In presenting this biennial report of the Office of Information Technology, for the two academic years July 2019 through June 2021, I first have to acknowledge that this is not the annual report I would have liked to have done. Yet the coronavirus pandemic and its repercussions basically forced all our hands — not only in the ways we responded, but in this, the way we document our achievements.

Similarly, our annual reports usually reflect a common theme within OIT during the year. For this report, you might say the theme chose us, in a very uncommon set of circumstances. To fully capture OIT’s response during the pandemic, we have organized the report into four sections, from preceding the crisis to — it is our fervent hope, by the time this is read — looking back on it.

In the first section, we reflect on how, having just completed our five-year plan to reorient OIT from a technology organization to a service organization, we were excited to begin our next phase of development: optimizing support initiatives like Campus Service Management; advancing enterprise-wide projects like the campus network upgrade; and continuing to drive diversity and inclusion efforts we started in 2016. Then COVID-19 hit and upended our priorities.

How we rose to the occasion, innovating to allow remote learning and work continuity during the early days of the crisis, is the focus of section 2. This section, in particular, shines a spotlight on our “technology first responders,” who rose to a tremendous challenge with an equally tremendous response. If anything positive has come from the pandemic, it is a redoubled appreciation for the people who make the University, and OIT, exceptional.

While being forced physically apart, we were able to strengthen our connections to one another.

The third section looks at our response to the persistence of the pandemic. When the expected three weeks’ disruption grew to three months, then doubled and doubled again, the University’s dependence on technology rose dramatically, asking us to both maintain operations and innovate at an unprecedented pace. Our relocation of the campus network hub, for instance — a task we’d never attempted before — completed its first phase during the pandemic, with virtually no downtime to network operations. Again, due in tremendous part to the ingenuity of our teams.

Section 4 takes us to the present where, despite our continued vigilance on the virus, we are again looking forward optimistically. The on-campus COVID response measures are fully in the vaccination phase. Students who returned to campus for spring 2021 will be joined by most of their peers in the fall. And OIT, along with the rest of the Princeton community, is forever changed, but with new wisdom and renewed vigor for serving the University’s primary mission, to advance learning through scholarship, research and teaching of unsurpassed quality.

Jay Dominick
Vice President for Information Technology and Chief Information Officer
On the heels of success, planning for what’s next

It was the start of the 2020 academic year, and from the vantage point of OIT, there were only blue skies ahead. Having just completed a comprehensive five-year plan focused on integration, security and service-driven goals, we had begun resetting priorities and initiatives — among them, strategizing a new approach for IT service delivery that would take the organization, and the Princeton structures and communities that depend on it, through the next three to five years. A hopeful, transitory phase, it showed no sign of the challenges to come, or the backbreaking efforts and unwavering commitment that got all of us at Princeton through them.

Before the Pandemic: Fall 2019

The new Strategic Planning Initiative began with a comprehensive set of goals proposed to build upon the successes of “OIT 3.0”:

1. Enable a “One Princeton” culture of integration, including planning, process improvement and how technology is leveraged.
2. Support campus growth and the implementation of the campus master plan.
3. Make security and risk management a campus-wide responsibility that is programmatic and cultural.
4. Provide premier support for network- and data-centric research.
5. Modernize the IT infrastructure to reduce risk, improve agility and enable new capabilities.
6. Implement a data governance model, tools and competencies that support the securing and sharing of data as a university asset.
7. Create a 21st-century customer support organization that pivots from technology provider to service integrator.
Before the Pandemic: Fall 2019

**Reorganizing to meet our new objectives head-on**

As the strategic plan was gaining consensus at the senior staff level, the organization itself was transitioning to meet evolving demands in research computing and for “the cloud.”

At this time, OIT was stepping up its efforts to support Princeton as one of the premier research institutions in the world. Within Research Computing, roles were redefined along more specific lines and in keeping with national trends, resulting in five distinct areas of focus:

- Advanced Systems and Data Storage
- Researcher Engagement
- Research Software Engineering for Computational and Data Science
- Research Computing Architecture
- Advanced Networking

At the same time, the “everything as code” revolution — which has effectively redefined infrastructure as software — had called for a new alignment among our software development functions. Where the accessibility, user experience, web development and application development teams had previously operated independently, they were now brought together under one umbrella, Software and Application Services (SAS), to address both the goals we had and the needs we could not have predicted:

- Bringing the User Experience Office (UXO) front and center, in keeping with our user-oriented pivot; and
- Shifting development to industry best practices, like Agile, that emphasize rapid iteration and automated deployment — vital capabilities once COVID called for change on a dime.

**Service Management as the core of OIT 3.2**

Additional changes were made to leverage Service Management as a path to continuous improvement:

- First, the Support and Operations Center (SOC) joined the Service Management Office (SMO), in anticipation of bringing our campus partners onto the IT service portal, ServiceNow, as a process management platform.
- Next, the SCAD/DCS program was taken under the wing of Operations & Planning, led by the deputy CIO, in recognition of its integral role in campus support.
- Finally, to streamline and align classroom and event support, the Instructional Support Services group (ISS) transitioned out of OIT into University Services, where it would support venues like the Lewis Center for the Arts and events like Commencement.

Collectively, the realignments turned out to be a prescient move, enabling the continuity of critical research, academic and administrative operations even as the campus was on the verge of going — for the first time ever — fully remote.
Before the Pandemic: Fall 2019

Campus Service Management makes its debut

The successful deployment of ServiceNow (originally launched as ServiceNow at Princeton, or SN@P) had transformed OIT’s internal workflows, creating a more efficient, scalable platform for service delivery and collaboration — effectively a “one-stop shop” where campus IT users could report issues, ask questions, or request support. The next step, then, was to extend the portal’s footprint, applying the same service management and Continual Service Improvement (CSI) principles to academic and administrative workflows.

The fall saw OIT bring select campus partners onto the common platform, as an intuitive, accessible means of automating their data-intensive workflows and streamlining cross-functional teamwork. Finance and Treasury, Environmental Health and Safety, The Graduate School and University Services became the early departmental adopters, serving as a kind of beta for the broader Campus Service Management rollout that would ultimately be delayed.

One bridge closes and a virtual window opens

In what would become a common theme for the coming year, an ostensibly minor change to campus operations became a major technology lifeline for the longer term. Learning that the Alexander Road Bridge, a main thoroughfare to campus, would be closed for renovations starting in early November 2019, OIT had expanded its Zoom site license for use campus wide (among other preparations). The idea: a hybrid work scenario meant to lessen a grueling campus commute.

Believing the shift to virtual would enable work continuity for the predicted six weeks, OIT had actually bridged the knowledge gap to fully remote operations — both administrative and academic — that would extend to six months, then a year, and beyond. In the early stages of remote learning in spring 2020, Instructional Support Services (ISS) would be able to use the system to support courses, large-scale events and meetings, and OIT would integrate it into the Blackboard Course Management System to simplify the setup of interactive sessions.

Erasing Blackboard for a clean Canvas

Before the Blackboard system became a remote-learning stopgap, however, the University had made the decision to transition to a modern, more robust learning management system (LMS). (Princeton had adopted Blackboard in the early 2000s.) Led by the McGraw Center for Teaching and Learning, collaborating with OIT, the Office of the Dean of the College and the University Library, the LMS team ultimately chose Canvas as the right tool for the (expected) times ahead.

Set to begin in spring 2020 with early adopters who would help refine the communications, training and support needed, the Canvas transition would be comprehensive: 3,760 courses created in the system; 1,260 faculty, 970 assistant instructors, and 300 staff instructed in its use. In all efforts, the McGraw Center led and OIT supported — a significant shift in itself.

Originally scheduled to span five semesters — aligned with the rhythms of Princeton’s academic schedule — the timeline ultimately had to be collapsed, delivering a full academic year earlier than planned. It was a necessary feat, since Canvas’ cloud-based system would better integrate with the digital tools faculty had come to rely on, but a feat nonetheless, impossible without the dedication and tireless work ethic of the McGraw Center and OIT staff.
Mission-aligned infrastructure moves

Some of the most mission-critical components of OIT's strategic initiative were a direct response to the changing digital landscape: the explosion of wireless; the growing number of network-connected devices (increasing by a factor of 10 every five to six years); the rise in data security threats; and the now-persistent role of technology in academic innovation.

A giga-achievement with NJEdge

Princeton's membership in the NJEdge network gave the University unrestricted broadband access to Internet 2, the country's premier backbone for academic research. Doubling capacity and connecting our research community to other preeminent facilities nationwide, the network had lived up to its name.

The start of the 2020 academic year then set an even more significant "edge" in motion: the creation of New Jersey's first ever GigaPOP (gigabit point-of-presence). Partnering with NJEdge and Rutgers University, the new access point was not only an advancement for Princeton research capabilities, but an investment in New Jersey as a whole, at a time when the country was on the verge of its greatest-ever demand for digital access.

Forward-thinking that enabled forward motion

When it ultimately became clear that the academic world — and the world at large — was changing irrevocably, other measures we had taken during this period began to bear fruit, in enabling work continuity, easing the pain of isolation, and addressing racial equity issues that not even a pandemic could put off. At this point, however, we had no way of knowing how critical they would become.

Elevating the importance of data

Recognizing what a critical asset data had become to the University, the Strategic Advisory Group on Data and Analytics (SAGDI) made a two-part recommendation to the Provost in 2019: the creation of a Strategic Data Office, housed in OIT, which would help us better apply

A next-generation network takes its next steps

After more than 30 years of incremental network upgrades — from the original 1.5 Mbps connection to 140 Gbps by 2019 — OIT had begun to modernize the campus network from the ground up. An ambitious undertaking, yes, but one in which we had already gained a great deal of ground. To meet the University's need for exponentially higher bandwidth and lower latency, (what was then called) the Next Generation Network had made significant progress in three key areas:

1. Enhanced bandwidth for data-centric research;
2. Increased security and resiliency of the network border (i.e., where Princeton's internal network connects to the rest of the internet);
3. Greater internal security through network segmentation.

Specifically, by fall 2019, we had upgraded our firewalls and added protection from Denial of Service Attacks, significantly increasing network security. Next, we would transition the entire campus network to Wi-Fi 6 and aim to increase network access points to 13,000; begin implementing our network segmentation strategy and increase capacity of our network research links; all while improving speed, reliability, redundancy and maintainability of the network.
data to strategic decision-making; and the hiring of a University Data Officer, charged with leading the strategy for data collection, use, management, and security.

While the pandemic forced an about-face in priorities — such that the hiring search continues — the recommendation created a lasting roadmap for analytics and decision-making within OIT.

**Fostering connections through CampusGroups**

Driven by two newly founded campus forums, SAGIT also approved the sourcing of an events management platform to centralize and standardize event registration and scheduling. The Graduate School’s professional development program, GradFutures, had initially prompted the need. When the inaugural launch of Wintersession, a two-week experiential learning program open to anyone in the Princeton community, was predicted to have 6,000–7,000 participants, the proposal became an urgent need.

Originally scheduled for an early 2021 go-live date, the CampusGroups platform — rebranded as *MyPrinceton* — was rolled out by OIT’s Software and Application Services (SAS) in time to support the (ultimately virtual) Wintersession, with 300+ workshops led by faculty, staff, students and alumni. Today, more than 600 student organizations use the platform. What's more, its utility extends far beyond student life, with configurations to support key administrative and academic departmental needs, and the planned integration with centralized University calendaring. Perhaps most important, the platform enabled connection and collaboration in an otherwise isolated time.

**Empowering Diversity, Equity and Inclusion within OIT**

Of course, the pandemic was not the only urgent issue that would confront campuses during this time. As the nationwide emotional reckoning over racial inequality came to a head, we were able to look to the University’s early diversity efforts in building a roadmap for greater inclusion.

Forming five subcommittees within OIT in 2019, we had outlined a Racial Equity Action Plan by December 2020, with the goals of:

- **Workforce diversification**, by working with HR hiring managers to better embed diversity and reduce unconscious bias, from the interview process onward.
- **Development and retention**, to extend the impacts beyond hiring to the lifecycle of an employee and plans for succession.
- **Culture of inclusion**, which would address issues of inequity or inaccessibility in OIT operations and communications at every level and within technological platforms like the University knowledge base.
- **Collaboration with University partners**, such as Finance & Treasury and University faculty, to enhance our supplier diversity program and collaborate on critical social justice initiatives.

Among our efforts to attract and retain gender-, racial- and ethnically diverse candidates were two key hiring and retention programs.

**The Apprenti Program** is designed to bridge specific talent and diversity gaps within OIT, discovering untapped talent and strengthening Princeton’s IT ecosystem overall. We began with two trainees — a developer and technical support apprentice — who, after finishing technical training with consultant Apprenti, are set to join our team for a year-long internship.
The OIT Summer Internship Program, a nine-week program within one of OIT’s departments offers a chance for Princeton students to gain professional experience in technology fields that they can then carry into the real world. While the program had to be placed on hold for summer 2020, we look forward to bringing more new minds into the IT fold.

Diversity, Equity and Inclusion (DE&I): Working to make every voice heard and valued

In 2013, three black female organizers gave life to a hashtag that would change the world: #BlackLivesMatter.

While hardly the first movement working to eradicate injustice toward people of color in the U.S., BLM became a rallying cry that would bring new generations to the fight. What’s more, it shed light on a dim area of bias: the unconscious, systemic racism that exists in even the most liberal-minded institutions in our country. Like Princeton University.

The dawning of diversity awareness for OIT

Princeton was ahead of that particular curve in taking on the issue of diversity. In 2012, as the death of Trayvon Martin rekindled the nationwide conversation on race and equity, Princeton’s Board of Trustees, recognizing the writing on the wall (before BLM was writ large on social media), issued a call to action to assess engagement in diversity and inclusion at the University. The resulting Committee on Diversity Report shone a positive spotlight on OIT, but in doing so, revealed what more could be done.

In rating highest, recognizing an opportunity to do more

When the report came out in 2013, OIT emerged as the highest-ranked Office on campus in terms of inclusivity and staff engagement. Yet while the staff gave OIT consistently positive feedback — on how they felt about working in OIT, if they mattered and were valued, if they had opportunities to grow — OIT leadership recognized that the results were not necessarily a reflection of how diverse the Office actually was.
The data, in fact, revealed clear opportunities to improve, especially as it related to bringing more women into IT. The sentiment became, "we can do more."

*How* to do more posed a new challenge, however. Even the most complex IT projects have measurable benchmarks — specific deliverables, end dates, performance metrics — but fostering a more diverse and inclusive environment wasn't a matter of numbers. So OIT began by playing to its strengths: planning and collaboration.

Assembled in 2014, the OIT Planning Team spent the next two years working closely with Human Resources, University Services, and other groups within the University that were working on their own diversity initiatives; as well as gaining insights from a network of Ivy League diversity groups. In 2016, the team’s Diversity and Inclusion Plan, with its framework of five strategic pillars, was approved.

Over the next two years, assembling an OIT Diversity Core Team and five working teams, a number of initiatives were developed: the “OIT Inclusive” discussion series, the “Join Our Team” employment site, the OIT Summer Internship Program, and the celebratory OIT Culture Fest. The most significant outcome from the period, however, was the creation of the Racial Equity Action Plan.
Racial Equity Action Plan: turning intention into action

While earlier efforts may have raised awareness and engagement, they had been hard to quantify. The Action Plan, by contrast, established four strategies that would yield tangible results.

<table>
<thead>
<tr>
<th>The strategy</th>
<th>Key results</th>
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<tbody>
<tr>
<td>Workforce Diversification</td>
<td>The OIT Apprenticeship Program, which is focused on broadening OIT’s workforce (see section 1), added two one-year term positions in 2021: a Client Systems Tech Assistant in the Service Management Office, and a Front-End Developer in Software and Applications Systems.</td>
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<tr>
<td>Development and Retention</td>
<td>As of this writing, OIT is about to launch its OIT Academy, designed to create learning and development opportunities for all staff. The curriculum will include topics such as IT Methodologies, Project Management, Leading from Where You Are, Emotional Intelligence, and Accessibility and User Experience.</td>
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<tr>
<td>Culture of Inclusion</td>
<td>Initial efforts to embed diversity, inclusion, equity and accessibility into OIT’s day-to-day operations include the writing and publishing of the knowledge base article “Guide to Inclusive Language in IT Content,” the inclusion of OIT’s DE&amp;I strategy in the orientation program for new hires, and making Unconscious Bias and Title 9 training mandatory for OIT staff (a particularly unusual step).</td>
</tr>
<tr>
<td>Collaboration with University Partners</td>
<td>OIT became a major sponsor of the Ida B. Wells JUST Data Lab, which is housed in the University’s Department of African American Studies, and was created to shrink the space between data and interpretation by providing context. The Office also committed to increasing its yearly net spend with minority-owned vendors by 100% by the end of fiscal 2023.</td>
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No voice left behind: engaging every member of OIT

To OIT, the efforts to raise their DE&I profile have been “truly teamwork to the nth degree,” from those at the top leading the charge, to every team member getting behind it. When staff were asked to submit applications to serve on DE&I subcommittees, for instance, OIT initially received 19 applications — but then reached out to 34 others. To ensure they were hearing the voices of
everyone in IT, they went deeper into the organization: to groups that hadn’t yet been involved, like the field staff; to those in entry-level positions, not just senior staff; to newer employees, and others. By forming teams as diverse as possible, in multiple ways, they would elicit the broadest, truest experience of OIT.

**How far we’ve come, and how much remains**

In March 2021, when Human Resources conducted its 2021 University-wide Staff Engagement Survey, OIT’s commitment to a welcoming departmental culture was again on full view. OIT’s results not only compared favorably with those of University staff overall, but in some categories exceeded them. Most notably, OIT staff gave all-around high marks to the statements “There are people at Princeton who appreciate me as a person” and “I am proud to work at Princeton.” The statement “My department has an inclusive work environment where all individuals are treated fairly and respectfully” was ranked nearly as high — illuminating both the progress made and the areas where, with additional effort and investment, OIT could be even better.
Extraordinary efforts in service of our mission

At the start of 2020, as OIT was entrenched in its new strategic initiatives, the world changed. The novel coronavirus, having been declared a global health emergency, was creating a cautionary ripple effect across the U.S. On February 21, New Jersey’s Governor Murphy issued Executive Order 107, which limited on-site work to “essential workers,” including those working in information technology support. In effect, OIT staff had just become “technology first responders.”

Even before the University had officially ordered pandemic measures, OIT went to work. A memo from Vice President for Information Technology and CIO Jay Dominick asked OIT to begin planning for two potential scenarios:

1. Princeton would remain in session, but administrative staff would have to work remotely for three weeks.
2. The campus would close, and the entire University community would be remote, but OIT would still need to maintain essential operations for three weeks.

At that point, three weeks was the expected time frame. It would soon become clear, however, that the detour in OIT operations was actually a complete change of destination, with work continuity while remote taking priority over every other initiative.

Rewriting the playbook: turning on a dime

When, on March 9, University President Eisgruber announced that fully distanced learning would begin two weeks later, OIT was already in motion. The planning that had effectively begun with one memo took on a
decisive framework, defining objectives, immediate actions, policy decisions, and communication needs over four distinct phases:

**Phase 1: Planning** — detailed 40 points of preparation needed to ensure minimum disruption during phase 2.

**Phase 2: First 48 hours** — set expectations for the flood of potential service disruptions and requests as online classes and remote work began.

**Phase 3: Sustain** — developed a fully operational model to manage a remote or hybrid scenario for an extended time period, previewing “the new normal.”

**Phase 4: Recovery** — reimagined workflow for the return to campus, including the planned project backlog and solutions to mitigate staff burnout (from the start, it was clear this would be a challenge unlike anything we had seen before).

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**A response for the history books**

Having written our playbook, we immediately mobilized our response, bringing IT staff together to meet the historic challenge as a team. Almost overnight, we stood up a technology loaner program for faculty. We auto-enabled technologies essential to remote work. We engaged more than 25 staffers to take support calls for Zoom and our Canvas and Blackboard learning management systems. We developed the Work Continuity website. All that and more — and that was the end of week three.

Of course, even as time-critical as the changes were, shifts this radical in the ways we worked would have to be tested, so our Enterprise Infrastructure Services (EIS) team stepped up. Before the floodgates opened — as they certainly would when the entire University community went remote — EIS staged a “remote-work practice day,” in which EIS staff would work from home for a full day, testing the reliability of remote systems at the same time they tested their own ability to provide support services remotely. The full OIT organization would then follow with another practice day one week later, applying the lessons learned by EIS. While many of the takeaways from those days would be specific to individual systems or processes (e.g.,
determining the root cause of secure remote access VPN drops), the biggest lesson was this: OIT was up to the task.

As predicted, OIT’s workload surged with the tsunami of remote network traffic and use of virtual collaboration tools like Zoom, among other issues, drove up Help Desk calls. Yet pre-COVID strategic planning had serendipitously given us the tools to ride it out. A test of OIT’s agility, it was ultimately proof of our teams’ dedication, professionalism and heart.

Pandemic response-related Help Desk calls

![Weekly Zoom usage, in minutes](image)

By the book: supporting University pandemic priorities

The beyond-abrupt transition to remote teaching and learning was the first test of OIT readiness. It was also the most important. It had to be done right, and fast, which meant an all-hands-on-deck approach that impacted every aspect of OIT operations. To ensure we were maintaining governance in the face of such immediate needs, OIT leveraged the Strategic Advisory Group on IT, or SAGIT.
When the pandemic hit, SAGIT quickly pivoted to align funding with the priorities set by the University, as this memo excerpt shows:

“SAGIT will continue to fund projects for the upcoming fiscal year, but will be primarily focused on projects that have a material impact on operations during this extraordinary time. SAGIT will support projects that align with the following criteria:

• Critical to the mission during the period of pandemic and financial uncertainty, including one or more of the four University priorities:
  – Ensuring the health and well-being of our students, faculty and staff
  – Supporting online/remote instruction
  – Enabling campus operations for remote work and instruction
  – Retaining and supporting our talented workforce by leveraging existing staff when possible
• Essential for campus safety and security
• Time-sensitive (driven by a regulatory requirement, contractual obligation, or the new SAGIT proposal criteria)

Projects already approved and funded may proceed; however, SAGIT is requiring that all approved projects be evaluated to determine whether the project should continue as is, continue with a changed scope/timeline, be cancelled or be deferred.”

Clearing the deck for what matters most

The IT Project Portfolio (IPP), within which some of the projects are funded by SAGIT, had been originally created to help navigate the plethora of projects OIT had over the course of a year. Yet the priorities we had set for 2020 were instantly dwarfed, as the pandemic forced us to take a new, urgent look at the IPP, determining which projects would need to be deferred or delayed vs. those that would continue or be expedited.

Ultimately, nearly 94% of IPP projects on the slate were impacted. Of the 151 planned projects, 109 were deferred and 32 were suspended, not only reappointing staff and resources to the critical need, but making nearly $1.3 million available in the short term for immediate initiatives that enabled remote work continuity. Of course, the most impactful of the shifts was to those projects that would be expedited.
Accelerating strategic moves to the cloud

In the early stages of the campus shutdown, the need for infrastructure to adapt to remote work was incredibly high (even if the expectation was that it would be short-lived). OIT pivoted to accelerate projects already underway that would streamline workflows. They were forward-thinking decisions: “cloudification” and a more automated infrastructure would relieve staff of the constant burden of manual intervention, freeing them for more strategic efforts.

**Cloudification** involved assessing key applications and technology in order to begin moving them from campus to the cloud — essential when so much work would become virtual.

**Research Computing experimentation and innovation**, which was standard practice for the department, enabled a seamless transition to remote computing and research.
Work Continuity Through Crisis: Winter 2019 – Summer 2020

A virtual toolkit for a newly virtual world
As all the work routinely done in person at Princeton — from teaching and learning to calls, meetings and collaboration — now had to be done remotely, OIT swiftly developed the means to do so, with a work continuity “toolkit.”

- **Zoom meetings**: Our campus Zoom license became indispensable once off-site work became the rule, rather than the exception. In addition to hosting physically distributed meetings and events, it enabled remote, interactive learning on a new scale.

- **GlobalProtect VPN**: As the need to securely access campus resources from off campus grew, we realized that SonicWall Remote Access would not be up to the task. Planning to sunset the existing VPN by the end of 2020, we brought in GlobalProtect, which was easier to use and install.

- **Jabber Unified Communications**, which had been implemented but not fully rolled out by the time the pandemic hit, was also accelerated. And was a success, thanks to the efforts of our “communications dream team”: automatically provisioning accounts, distributing headsets, and coordinating with the SCAD/DCS community to get the word out and users trained.

- **Microsoft Online 365 (O365)**: The migration from Microsoft Exchange to cloud-based O365 enabled collaboration from anywhere and supported the launch of Microsoft Teams and OneDrive file hosting, without need of a VPN to access them.

Coming together to meet the challenge head-on
Of course, none of these herculean efforts would have been possible without the collaboration and determination of our OIT and SCAD/DCS staff, as well as our University partners. While the entire Princeton community stood up to this unprecedented challenge with grace, the ways that our “technology first responders” came together were nothing short of inspiring.

Taming the pandemic with a Tiger Team
While the term “Tiger Team” is commonly used for a group of the best-of-the-best assembled to meet a specific challenge, in our case it meant that and more, as it spoke to the pride and commitment we all feel to the Princeton mission. The cross-functional team brought together OIT leaders and field experts — with the ability to tap additional resources as needed — to shore up our Support and Operations Center (SOC) Tier 1 support and champion our continued pandemic response.

Early Tiger Team achievements included:

- A SCAD/DCS survey, intended to improve incident handling, streamline ticket intake and standardize knowledge base articles (vital to enable self-help during high-demand periods for support).
- **Tier 1 support improvements** including a new SOC schedule, more IT call-support agents during peak hours, and training other OIT teams in SOC support procedures.
The Technology Loaner Program was reinvented in collaboration with the McGraw Center and other campus partners to meet the increased demands of a remote campus. Now called the Work at Home Loaner Program, it issued Mac and Windows laptops, iPad® Pro kits, document cameras, headsets and more.

Remote computer setup instructions and assistance with data migration.

Remote student technology support by the OIT Solutions Center Tech Clinic, recreating the effects of in-person assistance with dedicated call-in and virtual support sessions.

That was just to start. Over more than a year, the Tiger Team, like all of OIT, would work tirelessly and selflessly to achieve new technology feats in time frames that would have been unthinkable only a year earlier.

A continued focus on our mission alongside McGraw

When the University made the difficult decision to move all courses online, the McGraw Center naturally led its virtual learning initiatives, but OIT was an indispensable, committed partner in their efforts. Supporting the Instructional Technology Working Group, our teams provided the infrastructure and Digital Accessibility guidelines that would enable the shift away from in-classroom learning. Working hand-in-hand with McGraw, we were able to move hundreds of fall courses online in fewer than 10 days. What’s more, we accelerated the transition from Blackboard to Canvas (already begun before the crisis); what was planned as a five-year project was compressed to little more than eight months (see chart below).

An accelerated transition to Canvas

<table>
<thead>
<tr>
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<th>Spring ’20</th>
<th>Fall ’20</th>
<th>Spring ’21</th>
<th>Fall ’21</th>
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</thead>
<tbody>
<tr>
<td><strong>Total number of courses (Bb and Canvas)</strong></td>
<td>1,429</td>
<td>1,285</td>
<td>1,147*</td>
<td></td>
</tr>
<tr>
<td><strong>Total number of courses in Canvas</strong></td>
<td>43</td>
<td>543</td>
<td>846</td>
<td></td>
</tr>
<tr>
<td><strong>Percentage of courses in Canvas</strong></td>
<td>3%</td>
<td>42%</td>
<td>74%</td>
<td>100%</td>
</tr>
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</table>

* Number represents active courses (1,354 total)
Firming up the front line of computing support

With on-site technical support work at a halt, it had become clear almost immediately that aligning OIT and SCAD/DCS support activities through the Operations and Planning Group would be a tremendous advantage in marshaling our resources campus-wide. As direct support to Princeton’s academic and administrative departments, they would truly be the front line in maintaining their departments’ operations through the crisis.

It was a collaboration that would continue to evolve. In early March, in anticipation of the chaos that might confront SCAD/DCS teams once learning went remote, we formed a 16-person SCAD/DCS Working Group that would support the front-liners and ensure open lines of communication with OIT throughout the pandemic. Ultimately, forming the working group strengthened the relationship between the SCAD/DCS and OIT, enabling greater collaboration and information exchange, setting us on the path to an even stronger partnership in future.

Ensuring success from behind the scenes

While an incredible amount of OIT work shifted from backend to front-facing during the pandemic, wheels were still turning — and more quickly than ever — behind the scenes.

A sense of security in insecure times

Since 2008, our Information Security Office (ISO) has been conducting its Architecture & Security Review (ASR) on newly proposed IT products and services. Its purpose is not to offer a thumbs-up or -down, but to make assessments and recommendations about risk and how to mitigate it. In early 2020, with migration to the Canvas LMS underway and our “cloudification” efforts on overdrive — more than 85% of the technology reviewed was cloud-hosted by that point — ISO stepped up its pace remarkably to match the need. Compared to the 62 ASRs conducted in 2019, we completed 82 ASRs by end of 2020, enabling OIT to quickly and securely onboard the new technology needed to sustain remote work continuity.

Using the budget to its best advantage

The upheaval in operations could easily have swamped the existing procurement process, were it not for the central oversight of COVID-19 funding set up by our Operations & Planning (O&P) department. As with all OIT departments, O&P rose to the challenge, expediting procurement of equipment, licenses and staff, while carefully stewarding any remaining resources.

Adapting to whatever may come

By the end of this critical period, looking back on successes but acknowledging the challenges that still lay ahead, OIT Vice President Jay Dominick summed it up:

“Most importantly, we will remain flexible. It is impossible to anticipate what the next few months will bring. The dedicated staff at Princeton will do their best to support the instructional mission of the University, regardless of what comes our way.”
A Stellar achievement by Research Computing

Picture it: It’s 2019, and Princeton is up to research-as-usual — if being one of the leading research institutions in the country can be considered “usual.”

Discoveries are being made, models developed, theories proven. A Princeton climatologist is shortly about to win the 2021 Nobel Prize in physics. And behind the scenes of that world-class research engine is OIT’s Research Computing, developing and continually advancing the framework that makes it all possible, powerful and secure.

In early November, Research Computing had begun planning to replace a four-year-old computing cluster, Perseus, with a higher performance, higher capacity cluster, called Stellar, which would grow along with the research workload. Yet what began as an almost routine challenge would become one of the most significant the department had faced: the largest cluster installation they had ever taken on internally, just as the global pandemic had thrown a wrench in all kinds of machinery.

Taking on partners in high places

Initially, the project involved a small, internal partnership with the departmental owners of the Perseus cluster. Yet the power of Stellar to expand research computing capacity drew some newer, much larger partners to the party. First, the Princeton Plasma Physics Laboratory, or PPPL — which Princeton manages for the U.S. Department of Energy (DOE) Office of Science — saw the potential for Stellar to complement its existing high-performance computing cluster, Traverse. Stellar would not only run codes that couldn’t run on Traverse, but its size would allow it to handle some jobs that previously had to run on much larger DOE systems with longer wait times. That meant PPPL could do more, and more frequent, mission-critical research on fusion energy, while leaving the most massive tasks to the national facilities.

As the partnership grew with PPPL, Stellar attracted yet another, entirely new, partner. Because of the system’s dual architecture (i.e., running on two different kinds of chips), it could also run models for the Cooperative Institute for Modeling the Earth System (CIMES), a partnership between Princeton and the Geophysical Fluid Dynamics Laboratory (GFDL) of the National Oceanographic and Atmospheric Administration (NOAA).
As the Research Computing team was striving to develop these new, mission-critical relationships, COVID was not making things easy. In a University culture that prides itself on face-to-face communication, trust had to be built remotely, consensus virtually, and new ground broken over Zoom.

**A set of challenges upon challenges**

Yet remote collaboration was the tip of the iceberg. Once the planning had been put to bed, the physical work began — at a time when physical proximity was all but verboten. In January 2021, the installation of Stellar began. Because of space and power challenges that could have had a domino effect on the installation process, the team opted not to have the vendor perform the installation, leaving OIT’s Critical Infrastructure and Systems and Storage teams to take on the massive task internally. What’s more, pandemic-related supply issues meant shortages of needed electrical equipment to power the cluster.

At that time, the University’s COVID protocols prohibited the installation teams being on site for more than two hours at a time, with only two people allowed on the server room floor at once. It became a juggling act in which time was against them, as was space — dealing with the sheer logistics of where to place equipment in an already-full data center. Even the usually taken-for-granted details became a challenge: for instance, two hours left little time for cleanup, so teams were literally questioning — in a site that should be left impeccably clean — how to take out the trash.

**Tackling parallel projects without missing a step**

Stellar was a huge undertaking, to be sure. (And the numbers bear it out, as the list of components below shows.)

**Stellar by the numbers**

<table>
<thead>
<tr>
<th>For PPPL and Princeton Main Campus</th>
<th>For CIMES/GFDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>296 quad-socket Intel nodes</td>
<td>187 dual-socket AMD nodes</td>
</tr>
<tr>
<td>28,416 total cores</td>
<td>23,936 total cores</td>
</tr>
<tr>
<td>768G total memory</td>
<td>512G total memory</td>
</tr>
</tbody>
</table>

Yet it wasn't the only major project on Research Computing’s plate at the time. In recent years, as digital data had become more and more important to research — and research had become more and more competitive — the team had been tasked with developing a more secure research infrastructure. That wasn't merely a University mandate, but a federal one, based on cybersecurity standards that had been put in place in 2014 and has continually evolved.
So at the same time they were beginning the Stellar implementation, Research Computing teams were standing up Citadel, a secure infrastructure for analyzing and storing sensitive data like controlled unclassified information and intellectual property — one that had to be compliant with a myriad of federal standards (a virtual alphabet soup of acronyms).

All of which is to say nothing about the remote work continuity efforts — like Apporto/Vi-Lab (see section 3) — that the teams turned out on a dime.

**An eye-opener for OIT, a win for critical research**

For Research Computing, the Stellar implementation came with a number of lessons learned. The hardest of them was how difficult an installation of that size would be to take on alone (minus the vendor). The best lesson, however, was learning that within OIT, they would always have a strong team of technical professionals to rely on. The incredible flexibility, professionalism and collaborative spirit of their installation partners was a perfect example of how the pandemic had only brought OIT teams closer together.

In the end, however, the biggest winner was the research community, and by extension, the country’s scientific leadership. Even as the pandemic dragged on, and work continuity efforts took priority over most projects, Research Computing went beyond maintaining capabilities to growing them, advancing them, innovating with them. Just more proof that you can’t keep a good OIT team down.
Raising the Bar for Remote Learning: Fall 2020

A lingering pandemic opens new channels of innovation

As the fall 2020 semester loomed, it seemed increasingly unlikely that universities would be able to return to “business as usual” any time soon. Threatened by COVID variants and challenged in the aftermath of a nationwide racial reckoning, campuses were up in arms, but not up and running — at least not in the ways we had come to expect.

Doing our best to prepare for the worst

While the hope among the larger Princeton community was that at least some on-campus activity would resume in the fall, a hybrid learning scenario would be the most difficult option to manage from an IT standpoint. Knowing that, we took a number of steps to ensure equity between the on-campus and at-home environments: securing specialized equipment, support for a new pedagogy from the McGraw Center for Teaching and Learning, infrastructure for University public health initiatives, and more. Even if the hybrid scenario never came to pass, we were determined to get ahead of the curve.

The uncertainty was resolved when, on August 7, President Eisgruber made it official: Due to the ongoing health risks, undergraduate learning would be entirely remote for the fall. While a disappointment for the entire Princeton community, it was an eventuality we had prepared for. With the mechanisms for remote teaching already in place, we set about making the process smoother and more robust.

Online teaching: meeting University standards of excellence

Thanks to monumental changes at the last minute, we had salvaged the spring semester. Our task now was to ensure that teaching in the fall, though continuing remotely, could maintain Princeton’s exceptional standards. Where the spring was a sprint, preparing for this new remote reality would be a marathon, one for which the course would need to be clearly laid.

The ad hoc Committee on Online Teaching Excellence had been appointed by Provost Deborah Prentice back in April, with OIT Vice President Jay Dominick and McGraw Center Director Kate Stanton at the helm. In just three weeks and seven meetings, the Committee conceived of the support faculty and students
would need, new and emergent technologies to enable that support, course staffing models, and more, ultimately producing a final report that would become the roadmap for lasting online instruction and teaching innovation.

While many of the report’s recommendations fell under McGraw’s purview, OIT’s role was still critical; solutions that were once a stopgap now had to evolve in sophistication — and in doing so helped forge an even closer partnership.

1. **The 250th Fund.** The 250th Anniversary Fund for Innovation in Undergraduate Education, a set of online teaching grants awarded by the McGraw Center, received a record 80+ faculty proposals for the fall. In response, OIT stepped in to expedite the funding, leveraging the existing IT governance process and SAGiT as the vehicle for immediate access to funds.

2. **Increasing equipment equity and sophistication.** The full availability and adaptability of IT equipment for an at-home learning model was a concern raised in the spring's rush to remote. For the fall, then, OIT redoubled its efforts on those fronts, partnering closely with the Office of the Dean of Undergraduate Studies (ODUS), the McGraw Center, and Instructional Support Services (ISS).

In fact, the controlled chaos of the spring uncovered a number of pain points, which would have to be resolved before embarking on Princeton's first-ever fully remote semester in its 275 years. In response, 42 University-wide working groups were formed. Coordinated by our Project and Technology Consulting Office (PATCO), it was a comprehensive, aligned approach to advancing new modes of teaching.
Raising the Bar for Remote Learning: Fall 2020

Getting the right technology into all the right hands

One foundational need for the fall was a coordinated way to get technology into the hands of students — including international students, who needed both equipment and reliable internet access. Under the leadership of OIT, the Student Technology Needs Working Group was formed to take up the challenge, leading to the repurposing of our travel loaner program into an expanded, remote-era student resource.

The resulting Technology Loaner Program, developed and facilitated by OIT, ultimately benefited students, faculty and staff (as it also absorbed the spring’s Work at Home Loaner Program). Available resources included:

- Computers, both Mac and PC
- Tablets, including the iPad Pro® Kit and Apple Pencil®, Wacom One, and XP-Pen Star G640
- Teaching aids, including the Epson DC-21 document camera and Meeting Owl Pro
- Mobile devices, including MiFi and smartphone options

By October 2020, the program had provided nearly 500 loaner devices. Flanked by the Audio/Video Loaner Program — equipment like microphones, cameras and lights recommended and supported by the McGraw Center and Instructional Support Services (ISS) — it effectively created a level playing field for students and faculty alike.

Loaner program reservations
When it comes to remote learning, access matters

Of course, equipment alone couldn’t eliminate all the barriers to equity. When students with little or no internet access at home were forced to return there, the access they had on campus was lost. Enter the Remote Operations Working Group. In addition to other means of enabling access, the group was responsible for the speedy development and rollout of Tiger Speed, an online bandwidth test that revealed whether the user’s connection was, literally, up to speed. Anyone in the Princeton community could take the 30-second test; if their results came back as anything other than “fast,” they were directed to self-service optimization tips, and if needed, OIT support, equipment or funds to ensure equitable access.

Shifting IT support from walk-in to sign-on

Even the means of support could not be taken for granted, however. Where students had been used to visiting the OIT Solutions Center Tech Clinic on campus for hardware or software issues, the pandemic had put an end to walk-ins — calling for reinvention yet again. We asked ourselves, “how do we replicate the in-person experience for this new world?” The answer was to develop a dedicated OIT Solutions Center line controlled by ServiceNow and aligned with the efforts of campus partners like the McGraw Center, ODUS, Financial Aid and others. When the pandemic closed a door, we opened a virtual “window.”

Creating a real-world experience from the cloud

The Instructional Technology Working Group, meanwhile, was also tasked with replicating real-world experiences. Already they were shoring up the infrastructure for remote classwork and helping transition the University’s learning management system: By the fall, 40% of courses were already being taught on Canvas. Now, with the focus on raising the bar, the group would work a kind of magic: bringing the virtual to life. It was a game-changer for those areas of study that were particularly hands-on: Higher-performing monitors showed the subtleties of the performing arts, new software gave library users the ability to look at 3D objects, and on-campus computing labs migrated successfully to the cloud.

Partnering with Apporto, a leader in cloud desktops for education, the team developed the Vi-Lab solution, virtual computing labs that allowed students to use academic software via a portal on their own computers. Because the Vi-Lab was web-based, it gave students anytime, anywhere, any-device access to the software applications for their specific courses. What’s more, it gave teachers the ability to duplicate their on-site lab methodologies, for instance, by sharing their own screen while simultaneously viewing all their students’ screens.
Addressing public health: no progress without peace of mind

In June 2020, before the announcement of a fully remote fall semester was made, our planning to resume on-campus activities was still in full force. Yet the most essential element of the return to campus was not at all “remote;” concern for public health was still front and center. It was what had driven us to remote operations in the first place; the community certainly couldn’t be welcomed back until a solution was in place.

To that end, President Eisgruber announced that Princeton would create its own, on-campus COVID testing facility, since external lab partners took from 48–72 hours to return results. It was a new challenge for OIT, one for which the stakes were higher than they had ever been. Yet while it took a cross-functional OIT team of 57 to complete (essentially swallowing up the organization in public health work), we created an IT framework for the testing facility in record time.

The CLIA*-certified lab opened at the start of October, and by a year later would be processing an average 2,700 COVID tests a day. Over its lifespan, the lab would be supported by myriad OIT contributions: a mobile COVID Test Kit registration app, a web-based daily symptom check, tracking dashboards, contact-tracing software, a vaccine management system — in fact, an entire public health technology ecosystem.

*Clinical Laboratory Improvement Amendments

New momentum for tech and infrastructure renovations

If one good thing could be said to have come from the pandemic, from a process standpoint, it was the ability to advance some critical projects without disrupting the essential work of the University. With virtually everyone off-site, construction, renovation and relocation projects could move forward unfettered. Could speed up, in fact.

By the end of October (week 35 of our pandemic response), OIT’s Vice President and CIO issued a “halftime” report detailing, among other things, successes within our essential infrastructure projects.

The Network Modernization Project made remarkable progress, including:

• Full deployment of a new wireless network in the residence halls, giving undergraduates greater reliability and mobility
• Expedited wireless connectivity to the Lakeside Residences for graduate students, especially those needing access to undergraduate courses
• Go-live date for the NJEdge GigaPOP, doubling capacity for Princeton’s research community
• Hundreds of phones deployed to quarantine rooms, easing isolation and facilitating communication
• Network switch automation for critical infrastructure, increasing overall network security and reliability

A new Microsoft cloud-based identity management system replaced Oracle Identity Manager, allowing us to address usability of the ServiceNow knowledge base and deploy a new password reset tool. By "halftime," there had already been more than 1,000 resets.
Raising the Bar for Remote Learning: Fall 2020

The Critical Infrastructure team grew and was able to bring 18 critical systems into ServiceNow, including incident, change and asset management.

Our system monitoring capability was expanded as well, bringing ExtraHop, Awake and Palo Alto Networks security solutions into ServiceNow.

Perhaps one of OIT’s most monumental renovations — the relocation of our network hub from the soon-to-be-demolished 87 Prospect building — was begun at this point as well. In fact, it was moved up by 10 years, and its transition planned in less than a year, all while working remotely.

Strengthening connections, in every sense

While infrastructure improvements and remote innovation were unexpected positive outcomes of the pandemic, probably the best thing to come from the upheaval was our own coming together.

At the outset, preserving Princeton’s culture was an immediate concern. We were a community of people used to being seen, being present, being engaged, but remote work seemed to threaten the connections we had built in person. Would COVID shake our sense of community? The answer, we discovered, was a resounding “no.” In fact, bonding under adversity came to be a hallmark of how we coped during these times.

Behind the partnerships, incredible people

So much about remote learning depended on our collaborations with University partners like the McGraw Center, ODUS and others. Hammering out critical planning and implementation together in close (virtual) quarters gave us a shared sense of purpose — and in turn, a greater collaborative spirit and respect for one another.

Within OIT itself, where pandemic fatigue could easily have crushed morale, we made a concerted effort to prioritize our people. Semi-weekly “Town Halls” were established to celebrate achievements and keep the equivalent of the water cooler alive. (Non-tech topics ranged from bingeable TV shows to MadLibs.) Those same Town Halls, along with Friday updates, were leveraged to keep the lines of communication (and appreciation) open with departmental IT support, the SCAD/DCS teams who were the first line of defense for academic departments in flux. Other people-first innovations followed: “Tiger of the Week,” a recognition of staff who went especially above and beyond; “Birds of a Feather” a virtual gathering space for shared interests like gardening, cooking or music; and a 1:1 peer coaching pilot, based on the long-running MOR IT Leaders Program, which helped staff prioritize and build the soft skills that make real collaboration possible.
Transplanting the heart of Princeton networking

“We had never moved a core before.”

That summed up the challenge ahead of OIT’s Enterprise Infrastructure Services (EIS) team when the decision to relocate the University’s network hub was first handed down in 2019. Yet when an accelerated schedule collided with a global pandemic, the challenge became compounded, then doubly compounded, setting EIS and other OIT staff a seemingly impossible task.

Making way for educational expansion

Until 2021, the 87 Prospect building, in the northeast section of campus, had been known as the Computing Center. Housing Princeton’s network hub — or core, as EIS calls it — 87 Prospect was effectively the beating heart of campus IT operations. So when the University announced that it would be leveling the building to make way for a new complex within the School of Engineering and Applied Science, OIT was tasked with planning a “transplant” of the hub.

Initially, the news was merely a heads-up to OIT; the transition was presumed to take place “at some point” (likely later) within the next 10 years. Then, to align with University expansion plans, the time frame was collapsed to three to five years, and ultimately, to a deadline of July 1, 2021. At that point, prior to any notion of the coming pandemic, the date seemed aggressive, but achievable.

Decisive action in the midst of drama

With the clock ticking, EIS recognized how immediate and precise the planning of the move would now have to be. Discussions began immediately with Facilities and
the Office of the Provost as to where the hub could be moved, landing finally on what had been, at the time, a server room in Lewis Library. The room, however, would have to be renovated to accommodate all the fiber, backup generators and other equipment necessary to hub operations.

As the room in Lewis Library was being prepared, EIS leadership and the Network Services team set to work planning the move. By this point, however, COVID had begun to force a remote alternative to regular campus operations. While hardly a scenario to be wished for, it was a break for the physical work to be done — with the campus cleared of people, there would be fewer considerations (except for the ice and snow, as it turned out). Yet it was a more difficult time than ever for any network disruption. With so much remote learning at stake, OIT VP Jay Dominick issued a familiar challenge to the team: “minimize the downtime of the network” during the move.

As EIS leadership put it, the move would be “literally like surgery... we were touching the heart of our infrastructure.” As if that were not enough, multiple services would have to move at the same time: Tiger TV; the University’s radio communications system, the distributed antenna systems (DAS) for radio and cellular; security systems; and most vital amidst a health crisis, Princeton’s Department of Public Safety notifications. Every morning, starting at 4 a.m. during the first 10 weeks of the University’s COVID response, public notifications would go out every 30 minutes. Minimal downtime, in this case, was genuinely critical.

**Challenge accepted: a cross-functional, multi-phased move**

Ultimately it came down to, in OIT’s words, “flawless planning.” The teams devised a meticulous game plan to move the hub piece by piece, service by service, over four to five weeks — but only during late night hours, for less than a minute at a time.

It was an amazing process. Once all the networking had been connected in Lewis Library, the teams would “unplug” 87 Prospect, connect to approximately 12 regional hub sites on campus, and from there immediately plug in the fibers that tracked back to the new location (the new network systems would already be pre-positioned at Lewis Library, waiting to be connected). Simultaneously, the teams had been building a redundant site at the New South building, which housed both administrative services and a small data storage system.

The move was not only a mental challenge, but a physical one: The Network Services teams had to be on site, working in small network closets to pre-position new cabling, which added copious safety measures to the slew of steps to be taken. In all, a cross-functional team of about 40 people (Network Services, design engineers, vendors) came together to meet the challenge enthusiastically.

**Flawless is as flawless does**

Morning after morning, during the move, the teams were challenged, and rose to it. Night after night, they would come back with “Everything went according to plan. It went well.”

The expectation going into the switchover was that some components might fail, but that never happened. Even the older equipment did not fail. The added pressure of the project’s acceleration and the move to remote learning, rather than allowing something to slip through the cracks, inspired all team members to step up — not only double-checking to be sure nothing was missed, but then checking again. Astoundingly, what could have been a formula for failure became, in the team’s hands, a resounding success and a true testament to the capability, adaptability and professionalism of OIT teams.
With the crisis waning, looking forward once again

Fittingly, spring 2021 was a time of rebirth: not merely for the country, with rising vaccination rates hinting at a return to normalcy, but for the University, newly committed to bringing its community home. OIT’s tireless efforts — alongside all of Princeton’s “technology first responders” — had paved the way for the University to get back to business (if not quite “as usual”).

Agile moves to meet COVID head-on

While all of OIT’s efforts over the course of the pandemic had facilitated the University mission in some significant way, perhaps none more so than its technical support of the campus COVID testing lab. While the health of the Princeton community was definitively the #1 priority, there was nothing definitive about how to approach a comprehensive health solution for the campus. With no hospital on campus and no prior handling of patient data, OIT staff were starting, effectively, from zero — but ended their efforts with a community infection rate of nearly zero.

Efforts began in earnest for OIT shortly after the start of summer 2020, with the task of sourcing a lab information management system that could be adapted to Princeton’s specific needs. While University Health Services (UHS) led the initiative, OIT would ultimately be responsible for the chosen system — AgileBio’s LabCollector — meeting both University mandates and state and local requirements (which spanned three states with differing rules that, at times, might change as often as twice a day). In addition, it had to integrate with data from Accurate Diagnostics, the lab performing the test analyses. Finally, and most critically, it had to facilitate all of the above remotely and immediately.

Thankfully, as was the case throughout the pandemic, OIT already had wheels in motion: The Office’s pre-pandemic shift toward Agile software development practices enabled a rapid app development process that would lead, very iteratively, to an entire campus public health ecosystem.
Preparing to Return to Campus: Winter 2020–Summer 2021

Testing and Public Health Technology Ecosystem Overview

System Management Legend
- OIT
- Dept
- Shared

Campus health technology on a world-class scale

Given the need for mobile, self-service solutions, OIT’s Software Infrastructure Services (SIS) group was tapped for much of the application development. In tandem with the Service Management Office (SMO) and the Center for Data, Analytics and Reporting (CeDAR), the intensely collaborative effort produced dozens of IT solutions (with dozens of versions of each) in record time. Among them:

- Contact tracing system (critical to the University maintaining its COVID “bubble”)
- Student arrival quarantine notifications
- Daily Symptom Check app
- University COVID dashboard
- Testing mobile app and data integration
- Testing compliance reports
- UHS provider portal reports
- Lab test results automation
- Lab order processing automation
- Testing and public health data hub
- Vaccine management solution

In all, the efforts called for 57 OIT staff, generated 307 unique reports, took a staggering number of hours, and effectively turned a planning-intensive organization into an adaptive one (even more so than remote learning had already). Yet, as those teams are quick to point out, they were not the only ones adapting: As public health pulled staff away from their day-to-day responsibilities, the remaining OIT staff stepped in to take up the slack. As before, OIT rose to the challenge as one.
Preparing to Return to Campus: Winter 2020–Summer 2021

OIT in flux: working in the new normal

Amidst all its efforts to ensure campus continuity, OIT was faced with continuity issues of its own. OIT’s pre-pandemic Return to Work plan for the fall semester had detailed density seating for 701 Carnegie Center, where the majority of OIT staff work. That would effectively place 170 people in a single building — which, as COVID wore on, became less and less feasible. It was an issue, in fact, that extended well beyond OIT’s doors, calling for the creation of the University-wide Flexible Work Committee. The purposely diverse group — hand-picked to include voices not often heard — in turn developed the Flexible Work Agreement.

Under the agreement, more than 100 OIT staff would now work from home up to two days a week, while another 80 would remain fully remote for fall 2021. It was a necessary pivot, for several reasons: the demolition of 87 Prospect, which would leave OIT short of space; the eventual need to relocate staff from 693 Alexander; and the postponement of renovations to 701 Carnegie (another casualty of the pandemic). (For more on the 87 Prospect network hub relocation, see our story on page 29.)

Now, with a likely return to in-person classes on the immediate horizon, the Group set to work designed technology kits that would ensure equal network and technology access from one classroom to another, while making it easy for faculty to pick up instruction where they left off. While OIT and SCAD/DCS played a supporting role in the effort, it was a critical one:

- Expediting equipment expense approvals
- Ordering quantities to meet the highest-use scenario
- Setting up purchase agreements with generous return policies
- Installing and implementing equipment in the classrooms

Where classroom and dorm room converge

Yet the pandemic continued to raise contradictions: Even as some classes were returning to in-person instruction, newly arriving students were still required to quarantine, making access to some IT services difficult. In response, OIT began a printer redeployment initiative, relocating the printers from academic common areas to the residential college computing clusters — effectively bringing the service to them.

Entering phase 4: the campus in recovery

Adaptability was the key for all Princeton staff over the course of the pandemic — and all rose to the occasion impressively — but the goal was that faculty and students not have to adapt any more than was necessary. In fact, the Instructional Technology Group, under the leadership of the McGraw Center and ISS, had spent the bulk of the past year working to ensure it was the technology that adapted to faculty and students.

Giving Zoom a permanent place at the table

The collaboration platform had come a long way at Princeton since it had first been licensed as a bridge-closure stopgap. As with the country at large, Zoom had become the go-to for gatherings, both social and professional. Recognizing its impact on the way the world now communicated, the University stood up a formal Zoom Steering Committee, and along with it, shifted administrative responsibility for the platform from University Services to OIT.
Preparing to Return to Campus: Winter 2020–Summer 2021

Along with the creation of the committee, the University hired a Zoom administrator — an investment that signaled its intention to make Zoom a permanent enterprise platform.

**Next generation networking for a newly mobile generation**

With each technology development — from the rush-to-remote at the height of the pandemic, to the increasingly mature solutions that prepared for our return — the campus-wide network upgrade was the key enabling factor. Just as “cloudification” had enabled our workflow to go virtual, the transition to a predominantly wireless network infrastructure would strengthen our security, resiliency, flexibility, and, in particular, mobility.

It would also strengthen the collaboration between OIT and departmental IT support (SCAD/DCS): In order to reach the point at which devices would be migrated to the new network (or in some cases, decommissioned), SCAD/DCS cooperation would be critical to audit and verify all building connections, a process OIT developed and brought in additional resources to support. Most notably, it was progress made under unimaginable conditions at an exceptional pace.

**Network modernization milestones**

<table>
<thead>
<tr>
<th>Period</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>June–December 2020</td>
<td>Plan, test and go live with new resilient wireless system</td>
</tr>
<tr>
<td>June 2020–May 2021</td>
<td>Renovate server room in Lewis Library for relocation of campus network core from 87 Prospect</td>
</tr>
<tr>
<td>June 2020–February 2021</td>
<td>Plan new resilient design for campus network</td>
</tr>
<tr>
<td>March 2021</td>
<td>Go live with new redundant network core routers</td>
</tr>
<tr>
<td>May–July 2021</td>
<td>Move all network services (core router, TigerTV, Radio DAS, Cellular DAS, security systems) from 87 Prospect to Lewis Library Move all building network connections from old core router to new redundant core routers</td>
</tr>
<tr>
<td>June 2021</td>
<td>Aruba wireless system upgrade</td>
</tr>
<tr>
<td>Fall 2021–January 2022</td>
<td>Install new switches in buildings Deprovision all unnecessary wired connections</td>
</tr>
<tr>
<td>Fall 2021–February 2022</td>
<td>Work with departmental IT staff to move devices requiring wired connections to new network</td>
</tr>
<tr>
<td><strong>COMING February 2022</strong></td>
<td>Completion of the wireless and wired network upgrade</td>
</tr>
</tbody>
</table>
Preparing to Return to Campus:
Winter 2020–Summer 2021

Cementing our technological “Edge”

Around the same time, Princeton achieved another technological milestone. New Jersey’s first-ever GigaPOP, a collaborative effort between Princeton, Rutgers and NJEdge, made its first public appearance on December 8, 2020. Going live, the GigaPOP connected the state to a global Internet 2 research infrastructure that would expand education opportunities statewide. What’s more, the GigaPOP offered the potential to democratize technology access in the state, opening opportunities for economic development that would be sorely needed in the recovering economy. Further evidence that, even under the constraints imposed by a pandemic, Princeton remained a leader in research, innovation, and infrastructure.

In the end, a stronger organization

By Phase 4 of the “pandemic playbook,” it had become clear that the Office of Information Technology was a fundamentally different organization than it had been two years earlier, and not simply as a result of reorganization. While the people and structures it had put into place remained, both had become more than their former selves: OIT processes and technology had become more agile, robust and forward-thinking. OIT teams had become more connected, collaborative and adaptable. Lessons from the pandemic had not only been learned, but had begun to be applied. (Case in point: our initiative rethinking OIT communications. See the story on page 36.) A better OIT was rising from the ashes, only the proverbial phoenix was, in this case, a Tiger.

A functional realignment for the future

As we began to reach a turning point in the pandemic, in January 2021, OIT implemented another major organizational change, an echo of the pre-pandemic reorganization that had proved remarkably prescient.

Taking stock after the retirement of a long-valued team leader, and considering the lessons learned during the previous 12 months, OIT VP Jay Dominick made the strategic decision to bring like functions together, better aligning the organization and shrinking the distance between planning and support services. This meant:

• All customer-facing support functions would be combined under the Service Management Office (SMO), under the leadership of a new Director of Customer Service and Support
• All networking functions, from wiring to routing, would be combined under Enterprise Infrastructure Services, led by a new Senior Director of Networking

After a period in which OIT had been challenged as never before and come out more united, the restructuring effectively confirmed it.

Our optimism rose and was rewarded

In May, President Eisgruber announced that, as of August 30, the Princeton community could make a full return to campus.

“On May 16, we completed an extraordinary semester by holding one of the most unusual Commencement ceremonies in Princeton’s history... We now look ahead to what I expect will be a much more normal fall semester.”
Preparing to Return to Campus: Winter 2020–Summer 2021

A look into the future: Communicating within a culture of continual improvement

In 2014, Jay Dominick launched “OIT 3.0,” both an ideal and a kind of blueprint for the organization he wanted to see OIT become. In his own words:

“To us, OIT 3.0 represents the evolution of OIT from a technology-oriented department to one dedicated to excellence in delivering services. Embedded in this commitment is a focus on developing a culture of continual improvement.”

Over the course of the next five years, that culture was on full display, in virtually every aspect of service delivery. Yet, when the onset of the pandemic a year later forced the entire Princeton community to rethink the ways in which they talk, work and share, it revealed an underexplored aspect of the service model: communications.

Recognizing the need for governance

OIT, like the rest of Princeton, was, and is, a very interpersonal organization. In-person communications had long been the go-to, as was the tendency to let each person communicate in their own individual way. In the words of one PATCO leader, “OIT is the most high-touch organization I’ve ever worked with.” High praise, and merited.

Yet while that model was ideal for relationship building, it became clear to OIT leadership that communications needed to be more aligned, consistent and strategic. As Jay Dominick said, the model “provides distributed responsibility, but very little distributed accountability.” At a time when the pandemic had already created a great deal of uncertainty and rapid change, effective communications would have to become the bedrock of our support strategy.

So, even as an uncommon effort was underway to adapt the campus and curricula to entirely remote learning for the fall 2020 semester, OIT did continue one common practice: forward thinking. In late 2020, the Office engaged an independent communications agency to put its communications process, tools and governance under a microscope.

Putting in the work to forge a better process

The directive was to ensure that OIT was “communicating the right messages, in the right way, at the right time,” and to determine what, if anything, the Princeton community would like to hear from OIT that they were not hearing to that point. Yet it was not merely a directive for the agency; every OIT group leader and other key OIT staff — as well as volunteers from the SCAD/DCS teams — were asked to share their time and insights, speaking as candidly as possible, to further the project. OIT was prepared to commit as fully to a self-examination as they were to examining any technology challenge.

What’s more, the Office sought the help of partners campus-wide with whom they had worked, regularly communicated, or provided services. At a time when every project seemed to be “all-hands-on-deck,” OIT nevertheless found hands to contribute.
Preparing to Return to Campus: Winter 2020–Summer 2021

A rigorous look at a complex challenge

To kick off the project, a broader set of objectives was developed. A group made up of OIT’s Operations and Planning Department (which led the initiative), an OIT core team, and the outside agency recommended that the project elicit:

• Key audience feedback, especially pain points and preferences
• Best practices for communicating with key audiences
• Best practices for communicating internally
• How best to demonstrate the value of the department outwardly
• Tools and resources to achieve all of the above

From those objectives, a rigorous discovery process was conceived, one that would ultimately achieve 32 group and 1-on-1 interviews, with 126 individuals in total; 331 audience surveys returned; and a high-level audit of both key communication platforms and technical and brand requirements.

Each phase of discovery was also directed to all of Princeton’s primary constituents, ensuring that every community member had a voice:

• OIT leadership and staff
• SCAD/DCS staff
• Non-OIT staff
• Faculty and academic administrators
• Students (undergrad and graduate)

Patterns that reveal a new roadmap to communications

As an organization that thrives on data, many in OIT were able to recognize themselves in the discovery findings, for example, the previously mentioned value placed on personal communication and individual respect. Yet they were also able to recognize certain issues they may have only intuited before: a proliferation of certain types of emails, while there were too few of others; a common gap between the technicality of knowledge base articles and the technical savvy of the audience reading them; a wealth of communication and collaboration tools, but a paucity of recommendations for their use.

For all the individual efficiencies and pain points uncovered in the process, however, patterns began to emerge as well, common denominators that would ultimately serve as the basis of a new communications strategy — a holistic, coordinated multi-pronged approach.

Survey question: Overall, is there anything you’d like to see OIT do differently in communicating with you and/or your department?

| Accessible, accurate, targeted, centralized, relevant info | 12 |
| Increase visibility, awareness of services, offerings, tools, org chart/contacts, listservs | 9 |
| Improve SN (fulfiller, ticket comm, search, results) | 6 |
| Strategic comm (projects, roadmap, highlighted services, monthly updates, new products, metrics, process oriented) | 3 |
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Setting off on the path forward

Now, as the University continues its recovery from the impacts of the pandemic — both academic and interpersonal — communications efforts are forging ahead, including (but far from limited to):

• The talent search for a Director of OIT Communications
• The tapping of internal talent within OIT to take on regular, centralized communications responsibility
• An audit of necessary communications templates — across multiple media and platforms
• The reboot of a monthly OIT newsletter, to be more accessible and relevant to the audiences it serves

And the common denominator in this case?

The recognition that service and communication are interdependent — that communication, in fact, is a service in and of itself — and that a true culture of continual improvement makes a home for both.