

IT Division of Information Technology

Annual Report
Fiscal Year **2022**



TRANSFORMING IT AT VIRGINIA TECH

In Virginia Tech's recent IT past, the technology services we provided were more straightforward to scope, manage, and conceptualize than they are today. Through the 1990s and into the first years of the new millennium, there was a general understanding of IT as something of a new utility - an enabler, a driver of efficiency and precision that offered a tantalizing prospect of new and expanding horizons. Once upon a time, we could at least be pretty sure about the limits of what a given tool could do, or how it could be used. Those limitations provided clarity on which tools and which strategic approaches could meet the university's needs.

That is not where we are now — technology has become interwoven with almost every process at the university, and with almost every aspect of our personal lives. Gone are the days of one solution for each need; today's software offers seemingly endless integration, along with flexibility to operate in the cloud or on-premise. The capabilities are great, yet so are the complexities. Today's IT environment is so expansive that it is commanding a larger share of the university's time and resources to rationalize, plan for, and support.

While these changes attest to an amazing story of growth and innovation, they have led us to a place where the organizational principles, governance structures, and collaboration that go into the university's IT decision-making need thorough reconsideration and an updated model. At the same time, our workforce has become far more mobile, and the cyber threats facing the university on a daily basis have drastically increased. These factors, and the need to address them, are the drivers behind [IT Transformation](#).

During the 2022 fiscal year (FY 2022), as part of the overall IT Transformation, the Division of IT began making significant strides in enhancing cybersecurity protections across the university. In addition, two projects in the area of IT procurement promised to improve customer service and initiate a rapid approval process for eligible software.

These efforts were sponsored by Executive Vice President and Provost Cyril Clarke and Interim Senior Vice President and Chief Business Officer (SVP-CBO) Chris Kiwus, as well as Scott Midkiff, vice president for information technology and chief information officer. The program office for IT Transformation was initially organized by interim Program Director David Crotts, who pulled together support from across the SVP-CBO area and hired two new project managers on a contract basis. The work began in the fall of 2021, well in advance of the official kickoff date of February 3, 2022.

TRANSFORMING IT AT VIRGINIA TECH

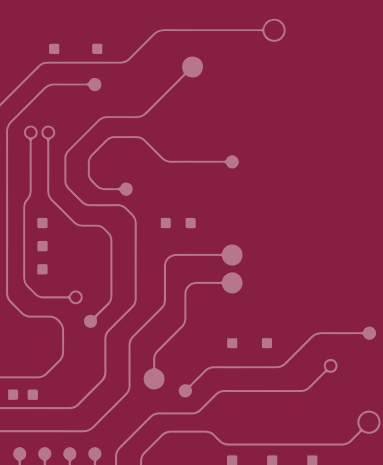
The [IT Transformation Program](#) will be a multi-year effort, encompassing a total of 19 distinct initiatives in six focus areas – governance, finance, talent, technology capabilities, service management, and cybersecurity. During FY 2022, two assessments were completed by Deloitte and reviewed by university leaders, and initial work on the highest-priority projects began. These included:

- Elevating VT IT Security to the Center for Internet Security's IG2 standards, beginning with risk assessment.
- Establishing a 24x7 Security Operations Center (SOC), engaging with Indiana University's OmniSOC service to enhance intrusion detection and monitoring capabilities.
- Initiating several measures to improve Endpoint Protection
- Conducting two pilot projects to improve software procurement processes
- Development of new guidance documents to support meeting Minimum Security Standards across the university

The first steps in this IT Transformation were taken this year, and there is a great deal of change and work along the path ahead, as well as many complex decisions. With perseverance, collaboration, and vision, we will keep pushing forward towards a new framework that will support the university's needs now and into the future.

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FISCAL YEAR 2022 FINANCIAL SUMMARY

The financial summary below provides an overview of the total budgeted funds and expenditures for the Division of IT during FY 2021 (July 1, 2021 - June 30, 20212).

Division of Information Technology Financial Summary, Fiscal Year 2022

Funding Category	Budget	Actual Expenditure
Education and General Funds	\$57,505,741	\$47,192,959
Equipment Trust Funds	\$6,736,157	\$7,260,810
Auxiliary Operations	\$27,423,036	\$19,782,875
Sponsored Grants and Contracts	\$881,673	\$509,952
Continuing Education / IDDL Funds	\$97,946	\$7,562
Overhead Funds	\$2,537,676	-
Other Sources	\$277,571	\$264,007
Total	\$95,459,800	\$75,018,165

FY 2022 Fiscal Summary

■ Budget ■ Actual Expenditure

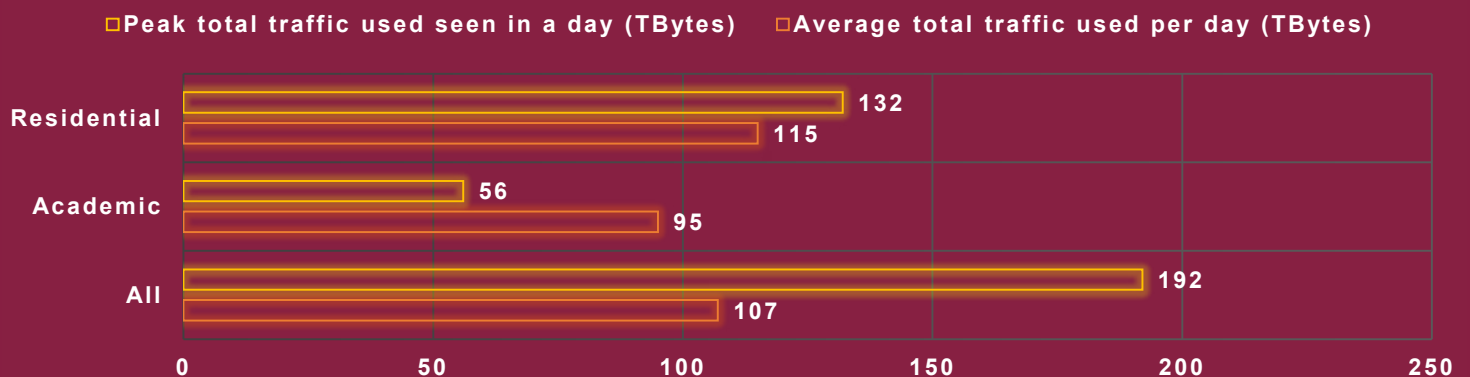
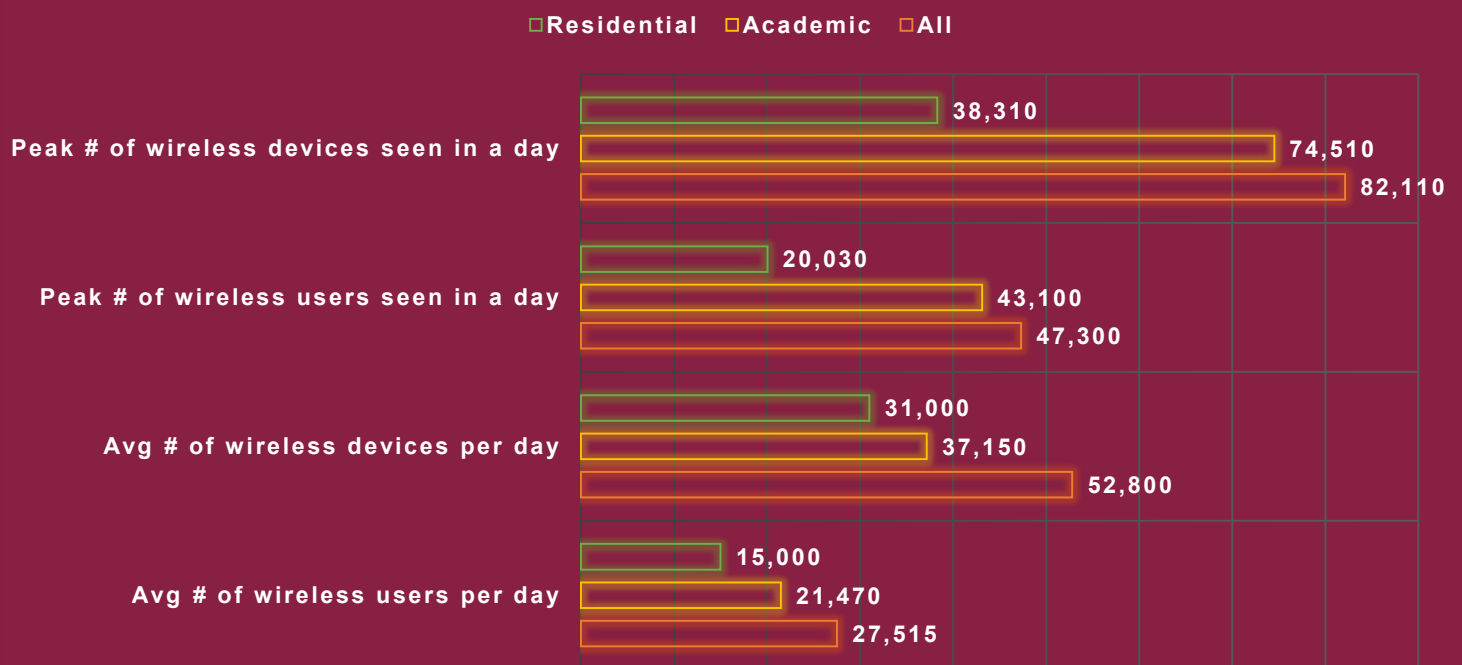


FISCAL YEAR 2022 FINANCIAL SUMMARY

FY 2022 Advanced Research
Computing/High Performance
Computing Investment
\$5,286,641



NI&S NUMBERS

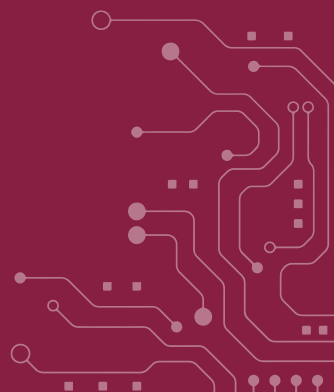


PILLAR 1: INNOVATION IN TEACHING AND LEARNING

With partners within and external to the university, we focus on the intersection of innovation, pedagogy, and technology to ensure that Virginia Tech can achieve its vision, mission, and goals for undergraduate and graduate education in Blacksburg, Roanoke, the Greater Washington, D.C. Metropolitan Area, and beyond.



Never before has technology played a more significant role in teaching and learning than during the last two years. The COVID-19 pandemic not only challenged us to leverage technology on a larger scale and apply technology in new areas — it proved we were capable of doing so very well in service of Virginia Tech’s strategic priorities and in the spirit of Ut Prosim. During FY 2022, the Division of IT invested in new tools and support for flexible and online learning as well as inclusive course design. Additionally, the Division of IT formed partnerships with faculty, staff, and departments across the university to leverage IT resources towards the goal of improved teaching and learning experiences.



Canvas usage remains strong as in-person learning resumes

With the new [University Data Commons reports](#), Canvas usage metrics can now be broken down between fall and spring. The percentage of course sections utilizing Canvas was 80 percent for Fall 2021 and 79 percent for Spring 2022. This number was consistently growing but appears to have plateaued. Given how vital Canvas usage is to the campus, this measure and the percentage of faculty members using Canvas will continue to be monitored. As of Spring 2022, 94.9 percent of faculty were using Canvas. This number has grown consistently since Canvas fully replaced Scholar in Fall 2017. TLOS will continue offering professional development opportunities to help keep Canvas usage high and will closely monitor this measure to assess post-COVID-19 changes.

The number of courses using Kaltura and Zoom was down by about 30 percent compared to the previous fiscal year. This decrease was expected as the COVID situation improved and many courses returned to in-person delivery. Since both tools provide insights into course modalities, reporting on these measures will continue. A new baseline for each metric will be set for the FY 2023 Administrative Unit Assessment.

Supporting Canvas, Kaltura, and Zoom is essential in maintaining these tools' use. In FY 2022, TLOS Support answered 1,474 incidents, a 1.4 percent increase. Tactics to reduce requests include developing and improving workshops, tutorials, and documentation focusing on the systems with the largest number of incidents: Zoom and Canvas. The adoption of Instructure Impact should further reduce support requests while giving users direct access to documentation from within Canvas. Additional support is provided through one-on-one consultations. Individual faculty or support staff requested 609 consultations with TLOS. The top categories for consultation include Canvas (30 percent), Zoom (27 percent), General Course Design (22 percent), and Kaltura (18 percent).

After thorough analysis, it was determined that Canvas continued to be the best hub for Virginia Tech's growing ecosystem of tools, and the contract was renewed in FY 2022.

New Learning Tools Interoperability assets enhance learning experience within Canvas

TLOS' commitment to innovation in teaching and learning includes the periodic analysis of Canvas tools and faculty-driven requests for new features. When considering requests, TLOS focuses on extending functionality and promoting Canvas as the central learning hub for Virginia Tech courses. The "Learning Tools Interoperability" (LTI) standard provides a uniform method of integrating third-party tools into Canvas. In FY 2022, TLOS met their goal of adding at least five LTIs per year, adding six new LTI tools:

- [ALEKS](#), McGraw Hill's adaptive learning program, offers course products for math, chemistry, statistics, and accounting to help students achieve mastery and enables faculty to take timely action to help students.
- [Achieve](#), Macmillan's online learning system, provides assessment tools and content to support faculty and students.
- [CyberRange](#) resources seek to increase the number of fully prepared students entering the cybersecurity workforce in operations, development, and research.
- [Google Assignments](#) helps students improve their writing skills, work more efficiently and turn in stronger assignments and provides faculty grading assistance options.
- [InQuizitive](#), W. W. Norton & Company's adaptive learning tool, gives students personalized study guides and faculty detailed performance analytics.
- [Packback](#) enables online discussion and provides AI writing tips for students and an AI grading assistant for instructors.



The new Cyber Range LTI is one of six new tools TLOS added to Canvas during the FY 2022.

Online Faculty Fellows and Faculty Inquiry Groups engage instructors in improving online and flexible learning

As part of TLOS' support for [flexible/online learning experiences](#), the Course Quality Faculty Fellow Program was formed to offer course quality reviews. Faculty fellows completed grant-funded [Quality Matters](#) professional development and relied on their experiences with flexible teaching to influence departmental decisions around flexible teaching quality. Faculty fellows receive a stipend in exchange for offering service to the university in the following ways:

- Completed professional development opportunities
- Offered professional development opportunities for their colleagues
- Served as ambassadors for course quality
- Performed peer reviews for online and flexible courses using the [TLOS Course Quality Checklist](#) and the [Peer Evaluation Checklist for Online Courses](#)

This pilot program increased the capacity for departments and colleges to ensure courses meet quality standards.

Faculty inquiry groups (FIGs) are another way TLOS supports faculty in evaluating teaching and learning. FIGs meet in person or online to work together on a specific question, issue, or concern in their teaching and their student's learning. In these collaborative groups, faculty are encouraged to use their expertise to explore options, solve problems, and create action plans to integrate technology into their course curriculum. In FY 2022, two groups were formed:

- Data-Informed Teaching explores collecting, refining, and analyzing data about students and their digital learning activities to improve educational outcomes.
- Teaching in Immersive Environments (now called the XR FIG) - explores emerging opportunities to incorporate virtual reality (VR), augmented reality (AR), and extended reality (XR) into learning experiences.



TLOS-led Faculty Inquiry Groups (FIGs) empower instructors to help each other successfully introduce new technologies and methods into the classroom, such as augmented and virtual reality.

Connected classrooms and computer labs enhance online learning experience across Virginia Tech's campuses

Connected classrooms and computer labs give faculty expanded options when planning online/flexible courses. TLOS supports point-to-point distance learning between the Blacksburg campus and the Northern Virginia Center in 11 Connected Classrooms with specialized hardware and software configurations – six classrooms on the Blacksburg campus and five in the Northern Virginia Center. In Fall 2021, 79 classes were scheduled in Blacksburg rooms, and 40 classes were scheduled in Northern Virginia Center rooms. TLOS' Computer-Integrated Learning Spaces (CILS) team supports physical labs and other services across campus:

- 17 computer labs containing a total of 356 workstations
- All computers in the Math Emporium (537 workstations)
- 21 teaching stations
- 17 Zoom Rooms
- 14 student printing stations
- 12 scantron (Datalink) locations
- 20 hardware lecture capture devices (Cattura) in classrooms



Connected classrooms allow students at both the Blacksburg and Northern Virginia campuses to enjoy a high-quality learning experience.

The TLOS instructional media team elevates flexible learning through creative, evidence-based instructional design

TLOS instructional designers work with the instructional media team to create, edit, and revise media-rich instructional objects to enhance online/flexible courses. They employ research-based design and development practices using a curated collection of software to create quality content. Instructional designers supported five programs in various stages of development throughout FY 2022—Computer Science, Ag Econ, Online MBA, Online Mechanical Engineering, and Reading Education.

The instructional media team produces high-quality videos for course-based instruction, employee training, research, engagement, and marketing in a classroom, studio setting, or the field. Faculty can [request a consultation](#) with a media expert to get started or [schedule time](#) in our new “Do It Yourself” (DIY) studio. The DIY studio design allows users to walk in, turn on the lights and camera, sign in on the computer, and start recording. Videos are automatically saved to users’ Kaltura My Media folder for easy access after the recording session.

The TLOS instructional media team prioritizes projects with instructional impact. In FY 2022, the team completed 53 educational video projects, including 1,028 videos. During the coming fiscal year, TLOS leadership will continue to refine its model for providing instructional media services, with a focus on rapid production and remote management of video studios.

TLOS-sponsored grants and awards enable innovative approaches to teaching learning, and research

TLOS-managed grants focus on identifying and assisting with designing, delivering, and evaluating quality learning experiences in programs with strategic alignment with university priorities.

The [Provost’s Office](#) and [Technology-enhanced Learning and Online Strategies](#) (TLOS) invited submissions of proposals for grants to support the exploration of technology-enhanced approaches to teaching and learning, the expansion of flexible/online course opportunities, and collaborative research across the Commonwealth. Seed grants, curricular redesign grants, and research grants were available through the [Innovation in Learning, Develop, Redesign, Innovate, Vitalize, and Enhance \(DRIVE\)](#) and [4-VA](#) programs.

TLOS partnered with the Provost’s Office and academic deans to identify and prioritize programs for conversion to online or flexible learning modalities. TLOS team members supported five programs in various stages of development throughout FY 2022. Work continued on Computer Science, Ag Econ, and Online MBA, with multiple courses in development. Online Mechanical Engineering and Reading Education were added for FY 2022.

In FY 2022, [53 proposals were funded, for a total of \\$847,267](#). Twenty-one of the funded proposals were for [collaborative research](#), 14 were for complementary research, three were for [collaborative endeavors](#), and the remaining 15 were for course design/development (11 for individual courses and four for programs). Innovation in Learning and DRIVE grants are funded and managed by the Provost’s Office and TLOS. 4-VA grants are funded through the Commonwealth of Virginia budget process.

TLOS investment in Universal Design for Learning facilitates more inclusive course design across the university

Universal Design for Learning (UDL) is a framework that helps educators achieve the goals of increased diversity, retention, and persistence. UDL-focused course development includes intentional content, instruction, and assessment changes that align with other inclusive teaching practices. Following UDL guidelines is a holistic approach that benefits all learners.

As more resources are allocated to online learning at Virginia Tech, this affords us the ability to include UDL guidelines when creating course materials. To advance its UDL efforts, TLOS hired a Director for UDL and Accessibility Services and created a [UDL 101 self-paced course](#) in partnership with the College of Liberal Arts and Human Sciences (CLAHS). CLAHS instructors participated in a pilot to design the UDL course and formed a network of UDL advocates. The added benefit of working with CLAHS was building faculty competencies around key accessibility components, including requesting captions, creating accessible documents, incorporating experiential learning, and developing alternative assessments.

The new Director for UDL and Accessibility Services, Pearl Xie, hosted consultations and engaged with faculty groups while promoting awareness of the UDL 101 self-paced course and other accessibility workshops offered through the Professional Development Network (PDN). Proactively designing accessible PDFs was a key emphasis. Along with the UDL course, a [PDF Accessibility](#) course was offered, and the software [Ally](#) was provided to scan and suggest remediation of existing course content. UDL guidelines were added to TLOS' computer refresh program, with plans to continue to promote these workshops in FY23.

UDL guidelines are an essential component of the International Association of Accessibility Professionals (IAAP) [Certified Professional in Accessibility Core Competencies \(CPACC\)](#) certification and the [Web Accessibility Specialist \(WAS\)](#) certifications offered by TLOS' Accessible Technologies group. These certifications continue to establish shared awareness and commitment to creating inclusive and accessible digital environments across the university. In FY 2022, the CPACC fall and spring cohorts had 51 Virginia Tech participants and eight external members from local school systems and other government agencies. The WAS fall cohort had five Virginia Tech participants and two external members. No WAS cohort was offered in spring 2022 to allow the fall participants extended time to prepare for the certification exam. Due to the technical expertise required, in the future, TLOS will facilitate just one WAS cohort per academic year.

Leveraging high-performance computing to enable creativity for visual design students

For students in the School of Visual Arts 3D Computer Animation class, rendering their work is an essential step to see the outcome of their design efforts. It also has a reputation for being one of the most time-consuming and error-prone steps; rendering requires substantial computational power, more than most laptops can handle in a reasonable amount of time without stalling out. High-performance computing can dramatically speed and improve the rendering process — if students can access this resource. During the fall 2021 semester, the Division of IT's Advanced Research Computing unit (ARC) collaborated with the School of Visual Arts (SOVA) and the Institute for Creativity, Arts, and Technology (ICAT) to launch a [classroom pilot program](#) that allowed students to utilize extra compute space on ARC's TinkerCliffs cluster to render their projects.



An innovative partnership between ARC, SOVA, and ICAT is helping students take their 3D animation skills to new levels. Design by Younhee Erin Chung, a graduate student in SOVA's Creative Technologies program.



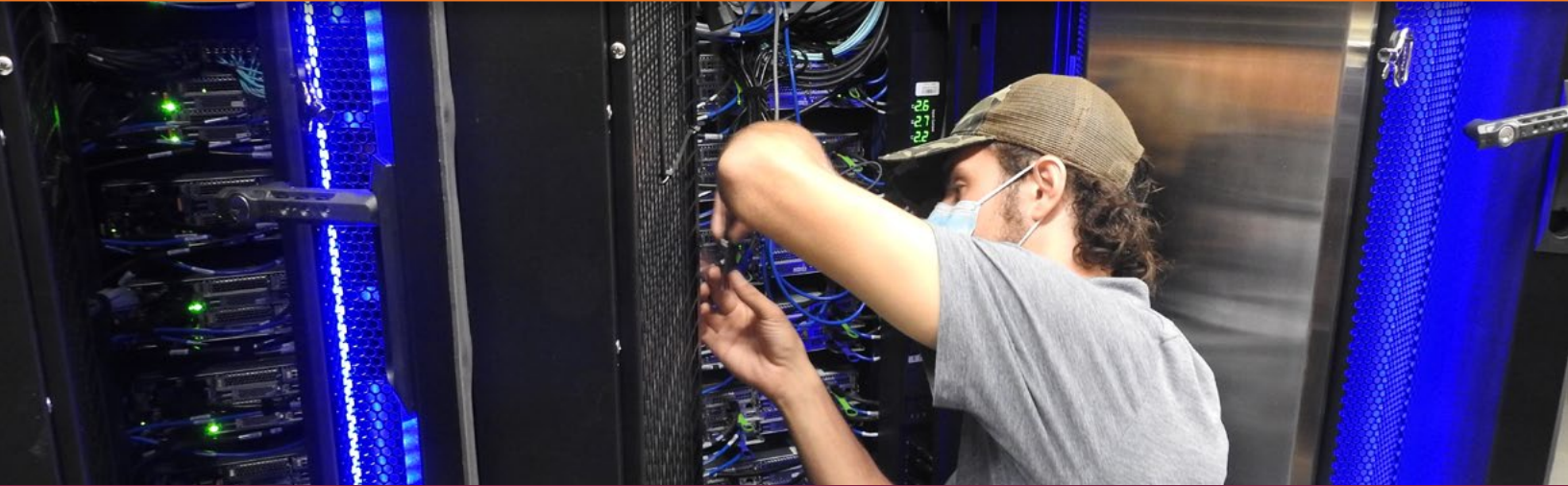
Students in the fall 2021 session of 3D Computer Animation tour ARC's data center in Steger Hall.

Thanks to this successful partnership, students in the class were able to render their projects more frequently throughout the design process, helping them to correct errors and make creative decisions they might not have had time to do otherwise. Being exposed to high-performance computing during their coursework can also prove advantageous in the future, as top design firms increasingly utilize high-performance computing in their processes.

The collaborators improved upon an earlier, similar pilot conducted in 2016, which resulted in a more user-friendly and resource-efficient program. SOVA and IT staff worked together to containerize the 3D rendering software that the students used, essentially wrapping the application into a portable software bundle so that it can run on any system. Containerizing allows the ARC clusters to access and use the software without it having to be installed, and makes the software easier to update over time. Additionally, ARC set up the rendering program so that students could use Open OnDemand, a web-based portal that allows the students to upload their job, log back in any time to see if the job is done, and download their completed files using a more intuitive web interface instead of a command line.

PILLAR 2: ADVANCING RESEARCH AND DISCOVERY

We strive to advance scholarship and increase competitiveness in innovation and research at Virginia Tech by providing access to advanced cyberinfrastructure for a broad set of Virginia Tech researchers.



For nearly 30 years, the Division of IT has enabled advanced, interdisciplinary research by providing high-performance computing, large-scale storage, and advanced computing software, as well as the support and expertise of highly skilled computational scientists and systems engineers.

In collaboration with the university's Office of Research and Innovation, the Division of IT works to ensure that the computing resources and services available continue to meet the current and future needs of researchers, and provide the capacity to elevate the types and scale of research that can be conducted at Virginia Tech.

In FY 2022, the Division of IT invested in several new systems and storage resources that have further expanded the university's high-performance computing capabilities, including the deployment of a new compute cluster dedicated to research involving sensitive and controlled data, as well as additional large-scale storage facilities. A brand new documentation site helps users new to high-performance computing better navigate the systems and software they will use to conduct their research. With these additions, Virginia Tech is in a solid position to facilitate innovations in multiple research areas as well as attract research funding.

Topic: High-performance computing system for Controlled Unclassified Information (CUI) expands possibilities for security research at Virginia Tech

High-performance computing system for Controlled Unclassified Information (CUI) expands possibilities for security research at Virginia Tech

Advancing research in ‘The Security Frontier’ — innovative solutions for secure and resilient communities — has become a major focus of the university’s research investment efforts, as evidenced by the [launch of the National Security Institute](#) in the fall of 2021.

In support of this investment into security research, the Division of IT and the Hume Center, which is now a part of the National Security Institute, joined forces to fund the purchase of an HPC system suitable for computational research that involves protected, sensitive, or restricted data, also known as controlled unclassified information, or CUI. Working in collaboration with the Office of Export and Secure Research Compliance in the university’s Research and Innovation division, Advanced Research Computing (ARC) systems engineers designed and implemented a CUI system compliant with federal regulations that can support a wide variety of restricted data types.



The new CUI cluster greatly expands Virginia Tech's capacity to conduct research involving controlled and sensitive data.

The [CUI cluster](#) came online in October of 2021 and provides a total of 15 nodes. Three nodes are dense graphical processing unit nodes matching those on the Tinkercliffs cluster, and twelve are 64-core central processing unit nodes. Together, they provide strong scalability for a wide variety of workloads. ARC’s computational scientists consult with researchers to ensure their projects necessitate use of the CUI cluster and to provide access and support.

With the addition of the CUI cluster, Virginia Tech’s capacity to support innovative computational research involving CUI, and in turn provides a competitive advantage for faculty in obtaining funding for their research.

New large scale project-storage infrastructure for HPC systems

In addition to providing high-performance computing (HPC) resources for faculty and students to perform complex computational research, ARC provides storage for the often-large datasets that accompany research projects. Consequently, as ARC's capacity to support computational research increases, so does the demand for storage. To address this demand, ARC implemented new large-scale project storage infrastructure for its HPC systems in March of 2022.

The new infrastructure includes an IBM Elastic Storage System system, which provides 3.2 petabytes of storage space and utilizes a General Parallel File System storage technology that allows filesets to be accessed by multiple nodes very efficiently. With the new system, ARC is able to provide 25 terabytes of storage space per principal investigator on a project. Available on the Tinkercliffs and Infer clusters, this added storage capacity provides a common, shared storage location for group collaboration, facilitating transdisciplinary research across the university.



ARC expanded its storage capacity in FY 2022 to accommodate growing demand for high-performance computing resources.

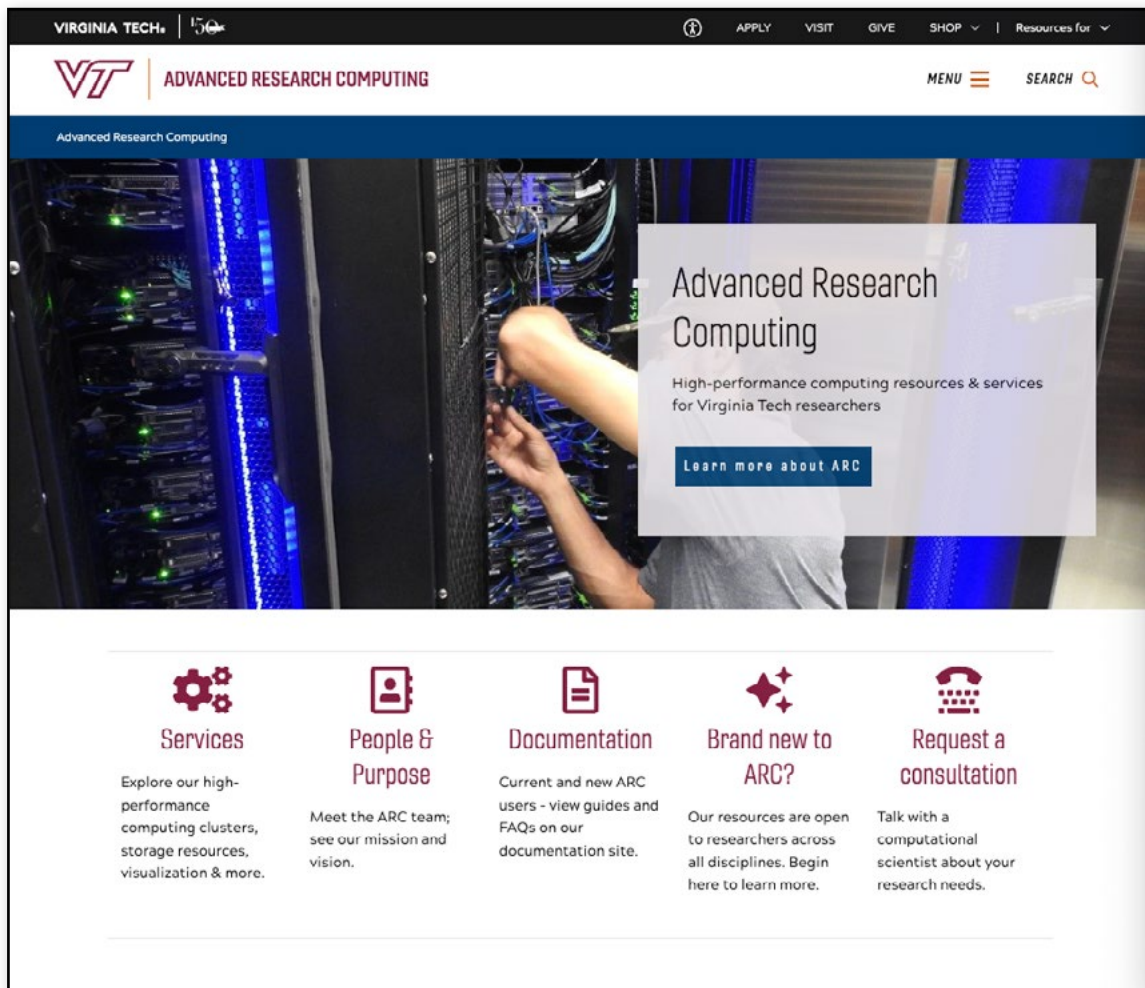
New documentation portal and website enhance ARC user experience

As part of its user support services, ARC provides documentation for its storage and compute resources, designed to help users navigate the HPC resources available to them. Historically, documentation was published and maintained in a Wordpress site, which had also served as the unit's website since 2009. By FY 2022, however, the site had become cumbersome to maintain. Not only was Wordpress not the most efficient platform for maintaining technical documentation, but Virginia Tech had also moved away from individually hosted sites towards a university-wide content management system (CMS).

To continue providing users with the best experience — and to reduce the ARC team's effort to maintain its site — ARC migrated arc.vt.edu to the Ensemble CMS, working closely with the Division

of IT Communications Team to redesign the site concept as a “digital concierge” for ARC, introducing users to the team, systems, and services available in a smaller and easier to navigate site.

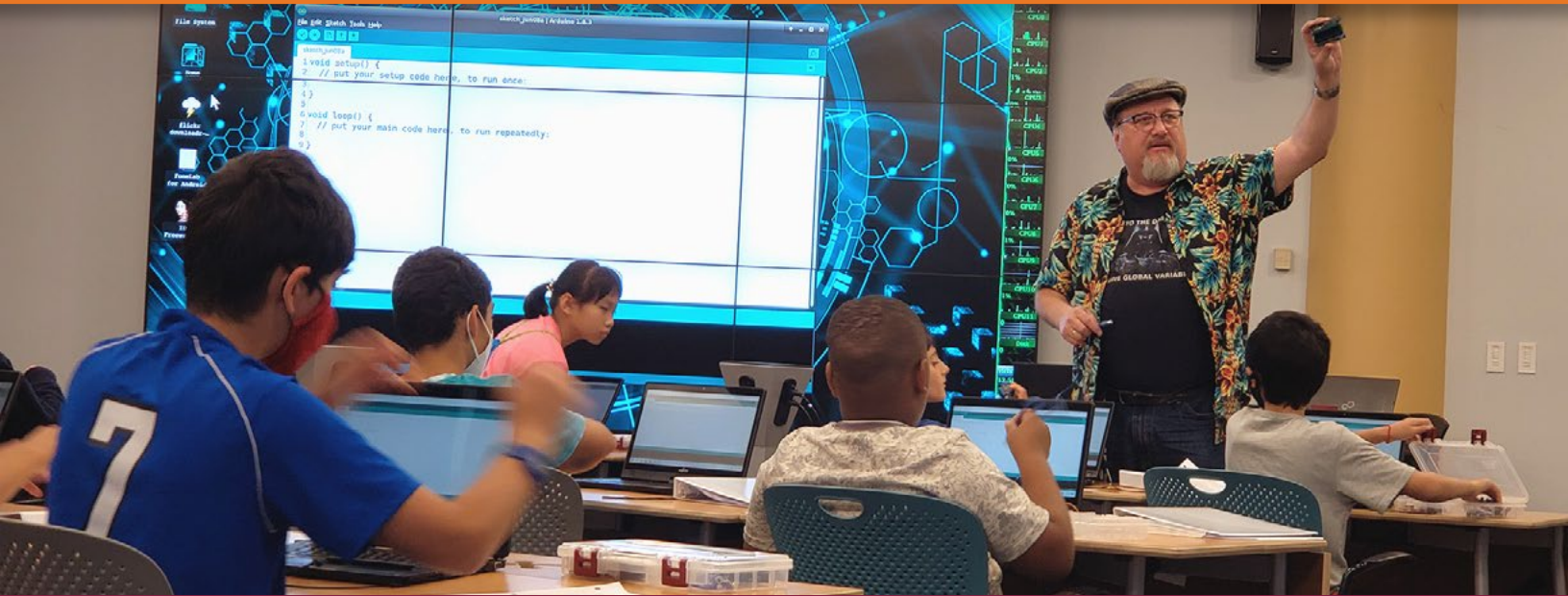
Additionally, ARC moved its documentation to the Read the Docs platform, which is designed specifically to host and update technical documentation. The new documentation site, docs.arc.vt.edu, provides information for brand new ARC users as well as specifications on HPC systems. Moreover, this new documentation site allows ARC staff to quickly and easily update documentation to ensure the most current information is available to users.



ARC worked with the Division of IT Communications team to design and launch a new unit website; the new site design serves as a “front desk” for new and current ARC users to quickly locate information and resources. For administrators, the site is more efficient to maintain and update.

PILLAR 3: LEVERAGING TECHNOLOGY FOR OUTREACH

We work with partners to leverage technology and apply our knowledge and expertise for outreach beyond the university in support of technology-related economic development and educational efforts in the Commonwealth of Virginia communities and in the wider region.



Outreach is the embodiment of Ut Prosim for the Division of IT. Since the early days of computing at Virginia Tech, we have engaged with partners in the local, regional, and national community to advance technology infrastructure and innovation, to support the economic health of underserved communities in Virginia, and to connect with and educate the next generation of technology professionals.

Despite the ongoing COVID-19 pandemic, the Division of IT moved forward in our outreach efforts during FY 2022, creatively engaging our communities through online gaming events, video series, and virtual conferences. By the end of the fiscal year, we welcomed the return of in-person camps and events. Our outreach efforts in FY 2022 focused on cybersecurity education and increasing diversity in STEM — key issues as we face a continued shortage of cybersecurity professionals in the Commonwealth, and as we seek to cultivate a more inclusive culture in technology fields. Looking ahead, we anticipate the full return of in-person events, and the energy and sense of community that comes with gathering in one place. Yet, thanks to the lessons of the pandemic, we now have the skills and capacity to host hybrid events, which will allow us to reach a broader audience, both demographically and geographically.

Cybersecurity for All” video series aims to generate interest in cyber careers

The Cyber Range received funding from the Commonwealth Cyber Initiative Southwest Virginia node to create a number of videos highlighting cybersecurity as a career. To fill current open cybersecurity positions and to meet the expected growth in cybersecurity positions, the Cyber Range developed a [series of cybersecurity videos](#) highlighting diversity in cybersecurity to increase interest in cybersecurity as a career. The Cyber Range interviewed several current cybersecurity students in high schools in Virginia who are interested in pursuing a career in cybersecurity as well as former students pursuing postsecondary education in pursuit of a cybersecurity career.

In the fall of 2021, the Cyber Range and Rock Creek Productions conducted interviews with five Virginia students, including two high school students from Potomac High School in Dumfries, Virginia. Interviews also included alumni from Old Dominion University, George Mason University, and the University of Virginia.

The Cybersecurity for All video series included the students’ perspectives on the field of cybersecurity and why it is an exciting career choice, advice on how to get started in a cybersecurity career, and celebrating diversity within the field of cybersecurity.



The Cyber Range's cybersecurity career video series aims to encourage high school students from all backgrounds to explore the different career options in the field.

Capture-the-Flag events National CTF events

The Virginia Cyber Range hosted a number of in-person and virtual Capture the Flag (CTF) events during the reporting year. These CTFs engage students in hands-on cybersecurity learning experiences and allow them to explore and apply cybersecurity concepts in a fun and interactive way. CTF events included:

- Senior Military College Cyber Fusion CTF at VMI (Aug 2-3). The Cyber Range hosted a Capture-the-Flag for the first of its kind cybersecurity conference and competition for Senior Military Colleges, which include Virginia Tech, Virginia Military Institute, The Citadel, Norwich University, University of North Georgia, and Texas A&M University.
- Cybersecurity Career Awareness Week CTF (Oct 18-21). The Cyber Range hosted a Capture-the-Flag competition in support of the National Initiative for Cybersecurity Education in October. This CTF had categories aligned with the NICE Workforce Framework job categories and was intended to pique students' interest in cybersecurity career fields.
- NICE K12 Conference CTF (Dec 6-7). For the fourth year, the Cyber Range hosted the conference Capture-the-Flag competition for the annual NICE K12 Cybersecurity Education Conference.
- Wicked6 CTF (March 23-24). The Cyber Range hosted a Capture-the-Flag competition for the Wicked6 Cyber Games, a 24-hour virtual global event and fundraiser for women in cybersecurity. 3,000 women participated in Wicked6 and funds were raised to benefit the Women's Society of Cyberjutsu, a national 501(c)(3) nonprofit that promotes training, mentoring, and more to advance women and girls in cybersecurity careers.

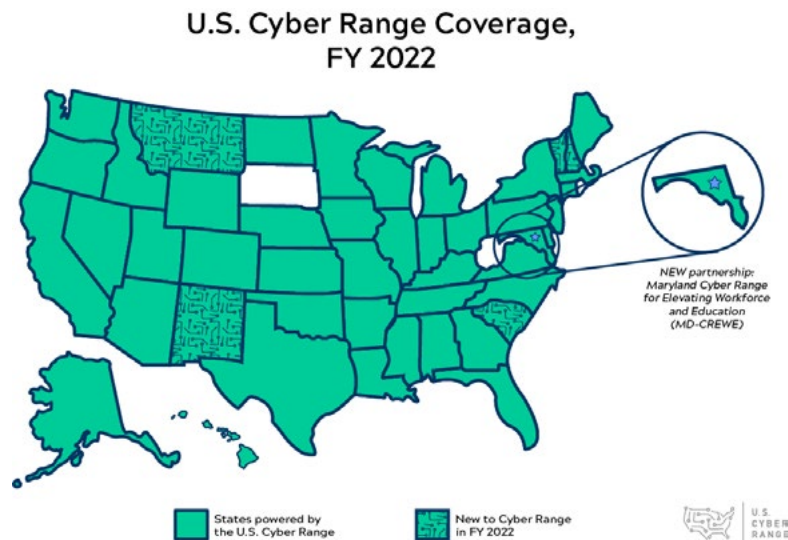
The CTFs were hosted on the Cyber Range's Cloud CTF platform. This technology enables CTFs to reach a wide audience, including students in remote areas or those without access to traditional cybersecurity resources.



Cyber Range director Dave Raymond leads a capture-the-flag competition for the 2022 Women's Global Cyber League Wicked6 Cyber Games. This is one of four CTF competitions the Cyber Range hosted at virtual and in-person events nationwide during FY 2022.

Continued expansion of Cyber Range usage across the United States

The U.S. Cyber Range continues to expand the number of organizations using its infrastructure and courseware, and now has users in 47 states. In June 2022, the Cyber Range signed an agreement with the Maryland Institute for Innovative Computing to support high schools and community colleges across Maryland with the cyber range platform, in a new initiative called the Maryland Cyber Range for Elevating Workforce and Education, or MD-CREWE.



Institutions in five new states began using the U.S. Cyber Range during FY 2022.

4th Annual Virginia Cybersecurity Education Conference, July 20-22 2021



The Cyber Range hosted their 4th annual Virginia Cybersecurity Education conference on July 20-22, 2021. Given the ongoing impact of the COVID-19 pandemic, the conference was presented virtually for the second time. “The virtual conferences have allowed me to attend when most likely I would not be able to due to funding and

work requirements,” one attendee commented in the post-conference survey. To keep educators engaged, the Cyber Range utilized virtual tools for conferencing, including Whova event management and Gather.town for networking socials.

A highlight of the conference included a keynote speaker, David Oranchak, software developer and Virginia Tech alumnus. Oranchak’s expertise on the Zodiac ciphers has led to his involvement with several Zodiac related documentaries, development of cryptanalysis software for the FBI, and the Youtube series “Let’s Crack Zodiac.”



The 2021 Virginia Cybersecurity Education Conference was held virtually due to the ongoing impact of the COVID-19 pandemic.

The Virginia Cybersecurity Educator Award was introduced at this year's conference. This award recognizes excellence in cybersecurity education in Virginia. Awardees were nominated by colleagues who could comment on both the educators achievements, and their students' achievements. Recipients of the inaugural award included Erik Breede, cybersecurity teacher at Phoebus High School in Hampton, Virginia and Kristi Rice, cybersecurity teacher at Spotsylvania High School in Spotsylvania, Virginia.

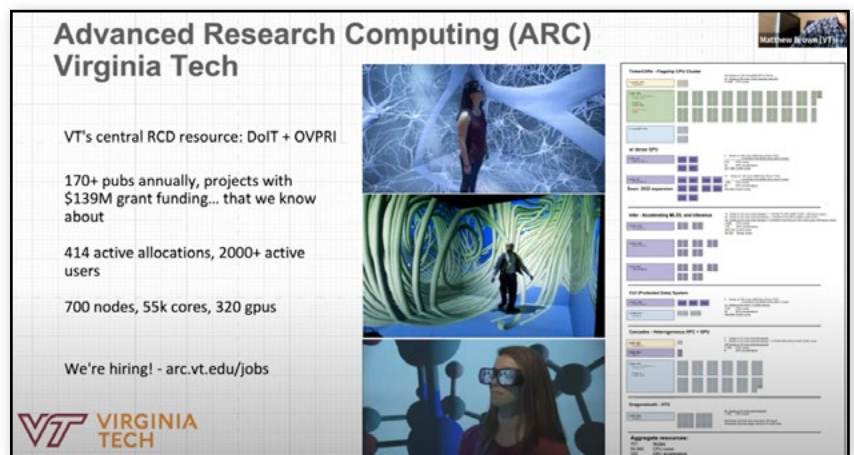
Awareness and Technical Training

In addition to defending the university's networks and technology assets, the Virginia Tech IT Security Office (ITSO) provides cybersecurity outreach and training, ranging from basic cybersecurity awareness for students and employees, to advanced-level courses for professionals, to conference presentations and panels.

During FY 2022, ITSO staff presented at various regional, national conferences, on topics including SSH key management, zero trust networks, follow-up talks on the 2021 Kaseya incident, security while working from home, and crypto-forensics. In addition, the ITSO hosted a multi-day course, Public Cloud Security: AWS, Azure, and GCP, through the [SANS Institute](#), the world's largest cybersecurity training organization. The course drew over 100 attendees from across the United States.

Co-founding the Virginia chapter of Women in High-Performance Computing

As with many STEM fields, women historically have been underrepresented in the high-performance computing (HPC) field. Women in High Performance Computing (WHPC) is an international organization whose mission is to grow a more diverse and inclusive high-performance computing workforce by providing community, support, and educational opportunities for women in the field.



ARC computational scientist Matt Brown presents on the high-performance computing landscape during a VA-WHPC event in April of 2022.

During FY 2022, ARC collaborated with HPC groups from across the Commonwealth to found the Virginia chapter of Women in HPC ([VA-WHPC](#)), which consists of seven member institutions, including Virginia Tech. ARC staff helped the new group establish its mission and brand and organize the inaugural meeting in October 2021, which drew nearly 100 participants. ARC continues to be involved with VA-WHPC by helping to organize and host monthly online seminars, supporting VA-WHPC mentorship programs and networking events, and promoting Virginia Tech faculty and student participation in the organization.

Through their involvement in VA-WHPC, ARC is embodying the Division of IT core value of Inclusion, while also helping to cultivate a strong, diverse, and engaged HPC workforce in Virginia.

K-12 STEM outreach sparks curiosity in next generation of scientists

Outreach is an important component of the Division of IT strategic plan, working towards our goal to support technology-related economic development and educational efforts in Virginia communities. In particular, our K-12 STEM outreach program embodies the Virginia Tech spirit of Ut Prosim and provides Division of IT employees an opportunity to engage with younger members of the community and cultivate their interest and skills in technology. FY 2022 saw the return of in-person outreach programs as COVID-19 pandemic restrictions eased, and the Division of IT reached kids throughout the K-12 age span both locally and statewide. Specific programs included:

- **Cybersecurity Best Practices at Auburn Middle School** (Floyd County) in October 2021 taught 6-8 graders the basics of cybersecurity, including exercises in password hacking to demonstrate the importance of using strong passwords, during a 2-hour in-school program.
- **Coding workshop ‘Making Music with Light’ at the 2021 VT Science Festival.** IT staff guided kids as they made arduino-powered that played music when sensing changes in light.



Thomas Weeks guides 4H campers through an intro to coding.



Campers from NRV 4H show off their sibling detector alarms.

- **STEM summer camp in partnership with Fralin Life Sciences Institute and Virginia 4H.** The Division of IT led a half-day coding workshop in June 2022 for kids aged 9 to 13 who were attending a day camp program for at-risk youth through the NRV 4H. During the workshop, campers assembled their own arduino-powered “sibling detector alarms” and wrote the code to make the alarms sound off when a sibling approached. The campers received kits to take home and continue experimenting on their own.



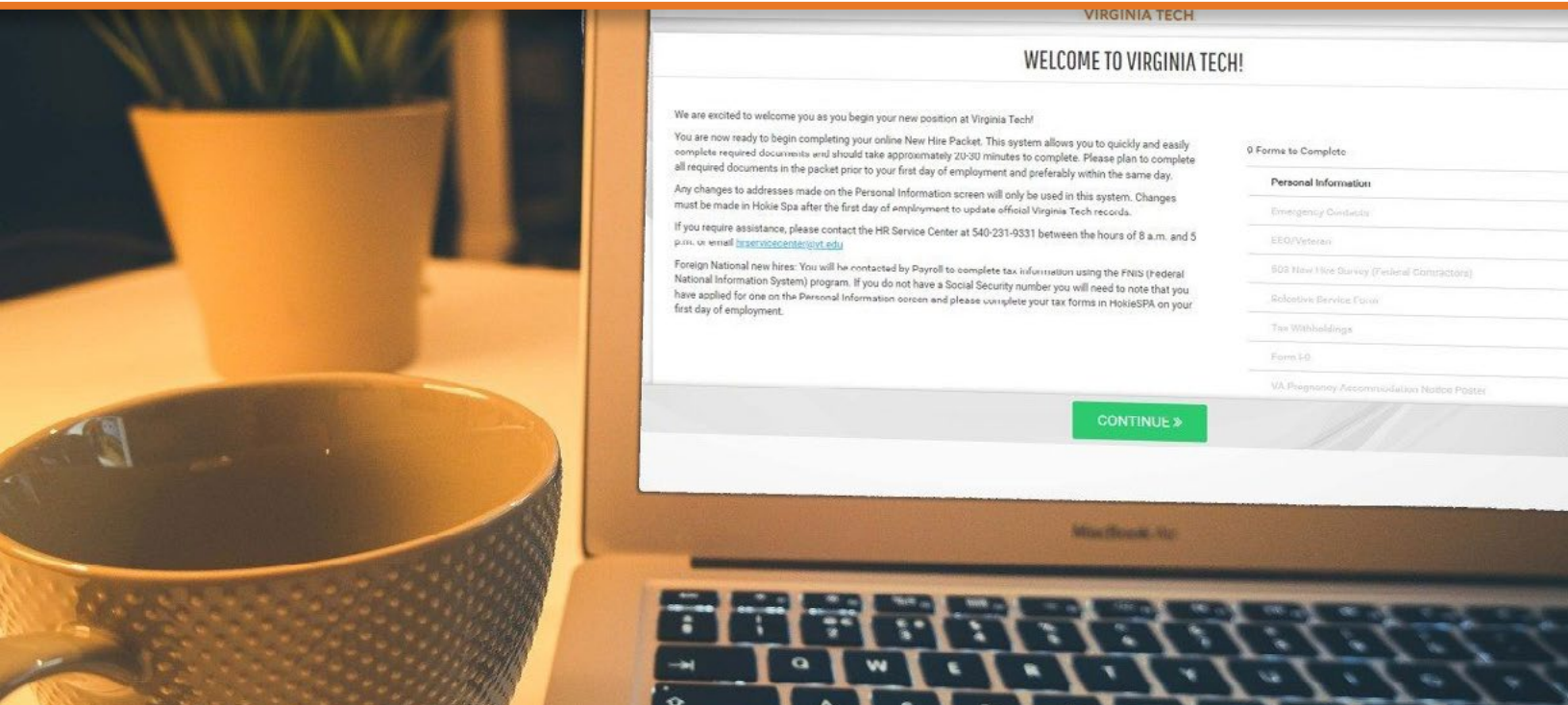
Division of IT staff volunteered to assist at the VT Science Festival.



Staff from the Cyber Range and Enterprise Systems visited Auburn Middle School in Floyd County to provide a special cybersecurity hands-on activity.

PILLAR 4: ENHANCING ORGANIZATIONAL EXCELLENCE

We strive to promote and enhance organizational excellence across the university through services and technologies that advance data-informed decision-making, enterprise effectiveness, and innovation.



From building and customizing applications, to ensuring our emergency services infrastructure is up to date and functioning, to administering cloud services, the Division of IT is consistently working to improve the administrative, academic, and research functions of Virginia Tech. Much of this work is performed behind the scenes; success is evident when the end users notice very little.

During FY 2022, our activities to support organization excellence involved some challenges, as Google announced significant changes to its Google Workspace for Education product terms; the resulting Google Workspace Program is a major and ongoing effort to ensure that our decisions about service best serve Virginia Tech users. In other areas, progress on efforts to transform the university's data analytics capabilities continued with the launch of new tools and features within MicroStrategy and the expansion of the Data Analytics Community of Practice. Additional new tools enhance efficiency and reduce redundancy in the areas of IT management and new employee onboarding. Altogether, these improvements reflect the commitment of our team members to continually improve the technologies that users across university functions rely on day after day.

Modernizing authentication protocols for M365

To improve the security posture of Virginia Tech's Microsoft 365 (M365) services, Collaborative Computing Solutions (CCS) began requiring that the university use the more secure Modern Authentication protocol for Microsoft services on November 15, 2021. This change is enforced at the authentication level when accessing VT M365 apps, including Exchange Online, SharePoint Online, and Microsoft Teams.

Though this improvement affected the entire university, the impact was felt by only a small portion of the approximately 4,800 users with devices who were still using the legacy protocol (less than 30 tickets were submitted). These users were contacted before the change, and we worked closely with a subset of them to understand the actual impact and work towards appropriate solutions or workarounds.

CAT Tool enhances IT service provision, collaboration across university

CCS deployed a new application called the CCS Admin Tool, also known as the CAT tool, to Division of IT partners in IT Experience and Engagement (ITEE), IT Procurement and Licensing Solutions (ITPALS), the IT Security Office (ITSO), and Secure Identity Services (SIS), as well as departmental IT administrators, to help them perform administrative functions and make crucial decisions regarding user services within their groups.

This tool provides critical user and departmental data

for the management, security, and support of accounts within the Google Workspace and Microsoft 365 (M365) environments. Features available to authorized CAT Tool users include a user profiles search to assist in service and incident management, a status dashboard for Virginia Tech Software as a Service (SaaS) environments, Hokie organizational unit (OU) admin tools, and multiple reports.

"IT Operations in University Libraries has never had this much information in one space that is this easy to access and navigate. The tool has allowed us to work with real information about our Google usage instead of estimates. This is going to be invaluable in the year ahead as we navigate the changes to our Google Workspace environment and what that will mean for library employees and the IT staff supporting them."

— Shannon Phillips, University Libraries

Overall, the new CAT Tool application enables better collaboration between central and distributed IT professionals, provides data visibility in the Google Workspace and M365 environments, and supports an incremental improvement process through feedback from university stakeholders.

New contract enhances Amazon Web Services for Virginia Tech users

CCS and ITPALS partnered to negotiate a new direct university contract with Amazon for AWS services. This new contract reduces Virginia Tech’s overall costs, provides new features to users, and includes Amazon enterprise support. Approximately 140 existing university AWS customers were transitioned to the new contract with minimal disruption to their cloud services.

This migration was planned and implemented over a five month period. The process included identifying and deprovisioning inactive accounts, setting up new accounts, migrating users, and ensuring access and services were not disrupted. CCS personnel communicated with university customers through the process, ensuring their accounts and information were accurate and up to date.

Google Workspace Program advocates for university community’s needs

In early 2021, Google announced several forthcoming changes to their Google Workspace for Education suite. The [Google Workspace Program](#) was launched to examine, analyze, and make recommendations for Virginia Tech’s future use of Google services. Division of IT partners involved in the program include CCS, ITEE, ITPALS, Enterprise Systems (ES), and Technology-enhanced Learning and Online Services (TLOS). The program steering committee includes faculty and staff from the Graduate School, Advancement, Division of Human Resources, College of Agriculture and Life Sciences/ Extension, University Libraries, the Virginia Tech Transportation Institute, and the IT Council, as well as representation from the graduate and undergraduate student bodies.



Project 2 of the Google Workspace Program included an optional survey of current students, employees, and retirees to learn how Google products are used at the university.

Project 2 from the program was completed in November 2021. Project goals focused on gathering information regarding VT use cases and additional data sources needed to reach a service decision, continuing the evaluation of Virginia Tech Google usage to help the university identify potential service options under the new license model, and obtaining an extension to Google's enforcement of storage limits, and.

Towards these goals, the Division of IT obtained a new Internet2 Net+ contract, signed on November 23, 2021. This four-year-long contract moves the Google storage enforcement deadline from July 2022 to July 2024, providing the university an additional two years to complete its evaluation and to plan and act on these licensing changes. Additionally, the Google Workspace Program conducted a Google usage survey to gain understanding of how stakeholders are using Google services at the university. There were 4,765 responses (7.2 percent response rate). The [Project 2 final report](#) contains a summary of the responses.

This project provided crucial information and direction to the Google Workspace Program Steering Committee and the VPCIO.

Improving central logging service processes

Established in 2017, the Central Log Service provides university departments with a centralized, secure location to store, analyze, and manage access to logging information for servers, desktops, and other devices under their provision. During FY 2022, Network Infrastructure and Services (NI&S), which operates the central log service, worked with the ISTO to migrate the service from an ELK-based system to the Splunk cloud platform.

Splunk offers numerous benefits, including more sophisticated log aggregation, searchability, and visualization for data analysis, as well as improved data security. When conducting the migration, NI&S and ITSO took measures to integrate and enhance our existing ingest pipeline to minimize changes for users and to maintain flexibility with our data. Overall, these upgrades to the central logging service offer increased operational functionality for users across the university IT community, while relieving pressure on our teams who manage the service.

Ensuring VT community access to emergency services through improved “Next Generation” 911 location data

Next Generation 911, or NG-911 is a nationwide initiative to convert Emergency 911 (E911) communication services to a digital, internet protocol (IP) based system, thus providing more ways to contact E911, reducing time to response by providing more accurate location data, and overall creating a more efficient, reliable system.

As part of a statewide collaborative effort, NI&S made several upgrades to E911 location data across Virginia Tech’s campuses ensuring that the data is usable by NG-911. In completing this project, NI&S worked closely with Campus Planning, Infrastructure, and Facilities (CPIF) to review all campus 911 emergency location records. More than 1,500 records were corrected to match the official address locations, and altogether more than 10,500 records were uploaded to the NG-911 services database.

Additionally, the NI&S Software Development Team developed a new NG-911 Address Management application, which will allow university Unified Communications users to update their 911 emergency locations when on the move. In preparation, NI&S uploaded all Virginia Tech automatic location identification (ALI) records — which allow location and other important emergency service information associated with the calling party’s telephone number to be automatically forwarded to the public safety answering point — to a new E911 database platform. These two actions not only enhance the safety of the university community by ensuring that first responders have accurate information to locate a caller, but also ensure compliance with [phase two of the Ray Baum Act](#), which went into effect in January 2022 and requires that telecommunications providers supply accurate E911 location data for mobile phone users.



‘Next Generation’ 911 upgrades made by NI&S will help ensure emergency personnel can respond to calls rapidly when time is of the essence.

Thanks to the collaborative efforts of NI&S, CPIF, and external partners, Virginia Tech’s E911 communications are ready to utilize NG-911, and callers can rest assured that dispatchers and first responders get to the correct location in an emergency.

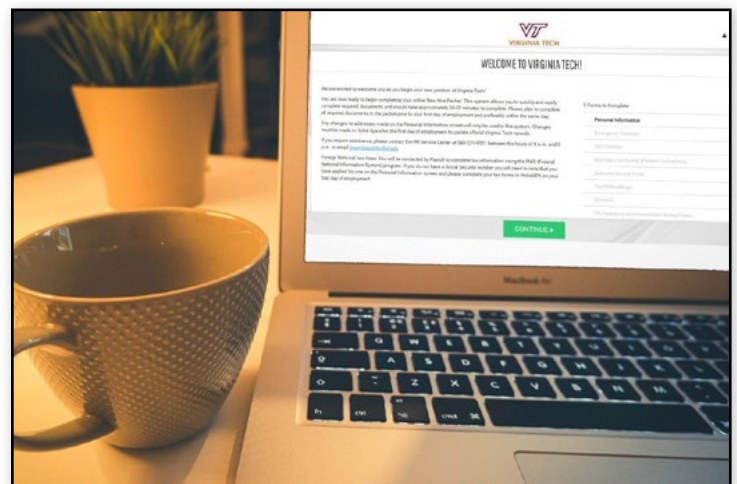
DNS/DHCP systems upgrade

The work required to increase the capabilities, capacity, and security of our technology infrastructure while maintaining stability and availability is a perpetual challenge. In this project, which was completed in early summer of 2022, three engineering teams in Network Infrastructure & Services completed a full upgrade of DNS (domain name service) and DHCP (dynamic host configuration protocol) systems at the university. These services, which *serve up internet sites and help balance load during peak access?* are critical services for Virginia Tech, helping to *reliably provide x service during peak usage?*

NI&S replaced hardware for seven DNS/DHCP servers, and upgraded CentOS (what is it?) to maintain compliance with audit and security standards. Significant planning and testing occurred prior to the upgrades, which enabled the project to be completed without interrupting service to users.

Enterprise Systems

The onboarding process for new Virginia Tech employees involves a lot of moving parts, from completing federal and state tax forms to entering direct deposit information, to conducting conviction checks. In March of 2022, Virginia Tech [launched the New Hire Center](#), a new onboarding portal for Virginia Tech that streamlines the onboarding process, providing a more consistent experience for new hires and an improved workflow for hiring departments. Developed by Enterprise Systems in partnership with the Division of Human Resources and the Controller's Office, the New Hire Center resides in the PageUp onboarding platform, and utilizes Equifax's Compliance Center interface for new hires to enter the bulk of information needed to begin employment, such as I-9 forms, federal and state tax forms, and state notifications.



The New Hire Center was designed to streamline the onboarding process both for new employees and departments.

By integrating the New Hire Center with Banner and PageUp, Enterprise Systems helped to eliminate the need for new hires and hiring departments to navigate between multiple systems for most of the onboarding process. With the New Hire Center, all new faculty, staff, and non-student wage employees follow a consistent and much simpler process.

Advancing Data-Informed Decision Making through new MicroStrategy tools

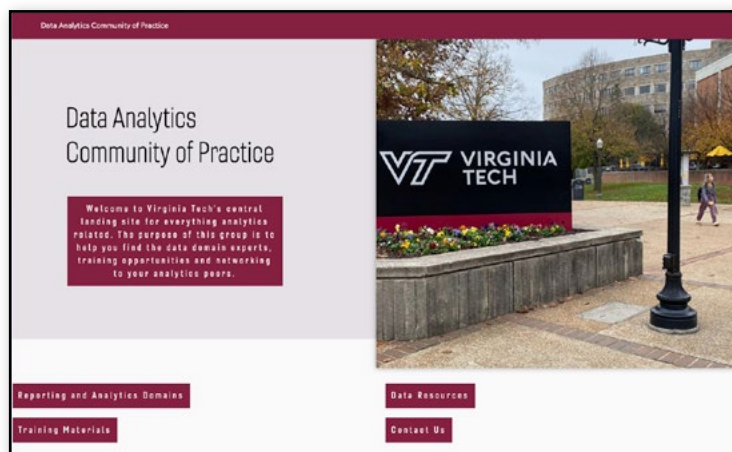
The vast amount of complex data resulting from the daily operations of the university presents both a challenge and an opportunity. With the right tools, this complex data can be managed and leveraged to achieve important insights for decision makers to inform policies and processes. During FY 2022, the Enterprise Systems group enhanced data-informed decision making capabilities through a major upgrade to the Virginia Tech instance of MicroStrategy, a business intelligence tool used for finance reporting and other data analysis needs. These included:

- New maps, public reports and VT templates for fast dashboard creation
- Addition of a Vaccine Reporting and Analytics environment, including integration with multiple vendors that had operational functionality.
- Imported non-employees into HR data mart and MicroStrategy to better support colleges' reporting needs.
- Released new solutions for HR Telework Data Mart, HR Leave Data Mart, and MicroStrategy Solutions.
- Released Fixed Assets MicroStrategy Solution based on existing data mart.
- Built a new MicroStrategy project to replace the legacy SCOOP tool for data queries

Data Analytics Community of Practice supports analytics employees through training, website resources

Formed in 2021 by Enterprise Systems, the Data Analytics Community of Practice serves to help drive common best practices among those using analytics in their work at Virginia Tech. The group consists of employees from across the university, who help to promote training and usage of tools for analysis, visualization and reporting and encourage effective data utilization.

During FY 2022, the Data Analytics Community of Practice expanded their presence at the university



The Enterprise Systems-led Data Analytics Community of Practice debuted a new website with resources and training events for analytics professionals at Virginia Tech.

by launching a central analytics website, analytics.vt.edu, to help support analytics employees distributed throughout the university. The website contains finance and data analytics training materials, including training for MicroStrategy, as well as links to policies, standards, and tools related to analytics and reporting.

In tandem with the site launch, the community held a number of MicroStrategy training sessions both for beginners and experienced users of the program. During these sessions, participants expressed their priorities when using MicroStrategy and other data analytics resources, which in turn has helped Enterprise Systems make thoughtful changes to both MicroStrategy and the data warehouse in service of their users.

PILLAR 5: DIFFERENTIATING THE VIRGINIA TECH EXPERIENCE

We strive to provide a technology experience for the university community and stakeholders that is consistent, robust, and exceeds expectations.



Having access to state of the art, versatile, and reliable technology services is an expectation of our students, employees, and visitors. In the Division of IT we are compelled to exceed these expectations, not only to continue setting Virginia Tech apart as a leader in technology innovation, but to ensure we are providing the best possible experience for all members of our university community in all aspects of their work and lives.

During FY 2022, the division completed several upgrades to our safety and security infrastructure, including addition of security cameras and upgrades to 911 communications networks. The impact for community members may not be apparent until an emergency arises, but in such critical moments the benefits of these changes are invaluable. New academic applications, such as an eTranscripts platform, have made key tasks easier and more efficient for both our staff and students, while upgrades to residence hall networks ensure our students can complete their studies with minimal disruption. These improvements illustrate how differentiating the Virginia Tech experience requires dedication to the fundamentals that keep our university running smoothly at multiple levels.

eTranscripts provides quick, online access to official transcripts

The official transcript is the complete record of all academic work attempted at Virginia Tech. Current and former students often need access to their official transcripts when applying for graduate school or jobs. Historically, the transcript fulfillment process has been long and tedious, both for students and the registrar's office.

In FY 2022, Enterprise Systems (ES) and ITEE worked with the Registrar's Office to implement a new "e-transcript" system which automates the procedures for processing transcript requests and provides the requestor with an electronic version of their official transcripts. The ES the Academic Applications group worked with the National Student Clearinghouse (NSC) and the Registrar's Office to automate and integrate the transcript ordering process with Banner. Enterprise Systems wrote all the services and tracking mechanisms to support this process, including finding the student when a request is made, identifying restrictions and terms, pulling the student's programs, sending the order to NSC, updating the order with status from NSC, tracking the order, and generating a printed version of transcripts for those that desire them. They also built a dashboard to track the usage of the eTranscripts system.



With the new eTranscripts application, Virginia Tech graduates can easily obtain their official transcripts electronically.

Adding automation significantly sped up transcript ordering and processing time for the registrar's office. No data entry is required by staff, transcript fulfillment time has been reduced, secure delivery and tracking is now in place. Overall, the process is more efficient. For students and graduates, getting their official transcripts is faster and easier than ever.

Security camera service upgrades enhance safety across campus

The campus security camera service is a vital component of the university's safety and security operations. During FY 2022, Network Infrastructure and Services (NI&S) implemented several upgrades to the camera service infrastructure and software to ensure optimal performance and reliability. In addition to adding approximately 100 new cameras — bringing the total number of cameras to 868 that together provide over 1,600 separate video streams — NI&S added indoor mapping capabilities, which all for camera displays based on building floor plans.



Security camera upgrades completed by NI&S help to make campus safer for the Hokie community.

NI&S also performed upgrades on all camera application and video archiver servers statewide, providing enhanced support for on-premise, hybrid, and cloud recording. Finally, the group made improvements to the web and mobile clients to enhance the user experience. Web client improvements include new layout options for viewing images and recordings, as well as new self-service capabilities to update user data such as passwords. Mobile client improvements include addition of new GIS maps as well as new camera layouts. These additions and upgrades, help to ensure that campus security and IT personnel have tools that meet the latest protocols in security surveillance.

Unified Communications Service migration/upgrade

Virginia Tech's Unified Communications (UC) service, which integrates real-time and asynchronous communications including telephone, email, conference calling, and emergency calls, has been in operation since 2014. NI&S completed numerous upgrades to the Unified Communications service and its infrastructure in FY 2022 to improve the service's value, efficiency, and security.

Infrastructure improvements included replacing much of the 8-year old infrastructure in 12 locations across the Commonwealth. This was part of a state-wide, collaborative effort to enable the university's Unified Communications devices to work with the latest technology, such as [Next Generation 911](#). In total, NI&S installed two new virtual clusters and 30 virtual systems, completed

upgrades to 66 gateways, verified 7,791 desk phones, and transitioned 914 mobile users to a more secure, SSO verification method.

In addition, NI&S installed new features such as self-service password management, implemented software updates, and virtualized all core systems to allow for more effective remote work — all which allow for more efficient and secure management and maintenance statewide. Overall, these upgrades work to keep the university community safer by ensuring reliable, efficient, and secure communications.

Restricted / Limited Access Network Redesign project

To help protect personally identifying information (PII), the IT Security Office (ITSO) and Network Infrastructure & Services (NI&S) collaborated to create the Restricted/Limited Access Network (RLAN), which provides additional network and computing environment protections for employees who work with PII.

The RLAN works by segmenting a portion of the university's network and implementing more stringent traffic monitoring and filtering within that segment. During FY 2022, the RLAN architecture was upgraded to allow secure work in today's hybrid work environment. Employees working with PII from home can now utilize the RLAN to ensure a higher level of security compared to what typical home internet service can provide. Without this capability, it would be necessary for employees working with PII to do so from a secure connection on campus. The current phase of RLAN deployment also included a migration of services to the Microsoft A5 License, and served as a pilot use of our new endpoint detection and response capabilities.

PEOPLE AND PROCESSES

People and processes form the foundation of our organization and are critical to effectively supporting and enabling the university's vision, mission, and goals. Our people are our most valuable assets in the Division of IT, and we are committed to investing in both the professional and technical development and the wellness of our team members. A major restructuring of our Network Infrastructure and Services (NI&S) organization during FY 2022 reflects this commitment by ensuring that positions are appropriately funded and facilitating more effective communication throughout reporting lines.



Processes that are efficient and effective allow us to best support the needs of our stakeholders, create value for the university, and enable the university to become a more data-informed institution. During FY 2022, the Division of IT saw to its strategic mission to continuously improve processes through implementation of a new Major Incident Management process as well as a “roadmap” to best leverage our service management platform. These changes are informed by efforts to keep user experience at the forefront of our services and customer interactions.

NI&S human resources reorganization

With well over 100 full and part-time employees, Network Infrastructure and Services (NI&S) is the largest unit in the division. It is also the only unit that operates in large part using auxiliary funds. In an effort to attract and retain highly-qualified employees, reduce administrative overhead costs, and improve efficiency in reporting and communication, NI&S conducted a significant reorganization and compensation leveling project during FY 2022.



The Outside Plant Team, part of the NI&S Installation Services group, near McBryde Hall.

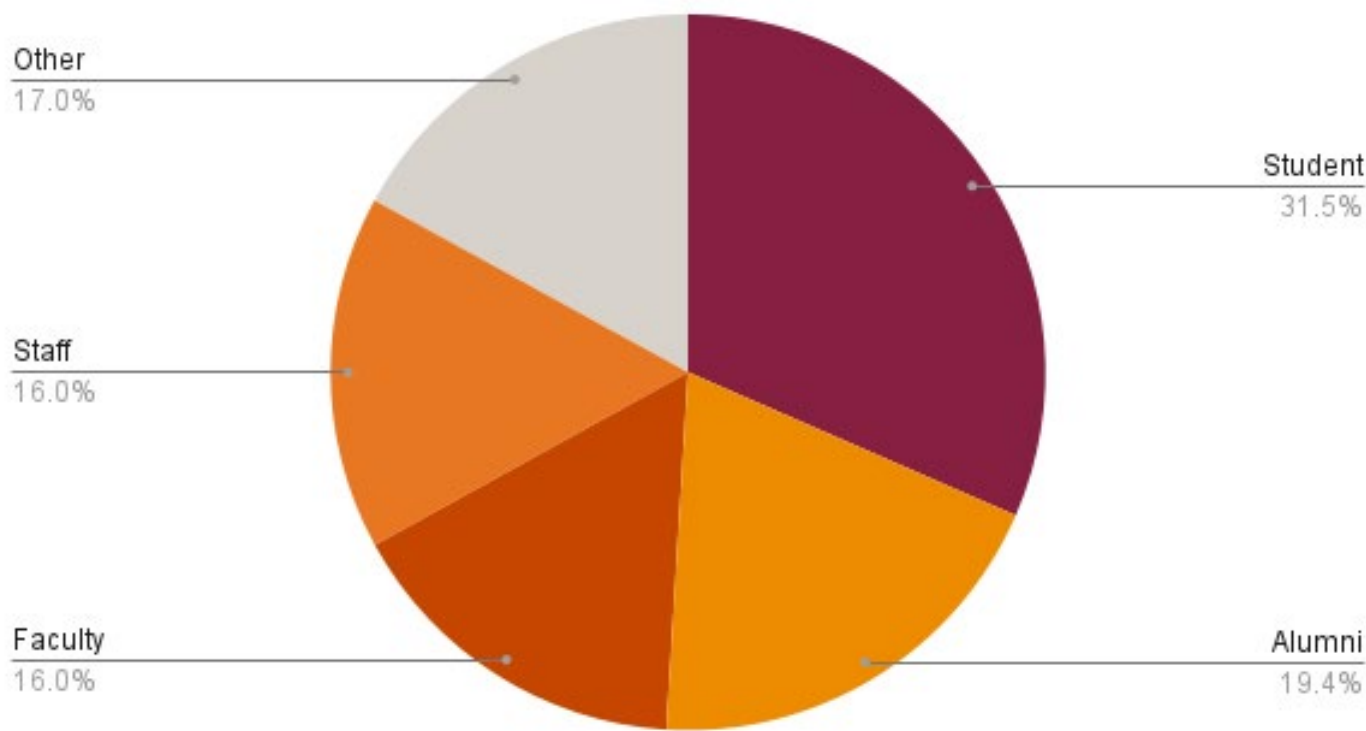
Specific actions included flattening the organizational structure so that team directors report directly to the executive director, using salary funds to provide equity and market-competitive compensation for technical positions such as developers and engineers, and establishing a base minimum wage for field workers on the Installation Services team. Additional cost savings were achieved by discontinuing certain legacy administrative positions when those occupants retired.

These changes are helping NI&S to operate more efficiently while ensuring that staff have the resources necessary to serve the university as network infrastructure needs continue to evolve and grow.

4Help customer service by the numbers

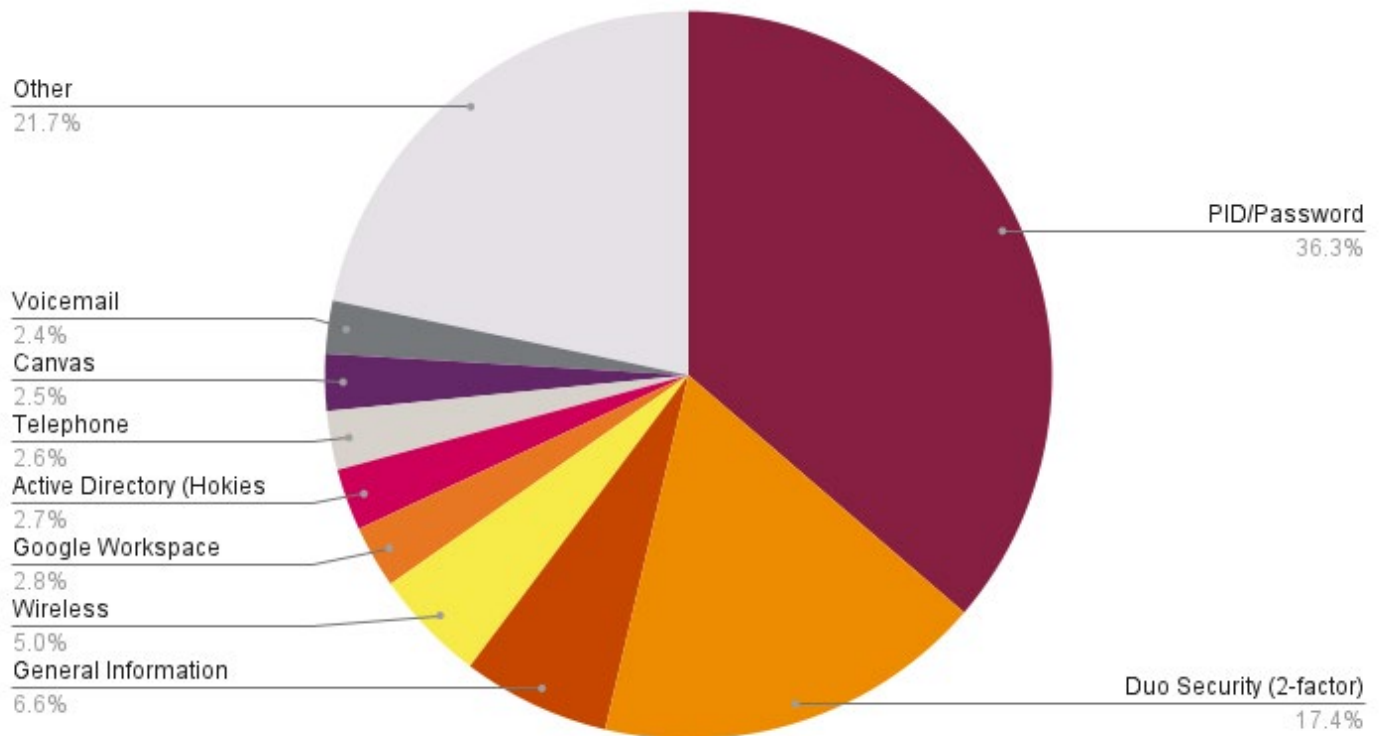
Each year, 4Help provides technical support to thousands of Virginia Tech students, employees, alumni, and retirees who request assistance with everything from password resets to network issues in campus buildings. The graphics below provide a snapshot of the type and volumes of incidents that 4Help agents helped users resolve during FY 2022.

Who utilized 4Help during FY 2022?



Affiliation	Incidents
Student	11,813
Alumni	7,271
Faculty	5,999
Staff	5,985
Other	6,377
Total	37,445

Types of incidents handled by 4Help in FY 2022



Incident Type	No. in FY 2022
PID/Password	12,184
Duo Security (2-factor)	5,833
General Information	2,207
Wireless	1,684
Google Workspace	934
Active Directory (Hokies Domain)	921
Telephone	878
Canvas	846
Voicemail	789
Other	7,285
Total	33,561

New major incident management process improves communication and response during core and critical service outages

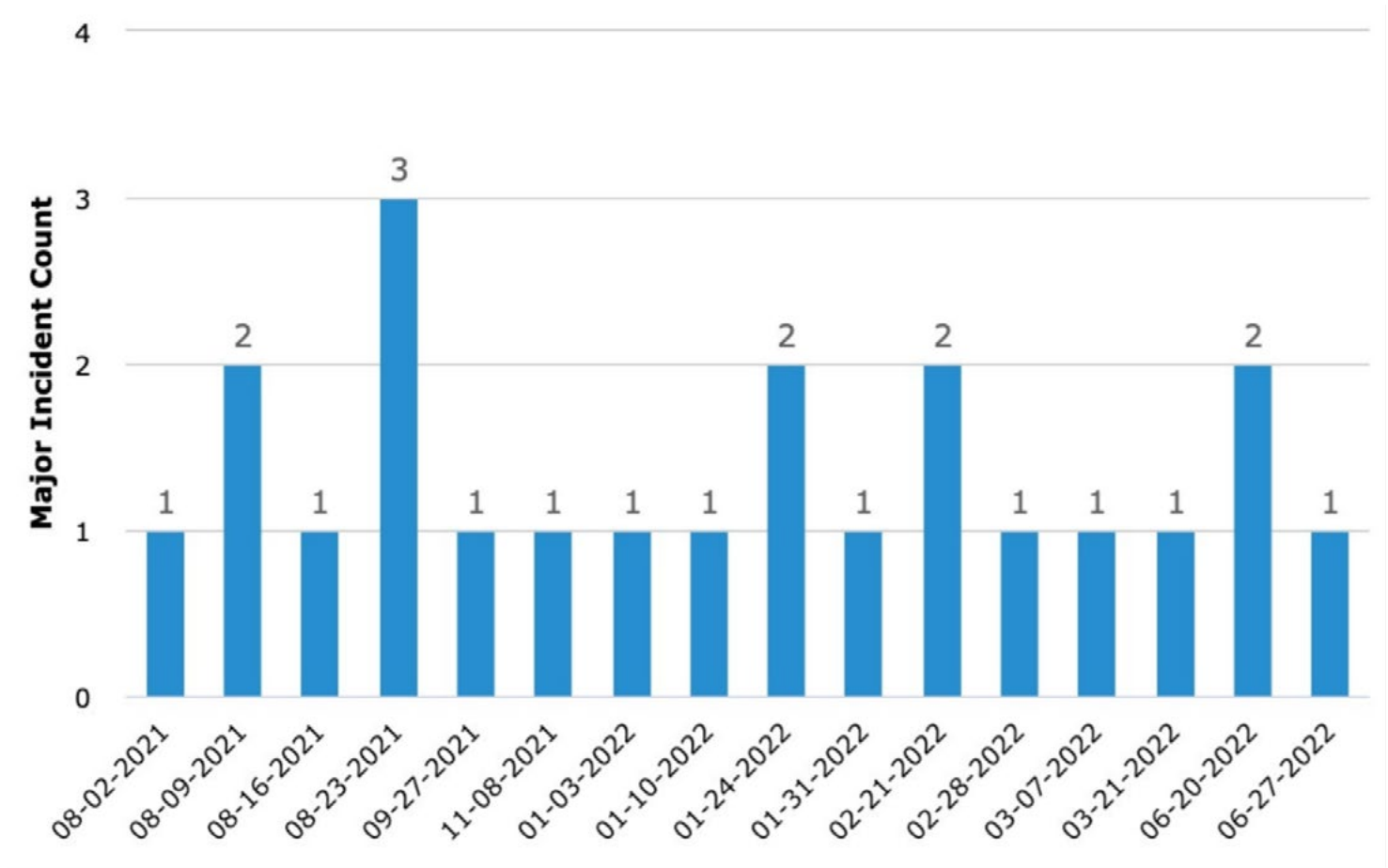
In August 2021, IT Experience and Engagement (ITEE) launched a new Major Incident Management Process to manage degradations and outages in core or critical IT services at Virginia Tech. Breaks in these services are intolerable as they can immediately cause damage to the university's mission.

The new process offers vast improvements in how effective the division is when identifying, managing, and ending major incidents. The new process much better clarifies when to declare an incident, clearly defines roles and responsibilities, and prioritizes both stakeholder communication and problem-solving. Specific improvements included:

- Established a list of core and critical services, along with the persons responsible for managing and supporting each service.
- Major incidents are now managed in a single incident record in ServiceNow, led by a designated Major Incident Manager from ITEE.
- Streamlined communications so that all messaging is generated from the Major Incident record, allowing consistent messaging to be sent to stakeholder groups.

To develop this process, ITEE reviewed prior major incidents to identify areas for improvement, solicited feedback from Division of IT service owners and deputies, and leveraged the Major Incident module in ServiceNow as a platform to manage actions and communications surrounding major incidents. The ServiceNow module also provides a consistent, centrally located record of the incident for more effective after-action reviews.

Through these changes, the Division of IT is now better poised to restore core/critical services to normal operations as soon as possible, inform stakeholders of core/critical service outages or degradations in a timely manner, and more effectively identify causes of issues when major incidents occur.



This graph shows the number of major incidents declared and managed each month during FY 2022.

Creating a roadmap to build upon the success of ServiceNow

The Division of IT first adopted ServiceNow to provide IT service management in 2014. Since then, usage has grown to include more than 15 distributed IT departments across the university, in addition to all units in the Division of IT. To continue building on the product’s success at Virginia Tech, ITEE worked with the other IT units to develop a ServiceNow Roadmap in FY 2022 to align its usage and growth with university priorities.

Over several months, the ServiceNow Governance Committee evaluated the existing ServiceNow implementation, facilitated discussions with senior leaders from each unit, and conducted surveys with the Division of IT and several departmental IT units to identify areas of need and gain insight into how ServiceNow might be expanded or implemented.

Several themes emerged in the survey data, including:

- Continue working towards more intentional change management, transparency and effective communications.
- Continue working towards more effective configuration management and asset management, and develop relationships and service mappings.
- Identify, evaluate, and prioritize opportunities for system interoperability and integration with the university's core shared data sources.
- Identify commonly performed actions in ServiceNow that can be automated.

The ServiceNow Roadmap includes a plan for work needed to address these priorities over the next two years. Such work is expected to include new or additional licensing of applications or modules as well as integration components and connectors not currently in place. Other work involves data cleanup, configuration changes, continual improvement of existing processes, as well as the creation and adoption of new processes.

Division of IT participates in the ITSO's Interactive Phishing Awareness Training program

Phishing emails, or fraudulent emails designed to trick recipients into disclosing personal information, are an ongoing issue at Virginia Tech and beyond. Increasing user awareness is one of the most effective ways to thwart phishing attempts, and one effective way to raise user awareness is to test users' ability to detect and report suspicious emails through benign tests.

During early FY 2022, the Division of IT participated in the ITSO's Interactive Phishing Awareness Training program. This program provides hands-on, safe and practical training to users, helping them gain real-world experience in spotting and avoiding phishing emails and malicious website links.

Over the course of several weeks, the ITSO sent emails to Division of IT employees that mimicked a real phishing email, such as messages that asked users to click a link that does not match the destination in the text, or open an unexpected document. During the exercise, anyone who mistakenly interacted with the message was taken to a safe ITSO-crafted landing page with educational resources to help them understand the fake phishing attack that just succeeded and ways to detect phishing in the future.

While the ITSO does not release results of phishing training exercises, the program proved a useful way to remind Division of IT employees that phishing remains a threat and to brush up on their phishing detection skills.

UX projects update

ITEE is committed to ensuring that students, employees, retirees, alumni, and guests have a positive experience with the IT services they use at Virginia Tech. In service of this commitment, ITEE established the User Experience (UX) community in 2020. The UX community is focused on helping the Division of IT design and implement services that are usable, valuable, accessible, intuitive, engaging, and consistent.

During FY 2022, the UX community launched several projects aimed at increasing participation in the UX community, better understanding users, and advancing best practices in UX across IT units. These include a new [UX research suggestion tool](#), which provides researchers and service providers suggested resources to help them follow UX best practices for their project. In tandem with the release of this new tool, the UX community held a series of 10 workshops on 10 usability heuristics for user interface design. The UX community also hosted eight guest speakers from colleges and universities across the nation who presented on topics related to UX and shared a case study from their organization's UX efforts.

ITEE also created IT a set of user personas based on data from 343 user surveys and 46 interviews. These personas help service providers better understand their users and focus on their user experience when designing IT tools and processes. In support of this effort, the User Experience Subcommittee within the university's [Information Technology Services and Systems Committee](#) created a guide on how to use the user personas to improve the IT support service at the university. Additionally, ITEE built a "Customer Experience (CX) playbook," a strategic guide to help service providers deliver outstanding customer experiences with the division's core IT services.

The new UX research tool is designed to help researchers and instructors employ user experience best practices in their work.

This report covers many of the Division of IT's most impactful efforts during the 2022 Fiscal Year. We're sure we missed some! We hope you have found this report useful in building your understanding of what we are about and how we strive to be of service to Virginia Tech.

If you have questions, or would like more information on the topics covered within this report, please contact IT Communications via email (it.communications@vt.edu). Thank you.



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INFORMATION TECHNOLOGY
VIRGINIA TECH.