IT empowers IU

OFFICE OF THE
VICE PRESIDENT FOR INFORMATION TECHNOLOGY
AND CHIEF INFORMATION OFFICER

IT at IU:
Woven through every aspect of university life

At University Information Technology Services (UITS), our goal is to support the teaching, learning, research, and clinical missions of Indiana University. Plain and simple. We do this by providing the highest-quality IT services to every student, faculty, and staff member in an environment, whether in person or virtual, where technology is woven through every aspect of university life.

We successfully serve all seven campuses of the university, two academic centers, and nine medical education centers across the state thanks to a united model of operations implemented over 20 years ago. This 1IUIT philosophy allows us to deliver shared services, IT infrastructure, and software to the entire IU community.

The visionary strategy of IU President Myles Brand, who recruited Michael A. McRobbie as IU's first vice president for IT, flourished under McRobbie and accelerated under former VP for IT Brad Wheeler. Today, IU runs one of the most respected IT organizations in higher education.

Much of our success can be attributed to these guiding principles:

1. **Edge:** These are the IT staffers in our schools and departments who are implementing innovative tools and processes.
2. **Leverage:** We at UITS consider their new ideas and scale them to university-wide services.
3. **Trust:** Through a relationship of mutual trust between UITS and our edge partners, we constantly improve IU's IT landscape.

Our successes are IU's successes. We keep the university humming in the middle of a global pandemic with our remote teaching and learning resources. We save IU money by negotiating contracts to provide no-fee software and discounted eTexts to students. We operate one of the most robust—and most secure—campus network infrastructures while supporting scores of tech-enabled classrooms and running world-class networks for external clients across the globe. We offer faculty and students easy access to high-performance computing tools while also leading our own funded research to develop new and better software and technology.

More than just a service organization, we bring in **millions of dollars in federal research grants** and contracts to further support IU's mission.

And the list goes on. Clearly, as IU embarks on its third century, UITS will continue to deliver world-class IT services while leading the future of IT.

Rob Lowden
Vice President for IT and CIO, Indiana University

At a glance:
IU's IT points of pride

In teaching, learning, and university operations

- Thanks to partnerships with dozens of publishers, the pioneering IU eTexts program enhances teaching and reduces students' costs. In FY20, the program distributed more than 200,000 eTexts and saved students $8.01 million in real-cost avoidance.
- IU has one of the world's best campus networking infrastructures handling more than 150,000 wireless devices at any given time.
- When COVID-19 hit, our Keep Teaching and Keep Learning resources bolstered faculty and student success during an uncertain time.
- Our Assistive Technology & Accessibility Centers, found on every campus, use technology to provide equal access and create an inclusive environment for the IU community.
- IU provides extensive software offerings at no added cost to students. Since the start of IU's Microsoft and Adobe enterprise license agreements in 1998, software titles were downloaded over 20 million times, and collectively saved the university over $300 million off the education retail price. Our consolidated structure allows IU to continue to pursue large-scale licenses with the biggest players in the field.

- UITS offers exceptional IT services and support, including an award-winning, 24x7x365 Support Center.
- IU leads in classroom technologies, with 99 percent of IU's general inventory classrooms containing an installed PC, webcam, and other tech to support dynamic in-person and remote learning.
- We provide high-quality support and education for faculty on new and emerging technologies through our teaching centers, faculty outreach, and partnerships.
- The University Information Security Office (UISO) and chief privacy officer ensure a resilient, secure IT environment that protects information resources and personal data.
- The new UITS website, built on a novel framework designed at IU, is customer-service focused and optimized for accessibility to offer an exceptional user experience.
- Our Decision Support Initiative builds data-informed tools for university leaders on topics ranging from revenue to financial aid.
- Our IT Training team offers award-winning educational resources on IT topics, as well as custom IT educational events.
- Our award-winning IT Communications Office supports enterprise-wide rollouts seamlessly, communicates grant awards, and ensures communication is at the core of everything we do at UITS.

In FY20 our supercomputers and high-performance computing systems helped IU faculty and researchers win $354 million in grants—41% of all grant dollars awarded to IU.

In research and discovery

- As home to the Center for Applied Cybersecurity Research (CACR) and the Research and Education Networks Information Sharing and Analysis Center (REN-ISAC), IU is a pioneer in higher education information security research, practice, and thought leadership.
- Research and education networks keep discovery alive, and we manage some of the world's biggest via our Global Network Operations Center (GlobalNOC) for clients like Internet2, the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Department of Commerce bringing in about $18 million each year.
- Big Red 200 is one of the world's most powerful university-owned supercomputers and is just one part of the suite of cyberinfrastructure tools we offer all IU researchers at no cost.
- The Media Digitization and Preservation Initiative saved IU's unusually rich and rare collection of more than 300,000 audio and video assets from degradation and obsolescence so future generations can enjoy and study them.
- Our Health Technology Services group offers a wide range of IT support and services for the IU School of Medicine—the largest med school in the country.
- We are leaders in IT research with unique partnerships between IT service and research areas—in fields including data science, high-performance computing optimization, and cybersecurity.

IU's eText program:

A pioneer in digital course materials

Since 2011, Indiana University's innovative eText program has reduced the cost of required course materials by nearly $70 million off retail price for IU students, making college more affordable for tens of thousands of Hoosiers across the state. The program allows students and faculty members to access digital course materials anytime, anywhere, and with any device.

In fact, we're so well known for this program, in 2018 we wrote the book on it when we published the free e-book "eTexts 101: A Practical Guide," sharing lessons learned and processes with the higher education community.

IU eTexts are more than simply digital versions of paper textbooks. Today, IU eTexts encompasses a full range of digital learning tools and courseware, including games, simulations, and video feedback tools.

The Unizin Engage e-reading platform, which powers IU eTexts, integrates with the Canvas learning management system, making it easy to access course materials with almost any device.

$8,013,778
In real-cost avoidance to students in CY20

202,771 eTexts distributed in CY20

200,000+
Titles from which IU faculty can choose

~$70 million
off retail prices for IU students since summer 2011

The value of eTexts became even more clear when the COVID-19 pandemic forced classes to move online. As IU moved into a distance-learning scenario, the eTexts team reached out to faculty about using them as they prepared for challenging upcoming semesters. Faculty responded well and increased the use of engaging digital resources in courses, which helped keep students on track to earning degrees.

Unizin: Getting good data on digital content

In 2014, IU co-founded the Unizin Consortium, a group of research institutions dedicated to enhancing learner success with digital technology. By focusing on content, learning environment platforms, and data, Unizin is helping faculty pinpoint what works, and what doesn't, in digital course content.

In fact, Unizin's data platform and learning analytics systems are being put to work in the "Mega-Study of COVID-19 Impact in Higher Education," led by IU's Ben Motz, director of the eLearning Research and Practice Lab in collaboration with Unizin and The Ohio State University.

The mega-study seeks to understand how the transition to remote instruction early in the pandemic affected the learning environment at a massive scale, and how the transition and its impacts might differ for different students and faculty.

Campus Networks:

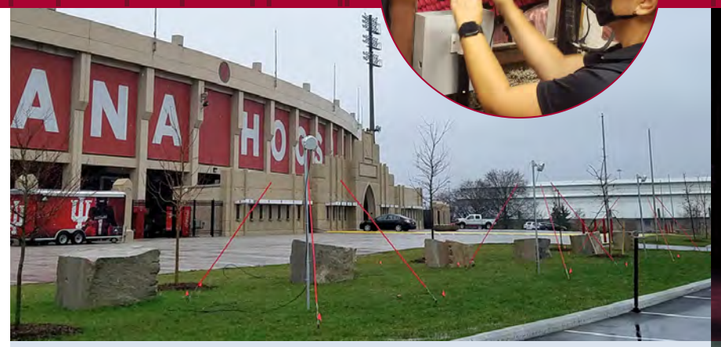
The lifeblood of a modern university

Whether delivering more than 1 billion emails each year or making sure millions of Zoom video conferencing minutes run without a hitch, IU's campus networks are among the best in the nation.

The Campus Networks team installs and supports total network connectivity—wired and wireless—for all students, faculty, and staff, overseeing more than 200,000 outlets and 10,000 access points in hundreds of buildings as well as internet and main network connectivity to IU's regional campuses.

This is quite a feat, considering a whopping 150,000 devices are connected to our network at any given time.

Our networks are easy to use, exceptionally reliable, and protected by dependable firewalls and secure wireless. These same networks additionally support the optimization of teaching and learning with cutting-edge classroom technologies. Campus Networks also manages a core routing environment that grows by more than 30 percent in bandwidth per year.



When the COVID-19 crisis hit and most of the IU community needed remote access to these dependable networks, we nimbly answered the call and redesigned IU's VPN (virtual private network) infrastructure to enable the increased need for secure remote connectivity. Meanwhile, our parking lot hot spots around the state supplied free Wi-Fi to the IU community and the public.

Our pandemic response also included outfitting socially distanced auxiliary classroom space on campus and installing special networking for COVID-19 mitigation testing sites at IU Bloomington's Memorial Stadium, Tennis Center, Garrett Fieldhouse, and in various parking garages at IUPUI.

Making sure IT resources are truly available to all

Indiana University is committed to supporting an inclusive and accessible environment across all campuses. This especially includes information technology. With about 20 percent of college-age students reporting a disability, the need is clear.

The UITS Assistive Technology and Accessibility Centers (ATAC) bolster this commitment by making sure students, faculty, and staff with disabilities can take advantage of our IT resources equitably. The ATAC partners with campus disability services to offer assistive technology and IT accessibility consultations, presentations, training, and support.

ATAC's diverse range of services, resources, and support are available to all students, faculty, and staff on all IU campuses. Those services include:

- Alternative media formats for textbooks
- Assistive technology hardware and software support
- Course accessibility consultations
- Presentation and training on accessibility best practices

For faculty, ATAC consultants help with:

- Assessing existing courses for accessibility concerns
- Developing remediation plans, including timelines
- Coordinating resources for materials remediation, including text, audio, and video
- Implementing accommodations requests received from the campus disability services offices

ATAC:

Equal access and inclusive environments

Our efforts are making a difference. In December 2020, the Higher Ed in 4k Project named IU Kokomo No. 1 in the nation for web accessibility—out of over 3,800 institutions evaluated. The 4k Project documents the progress of U.S. higher education institutions' efforts to improve web accessibility.

Pandemic pivot:
Unparalleled COVID-19 response

When IU announced it was moving its classes online in March 2020, affecting all 93,000 students and 21,000 faculty and staff, UITS sprang into action.

With just two weeks' notice, faculty had to be prepared to deliver their courses online and staff set up to work from home. UITS played a mission-critical role in creating the plans for shifting processes and infrastructure to support the rapid transformation.

UITS staff worked tirelessly to create systems, dashboards, technology in the field, and everything in between, including:

- Shifting to online webinars for faculty support
- Updating our well-established Keep Teaching site and building the Keep Learning and Keep Working sites to help faculty, students, and staff stay informed and connected while remote
- Creating a detailed classroom inventory database to help with pandemic social-distancing planning and rescheduling of space
- Creating additional classrooms and installing AV/tech in auxiliary spaces such as the IU Auditorium that allowed for safe distancing
- Creating outdoor Wi-Fi across campus for drive-up access for the IU community and the public
- Designing, installing, and managing sign-in kiosks with barcode printers for the massive COVID-19 mitigation testing process
- Creating apps and data dashboards as well as a Citrix virtual desktop so students could access software at home

UITS touched nearly every facet of the university from the student learning experience to faculty redesign of coursework and learning new technologies, operations for COVID-19 testing, readjustment of campus social-distancing experiences in classrooms, and research for the COVID-19 vaccine.

Thanks to our committed professionals, the university was empowered to adapt successfully, students remained safe while continuing to learn, and the quality of the IU experience was preserved. Today, IU is more resilient than ever, with a more digitally-savvy faculty, an increase in online learning, and more flexibility in our work environments.

137,263,919

Minutes of video watched in Kaltura (our video instruction platform)

45,331,472

Sessions initiated in Canvas (our learning management system)

3,357,658

Meetings hosted in Zoom

The bottom line: Now, one year and one BILLION hours of Zoom later, IU is thriving. At the May 2021 commencement ceremonies around the state, IU conferred 21,145 degrees to graduates aged 17 to 74.

Perhaps most notably, UITS staff put on their face masks and provided on-site tech support for IU's arrival and mitigation efforts, ultimately supporting the technology to conduct 204,903 mitigation tests throughout the IU network.

The collaboration, creation, and deployment of the many new services could be described as heroic. Beyond the scope of our individual campuses, we supported COVID-19 research efforts globally. The UITS team worked with penMRS to use Jetstream (see In the Jetstream, p. 31) for national and worldwide health efforts, including COVID-19 research and tracking.

Staff also worked with the IU School of Medicine on using REDCap, Indiana University's research survey tool, to support the AstraZeneca COVID-19 vaccine trial and developed multiple apps.

Since the start of the Microsoft and Adobe enterprise license agreements, **software titles were downloaded over 20 million times**, and collectively **saved the university more than $300 million** off the education retail price over the last 23 years.

Unrivaled software access:

The most popular packages at no extra cost

IU offers no-fee access for students, faculty, and staff to dozens of the most popular software packages and tools for learning, creative projects, statistical analysis, web work, security, and more. Our long-standing license agreements with software giants Microsoft and Adobe are hallmarks of our commitment to innovative teaching and learning, while at the same time preparing students for the modern workplace.

In 1998, IU was the first university to sign an enterprise-level agreement with Microsoft—providing products like Word, Excel, PowerPoint, and Windows at a fixed cost to the institution.

In 2008, IU was the first university to develop an enterprise-wide agreement with Adobe, which has become the model for many other educational institutions since. In November 2020, IU signed a new enterprise-wide contract with the company to provide access to Adobe Creative Cloud Pro—a collection of 20+ desktop and mobile apps and services for photography, design, social media, video, web, and more, plus stock photo services.

Agreements like these save IU thousands of hours in internal billing, and millions of dollars off the educational list price of software every year.

IU makes using the software easy, too. Need to access a high-speed version of Adobe InDesign on an older laptop? Or maybe you need to proctor a remote exam for hundreds of business students? IUanyWare, our award-winning, cloud-based service, gives virtual access to the IU computers and software that make it all possible.

No matter where you are or what device you're using, you can stream IU-licensed apps and software—without having to install or download each one or use a VPN. IUanyWare gives students equal access to the tech they need when they need it.

Popular software titles include Microsoft 365's Word, PowerPoint, Excel, Teams, and SharePoint; Adobe's Photoshop, Illustrator, InDesign, Acrobat, and Premier Pro; and accessibility software Read&Write.

With an operating budget of $3.7 billion and about 130,000 students, faculty, and staff around the state, Indiana University is comparable to a major corporation. And like any big company, IU relies on IT systems to be successful.

UITS manages IU's enterprise resource-planning systems in support of human resources, payroll, finance, student information, student advising, research administration, learning management, parking, CrimsonCard IDs, and other academic and administrative systems.

Exceptional IT services, systems, and support

Many of these tools were created in-house by our software developers, and are now commercialized for other higher education institutions, generating income streams for IU. Examples of these entrepreneurial tools include Kumo cloud storage management, IUanyWare software licensing, One.IU service discovery, and Box migration custom scripts.

How we support all this phenomenal IT

With this abundance of technology and software, people will need support for their questions and issues.

Our award-winning UITS Support Centers and Contact Centers offer efficient, 24/7 help via an artificial intelligence chatbot as well as customer-focused UITS staff available by email, phone, andwalk-up services for faculty, staff, and students on all campuses. Meanwhile, our award-winning Knowledge Base (KB) offers an online, searchable repository of thousands of answers to common questions about computing at IU.

Our Executive and Internal Technology Support group provides white-glove IT support for IU executives, including the president's and vice presidents' offices and the Board of Trustees.

Did you know UITS supports these enterprise-wide systems?

- One.IU
- Microsoft 365
- Kuali Financial Systems
- iGPS (course planning tool)
- AdRx (advising records)
- PeopleSoft Student Information Systems

Unified constituent relationship management (CRM) for IU

The IU CRM is a cloud-based system of engagement that provides a 360-degree view of contacts and constituents, allowing for more effective relationship management and interaction tracking.

IU CRM also helps staff and departments collaborate internally and externally, gather insights from social media, track important metrics, and communicate via email, phone, social media, and other channels. The IU CRM platform is comprised of two components: Salesforce CRM and Marketing Cloud.

CrimsonCard:
IU's official photo ID—and so much more

CrimsonCard gives access to every card-based university service in one convenient, secure package. It's a print release card, keycard to authorized university buildings, library card, and if you're enrolled in a dining services plan, it's your meal ticket.

This handy card even generates revenue for IU when used to pay for items at participating on- and off-campus vendors.

Teaching and learning:

Reimagining what it can be

We are constantly looking for ways to engage the active minds of students and the accomplished instructors who guide them. By designing and supporting diverse learning environments, we provide opportunities for students and faculty to explore new technologies and engage with peers.

Classroom tech extends well beyond the hardware available in IU classrooms. Although more than 99 percent of IU's classrooms feature a PC and webcam, many even have advanced tools like wireless screensharing, sophisticated microphones, and pan, tilt, and zoom cameras.

As the pandemic made particularly clear, tech like video and web conferencing and video streaming can help faculty educate students across the country and collaborate with peers across the globe. Our Collaboration Technologies team engages directly with instructors to make sure these tools run smoothly.

Formal and informal spaces enable collaborative, active learning through attention to flexible design, enhanced tools, and ongoing evaluation. In fact, IU is leading in the active learning arena, thanks to projects such as the Mosaic Initiative and the Alcove (Active Learning Classroom of Valuable Experiences) sandbox classroom, both of which foster innovative classroom design, research, and comprehensive support for all IU classrooms.

Meanwhile, we are reimagining IU's Student Technology Centers. Instead of traditional computer labs with rows of PCs, we are building informal learning spaces to invite student collaboration. And our IUanyWare service allows learners to access apps virtually—from anywhere, at any time—through a remote desktop experience.

Keeping instructors' skills sharp, at the speed of tech

To keep IU's faculty empowered with the latest learning technologies, UITS partnered with the Office of the Vice Provost for Undergraduate Education to create the Center for Innovative Teaching and Learning (CITL).

Centers like CITL are found on every IU campus. Their staffs work with faculty to enable innovation in curricula, implementation of new technologies and pedagogies in and beyond the classroom, as well as foster student engagement with learning resources and materials that promote critical analytic and research skills.

In Bloomington, CITL's location on the second floor of Wells Library's east tower also encourages close collaboration with librarians specializing in information literacy. This blend of specialties enables the CITL to offer a collaborative and dynamic way of addressing complex teaching issues.

Security and privacy:
Safeguarding IU's tech landscape

Two teams of cybersecurity experts are actively working right now to protect the IU community. The University Information Policy Office (UIPO) and University Information Security Office (UISO) together help create a resilient and secure IT environment that protects information resources—without impeding their widespread and appropriate use.

The security team provides security analysis, development, education, and guidance related to IU's information assets and information technology environment. The policy team develops, disseminates, reviews, interprets, and provides education on policies about information and IT.

They work together in responding to and investigating incidents related to misuse or abuse of IU's information technology resources, including computer and network security breaches and unauthorized disclosure or modification of electronic institutional or personal information.

The security and policy offices also develop guidelines, best practices, and educational materials about the use and protection of computing resources and the handling of sensitive institutional data.

At every university, one thing is constant: important decisions always loom on the horizon. To make smart decisions and set a course for a bright future, executives and leaders need access to timely, relevant, and accurate information.

One major challenge to running a large university is that key decision-makers are often dealing with too much data, in too many formats, in too many places to be useful. They might not even know where to find all this data, or that it even exists.

That's where our Decision Support Initiative (DSI) comes in. Launched in 2015, DSI supplies timely, relevant, accurate data to facilitate better decision-making. DSI brings together disparate data sources in easy-to-use, self-service reports, so leaders always have access to high-quality information. Shared data sources ensure that leaders across all campuses and units have the same data and can use it to develop solutions to various challenges based on a single source of truth.

Dashboards:
Helping IU make data-driven decisions

Academic Metrics 360: Dig into the data with dashboards

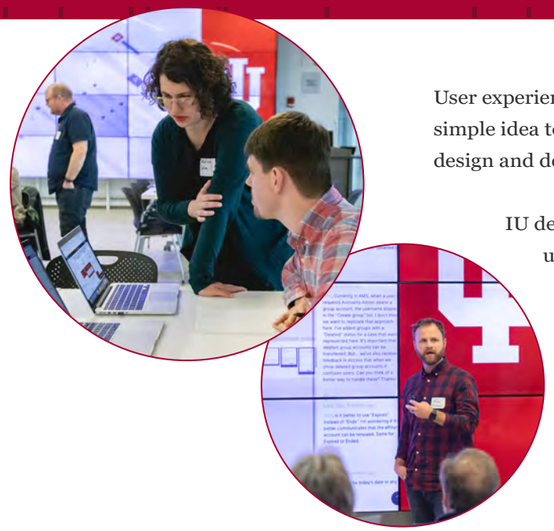
DSI's flagship project is Academic Metrics 360 (AM360). AM360 is a suite of easy-to-use online, interactive dashboards that empowers university decision-makers to measure, compare, and analyze trends about the financial health of their responsibility center (RC).

IU uses a financial system called Responsibility Centered Management (RCM), which gives RCs responsibility both for generating income and managing expenses. Data transparency across schools and units are the foundation of RCM, and AM360 supports the management process by making data easily accessible to faculty and staff leaders.

Available dashboards include data on academic department finances, student credit hours, student course trends, faculty trends and comparisons, student financial aid, and instructional and workforce trends, among others.

User experience:

Building a beautiful, functional digital campus



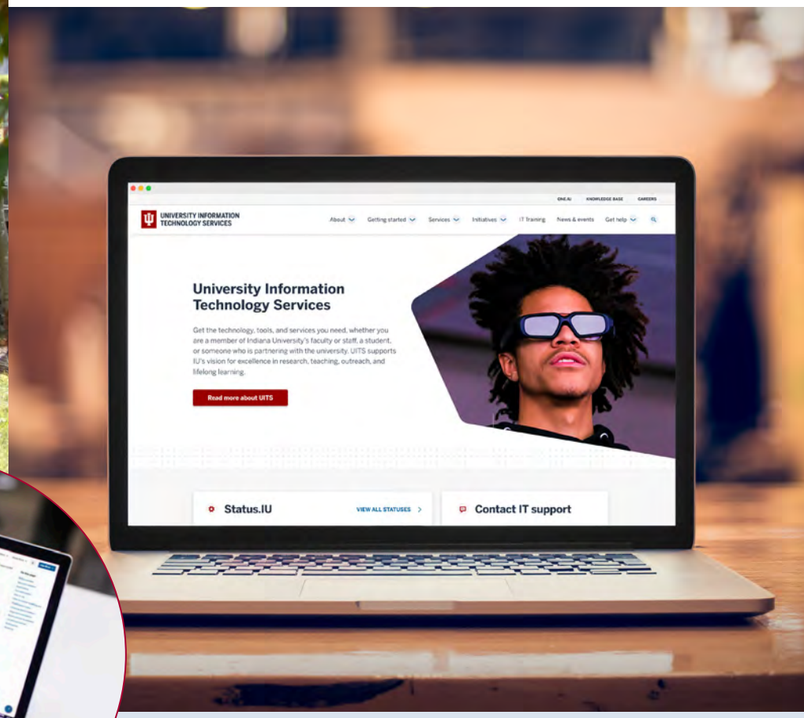
User experience is human experience. IU's User Experience Office takes that simple idea to heart, working with IU offices, departments, and schools to design and develop an impactful digital campus that puts people first.

IU designers, developers, and leaders form the user experience (UX) unit of university software. The UX Office works with teams at all stages in a project to simplify processes, address accessibility needs, and develop adaptable products.

To have the greatest impact and provide the most consistency to all constituents, the office focuses on university-wide strategies and practices with projects that cover all aspects of UX from principles to code to delivery.

Initiatives include:

- **Rivet.** The first design system in higher education, Rivet is one of the top, most accessible, open-source design systems in the world. As a collection of code and visual assets used to create patterns across software titles, Rivet makes it easier to build and support consistent user interfaces.
- **Accessibility audits.** Comprehensive web accessibility is a standard at IU, not just a goal. These audits ensure accessible experiences with an evaluation and a do-it-yourself checkup.



The UX Office's efforts have paid off. IU's major digital campus properties now rank first in the Big Ten, and IU ranks in the top 5 of 151 universities in a longitudinal web accessibility study presented at the EDUCAUSE Annual Conference.

New UITS website puts our clients' needs first

In January 2021, UITS unveiled a new, streamlined website, focused on helping IU faculty, staff, and students quickly find the information they need. The project is a collaborative effort with IU's User Experience Office, IU Studios, UITS IT Communications Office, and vendor Brain Traffic.

Unlike the earlier site, which had 104 websites totaling 21,659 pages in its ecosystem, the new site is more concise, mobile friendly, highly accessible to people with disabilities, and organized to make our most popular services quick and easy to find.

IT Training:

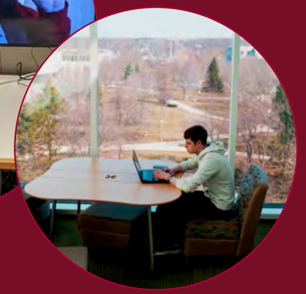
Teaching the tech

IU offers a wealth of software and applications to faculty, staff, and students. To get the most out of all these powerful products, UITS's award-winning IT Training office offers thousands of live and recorded training sessions and courses at no cost. The courses are accessible even to those outside IU.

IT Training offers certificates in six areas: Access essentials, audio-video production, Excel, media design, office productivity, and web creation. In addition, it provides custom training sessions for IU groups and classes of 10 or more, which are aimed at empowering attendees with IT skills that accelerate academic and career goals.

IT Training was instrumental in the switch to remote teaching and learning in March 2020 at the start of the COVID-19 pandemic and trained more than 2,500 faculty and instructors to quickly transition their courses online.

IT Training was able to adapt rapidly because their staff was prepared. They created the Keep Teaching website in 2009 following the H1N1 pandemic, and maintained it during the 11 intervening years, which ensured that IU was ready to move courses online quickly.



In addition, IT Training offers dozens of courses in these topic areas:

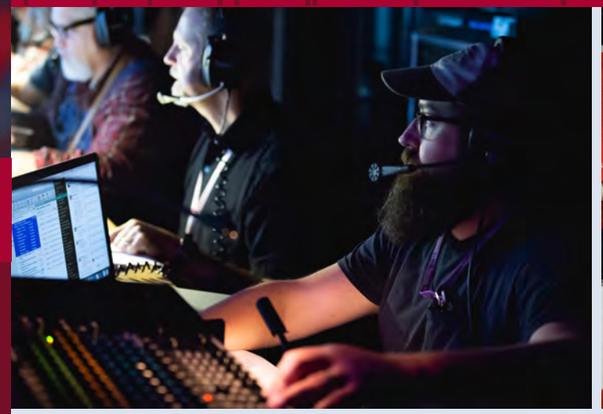
- Accessibility
- Coding
- Design and media
- IU services
- Productivity
- Research computing
- Safe IT practices
- Web development

IU was one of the first university IT organizations to have a dedicated communications office. Embedding communications specialists in our organization helps make sure that faculty, students, and staff make the best use of our world-class infrastructure.

When we roll out a new IT service, retire an old one, or experience an IT outage, our dedicated communications professionals in the IT Communications Office (ITCO) ensure that the IU community has the information they need to continue teaching, learning, or researching. ITCO also helps with IT grant proposals and submissions, and several ITCO staff member salaries are funded by grants to provide communications and marketing related to those projects.

IT Communications:

Keeping IU and the public informed



Our IT Communications Office is a model for other large universities, consulting for several in the Big Ten alone. In addition, our ITCO team has won multiple awards from the Society for Technical Communication and the Council for Advancement and Support of Education.

ITCO also produces the annual, corporate-sponsored Statewide IT Conference for all of IU's IT professionals on all campuses. The group coordinates other large-scale events, and markets external, fee-for-service groups that are part of the Office of the Vice President for IT such as GlobalNOC, OmniSOC, I-Light, and REN-ISAC.

Now more than ever, universities and other research organizations are grappling with the risks of cybersecurity. The pandemic rapidly shifted Indiana University online, and it's made us all more aware of the threats we face.

IU takes cybersecurity seriously and the service centers in this area are among our most impressive accomplishments.

Cybersecurity at IU:

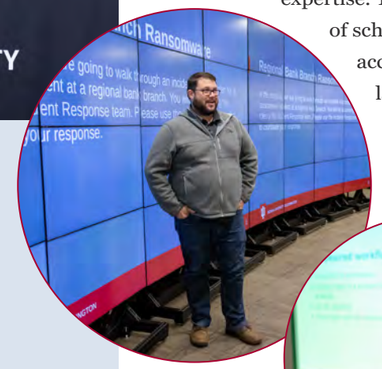
Leading the state and the nation

CACR has received research grants from the National Science Foundation and U.S. Department of Defense, and it also partners on funded projects with the Naval Surface Warfare Center, Crane Division (NSWC Crane), a U.S. Navy base in southern Indiana.

The Center for Applied Cybersecurity Research (CACR)

CACR has been working since 2003 to provide the nation with leadership in applied cybersecurity technology, education, and policy. Its applied research identifies and addresses difficult cybersecurity problems facing public and private communities, while inviting continued collaboration to foster greater innovation and creativity.

What sets CACR apart is its ability to interweave technical and policy expertise. The center draws on Indiana University's wide range of scholarly expertise in computer science, informatics, accounting and information systems, criminal justice, law, organizational behavior, public policy, and other disciplines, as well as the extensive practical cybersecurity experience of its operational units.



Indiana University thrives on collaboration, which is why CACR works closely with the Kelley School of Business; the Luddy School of Informatics, Computing, and Engineering; and the Maurer School of Law. These partnerships enable important discussions on the intersection of cybersecurity issues in business, policy, law, and technology.

The Research and Education Networks Information Sharing and Analysis Center (REN-ISAC)

The REN-ISAC serves over 650 dues-paying member institutions within the higher education and research community by promoting cybersecurity operational protections and response. Its member institutions benefit from Security Event System (SES) threat intelligence and other automated data collection and sharing tools to enable informed decisions about threats and events. What's more, it provides peer assessment services to improve client institutions' overall security posture.

REN-ISAC also offers members daily cybersecurity news reports, alerts and advisories, analysis reports of cybersecurity threats and mitigation, and an active, interested community of subject matter experts who provide feedback on practices and standards. The center fosters professional training and development through monthly webinars, regional workshops, and an aggregate purchasing program with the SANS Institute. The REN-ISAC staff also create informative whitepapers that provide cybersecurity tips, tricks, and procedures.

The Omni Security Operations Center (OmniSOC)

This shared cybersecurity operations center is located at Indiana University and was founded by IU in partnership with Northwestern University, Purdue University, Rutgers University, and the University of Nebraska. In fact, OmniSOC is higher education's only collaborative multi-state institution security operations center (SOC).

OmniSOC is also the only collaborative SOC supporting NSF research and the only SOC with a multi-state institution data sharing agreement for researchers.

OmniSOC rapidly delivers critical, actionable, high-quality alerts **all day, every day** to its dues-paying members.

This allows cybersecurity staff to focus on what's important, at substantial cost savings, from a trusted leader in the higher education cybersecurity community. OmniSOC operates collaboratively across member institutions, reducing the time from first awareness of a cybersecurity threat anywhere to mitigation everywhere for its higher education institutions and research facilities members.

The Research Security Operations Center (ResearchSOC)

This National Science Foundation-funded organization helps make scientific computing resilient to cyberattacks, specifically for the research community. It's capable of supporting trustworthy, productive research through operational cybersecurity services, training, and information sharing. These services are provided to researchers both inside and outside of Indiana University.

Regardless of where they get their work done, researchers' needs vary. For instance, diverse infrastructure tools such as a high-powered telescope have very specific cybersecurity needs.

ResearchSOC identifies these unique needs and pinpoints effective solutions. The organization ensures data integrity, confidentiality, and enables instrument accessibility all while providing direct control to project principal investigators and IT leads. In short, ResearchSOC relieves the burden and reduces the noise so researchers can focus on changing the world.

It all started in 1998, at the dawn of the internet age, when IU joined forces with Internet2 to build a research and education networking community that would protect and support collaboration and discovery.

Research and education networks:

A global leader in connecting the world

Today, IU Networks and its three divisions—the Global Network Operations Center, I-Light, and International Networks—are at the forefront of network operations and initiatives, propelling research and fostering collaboration for scientists and scholars throughout Indiana, the United States, and around the globe.

Our reputation as the leader in R&E networks translates into income for the university, with IU Networks bringing in about $18 million in external contracts and funded research grants each year.

GlobalNOC

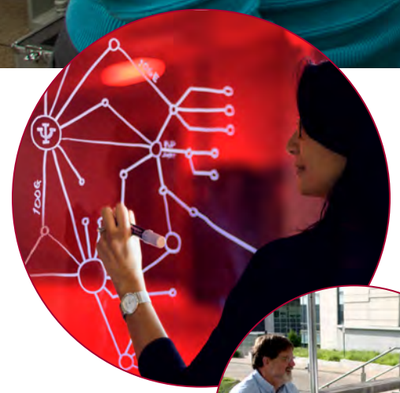
The Global Network Operations Center, or GlobalNOC, supports some of the world's most powerful computer networks vital to the Indiana economy and to researchers here and around the world.

For example, GlobalNOC supports networks connecting all but one of Indiana's universities and colleges, facilitates collaboration between doctors in China and the U.S., moves massive physics data from the Large Hadron Collider in Europe to researchers in the U.S., and models severe weather to predict dangerous conditions in collaboration with NOAA. It is also home to Internet2's network operations center.

The GlobalNOC community currently includes 20+ network partners in research, education, public service, and municipal operations, ranging from small and local to global in scope and impact.

In a 10-year span, from 2017 to 2027, the GlobalNOC is projected to bring in more than $200 million and create at least 30 new high-tech jobs at IU.

The GlobalNOC is a true Indiana success story, bringing in people, jobs, and millions of dollars in research funding. Since 1998, it has grown from three to nearly 130 highly skilled, full-time employees, many of whom were recruited to Indiana from outside the state. In addition, the GlobalNOC attracts new IU faculty who study network performance, win federal research grants, and attract highly talented students.



I-Light network

I-Light is the high-speed, fiber optic network that connects all but one Indiana public university and private college. Managed by IU's GlobalNOC, I-Light connects members to state, national, and international research and education communities, enabling collaboration and discovery to benefit us all. It is made possible by a unique collaboration among Indiana colleges and universities, state government, and private sector broadband providers.

Membership has its benefits. I-Light enables a variety of capabilities such as the secure exchange of large data files, access to supercomputers and scientific data storage facilities, multi-campus collaborative research projects, and much more.

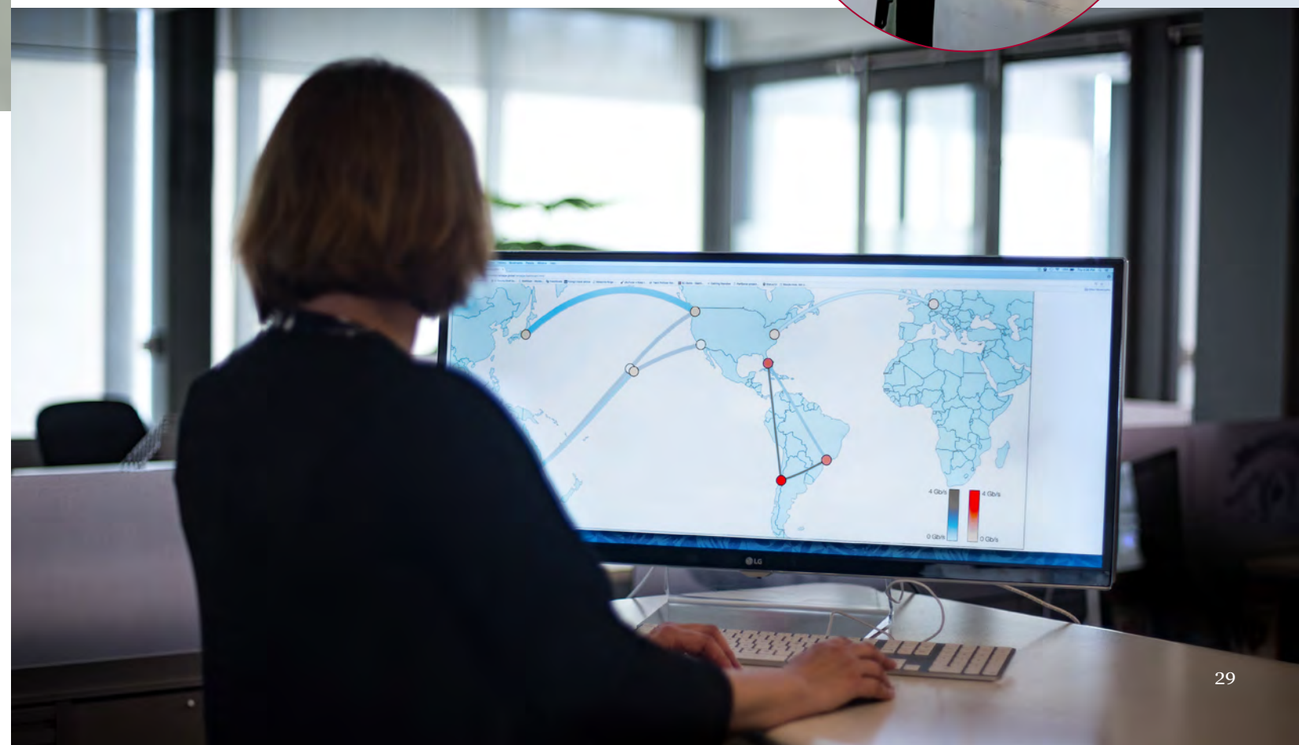
International Networks at IU

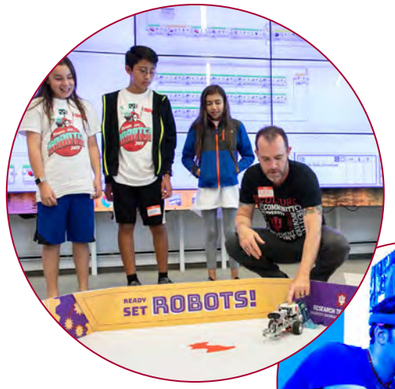
International Networks at Indiana University (IN@IU) delivers network connectivity that fosters the scientific collaboration that drives research and education in every corner of the world.

In fact, networks managed and operated from Indiana reach 91 percent of the world's countries, furthering important discoveries in a range of fields including astronomy, bioinformatics, climate science, and medicine.

From niche projects to large-scale research efforts, IN@IU uses high-performance networking as a tool to advance scientific diplomacy.

Recent grants include the **$4.75 million TransPAC5 award**, extending more than 20 years of collaboration in the Asia-Pacific region, and Networks for European, American, African, and Arctic Research, providing services and bandwidth connecting researchers in the U.S. with their counterparts on three continents.





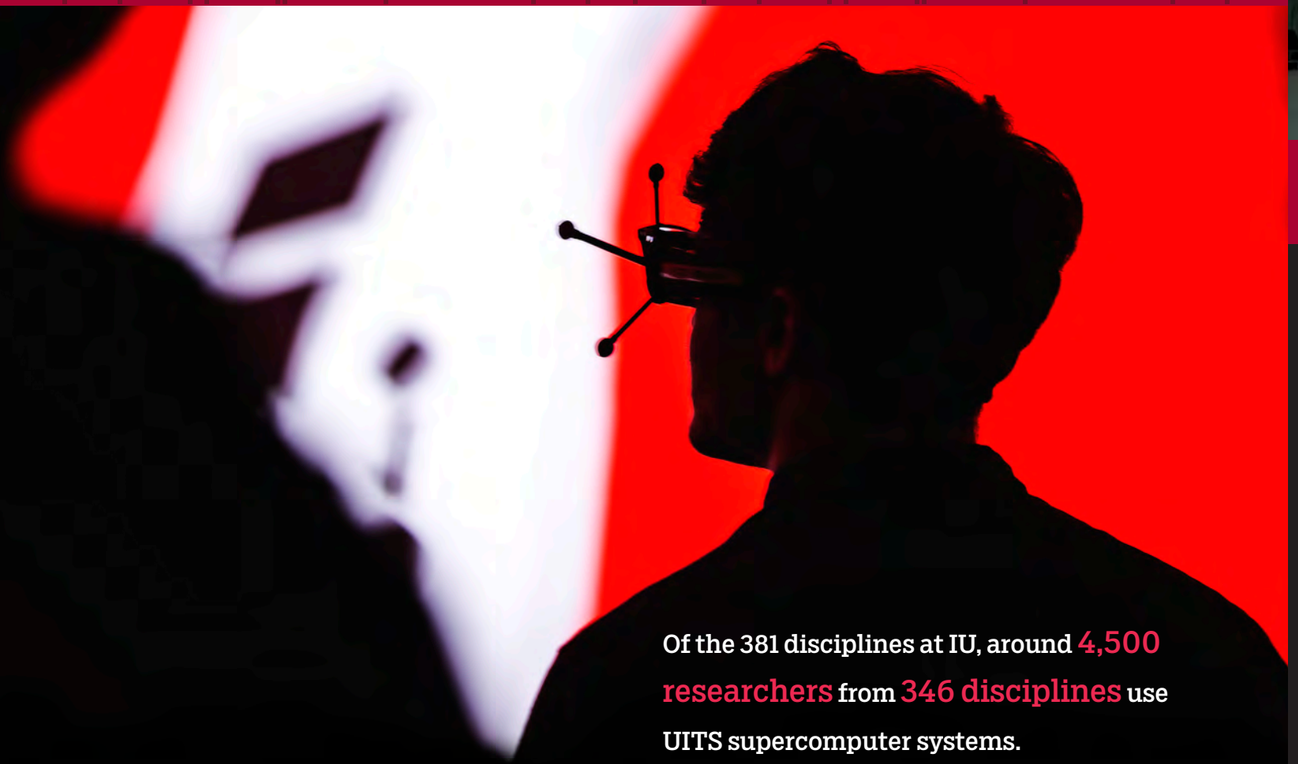
Research Technologies (RT) is unique among peer institutions in how it collaborates with and supports faculty and research labs. RT offers expert consulting, compute and storage resources, research software, and visualization and data services to meet researchers' needs.

RT complements these efforts with education and technology translation services to help researchers make the most of the unparalleled technology resources available at IU. RT's services and support, coupled with leading-edge high-performance compute and storage systems available free of charge to everyone at IU, mean higher grant competitiveness for IU.

Access to major supercomputer systems with the capacity for massive data storage and ultra-fast networks is a fundamental need at a renowned research university like IU—across nearly all the disciplines from astronomy to zoology.

Research Technologies:

Enabling discovery across IU



Of the 381 disciplines at IU, around **4,500 researchers** from **346 disciplines** use UITS supercomputer systems.

All about Big Red 200

Big Red 200 is the first university-owned Cray Shasta system capable of artificial intelligence research. Built specifically with IU's research needs in mind, Big Red 200 supports large-scale research in medicine, climate modeling, physics, and hundreds of academic disciplines.

With a peak performance rate of more than six quadrillion—or six thousand trillion—floating-point operations per second, or petaFLOPS, Big Red 200 is more than six times faster than its predecessor, Big Red II. It would take everyone in the state of Indiana more than 28 years—performing one calculation per second 24 hours a day, 7 days a week, 365 days a year—to perform the same number of calculations that Big Red 200 can do in just one second.

Such computational horsepower will help IU continue to attract top research and teaching talent, and bolster IU's well-earned reputation as a high-performance computing (HPC) powerhouse.

200+ Departments supported in FY20

$351,632,947
FY20 grant dollars supported by RT

$854,478,824
FY20 grant dollars for all of IU

In the Jetstream

UITS Research Technologies is home to Jetstream, the first National Science Foundation-funded cloud system designed to give researchers on-demand access to advanced cyberinfrastructure from their desktops, laptops, and tablets—anytime from anywhere. Jetstream2, its follow-on system set to come online in fall 2021, builds upon its predecessor's success and expands into artificial intelligence capabilities.

Jetstream is also a member of the COVID-19 HPC Consortium, providing vital high-performance computing resources in support of COVID-19 research.

Media Digitization and Preservation Initiative:

Saving precious recordings

Indiana University holds large numbers of audio, video, and film recordings with high research and instructional value. As IU neared its bicentennial, many were on obsolete formats that were degrading and would have been lost forever had we not digitized them.

Announced by IU President Michael A. McRobbie in 2013, the Media Digitization and Preservation Initiative was charged with digitally preserving and providing access to all significant audio, video, and film recordings on all IU campuses.

Since then, more than 350,000 audio and video items and film reels have been preserved through our unique partnership with Memnon Archiving Services, a Sony company.

MDPI was a massive group effort with dedicated funding from all over the university including the Office of the President, Office of the Provost, and the Office of the Vice President for Research. Additional funding and in-kind contributions came from the IU Libraries, UITS, and various media-holding units.

The result of this work is that IU is a world leader in media preservation. Researchers and community members today and well into the future now have online access to IU's many precious artifacts.

92,341
Videotapes (open reel, VHS, Beta, Umatic, DV)

77,333
Vinyl records (LP, 45, 78)

17,030
CD-Rs and DVDs

7,759
Lacquer, aluminum, and other audio discs

6,643
Films

185
2" videotapes

36
Magnabelts

IU has preserved:

- **Audio recordings of Orson Welles radio broadcasts from 600 lacquer disks**
- **276 wax cylinder recordings of Native American languages and music**
- **184 open-reel audio recordings of "The Afro-American in Indiana" radio show**

Pervasive Technology Institute:

Accelerating innovation through unique collaboration

IU's IT organization not only manages its entire tech landscape, but it's also making discoveries and helping set the course for the IT field. In fact, we are unique in higher education for the ways in which our IT service organization, UITS, collaborates with IU researchers and conducts its own frontline research.

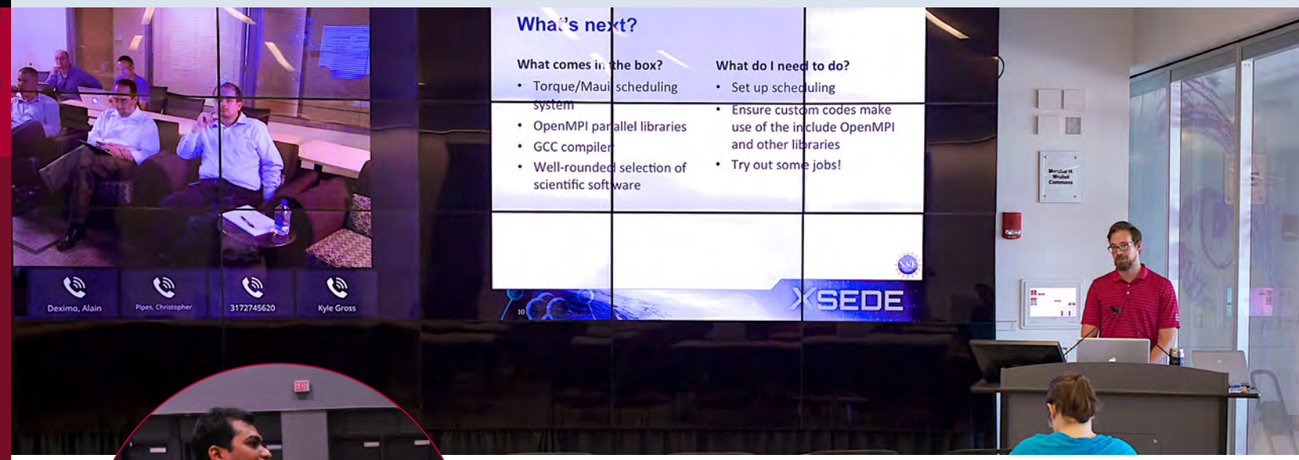
One of the main ways we do so is via the Pervasive Technology Institute at IU, or PTI. PTI was founded in 1999 to help IU become a leader in the use and application of information technology. It was seeded through a $30 million grant from the Lilly Endowment.

The institute comprises 10 affiliated research centers focused on using technology to tackle problems such as human health, cybersecurity, and the impact of global climate change. Staff create software, deliver information and services, and support and provision a world-class cyberinfrastructure. Each of these centers is active in obtaining external grants and contracts.

Since inception, PTI has garnered $123.6 million in public grant awards and $12.7 million in private funding for research and innovation at IU.

The 10 PTI centers are:

- **Center for Applied Cybersecurity Research** provides leadership in applied cybersecurity technology, education, and policy guidance.
- **Crisis Technologies Innovation Lab** accelerates research and practice on the use of next-generation technologies for emergency and crisis response.
- **Cyberinfrastructure Assessment and Evaluation** conducts return-on-investment analysis, longitudinal studies, and other program assessment activities.
- **Cyberinfrastructure Integration Research Center** enhances the use of advanced cyberinfrastructure, including large supercomputers, grids of smaller computers, and advanced data sources.
- **Data To Insight Center** conducts societally relevant research, scholarship, and outreach in data science and data-driven computing.
- **Digital Science Center** explores new applications related to the most cutting-edge grid and cloud technologies and works to define some of the most powerful new computational techniques available.
- **eLearning Research and Practice Lab** acts as a link between IU faculty researchers and the systems that store eLearning records, helping to enable systematic and sustained research.
- **HathiTrust Research Center** facilitates non-profit, educational, and computational uses of the HathiTrust Digital Library through text and data analysis.
- **National Center for Genome Analysis Support** enables the U.S. biological research community to analyze, understand, and make use of the vast amount of genomic information now available.
- **UITS Research Technologies** develops, delivers, and supports advanced technology solutions that enable new possibilities in research, scholarly endeavors, and creative activity at IU and beyond.

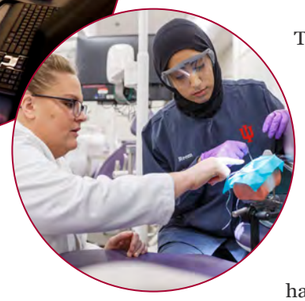


PTI executes its mission through collaboration across organizational boundaries within IU, an innovative collaboration of the Office of the Vice President for Information Technology; the Maurer School of Law, the Luddy School of Informatics, Computing, and Engineering; the College of Arts and Sciences; and the Kelley School of Business.

PTI is also a hub for activity and collaboration beyond IU—serving as a point of contact for external partners and a nucleus of new ideas within IU.

Health Technology Services:

Tailored support for clinical schools



IU's clinical schools—including the School of Medicine, School of Dentistry, School of Optometry, School of Nursing, and School of Public Health—have IT needs that are critical to patient health, life-saving research, and the health of our communities.

The Health Technology Services (HTS) team, our united clinical affairs IT support unit, provides more than 50 HIPAA-aligned systems and delivers a wide range of IT support and services for physicians, researchers, healthcare teams, faculty members, and IU health sciences staff.

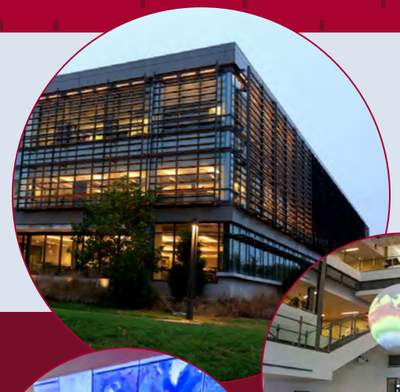
These services empower physicians and researchers to focus their energies on their work while HTS ensures that software, hardware, medical education, classroom technologies, and servers are running efficiently and securely.

Our accomplishments are the direct result of the dedication and expertise of our most valuable resource: **our people**.

The people who power IT at IU

With 1,100 full-time and 300 part-time employees—the largest staff of any non-degree-granting unit at IU—we are building an inclusive culture of diverse, innovative, and collaborative people who contribute to the mission of the university—at scale.

Facilities:
World-class IT spaces



Our exceptional, highly secure IT facilities are essential to IU's success in attracting millions of dollars in federal research grants and private contracts.

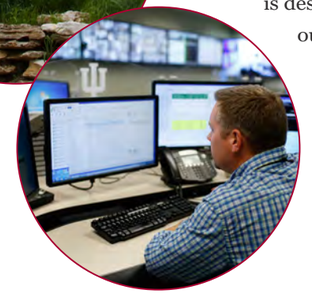
From collaboration spaces and solar panels to tornado-proof bunkers for our supercomputers and comfy, creative places for our students, UITS facilities boast state-of-the-art resources and experiences.

Cyberinfrastructure Building (CIB), IU Bloomington

The CIB is the home of the Office of the Vice President for IT and CIO, housing the majority of UITS staff at IU Bloomington. The 123,000-square-foot building features a collaborative, open-space office design, numerous spaces for teleconferencing, 36 focus booths for meetings and private discussions, and abundant soft- and bar-style seating to encourage community and informal work throughout the building. The CIB is home to the GlobalNOC's fully redundant network operations center, with the other in the Informatics and Communications Technology Complex at IUPUI—to ensure uninterrupted services in case of an outage at either site. It is the greenest building on the IU Bloomington campus, earning Leadership in Energy and Environmental Design (LEED) Gold certification from the U.S. Green Building Council.

Informatics and Communications Technology Complex (ICTC), IUPUI

Thanks to a major renovation in 2019, the ICTC now has a more modern environment with natural light, clean lines, and openness. The 207,000-square-foot space, which spans five floors, includes more windows, glass walls, collaborative spaces, new kitchens, lounges, and a gleaming new GlobalNOC. That's great news to the 350 university, grant-supported, and contracted staffers who make it their work home as well as to UITS government partners and corporate clients who often visit our facilities.



IU Data Center

The state-of-the-art IU Data Center in Bloomington provides a robust and well-secured environment for housing IU's valuable IT assets, including its supercomputers and administrative data. The 90,000-square-foot reinforced-concrete bunker is designed to withstand flooding, power outages, and even an EF5 tornado (that's winds above 200 mph).

In 2019, the Data Center was upgraded with additional power and cooling to accommodate state-of-the-art cyberinfrastructure as well as room for future expansion.

Idea Garden

IUPUI's Idea Garden offers a comfortable place for students to work and collaborate using emerging technologies. The colorful, fun space is anchored by a huge monitor wall and is outfitted with the latest tech for personal and professional growth, including 3D printers, high-performance PCs, VR headsets, Dell Canvas touchscreen workspaces, Microsoft Surface computers, and an IQ-Wall touchscreen video display.

The Idea Garden also provides a venue for learning, growth, and connection, hosting activities and events supporting the educational mission of IUPUI and offering opportunities for students to connect with technologists, entrepreneurs, and businesspeople from Indianapolis and beyond.

OVPIT: Leadership

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