Classes was provided, and the development teams are working to implement improvements. Plans are also underway to launch a new Albert interface in early 2018 and improvements to the NYU Start page and NYU Login page; all will enhance digital accessibility. Among the services recently updated to address accessibility issues is NYU Stream, the University’s streaming video service. This improvement includes the addition of automated, editable transcriptions and captions. Supplementing this expansion of the NYU Stream service are a number of more detailed, fee-based manual transcription services that have been identified by the accessibility working group.

A new digital accessibility website was created to provide tools, standards, and style guides to assist anyone at the University in creating accessible documents, websites, videos, and other content. NYU IT also created a group, Accessible Technology Services, to support the greater NYU community with technical issues, remediation, and communication related to improved accessibility.

NYU IT is looking forward to building on these efforts in the coming months and continuing to increase the level of community engagement around digital accessibility across NYU. Information technology is an integral part of our daily lives. NYU IT is committed to ensuring that IT services and initiatives involve the community, are clearly communicated, and are available and accessible to everyone at NYU.

Global Service Delivery

NYU IT has played a large role in the build-out and support of technology at NYU’s global locations: the New York, Abu Dhabi, and Shanghai campuses and 11 global academic centers. The focus has been on bringing all locations up to a certain level of technology that ensures students, faculty, and researchers can move around the globe and work as if they were at their home location. Standard physical access, wifi, computer labs, telephony, networking, and academic and administrative services are available around the globe. IT support is available 24x7 to ensure that there is someone to help at any time.

Service Delivery Managers (SDMs) are assigned to each of the global locations to help clients navigate the NYU IT organization and to make sure that technology services are meeting their needs. SDMs also serve as technology advocates for the NYU global academic centers. They perform problem assessment and ensure problem resolution for these locations. While every academic center/site is different in style, location, and academic programs, NYU aims for consistency of technology experience wherever possible. The SDMs play a key role in ensuring that students and faculty at academic centers are able to use NYU services as effectively as possible. Different service models are currently being evaluated across the academic centers to ensure support is available when needed.
Formation of the Research Technology Unit

NYU IT has long been a key partner in the field of research technology, but there has never been an official NYU IT Research Technology group, until 2017. The Research Technology group was established with the mission of collecting and organizing the various services, technologies, and efforts of NYU IT’s Data Services and High Performance Computing groups, the LaGuardia Studio, and Digital Library Technology Services under one umbrella. This will make it easier for faculty to know where to go to accomplish their goals and what services are available to them. It will also enable more effective communication to the University and beyond about the significant work in which Research Technology is involved.

Collaboration and Peer Benchmarking

Research Technology shares many of its services with long-time partners in the Division of Libraries, and NYU IT continues to build on that relationship. Research Technology recently completed an intensive round of peer benchmarking — reviewing the services and the governance of peer research institutions and assessing how NYU measures against them. In partnership with NYU’s Senior Vice Provost for Research Paul Horn, NYU IT has significantly increased its engagement with faculty by forming a new Faculty Advisory Board (The FAB) in the spring 2017 semester. The FAB includes roughly three dozen faculty members from many NYU Schools. In addition, Research Technology is now a participant in Provost Horn’s Research Deans group. Together, both groups help Research Technology prioritize time, funding, and available resources as well as assist in securing financial investment.

NYU IT will be identifying a faculty member to lead an eventual Center for Research Computing, which is currently being designed. This is a new and exciting direction. NYU IT has always worked closely with faculty, but the Center will
be the first faculty-led NYU IT initiative. This will help NYU IT react more quickly and nimbly to the needs of researchers.

**GIS and Census Data Collections**

Over the course of the 2016-17 academic year, the Geospatial Information Systems (GIS) service team, part of Research Technology's Data Services, provided over 1,500 GIS-related consultations to students, faculty, and staff. In addition to working directly with clients, the team has developed a first-rate geospatial data collection that is open to the community. NYU Libraries has added data from many sources, including census data from Latin American countries and high-density LiDAR data of Dublin, Ireland collected by a team of researchers led by Dr. Debra L. Laefer at NYU’s Center for Urban Science and Progress (CUSP). This data is available to the public via NYU’s Spatial Data Repository. The comprehensiveness of this multi-layered data set enables new opportunities in exploration and modeling.

**OpenStack and Remote Hosting for High Performance Computing**

As the number of HPC users and research projects rapidly increases, NYU IT has been expanding its computing and big data analytics offering and investigating more efficient, affordable means of storing and analyzing massive amounts of research data. In collaboration with the Center for Data Science, the HPC group is in the midst of launching an OpenStack cluster, a technology that enables researchers to reconfigure centrally-located servers on the fly to better fit their computing requirements. This eliminates the need for locally-deployed servers spread across the University. The Infrastructure group is evaluating existing data center spaces, their growth potential, available temperature control, and the necessary electrical power provisions to support the expanding HPC capabilities. In addition, Research Technology will soon be launching a service that will enable researchers to mount high-capacity remote storage on their local desktops.

**Experiential Supercomputing Collaboration**

The NYU Holodeck project (named after the Holodeck in *Star Trek: The Next Generation*) is poised to create a collaborative, immersive, virtual/physical research environment that provides unparalleled tools for research collaborations, intellectual exploration, and creative output. The NYU Holodeck will be a software/hardware instrument that fosters creativity by incorporating: audio, visual, and physical
components; novel technologies to enhance human-human, human-agent, and human-robot social interactions; rapid prototyping and fabrication tools; and tightly-coupled interactive visual, audio, and physical experiences.

3D Innovation at LaGuardia Studio

NYU's LaGuardia Studio has emerged as one of the premiere 3D printing and scanning facilities in higher education in the country. They are not just serving the NYU community; peer institutions and research centers from around the world come to them for consultation. One of several exciting projects with which the LaGuardia Studio has been involved recently is the printing of human bones discovered at a site in Jebel Irhoud, Morocco. The bones, estimated to be somewhere between 300,000-350,000 years old, represent the oldest known remains of Homo sapiens. Because of the bones' age, and to preserve the integrity of the site, researchers were not allowed to remove them. Instead, they used handheld scanners to capture 3D models of the bones and sent them to the LaGuardia Studio, where perfect replicas were printed and can now be shared with other researchers around the world.

Technology Support for Scholarly Research

Digital Library Technology Services is a collaboration with the NYU Libraries that has amassed a remarkable collection of digitized documents, photos, and videos for use by researchers including ancient texts, photo archives, and music libraries. Their services enable new kinds of scholarly communication and preserve the scholarly record for future researchers. Current Digital Library projects involve partnering with the Internet Archive on preservation, with the NYU Press on scholarly discussion technologies, and with Penn State on the creation of Databrary, an online video data library for developmental science.
Teaching & Learning with Technology

Curricular Design Consultation

One of the NYU IT Teaching & Learning with Technology (TLT) unit’s most exciting projects this year has been the collaboration with a highly esteemed NYU Stern faculty member, Pankaj Ghemawat, to develop three different versions of the same course to cater to different student populations. In the first version, called "GLAM," Professor Ghemawat teaches primarily in person with online elements as part of the M.B.A. program at Stern in New York. He also teaches an undergraduate version of the same course, called "GLOBE," in New York, with in-person and online elements. The third version is taught in person to undergraduate students at NYU Shanghai by a different instructor, with online elements that include occasional virtual participation by Professor Ghemawat. The two professors teach in tandem each week, tracking student work and ensuring consistent student progress across the two locations. This project gave the TLT unit a unique opportunity to reimagine the most efficient and engaging use and delivery of content in three different modalities.

Enhancing Education Through Video

TLT staff worked with NYU College of Global Public Health faculty to create the online version of a course entitled “HIV/AIDS from a Global Perspective.” Together, they converted the face-to-face lessons into a combination of videos and images that deliver
the content in engaging ways. Educational design technologist Sharon Kay noted, “We tried to use video in an efficient and meaningful way.” Summing up the process from the instructor’s point of view, Associate Professor Danielle Ompad said, “It has made me a better teacher in the classroom because I had to hone my message and make it more focused.”

**Simulation for Explanation**

For the “Quarks to Cosmos” course, TLT created an interactive online module to demonstrate the parallax effect, and how it can be used to measure distance on a cosmic scale. This visual effect cannot be easily described with words, and because of the vast distances involved, it cannot be easily demonstrated in the classroom. The interactive module allows students not only to see the effect in action, but also to modify the distances and properties of the celestial bodies involved. They can learn by immersing themselves in the process, instead of merely observing it.

**Online Program Services**

NYU Enrollment Services and IT are creating new services to support online or low-residency programs, which use technology to enable students to take courses both remotely and in person. The goal is to support Schools, sites, departments, and programs in two key ways: help determine and document key goals prior to vendor, platform, and deployment decisions; and help connect online programs across the range of services NYU offers to support a successful deployment.

**Mobile and Usability Enhancements to NYU Classes**

Every semester, more than 50,000 individuals use NYU Classes, NYU’s primary digital learning environment. As a continuous improvement effort that caters to a population always on the go, the TLT team enabled and supported the smooth launch of an NYU Classes mobile platform in spring 2017.

**Learning Analytics and Adaptive Learning**

TLT is thrilled to have begun developing its first learning analytics pilot at NYU. This involves the creation of guidelines and dashboards within NYU Classes to help faculty members analyze student performance by bringing forward data about their own courses that they may not be able to obtain in person from students.

Related to this is the use of adaptive learning technologies, which TLT is piloting at the College of Dentistry. The use of these technologies can personalize learning for a student and present the faculty with insights into the pace of student progress, and different competencies. For example, the tool might determine that a student is adept at chemistry foundations but struggling with their clinical work. The tool would then respond by streamlining them through the chemistry elements, but adding an extra module for clinical learning.
Data Analytics

Tableau Self-Service Reporting

Another major accomplishment has been the launch of Tableau, a leading self-service reporting tool that facilitates visualization of and reporting on data for decision support. This tool enables users at NYU to pull data from multiple sources — including University Data Warehouse Plus (UDW+), local data sets, and external data sets — and share the analytics results in a secure way with their audience. It also helps NYU IT reduce IT resource investment on reporting and analytics solution development, and enables easier data exploration. Tableau is already in use at the University to provide reporting dashboards for a number of key projects, including the Learning Analytics Project and Senior Leadership Information Portal.

The next milestone is to promote adoption of the Tableau shared environment, build a community for self-service decision support developers, and provide training. This will help NYU IT empower the NYU community and business units to take advantage of not only Tableau, but also of other tools that help boost productivity and deliver innovative solutions. In addition, Tableau will help keep everyone well connected to NYU IT's governance framework, guiding principles, and best practices.

Administrative Metrics Dashboard

NYU IT provides metrics and analytics to the NYU community for data-informed decision making. The administrative metrics dashboard developed in FY17 provides a view of financial operations services across NYU. On the dashboard, one can filter by School and view data from a productivity, aging, timeliness, and quality perspective. There are graphs provided, drill-down capabilities, all of the service data from NYU ServiceLink, and some of the operational data from the University’s financial system, Financial Administration Made Easier (FAME).
Multi-Factor Authentication

One of NYU IT’s biggest accomplishments this year has been the University-wide implementation of NYU Multi-Factor Authentication (MFA) for essential University services. MFA is quickly becoming the industry standard for more secure access to services, applications, and data. Implementing it at NYU has been a multi-tiered, multi-year process that includes laying the technical groundwork, training, and communicating the change to the NYU community. A phased MFA rollout to the entire NYU community is nearly complete.

Implementation of a Next-Generation Firewall

Like any prominent academic institution, NYU can attract unwanted attention from cyber actors who seek to gain illegal access to the systems, intellectual property, and personal and sensitive data stored and shared on NYU’s network. To combat immediate threats, NYU IT implemented phase one of a perimeter firewall — also known as an Intrusion Prevention System (IPS) — in summer 2017. This threat prevention technology now sits on NYU’s network border and has the ability to identify, stop, and block future inbound security attacks on the University’s network in New York. With the initial configuration of the IPS for NYU New York complete, subsequent phases are planned to deliver additional protections and greater security to the global network. The NYU New York Infrastructure team will be collaborating with NYU Abu Dhabi and NYU Shanghai on a global firewall management capability, which will create greater synergy across the security and infrastructure efforts, while saving time and money for the University.

Email Security

Maintaining the security of NYU’s email ecosystem is also critically important for NYU community members and for the institution. Recently, NYU IT installed an email security gateway that provides numerous benefits to the University’s email security and threat management program. Thanks to the gateway’s malware identification capability, the technology halted over 648,000 malware and ransomware attacks and 352,000 phishing attacks between August and November 2017. In addition to detecting and classifying spam and malware threats, NYU IT now has access to advanced reporting that enables staff to quickly address security issues and stay ahead of trends as they emerge.

Vulnerability Management System

Widespread cyberattacks such as WannaCry ransomware often result in significant losses of revenue and productivity within organizations. Thus, it is important that NYU stays vigilant when it comes to protecting the personal and sensitive data of NYU community members across the University’s global sites. To meet these pressing challenges, NYU IT is taking steps to develop a scanning methodology that scans every server, endpoint, and piece of network infrastructure on a monthly basis. These scans do not scan content, but they check for the currency of patching and operating systems. By checking for missing patches consistently and regularly, NYU will be better positioned to proactively address the threat of hackers who are exploiting these missing patches. In addition to patching critical vulnerabilities in NYU’s network, NYU IT’s goal is to use this process to furnish data on the deprecated operating systems that need to be replaced or upgraded in the near future.
Resource Capacity Modeling Exercise

To ensure that NYU IT is equipped to successfully implement the projects that will be moving forward in FY18, NYU IT is developing an annual capacity model that identifies the resources that are required by each project (both within NYU IT and in the business units) per month. Improving NYU IT services requires successful project delivery that is on time, on or under budget, and within scope. This model will help achieve these goals by making sure everybody is aligned on what their expectations are for resources, and that those resources are actually available.

IT Governance Restructure

NYU IT has launched a new and improved IT governance structure, which helps guide technology strategy, operations, and priorities across NYU. The IT governance process ensures that technology investments deliver value to the NYU community and are aligned with University priorities, like affordability and innovation. It also enables mission-critical activities, like teaching, learning, and research. As NYU IT makes improvements, the organization continues to look for ways to further refine and take IT governance at NYU to the next level.

Financial Portfolio Restructuring

NYU IT also redesigned and restructured its financial portfolio with the goal of creating more funding capacity to make strategic IT investments. Some of the specific initiatives include changing NYU IT’s approach to managing capital funds, transitioning to an asset acquisition model from a leasing/financing model, establishing tighter policies and controls around spending practices, and launching a more robust sourcing and vendor management program.

IT Governance
Operational Effectiveness

Streamlining Processes via Expansion of iBuy NYU

Members of the NYU IT community can now shop for goods and services in iBuy NYU, the University’s procure-to-pay system. With the transition to iBuy, NYU IT was able to retire the Business Travel Approval Form (BTAF) and modify the Funding Disbursement Form (FDF) to accommodate a specific set of uses. The adoption of iBuy reduces redundant processes and systems, ensures a quicker turnaround, and provides order-to-payment visibility.

Increasing Efficiency for Hiring and Managing Consultants

In an effort to simplify the process of hiring and managing consultants, NYU IT is deploying Fieldglass, an industry-recognized vendor management solution. Besides increasing efficiency, Fieldglass gives hiring managers a greater degree of flexibility in posting consultant positions and identifying and hiring qualified candidates. Additional features of Fieldglass include: robust reporting with visibility into who is currently working and when assignments are scheduled to end; the ability to compare candidates across a variety of different attributes; rate benchmarking; and easy timesheet approval.

Continuous Improvement

Conducting IT audits is one of NYU IT Application Development’s responsibilities. This year, NYU had its first IT controls audit with no citations, observations, or recommendations. NYU IT also had the most successful IT Disaster Recovery Test for University enterprise applications, with Recovery Time Objective (RTO) and Recovery Point Objective (RPO) met successfully. These success stories speak to the continuous improvement NYU IT has achieved in FY17.

Capital Project Administration and Control System

To better support the construction and renovation of NYU buildings, Operations Technology Services & Support (OTSS) will be rolling out enhancements to the Capital Project Administration and Control System (CPACSweb). CPACSweb functions as a full-service solution for managing capital projects and transactions, and integrates with existing NYU financial and IT administrative systems. OTSS’ enhancements roadmap will introduce new features like multi-currency, multi-phase project management and enhanced document management capabilities for storing warranty and other project documents.
Service Excellence

Client Satisfaction

In fall 2016, NYU IT conducted a large client satisfaction survey of 3,200 randomly-selected faculty, staff, and students. With a significant 47% response rate, the survey provided NYU IT and the new CIO with a better understanding of the levels of satisfaction with information technology at NYU. The first of its kind at NYU IT in over 10 years, the survey also provided insightful comments that helped inform the organization’s roadmap for service improvement.

Overall satisfaction results included:

Technology at NYU: 68% Satisfied and Very Satisfied

NYU IT provides high-quality services: 69% Agreed or Strongly Agreed

NYU IT communicates clearly and concisely about its services: 66% Agreed or Strongly Agreed

NYU IT is committed to conducting this survey every two years with the next one scheduled for fall 2018.

The goal is to improve satisfaction levels to 75% by fall 2018.

An additional 13,000 faculty, staff, and students were asked questions about School-specific services; these questions were generated by the Schools that chose to participate. The response rate on these varied by School but was also very high. School IT units are using this data to evaluate changes in their programs.

Partnerships and Community Relations

As part of the continuing initiative to improve and expand engagement with the broad NYU community, NYU IT recently created the position of Director for IT Partnerships and Community Relations. The Director and supporting staff will build on current relationships and form new partnerships with University Schools and units. The program will enable partners to work more closely with NYU IT to meet their institutional and School goals, as well as improve communication, planning, decision-making, and service delivery. NYU IT has also recently added a Communications Director, who will help expand existing communications assets while improving coordination, reach, and strategy.

Client Services

Client Services consists of two support teams: the IT Service Desk and Desktop Support. The Service Desk supports NYU IT and other University services for all of NYU’s global locations and is open year-round, 24x7. In the previous academic year, the IT Service Desk handled more than 150,000 calls. To address the ever-increasing call volume, Client Services has partnered with NYU IT Application Development to launch new performance analytics tracking tools that will significantly improve both support and efficiency. One of these tools is already enabling Client Services to see which services need more support or more troubleshooting on the technical side, and what times of day or night would benefit from increased or decreased staffing.

In the coming academic year, the IT Service Desk will be introducing chat support which will be
integrated with ServiceLink (NYU’s ticketing, knowledge base, and service catalog system). The chat transcript will be automatically recorded into the service ticket, enabling better transparency of the ticket history and quicker resolution should it be escalated to service partners.

Video Conference is one of Client Services’ new support areas and another innovation story. NYU IT has started working toward a virtual Video Network Operation Center (VNOC), a unified effort between the NYU IT Facilities and Infrastructure units and Video Conference teams to create and implement an enhanced support model. The goal of the VNOC is to integrate new and legacy Video Conference (VC)/Audio Visual (AV) systems, and to improve Client Services’ ability to support scheduled and ad hoc VC and AV requests, as well as provide a quick response to troubleshooting requests from the community. The process will include standardizing and deploying remote tools across the entire VC and AV landscape at the University. This will help Client Services cover a greater area with fewer resources and amplify the service that is provided.

Global Command Center: Always-Ready Reliability

Like the IT Service Desk, the Global Command Center (GCC) is a year-round, 24x7 operation. It is responsible for monitoring and tracking IT infrastructure- and service-related issues — not only for New York City, but for many of NYU’s global locations.

The GCC’s largest project over the past year has been planning for the implementation of PagerDuty software, which will significantly improve response time and incident resolution. It will provide the GCC with
a single dashboard and will allow most of the distributed monitoring tools used across NYU IT to be overseen by the GCC. Implementation is now underway.

In addition, the GCC assumed responsibility for monitoring Uptrends, which itself monitors approximately 40 web-based applications. They have also set up chat and softphone accounts to provide backup phone and mobility service to GCC staff in the event of an evacuation of the Command Center.

NYUHome Launch and SIS Upgrade

Application Development undertook several major enterprise-wide projects in FY17 that resulted in exciting achievements. Among them was the launch of the new NYUHome in July 2017. The completely revamped service now provides the NYU community with a highly-customizable interface, community-building features, and a more interactive user experience. Another achievement was the upgrade of NYU’s Student Information System (SIS). This upgrade, which will be made fully available in early 2018, significantly enhances the interface, usability, and accessibility of the service for students and faculty. Application Development is also working on improvements to the interface of several mobile apps, and specifically the Albert portal. The revamped Albert portal will feature a unified visual experience with quicker and easier navigation.

NYU WorkLink Improvements

In addition to rolling out the NYU WorkLink client portal, Operations Technology Services & Support (OTSS) developed a machine learning algorithm to predict work order completion times. OTSS also formed a User Experience (UX) Design team to create a “UX Lookbook” for the group’s WorkLink phase two project. WorkLink has processed over one million orders since its launch in November 2015. Phase two will incorporate emerging technologies such as machine learning to analyze historical data and predict the length of time for processing future work orders.
Student Engagement and Success

Student Worker On-boarding and Pay Process

The NYU IT Program Services Office (PSO) recently undertook a process improvement initiative to address inefficiencies in the student employee on-boarding and pay process, primarily relating to delayed paychecks. The first step was to map out the existing processes and look at known issues from a people, process, technology, and analytics perspective. PSO then came up with a series of recommendations, including the automation of forms, the publication of calendars, and process changes between the Schools and the central units. This has been a real success story, with far fewer paycheck delays thanks to student workers now being on-boarded before their first paycheck more than 80% of the time, with an ultimate target of 95% soon within reach.

Student Technology Centers

At the Student Technology Centers (STCs), staff take pride in encouraging and cultivating creativity among student workers. They are inspired and full of great ideas, and the STCs offer students not only training, but also a testing ground for their ideas and the apps they develop. Student engagement is the key to the vibrant collaborative energy of the STCs. It has been paying off, both for the STCs and for the students, and will continue to be fostered in many new ways in the coming year.

Student Applications – Rapid Application Development

The NYU Print Service is heavily used by students. To serve them better, Application Development
designed a new web-based status app which lets users see real-time availability of NYU Print Service printers in New York (i.e., busy, free, and out of service). It also shows other critical things like the location of the printer in the building, the type of printer (color versus black & white), and the status of toner and paper. It is now available via the NYU Mobile app.

**Student Career Development**

During FY17, OTSS worked with Application Development to launch the Student Software Developer program. In support of NYU WorkLink’s phase two project, OTSS also created a Student Leadership Program for Software Developers that focuses on identifying applications for artificial intelligence, machine learning, and other emerging technologies. OTSS’ student career development efforts include collaborations with the Wasserman Center for Career Development team and computer science faculty at NYU’s Brooklyn campus to investigate job opportunities for OTSS and Application Development student developers and engineers.

**Bookstore Transition**

In response to faculty requests to reduce student textbook costs, NYU IT supported an affordability effort that resulted in the transition of the operations of the NYU Bookstore to Follet, a third-party vendor. Follet’s extensive network made it possible to lower the cost of textbooks for the University, students, and faculty.

**Student Computing Services**

Student Computing Services (SCS) enables the success of many client-facing units at NYU. The Digital Studio, Data Services, Student Technology Centers, and NYU’s general purpose classrooms all rely on the SCS’ Unified Desktop Imaging service.

The SCS’ NYU Print Service enables versatile printing. For example, an NYU student can submit a print request from anywhere using a computer or mobile device, including tablets, and pick it up at any nearby NYU location with an NYU Print Service station.

SCS’ ResNet service ensures student access to a wired connection in their residence halls for gaming consoles and other devices.

The Virtual Computer Lab (VCL) makes highly-specialized and expensive software available to students free of charge anywhere there is an internet connection. Despite having only a handful of dedicated staff to support the service, the VCL ranked highly amongst community members in last year’s IT client satisfaction survey.
Organizational Development

Women in Information Technology

NYU IT launched the Women in Information Technology (WIT) initiative to promote diverse career pathways, as well as build and nurture a robust support network for female IT professionals at NYU. Its mission is to empower women who are working in IT-related professions at NYU, and to encourage them to reach their fullest professional and personal potential by pursuing University career opportunities, taking advantage of professional resources on campus, and employing industry best practices in their fields.

Workplace Satisfaction Survey

In November 2016, NYU IT conducted a Workplace Satisfaction Survey which showed that 71% of employees are either satisfied or very satisfied with working at NYU IT. To help increase employee satisfaction, NYU IT formed a survey response team that has been working diligently in 2017 to identify areas of opportunity and implement initiatives that address the feedback received. To date, this includes the establishment of a mentoring program, improved communication, a rewards and recognition program, new professional development offerings, community service opportunities, and social activities such as an employee picnic.

Knowledge-Sharing and Mentoring

The NYU IT Mentoring Program was developed in response to the NYU IT Workplace Satisfaction Survey. This program is open to full-time IT employees and aims to increase engagement, support career goals, and enhance the overall workplace environment. A mentoring committee pairs mentors and mentees by identifying compatibility in goals, strengths, stated needs, and preferences. The program provides an opportunity to network, collaborate, and learn new skills while building lasting work relationships. After the conclusion of this first year, and after further review, the program may expand to include IT departments at NYU Schools.
NYU IT CORE BELIEFS

We demonstrate our core beliefs every day in our interactions, attitude, and performance.

People at the heart of everything we do.
We listen to our clients and colleagues, and use our expertise to anticipate and address their needs.

Create space to innovate.
We challenge assumptions, and seek out fresh perspectives and new ways of thinking to fuel our productivity.

Right promises. Right delivery.
We set clear goals and priorities, and execute with speed and agility to deliver better results.

Share information. Build trust.
We engage in open and honest communications that reflects inclusiveness, fairness, and respect for each other.

Teams and partnerships work. Boundaries don’t.
We collaborate to maximize the value we bring to NYU because our best ideas come from working together.

Insist on excellence.
We take pride in what we do, strive to improve constantly, and hold ourselves accountable for the results.