



2024

IMSS Annual Report
Caltech

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MESSAGE FROM THE CHIEF INFORMATION OFFICER

As we conclude FY24, we are pleased to share our annual report. In this report, you will learn how **Information Management Systems & Services (IMSS)** has supported Caltech's research and education mission while continuing to provide robust services for our administration needs. The notable accomplishments of each group are outlined below.

- **Academic Computing Services (ACS)** continues to support close to 600 websites and 80+ web applications, including access.caltech proxy, which authenticates, authorizes and routes all access.caltech activity. We are currently working on the exploration of LLMs and AI Solutions, and expanded Use of AI/ML Tools.
- **Academic Media Technologies (AMT)** has supported more than 210 projects, facilitated more than 160 in-person events and webinars, posted more than 180 YouTube videos, and completed 22 AV technology installations.
- **Information Security (IS)** has deployed CS Endpoint Detection and Response (EDR) to more than 4,000 devices and blocked more than 2.1 million attacking IP addresses at the network perimeter. While working with the IMSS help desk, IS deployed close to 9,000 Duo multi-factor authentication configurations.
- **Infrastructure and Data Service (IDS)** supported both on-prem and cloud computing and storage infrastructure that includes 300 virtual servers and 170 virtual desktops in addition to mission-critical Oracle databases. IDS also completed a successful expansion of the Resnick High Performance Computing Center (HPC) that hosts 5 PB VAST SSD storage, close to 30,000 cores, more than 220 GPUs and supports more than 900 active researchers and processed more than 6 million HPC jobs submitted by them.
- **Institute Business Systems (IBS)** worked on multiple strategic projects, such as Huron Grants Management System, Visitor Access Request (VAR), Protocol Application System (PAS), Facilities Data Lake, CURO (annual compensation tool), and B2Gnow. IBS also delivered ongoing maintenance and support for the Data Warehouse, Conflict of Interest (COI), Annual Oracle Patching, DPM, and ongoing REGIS performance enhancements.
- **Networks and Support Services (NSS)** has supported 27 construction projects and added ~1,000 wired ports and more than 150 wireless access points to the campus networks. NSS also processed more than 11,000 help requests and oversaw Zoom infrastructure with more than 150,000 virtual meetings. NSS continues to manage close to 1,700 PCs.

I hope you can see our commitment to Caltech's success as you read the rest of this annual report. I would also welcome your feedback regarding emergent opportunities and how we can be more effective.

The following pages outline a summary of annual accomplishments for each of IMSS functional areas: Academic Computing Services, Academic Systems, Academic Media Technologies, Information Security, Institute Business Systems, and Networks and Support Services.

With gratitude,

Jin Chang
Chief Information Officer

ACADEMIC COMPUTING SERVICES

The **Academic Computing Services (ACS)** team is dedicated to supporting Caltech's core processes through custom web application development, which includes creating web applications, websites, and mobile applications.

The ACS group collaborates with various campus entities to implement, support, and enhance large-scale projects for Caltech. This includes maintaining the Institute's websites and managing **access.caltech**, the primary gateway to the Institute's administrative systems.

MAJOR ACCOMPLISHMENTS

The **Academic Computing Services** team had a productive year, successfully enhancing existing applications and developing new ones for the campus community. Some of the highlights include:

Infrastructure Modernization and Security

- **AWS Infrastructure Enhancements:** The team implemented significant updates to the AWS infrastructure, including migrating applications to a new ADS-PROD AWS account, building a new Virtual Private Cloud (VPC), and upgrading proxy services. Security was prioritized with initiatives to secure ADS AWS accounts and replace EC2 instances to support IMDSv2 (Instance Metadata Service version 2).
- **Terraform and DevOps Improvements:** The team updated Terraform codebases and integrated the latest versions of terraform-caltech-commons, our library for implementing best practices for AWS services. These enhancements improved our security posture and ensured consistency across the ADS ecosystem.
- **Cloudflare Implementation:** Assisted in deploying access.caltech production behind Cloudflare Web Application Firewall (WAF), conducting thorough testing and planning for future deployment.
- **Load Testing and Scalability:** Initiated the development of a load-testing framework and focused on user-initiated scaling of environments to enhance performance management.

Application Development and Modernization

- **Accessibility Improvements:** The team prioritized making applications and platforms more accessible by addressing critical issues across multiple Caltech websites. Significant updates were made to menus, catalogs, and search functionalities to enhance user experience for all individuals.
- **Wagtail and Web Modernization:** The team undertook complex upgrades to Wagtail for Caltech Sites, resulting in a modernized web infrastructure and an improved user experience.
- **Legacy System Support:** Continued providing support for existing applications such as **Cataloger, Directory Mailer, and Out of Office (OOF)**. Enhancements included migrating applications to Fargate and refactoring legacy codebases for improved performance and maintainability.

Innovation and AI/ML Integration

- **Exploration of LLMs and AI Solutions:** The team researched and experimented with large language models (LLMs), including GPT-4 and Langchain, to explore advanced chatbot and AI technologies. This initiative aims to understand potential applications for Caltech's data needs in the future.
- **Expanded Use of AI/ML Tools:** The team investigated innovative applications of AI and machine learning (ML) to enhance efficiency and productivity across various processes.
- **Automation and Testing Improvements:** Implemented Selenium testing across various applications to enhance user experience (UX). Additionally, automated scripts were developed for routine processes, such as PDF generation and data migration.
- **Data Integration and Automation:** Created automation tools to facilitate data migration and improve analytics capabilities.

Operational and Strategic Contributions

- **Support for Academic and Administrative Functions:** The team provided crucial technical support for various initiatives, including faculty searches, registration performance analysis, and trustee updates. New tools and reports were created to address institutional needs, such as enhancements for **Out of Office (OOF)** elections and improvements in **TQFR** performance.
- **Documentation and Knowledge Sharing:** Expanded documentation efforts across numerous projects, including the development of detailed Terraform guides. These improvements enhanced onboarding processes and fostered better collaboration across departments.

Continued Support and Maintenance

- **Ongoing Application Support:** The team provided consistent operational support for a range of **ADS-managed applications**, ensuring their stability and compliance with evolving technological standards.
- **Routine Upgrades and Enhancements:** Regular updates were conducted on existing applications to align with the latest technology stack. This included performing critical bug fixes, implementing security updates, and introducing feature enhancements.

The accomplishments highlighted above collectively illustrate the **Academic Computing Services (ACS)** team's pivotal role in advancing **IMSS's** technological capabilities. By driving innovation and ensuring the institution's digital infrastructure remains resilient and forward-looking, ACS has demonstrated its strategic importance. Through effective leadership, robust infrastructure management, and a commitment to accessibility and modernization, the team has established a solid foundation for continued success in the upcoming year.

The screenshot shows the Caltech website for the Division of Chemistry and Chemical Engineering. The navigation bar includes links for Faculty, Undergraduate, Graduate, Research, News & Events, DEI in CCE, Safety, Resources, and About. A search icon is also present. Below the navigation, there is a search bar with the text "Check out the latest CCE Newsletter". The main content area is divided into "News" and "Events". Under "News", there is a photo of an older man and a building. Under "Events", there is a list of events: "Midterm Examination Period" (Ongoing) and "Inorganic-Organometallics Seminar" (November 1, 2024, 4:30 pm) in Noyes 147 (J. Holmes Sturdivant Lecture Hall).

The screenshot shows the Caltech website for the Division of Biology and Biological Engineering. The navigation bar includes links for Research, Academics, People, Diversity, and Resources. A search icon is also present. The main content area features a large image of petri dishes with green bacterial cultures. To the right of the image, there is a news article titled "New Technology Illustrates Bacterial 'Hibernation States'" dated October 21, 2024. The article text reads: "Researchers make the first characterizations of antibiotic-tolerant bacteria in low-power metabolic states."

BY THE NUMBERS

2024	2023	2022	
6	6	6	Total FTE Count
5	5	5	Team
1	1	1	Director
			Development Metrics
647	583	505	Websites supported
82	84	77	Web applications supported

ACADEMIC MEDIA TECHNOLOGIES

The Academic Media Technologies (AMT) group provides the Institute with the following expertise:

- Film, video, audio, and podcast production
- Virtual, in-person, and hybrid event, recording, and live broadcast support for research, education, and outreach including lectures, meetings, conferences, Convocation, and Commencement
- Educational technology, including supporting Canvas and implementing new tools
- Audio visual upgrades for new buildings and renovated spaces



New items for FY24 and comparisons with FY23

A first this year was **providing live, human-generated captions** for both the online audience viewing the YouTube live stream and flat screens in the audience tent for Commencement. This replaced adding the ASL interpreter to the video feeds for both audiences. This change received positive feedback.

Another first was **“flipping” the orientation meetings for incoming Trustees**. AMT created 7 videos for new members to view before arriving to campus. This allowed more time for interactive, in-person activities including campus tours.

The overall **number of projects increased in FY24** including video and audio productions, people recorded, audio recordings transcribed, AV installations, and event recordings. **Creating highlight reels of community events increased**, including short videos of Professor Andersen’s pre-Watson Lecture research and Caltech and the Origin of Electric Vehicles events. Echo360 recordings however decreased this year due to the adoption of a new Distance Education policy for academic classes.

YouTube Live, Zoom Meeting, and Zoom Webinar continued to be AMT’s hybrid and virtual event hosting platforms. The total number of hybrid and virtual events decreased this year, but 10% more of those events were hybrid versus remote only. **AMT supported 16% more hybrid events using the Zoom platform for online audiences instead of YouTube, although the YouTube platform continues to cull more overall viewership**. The preference for using Zoom for hybrid events was based on clients’ requirements to take advantage of registration and attendance tracking; features not available with YouTube. AMT’s increase in in-person and hybrid meeting support for JPL in FY23 was maintained this year.

AMT **uploaded 38% more videos to YouTube** than in FY23. **Viewership of FY24 YouTube videos garnered 65k more hits (a 48% increase) and 4k more viewing hours (a 17% increase)** than FY23 content.

AMT’s support of Canvas expanded with new learning tool integrations, growth in the number of non-academic courses, a new Canvas website new/updated Canvas training, and new blueprints. AMT has a new role in FY24 serving on Instructure’s Customer Advisory Board.

FY24 Overview and Metrics

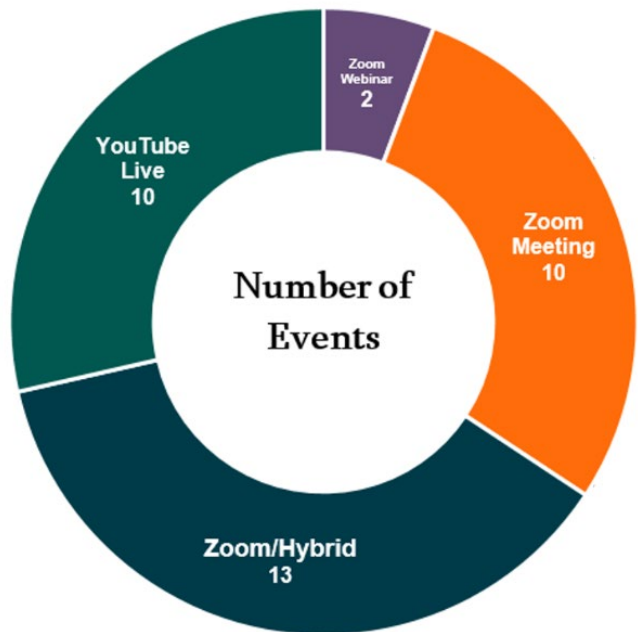
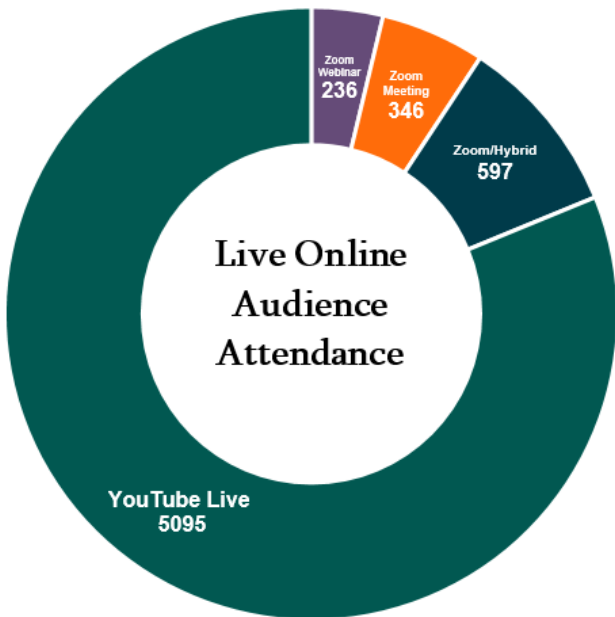
Virtual and Hybrid Events by the Numbers

35 Events
(23 hybrid)



>6,300 Live Online Attendees

Largest Online Audience: 3,678 for Caltech's Commencement



Virtual + Hybrid + In-Person Events



Divisions/Research

- Australian BBC Live: D. Kormos on Einstein
- BBE: Faculty Job Talks and Symposia, Dreier Lecture by M. Ehlers
- CAST Annual Program Review
- Center for Sensing to Intelligence Symposium
- KNI: Fireside Chat with G. Whitesides, Wheatly Scholar Lecture by M. Mirhosseini
- Keck Institute for Space Studies (KISS): Lectures/Short Courses/Workshops
- M. Meselson Research Talks/Conversations
- NetLab Reunion Conference
- Tenth International Conference on Mars
- Webinars: Black Hole Jets Press Conference, EAS Carbon Removal Strategies

Campus/Community

Student-Focused

- 3MT Thesis Event
- Bill Gross Business Plan Student Competition
- CTLO Teaching Conference
- Commencement
- Convocation
- DiscoTech (admitted student preview event)
- Everhart Lectures
- Feynman Teaching Prize Lecture
- FSRI Research Talks
- Orientations: Undergraduate + Graduate Students
- Student Faculty Conference

Caltech Community and Beyond

- AI on the Big Screen
- Caltech and the Origin of the Electric Vehicle
- Orientation: Post Doctoral Scholars
- Presidential Lecture: B. Iger, M. Lomax CCID: Celebration, History of Pride Lecture
- Series: Caltech Science Exchange, Behind the Book, Science Journey, Watson Lectures
- Venerable: Family Storytelling, Parable of the Pathmakers performance

Education

Canvas Learning Management System

New

- **Installed LTI 1.3 applications.** Upgraded: Zoom, Gradescope, Ares Course Reserves, NameCoach, Perusall, and Ed Discussion. New: McGraw-Hill Connect, SensusAccess
- With CTLO, **created new Canvas at Caltech website**, canvas.caltech.edu; includes accessibility tools, course design, recent updates, and FAQ s
- **Expanded use of non-academic courses in Canvas**
 - NEW: responsible for non-academic SIS enrollments (formerly managed by the Registrar's Office)
 - Received (25) new requests: Undergraduate Dean's Class of 2028, KNI's Laboratory Training, CS7's API testing, Student Wellness Services courses, PMA Toolbox for Success, CALE First Year Career, SFP's Summer Research Program, Peer Coach Training, EAS Chair Scholars, (6) AI Bootcamp courses, (9) CTLO courses.
 - Matriculation and placement test courses doubled from 7 to 14
- **Revamped Getting Started with Canvas Instructor training course**; Created/updated (4) technical guides

Ongoing Canvas Admin Responsibilities

- Support users with guides, workshops, email and Help tickets, Teach and Canvas website updates
- Monitor monthly platform updates and deployments, adjust settings and features in Canvas
- Organize review of new LTI tools for security, FERPA, accessibility, legal
- Creation and maintenance of Canvas Admin Plan and change log
- Create new course blueprints for each term, and push critical updates to all courses
- Address security, archiving, user permissions, and course availability concerns
- With CTLO, create and distribute Canvas global announcements and maintain Canvas calendar
- Serve as administrator and contact for Echo360, Gradescope, Piazza, NameCoach, Perusall, Ed Discussion
- Serve as member of Instructure's Customer Advisory Board

Echo360 Lecture Capture

Provide platform administration, training, integration in Canvas. New recordings in FY24 including 3 academic EAS/PMA courses and events: Astronomy and EAS colloquia, Astronomy Outreach talks and Hackathons, and the Caltech Entrepreneurs Forum. There were 172 recordings, resulting in ~3,700 viewing hours, 80 were streamed live.

Equipment

Maintain revolving inventory of equipment for teaching, especially needed for courses with requested accommodations. Proactively work with BBE division to provide stable AV for teaching.

Course Evaluation Tools

At the request of the Faculty Board, AMT worked with colleagues from CTLO and the Registrar's Office reviewing several course survey and assessment tools to replace TQFR.

Administrative + AV Installations



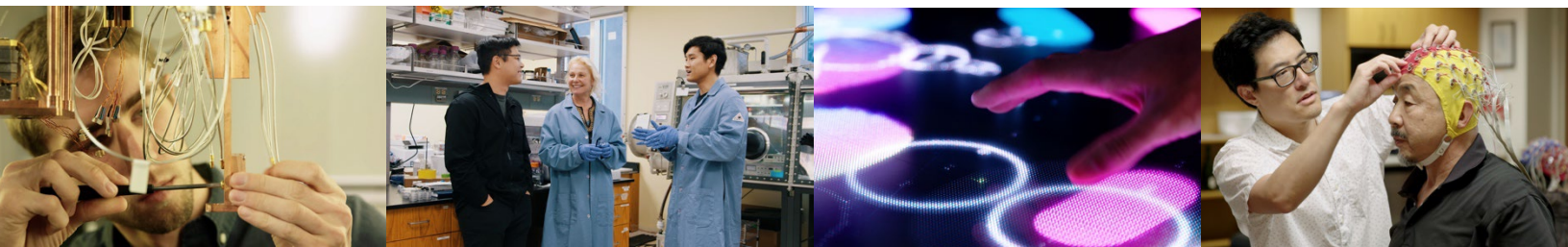
- Completed the AV Renovation of **210 Parsons Gates**
- Maintain + troubleshoot **Caltech Board Room** hybrid meeting capabilities
- AV designs for new centers: Resnick Sustainability Center + Ginsburg Center for Precision Quantum Measurement
- Collected AV upgrade designs for the Keck Center Think Tank
- **BBE**: AV Troubleshooting in Chen + Beckman Institute
- **EAS**: AV upgrades in Moore B270/B280, Guggenheim
- **GPS**: Renovations in Salvatori Room + Budwala Room
- **PMA**: AV renovations in Hameetman Auditorium, Downs, East Bridge



Video + Podcast Production



- Brinson Exploration Hub video montage
- CAST Showcase: Autonomous Robots Everywhere
- Caltech and the Origins of EV Highlights
- Faculty Profiles: M. Robb + Z. Ross
- F. Arnold's ACEC acceptance speech
- Grant Proposals: H. Atwater + V. Gradinaru
- KNI 20th Celebration
- R. Andersen pre-Watson Lecture Research highlights
- Orientation videos for New Trustees
- S. Shimojo for Tateishi Prize
- The Academic Minute podcast with scholar from the Huntington
- V. Gradinaru for Merkin Prize event
- Welcome to Caltech for Convocation
- Stewardship
 - Allen and Charlotte Ginsburg Gift
 - Discover Caltech event videos
 - Walter Burke Institute 10th Anniversary Celebration
 - GPS River Trip promo
 - The Associates webinars
 - Caltech Forward Series
 - Ross Brown profile



YouTube Metrics

184 videos posted to YouTube

~200k views

>28k viewing hours

Top 10 New AMT YouTube Videos during FY24

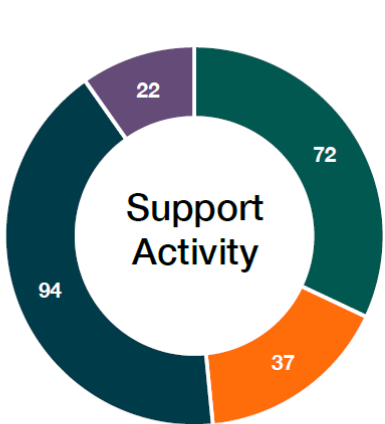
	Views
▪ Everhart Lecture: The Universe Never Forgets, Pushing Einstein's Theory to the	52,663
▪ Caltech's 130 th Commencement Ceremony	33,759
▪ CRS: Consciousness & Its Physical Headset	6,817
▪ CAST Showcase: Autonomous Robots Everywhere	6,281
▪ CRS: Bioelectricity, The Body's Cognitive Glue	5,431
▪ Watson: Wearable Biosensors and the Future of Personalized Medicine (Gao)	5,289
▪ Watson: Historic Innovations by Caltech People that Changed the World (Mead)	4,042
▪ Sci-Fi to Sci-Fact: AI and the Big Screen	3,866
▪ Watson: Unlocking Movement (Andersen)	2,596
▪ Watson: The Chemistry of Everything (Nelson)	2,359

Note: 7 of the top 10 videos viewed on Caltech's YouTube channel were created by AMT, with 7 million views

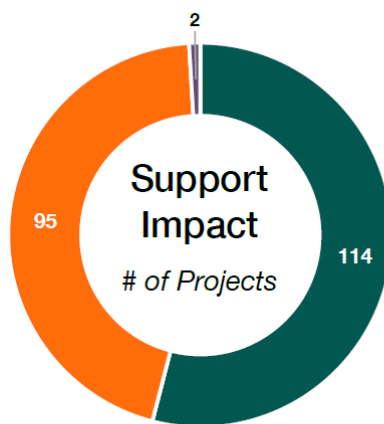
Client and Support Overview

Top Clients

- AAR
- Divisions: BBE, EAS, GPS, HSS
- Facilities
- JPL
- KISS
- President's Office
- Provost's Office
- Strategy Implementation
- Student Affairs



- AV Support
- Video Production
- Event Recording (Virtual, In-person, Hybrid)
- AV Installation



- Campus/Community
- Research/Division
- Education/Classroom

BY THE NUMBERS

2024	2023	2022	
4	6	4	Total FTE Count (<i>FY24, increased to 5/6 in July/Sep</i>)
3	5	3	AMT (<i>FY24/23/22/21 = .5 of FTE supports CTLO for EdTech + .5 FTE supports Event Management for the Office of the President</i>)
1	1	1	Director
211	176	165	Projects
242	78	>220	Faculty, students, staff, and postdocs recorded w/ collected releases
26	10	6	Hours of interviews/events transcribed
94	80	56	Event and lecture recordings (in-person, FY21 is virtual only)
46	29	51	Video productions
184	133	182	Videos posted to YouTube
22	16	39	AV upgrades and installations
72	52	18	AV event support (<i>FY21-24 are in-person only</i>)
5	8	41	Courses and training modules created/posted (FY22 are recorded with Echo360 in 3 campus spaces)
35	60	98	Zoom webinars + meetings, YouTube Premiere + Live broadcasts

INFORMATION SECURITY

The **Information Security** group is responsible for ensuring the cybersecurity of the Institute through various key functions: **Cybersecurity Incident Handling** and forensic investigations. **Vulnerability Management** and providing remediation advice. **Application Security** vetting and code analysis. Managing the **IMSS infrastructure firewall** service for Chester Data Center. Issuing **SSL certificates**. **Tracking threats** and writing security advisories. Offering **security best practices consultation** and **policy review**. Additionally, the group manages **identity and access control**, including user access for central applications. The team is led by the **Chief Information Security Officer (CISO)**, who oversees all operations related to protecting the Institute's information resources.

During this reporting period, the Information Security team continued to protect the Institute's information resources across all departments and divisions. Notable contributions are below.

MAJOR ACCOMPLISHMENTS

As part of its mission to protect Institute systems and data, the **Information Security** group designs and implements protections, monitors system and network activity, develops and collaborates on security policy, and serves as a subject matter expert and advisor on technology projects.

- **Firewall Upgrade:** Replaced the data center production firewall pair with newer technology and installed a second firewall pair to enhance protection for IMSS applications by segregating vendor-managed applications.
- **Endpoint Protection:** Collaborated with various IMSS teams to select and implement **CrowdStrike** as our endpoint protection software, deploying it across all managed computing for IMSS servers, administrative computing, and several academic areas per request.
- **Multi-Factor Authentication (MFA):** Partnered with Division Services, Special Projects, Support Services, and Business Systems Infrastructure to drive MFA adoption among Caltech community members. Successfully enforced MFA on VPN and are working towards enforcement for Access.Caltech, Box, WebHelpDesk, and Canvas, enhancing security through Duo verified push notifications.
- **Cybersecurity Committee Engagement:** reengagement for quarterly meetings with the Cybersecurity committee to update them on information security progress, discuss issues, and set directions.
- **Phishing Awareness Program:** Continued the phishing exercise program for all Caltech faculty, students, and staff to improve their ability to recognize malicious emails. Results are reported to the Cybersecurity committee.
- **DDoS Protection Implementation:** Collaborated with other IMSS application development teams to implement Cloudflare's DDoS protection and Web Application Firewall for Caltech, enhancing website security. This is still in evaluation mode and we are progressing forward to turn blocking mode slowly per application.

- **Password Management Upgrade:** Replaced **LastPass** with **1Password** to provide more robust password management and protection.
- **Incident Investigation:** Investigated security incidents and anomalies related to numerous campus events, ensuring rapid response and resolution.
- **Cloud Security Enhancement:** Enabled CrowdStrike Compliance monitoring for AWS, Azure and GCP under one console. Working on fixing all Critical and high items identified.
- **AWS Compliance Policy Implementation:** Enabled compliance with NIST 800-53 Rev5 and AWS Foundational best practices policies for all AWS IMSS accounts and are working to implement these for Library and IPAC.
- **Vulnerability Monitoring:** Enabled CrowdStrike Exposure Management to continuously monitor vulnerabilities on IMSS servers and managed workstations.
- **Insider Threat Visibility:** Implemented a new solution with CrowdStrike for **Identity Monitoring**, improving visibility into potential insider threats.
- **Lab Security Guidelines:** Enhanced Lab Security Guidelines by developing a **Cybersecurity Plan template** aligned with NIST 800-171 to meet CUI mandates, discussed with the Research Compliance Officer. Also, working with AWS to evaluate CMMC environment costs and structure.
- **Account Management:** Continued to provide high-quality service in managing Caltech campus accounts, overseeing creation, privilege assignments, changes, and terminations efficiently.
- **Network Vulnerability Scanning:** Conducted quarterly network vulnerability scanning of the primary campus and IPAC networks to increase awareness of vulnerable systems, along with monthly scanning for requesting departments.
- **Security Monitoring and Response:** Provided security monitoring and incident response coverage for campus systems and networks **14 hours a day, 7 days a week**, including holidays.

Initiated

- Replaced Armorblox email security system with Checkpoint Mail Protection.

Security Reviews Performed

Caltech-developed systems reviewed:

- Conflict of Interest Grad Student
- Conflict of Interest Reviewer
- Equipment Mobile Inventory
- Covid Reporting
- Graduate Student Visit Scheduler
- Visitor Application (VAR) -WIP

2,118,529

Attacking IP addresses blocked at the network perimeter

Vendor systems reviewed:

- Huron Research Suite
- Key Solutions
- Caltech Retirement Plan Management – Fidelity
- Caltech Retirement Plan Management – TIAA
- Cayuse Vivarium Applications
- ServiceNow
- BigMaker
- Autodesk
- Watermark Insights
- Blue (Explorance)
- Sunapsis International Office Module (on prem)
- Mongoose Cadence
- CampusOptics
- Perusall
- College Board
- Unlawful Harassment Training LMS
- BrightHire
- Qualtrics
- Aidentified

Below are the top reasons for blocking external attackers at Caltech. This provides a further glimpse into the trends we are seeing and capturing.

Reason Blocked	Number of Attempted Attacks		
	2024	2023	2022
Attacks on secure shell protocol (port 22)	592,539	624,789	481,637
Attacks on SQL server database (port 1433)	267,020	286,499	272,796
IP addresses included in known-bad intelligence we subscribe to	73,025	408,775	219,085
Port 8080 – usually a web server or printer	1,963,592	997,921	89,023
Windows remote access (port 3389)	79,076	73,111	88,071

BY THE NUMBERS

2024	2023	2022	
8	8	7.5	Total FTE Count
4.5	4.5	4.5	Security operations
2.5	2.5	2	Identity management & access control
1	1	1	Director

Projects			
2,118,529	1,583,117	1,566,737	Attacking IP addresses blocked at network perimeter
2,101	2,518	2,208	Accounts created (access.caltech and Kronos)
2,418	1,690	2,760	Account terminations processed
2,528	677	955	Data access change requests (Kronos/Oracle/OBI/Exeter)
8,929	8,595	7,770	Duo multi-factor authentication for users
153	187	171	Firewall change requests processed
378	445	370	Malicious sender addresses blocked
1,197	817	663	SSL certificates issued
3	19	52	Phish sites blocked by URL name (via RPZ)
21	6	21	Copyright complaints handled
21	85	18	Campus devices blocked for misbehavior
39	10	172	Internal devices blocked for protection
693,000	N/A	N/A	L7 DDoS attacks blocked/prevented

Infrastructure and Data Services

ACADEMIC SYSTEMS

The **Academic Systems (AS)** team offers specialized support to faculty and researchers in the areas of academic computing, cloud, containers, and traditional compute environments along with traditional Linux infrastructure support.

The AS team collaborates extensively across campus, playing a key role in implementing, maintaining, and advancing large-scale, mission-critical projects. These include supporting the Institute's websites, managing the central high-performance computing cluster, and overseeing identity and access management systems.

MAJOR ACCOMPLISHMENTS

The **Academic Systems team** had an impactful year, delivering both enhancements and new applications to the campus. Key accomplishments include:

Infrastructure

- **Enhanced Security:** Partnered with Information Security to implement updated AWS best practices across our ACS infrastructure, strengthening overall system protection.
- **Cost Optimization:** Achieved significant savings by phasing out expensive services, by migrating local Caltech WordPress sites to WordPress.com and streamlining our offerings.
- **Reduced Technical Debt:** Successfully decommissioned all RHEL6 infrastructure and the majority of RHEL7 systems, lowering technical debt and improving system performance.
- **Modernized Web Application Security:** Upgraded all ModSecurity infrastructure to RHEL8 or migrated it to Cloudflare, significantly improving web application security.
- **Cross-Department Collaboration:** Worked with Windows Admins to migrate monitoring services to Nagios and SNMP, enhancing system visibility and monitoring capabilities.
- **Centralized HPC Mail Integration:** Integrated HPC mail into the central Mail system, allowing for the decommissioning of CACR systems and streamlining communications.
- **Increased Efficiency:** Continued automating new container and system builds with RHEL9, aligning infrastructure with new security guidelines and boosting operational efficiency.

BY THE NUMBERS

2024	2023	2022	
4.5	8	8	Total FTE Count
3.5	7	7	System Administrators
1	1	1	Managers
Managed Systems and Services			
451	322	303	Customer Websites hosted
5	17	22	Service Level Agreement
25	24	25	Wikis
4(migration)	29	32	WordPress
2,106	2,073	2,022	Mailman lists
15	4	61	Servers decommissioned
5	5	3	Integrated identity service federations
207	185	155	Custom Shibboleth SSO service providers
5,469,584			Shibboleth Auth Requests
136,824,334	111,701,660,814	83,761,993,565	Log messages collected
			Note: The large difference in the stats is due to one of our major customers no longer uses this tool to track log messages.
115	118	126	Hosts under configuration management
1,079	626	596	Hosts under patch management

Business Systems Infrastructure

The **Business Systems Infrastructure (BSI) team** provides IT infrastructure for business applications, both on-premises and in the cloud. We provide server virtualization and operating system administration, supporting a multitude of systems for many departments across campus. We are responsible for the back-end storage and backup infrastructure for IMSS hosted servers. In addition, we administer the O365 cloud email infrastructure for the Institute. Lastly, we have a portfolio of approximately 50 applications for which we provide varying degrees of support.

MAJOR ACCOMPLISHMENTS

The Business Systems Infrastructure team had many accomplishments throughout the year, some of which are highlighted below:

Deployments

- Deployed CrowdStrike Identity Protection module to help identify and prevent against identity-based attacks
- Deployed new Cohesity backup infrastructure to replace end-of-life appliances
- Deployed all new compute nodes for IMSS' Managed Hosting infrastructure
- Deployed anti-spoofing protocols (SPF, DKIM, DMARC) for Caltech mail subdomains

Migrations

- Migrated several hosts from an end-of-life Windows 2012 operating system to newer operating systems that are still supported by Microsoft
- Migrated several AAR environments to a new, segmented firewall, that has dedicated zones per customer
- Migrated email accounts for graduated seniors from @caltech.edu to @alumni.caltech.edu

Upgrades

- Performed dozens of application upgrades for the systems hosted by BSI
- Upgraded the Tintri storage infrastructure to the latest software version
- Upgraded the Cohesity storage infrastructure to the latest software long-term release
- Upgraded the VMware Virtual Machine (VM) infrastructure from vSphere ESXi version 7x to version 8x
- Upgraded the VMware Virtual Desktop Infrastructure (VDI) from Horizon View version 7x to version 8x

Ongoing Support

- Restored service to all IMSS hosted Windows servers within a matter of hours after a major worldwide CrowdStrike outage
- Assisted in the implementation of Duo for VPN
- Provided account management support: account creations, terminations, etc.
- Provided email support: email account creation, distribution list management, forwarding, email tracing, alias requests, etc.

BY THE NUMBERS

2024	2023	2022	
6	5	5	Total FTE Count
5	4	4	Business Systems Infrastructure
1	1	1	Sr. Associate Director – Business Systems Infrastructure
			Projects
182,402,000	223,933,000	1,221,397,000	MPG - Spam emails filtered
			Note: The drop in Spam emails is in line with our normal number of emails that are filtered. In 2022, we were under a massive spam attack, which inflated the numbers for 2022.
159,068,980	193,986,560	157,286,400	OneDrive - Megabytes of storage space
5,672,797	3,984,589	Not Tracked	SharePoint - Megabytes of storage space
103,232,308	83,676,365	69,730,304	Office 365 - Megabytes of email
1,896	2,148	2,064	Windows - Servers patched
127TB	138TB	110TB	Tintri - Logical Storage Consumed
94TB	92TB	80TB	Cohesity Backup - Physical Storage Consumed
259 VMs	327 VMs	293 VMs	VMWare - Number of Server VMs Hosted
187 VMs	175 VMs	174 VMs	VMware - Number of VDI VMs Hosted

Data Center Operations

The **Data Center Operations Group** consists of a skilled team of operations support technicians who oversee daily job processing in a multi-shift environment by using the Broadcom/CA Application Manager (AppWorx) scheduler. By utilizing AppWorx and Linux scripting, the team efficiently creates, modifies, troubleshoots, executes, and monitors 24/7 nightly data loads for administrative systems. The Operations office provides coverage 25/5 and remains on-call over weekends to address emergency IT issues.

In addition, the group manages the Chester and Powell-Booth data centers, ensuring infrastructure availability, overseeing space planning, evaluating power and cooling needs, and implementing data center standards.

MAJOR ACCOMPLISHMENTS

The **Data Center Operations team** achieved numerous milestones over the past year. Some key highlights include:

- **Production Job Management:** Facilitated the creation, modification, and troubleshooting of more than two dozen production jobs each month.
- **Oracle Upgrade Projects:** Managed all test job processes, including creation, modification, troubleshooting, and execution of AppWorx chains and modules for critical systems like Oracle, Exeter, Kronos, Advance, OBIEE, and Cognos.
- **Infrastructure Projects:**
 - Coordinated and participated in the planning and execution of the Powell-Booth Generator and UPS replacement project.
 - Led the planning and execution of the IMSS Server Room Air Conditioner replacement project.
 - Facilitated the installation of a UPS and Data Storage System to support the High Performance Computing Cluster.
- **Equipment Disposal:** Safely decommissioned and disposed of over 150 servers, 60 hard drives, and 129 backup tapes, ensuring secure data handling.
- **Tax Documentation:** For the 2024 tax year, within 36 work hours and with a team of 2.5 FTE, the team printed, folded, and processed:
 - 759 1099M forms
 - 993 1099NEC forms
 - 866 Cash Grant letters
 - 285 592B forms

BY THE NUMBERS

2024	2023	2022	
5	5	5	Total FTE Count
4	4	4	Data Center Operations
1	1	1	Manager – Data Center Operations
			Operations Stats
382,762	362,852	323,000	Jobs/Processes - Completed successfully
1,049	682	887	Administrative Systems - Average Jobs/Processes managed each day
3,308	-	-	Payroll Checks Printed

HPC and Cloud

The **HPC and Cloud teams** support faculty and researchers by providing expertise in high-performance computing, cloud platforms, and traditional computing environments. These teams collaborate with the majority of research groups across campus, ensuring that infrastructure meets the evolving needs of academic and scientific projects.

MAJOR ACCOMPLISHMENTS

The **HPC and Cloud teams** had a highly productive year, delivering both enhanced and new services to the campus. Some key achievements include:

High Performance Computing (HPC)

- **Storage Expansion:** Deployed an additional 4PB of high-speed storage to meet growing data needs.
- **Corporate Partnership:** Established the first corporate partnership for The Resnick HPCC within IMSS.
- **System Upgrades:** Updated the operating system on over 550 nodes and all supporting packages to RHEL9.
- **Compute Expansion:** Expanded the cluster by 188 compute nodes, including 16 H100 GPUs for advanced computing tasks.
- **Job Support:** Supported 141 million core hours across jobs run by 933 users from 228 research groups.
- **Software Management with Spack:** Transitioned to **Spack** for software installation and management as part of the RHEL9 upgrade currently supporting over 200 applications. Spack provides a standardized, automated process for deploying software across the cluster.
- **Open OnDemand Enhancements:** Upgraded **Open OnDemand**, adding Visual Studio and enhancing R Studio, making the cluster more accessible via a browser interface and lowering barriers to entry for users.
- **Network Upgrades:** Upgraded external Ethernet connections to 25G, boosting data transfer speeds.
- **Provisioning Enhancements:** Upgraded **Foreman** to improve provisioning capabilities, enabling future OS upgrades.
- **Monitoring and Management:** Updated **Nagios**, **Grafana**, and **OpenXdmob** for improved cluster monitoring and management.
- **Head Node Upgrades:** Improved the DNS, LDAP, database, SLURM, and NAT configurations for head nodes to optimize performance.
- **WebMO Deployment:** Installed **WebMO**, the first standalone web-based HPC offering, allowing visual access to the cluster for computational chemistry tasks.
- **Snapshot Management:** Developed custom software to manage snapshots on the **Vast** file system, improving data management.

Cloud

AWS Infrastructure Optimization and Security Enhancements

- **Optimized VPC Architecture:** Consolidated underutilized VPCs to reduce network complexity and decrease operational overhead, while ensuring secure isolation between environments.

- **Deployed AWS Foundational Best Practice and NIST 800-53** standards across organization using Security Hub's central configuration capabilities. AFBP along with NIST 800-53 enablement assures that we're consistently monitoring AWS resources against important security controls and compliance requirements.
- **IAM and Identity Management Improvements:** Streamlined identity management by further reducing standalone IAM accounts and centralizing user management with federated access, enhancing security and minimizing risks associated with unmanaged credentials.
- **CloudWatch Global Observability:** Deployed CloudWatch Global Observability across regions and accounts, providing unified cloud resource monitoring, enabling proactive issue detection and resolution.
- **Enterprise Account Migrations:** Initiated and nearly completed the migration of DLT accounts to the enterprise agreement. Also, removed remaining DLT roles and assets from the top-level account.
- **Root Key and Account Security Enhancements:** Removed unnecessary root access keys and real-user IAM entries to tighten security and prevent unauthorized access.
- **CrowdStrike Deployment:** Deployed stack sets and roles for CrowdStrike Falcon across the organization, ensuring consistent and comprehensive endpoint security.
- **Cost Optimization Hub:** Enabled AWS Cost Optimization Hub on the top-level AWS account, increasing visibility into resource usage while improving budgeting capabilities.
- **AWS Enterprise Support:** Enabled enterprise support on all AWS sub-accounts, ensuring a high level of support service across the organization while enabling individual IMSS groups to directly initiate and manage support cases.
- **Trusted Advisor Engagement:** Initiated Trusted Advisor engagement for ongoing support in AWS account management and best practices adherence. We will be focused on using this tool going forward for case management.

Security & Monitoring Enhancements

- **AWS Health Dashboard:** Enabled the AWS Organizational Health Dashboard within the principal/payer account, providing increased visibility into both Org and account level health events.
- **AWS Config:** Enabled AWS Config on the principal/payer account for previously lacking regions (us-west-1, us-east-1, us-east-2) , improving configuration management and security.
- **Root Password Resets:** Assisted with the AWS root password reset project, reducing root level credential issues.
- **VPC ACL Updates:** Updated VPC NACLs across AWS organizational accounts, blocking access to typical management ports (e.g., SSH). This will reduce exposure to unauthorized users as well as providing additional safeguards in the event of incorrectly set security groups or OS level firewalls.
- **SSM DHMC Deployment:** Deployed Default Host Management Configuration (DHMC) in SSM across the organization to streamline EC2 instance management and monitoring within sub-accounts.

Google Cloud (GCP) Initiatives

- **Security Command Center Deployment:** Deployed GCP Security Command Center on the organizational level account, improving visibility into security risks and enabling proactive remediation.
- **Splunk Ingestion:** Updated GCP service accounts for streamlined Splunk ingestion.
- **GCP VPC Security Enhancements:** Updated VPC NACLs across GCP organizational accounts, blocking access to typical management ports (e.g., SSH). This will reduce exposure to unauthorized users as well as providing additional safeguards in the event of incorrectly set security groups or OS level firewalls.

Support for Research Computing and Cloud Architecture

- **AWS Account Creation Workflow:** Documented process for consistent and secure AWS account creation, supporting the rapid deployment of new environments in a consistent manner using AWS account factory.

- **Custom Research Support:** Deployed and managed unique cloud applications and architectures for research, including custom cloud-based MATLAB web app servers, tailored for faculty's growing research needs.
- **CrowdStrike Falcon Redeployment:** Worked with InfoSec to redeploy CrowdStrike Falcon across our environment, ensuring consistent security across all instances.

Additional Contributions

- **AWS Credit Distribution:** Managed AWS credit distribution for researchers, facilitating cloud resource allocation for various academic projects.

BY THE NUMBERS

2024	2023	2022	
4	4	4	Total FTE Count
3	3	3	System Administrators
1	1	1	Managers
Central High-Performance Cluster Metrics			
141,473,512	108,364,225	85,406,534	CPU hours
6,547,265	7,826,989	11,168,145	Jobs run
4,096	12,000	5,000	Max job size (cores)
3,016	2,443	1,984	Users
228	210	188	Research/Faculty Groups
28,591	28,520	16,840	Cores
229T	218T	136T	Memory
228	216	200	GPUs
4.2P	4.2P	2.5P	Storage
846	590	538	Open OnDemand Users
AWS Resources Managed			
123	144	144	Running Containers
297	311	301	EC2 Instances
16	13	10	RDS Databases
33	32	27	ElastiCache Nodes
28	72	53	VPC
784	852	824	EBS Volumes
109T	118T	91T	EBS Total Size
242	287	264	S3 Volumes
102T	147T	103T	S3 Total Size

INSTITUTE BUSINESS SYSTEMS

The **Institute Business Systems (IBS)** group supports the administrative business functions of the Institute, including the core ERP system, **Oracle EBS**, and all related administrative systems. In **FY24**, IBS began implementing several significant projects, including the **Huron’s Grants Management System**. Additionally, IBS is supporting the campus-wide initiative to modernize our ERP and administrative systems. This effort will likely initiate a number of foundational projects in 2025, followed eventually by the implementation of a new ERP system to replace Oracle EBS. In the meantime, IBS has been focused on addressing backlogged projects to ensure they are completed before the launch of these major initiatives.

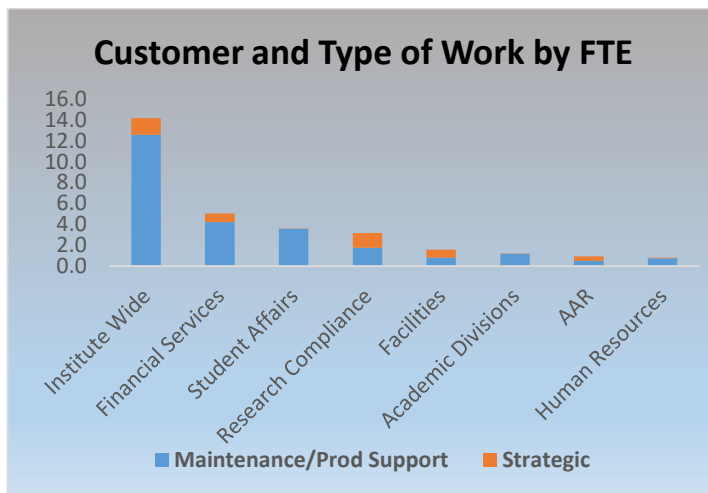
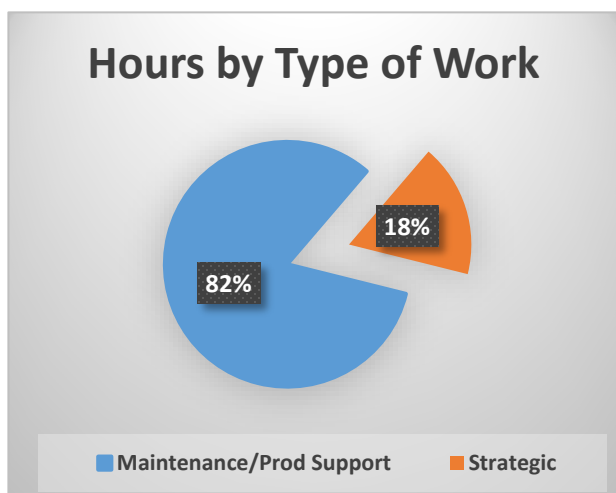
To effectively manage its efforts, IBS categorizes its work into **strategic projects** and **maintenance/production support** activities. Strategic projects are designed to create new capabilities that hold strategic importance for the Institute, while maintenance and production support efforts encompass the day-to-day activities necessary to maintain existing systems and capabilities.

IBS Overview

The **Institute Business Systems (IBS)** group within IMSS provides technical support for Caltech’s administrative information systems, which encompass financial, human resources, student, and facilities management applications, and many ancillary systems that interact with these core systems. IBS assists Caltech’s administrative departments in implementing, integrating, and enhancing these systems, and IBS also provides day-to-day operational support for these systems.

Historically, IBS allocates approximately **75% of its time** to maintenance and production support projects, with the remaining **25%** dedicated to strategic initiatives. In this reporting period, however, IBS devoted **82%** of its time to maintenance and production support tasks. This category encompasses all efforts to support existing systems, provide customer support, and implement maintenance projects. Despite this focus, IBS successfully allocated **18%** of its time to implementing strategic projects.

The first graph illustrates the percentage of hours spent by IBS categorized by “Type of Work.” The following graph displays the number of FTEs allocated by customer and type of work.



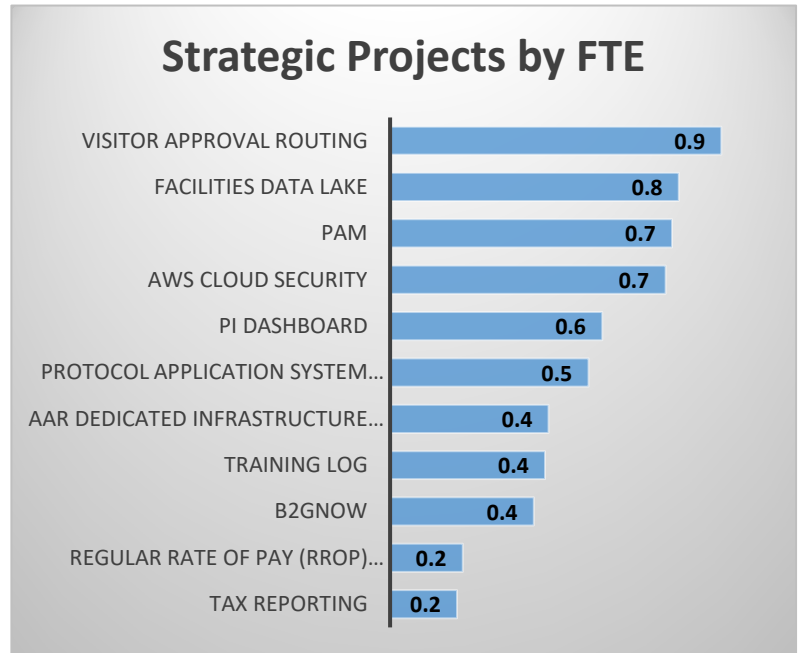
MAJOR ACCOMPLISHMENTS

Strategic Projects

Strategic projects are planned initiatives aimed at developing new business capabilities or enhancing existing functionality. The IBS team collaborates closely with administrative departments to plan and prioritize these projects, ensuring that they deliver maximum business value. This collaborative approach helps formulate a strategic plan tailored to the business objectives of each administrative department.

Common business objectives include:

- Ensuring compliance
- Protecting the Institute’s confidential data
- Improving information exchange with academic divisions
- Enhancing administrative efficiency



This year, IBS dedicated **18%** of its time to working on strategic projects, reflecting our commitment to aligning with the Institute’s broader goals.

Below are some of the strategic projects that IBS worked on, along with their key accomplishments:

Visitor Approval Routing

A visitor management system has been implemented to streamline the invitation process for outside visitors. This system allows visitors to complete their personal information online, which is then routed for approval through designated administrative channels. By automating the approval process, the system enhances security, improves communication, and creates a more organized experience for both staff and visitors.

Facilities Data Lake

The **Facilities Data Lake** project aims to provide a flexible reporting solution for **AIM ERP** data. Recognizing that the standard AIM reporting tools were cumbersome, the data lake will house AIM data and allow users to access it via **Microsoft Power BI**, facilitating easier reporting and analysis.

PAM (Huron Grants and Agreement system)

The IMSS team is assisting in the implementation of the **Huron Grants and Agreement system**. Responsibilities include integrating the Huron system with Oracle and other Caltech systems, as well as facilitating data conversion.

AWS Cloud Security

This project focuses on establishing a security standard for AWS accounts, specifically **NIST 800-53.5** and **AWS FSBP v.1**. It involves creating an AWS Organization, applying Service Control Policies, validating AWS security services and logging, and cleaning up indicators of possible misconfiguration using **CrowdStrike** and **AWS Security Hub**.

PI Dashboard

This project involves migrating the data warehouse from **OBI to OAS** and creating new reports and dashboards that combine existing OBI data with new **PAM data**, including proposal and agency award information.

Protocol Application System (PAS)

The **Protocol Application System (PAS)** is utilized by researchers to submit protocols for review and approval by Caltech's Research Compliance Committees. The PAS platform will be further expanded to support Caltech's **Biosafety** and **Human Embryos and Stem Cell** committees.

AAR Dedicated Infrastructure Project

Transitioning AAR infrastructure to a dedicated subnet to strengthen network isolation and enhance overall security.

Training Log

The **Training Log** provides a central location for monitoring the mandatory safety training status of staff, ensuring compliance and readiness.

B2Gnow

B2Gnow verifies supplier certifications from official agencies to enhance Caltech's supply chain management, ensuring that all suppliers meet necessary regulatory standards.

Regular Rate of Pay (RROP) Enhancements

Enhancements to the **Regular Rate of Pay (RROP)** configuration will align with **Federal Labor Standards Act (FLSA)** regulations. This update aims to improve accuracy and reduce errors in premium pay calculations.

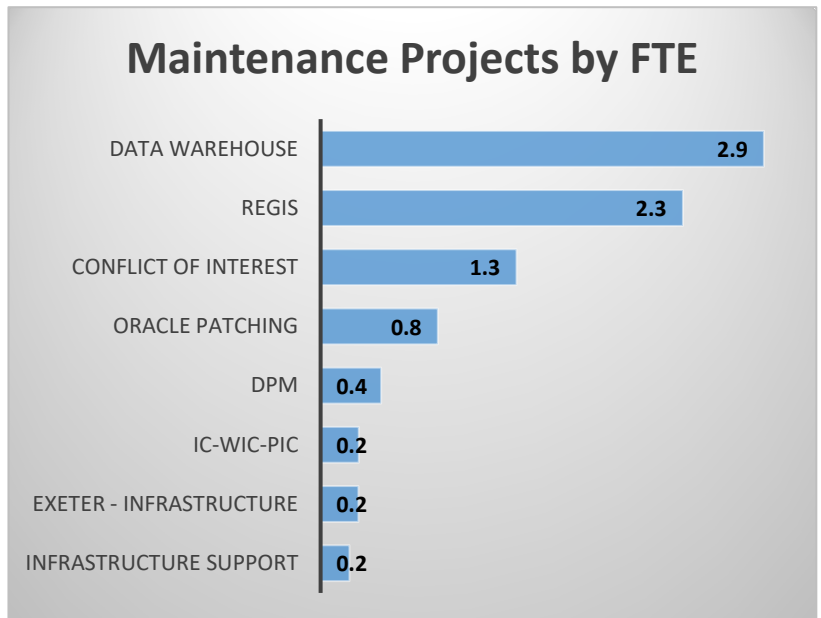
Tax Reporting

Sprintax is a tax compliance software designed specifically for non-resident employees. It provides a comprehensive solution for managing tax analysis and employment tax forms for international employees, streamlining the preparation and filing of forms such as the **1042-S**, while ensuring compliance with IRS regulations.

Maintenance and Production Support

The Maintenance and Production Support initiatives are essential for ensuring the uninterrupted operation of our systems. During this reporting period, approximately **82% of IBS's time** was dedicated to providing maintenance and support to the campus.

Maintenance Projects: IBS undertook several large-scale projects aimed at maintaining the operational integrity of the supported systems. These projects included existing system upgrades, patching efforts, and the replacement of aging systems, all without the intention of creating new business capabilities or enhancing functionality. These initiatives are typically driven by vendor recommendations or issues identified with aging infrastructure.



The top maintenance projects for this reporting period are ranked by the number of Full-Time Equivalents (FTEs) who contributed to each initiative. Below are the key projects handled by IBS, along with notable accomplishments:

Data Warehouse

The de-supported **Cognos Data Warehouse** is set to be retired. This project involves rewriting the final data marts (HR and AP/PO) using OBIEE/Apex tools. The first two phases of the **HR data mart** have already been deployed, while the **AP/PO data mart** has been successfully rewritten and rolled out to customers.

REGIS

In FY24, significant resources were allocated to evaluating the performance of the **REGIS application** during registration period openings, which occur three times a year. Through extensive performance monitoring and database tuning, **transaction throughput** has significantly improved, leading to a better user experience.

Conflict of Interest (COI)

Over the past year, several enhancements were made to the **Conflict of Interest (COI)** project, greatly improving functionality and usability. Updates include:

- Streamlined display of disclosure statuses
- Enhanced visibility of key features like the "Return to Employee" button and the FI Decision Tree link
- Improved management of disclosure forms and travel associations with entities.
- Additional improvements, including logic adjustments, email revisions, and access refinements for team members, have collectively enhanced **usability, accessibility, and data integrity** within the **Disclosure of Financial Interests and Commitments** application.

Oracle Patching

Mandatory maintenance and security patches were successfully applied to core administrative systems, including **Oracle, Exeter, Kronos, and Advance**.

DPM

Substantial progress was made on the **Division Personnel Management** project, improving the appointment form creation and modification process. Key updates include:

- Ensuring data accuracy independent of Oracle
- Allowing users to update Oracle without altering submitted information
- Successful integration of a **New Org** for the Provost Office for creating administrative appointments
- Adding **Rank field data** to automated emails, streamlining communication and improving the database system.

IC-WIC-PIC

The **IC-WIC-PIC** system now allows users to process **PTA** and **SBS account charges** using various formats, including online forms, recurring templates, and spreadsheet uploads.

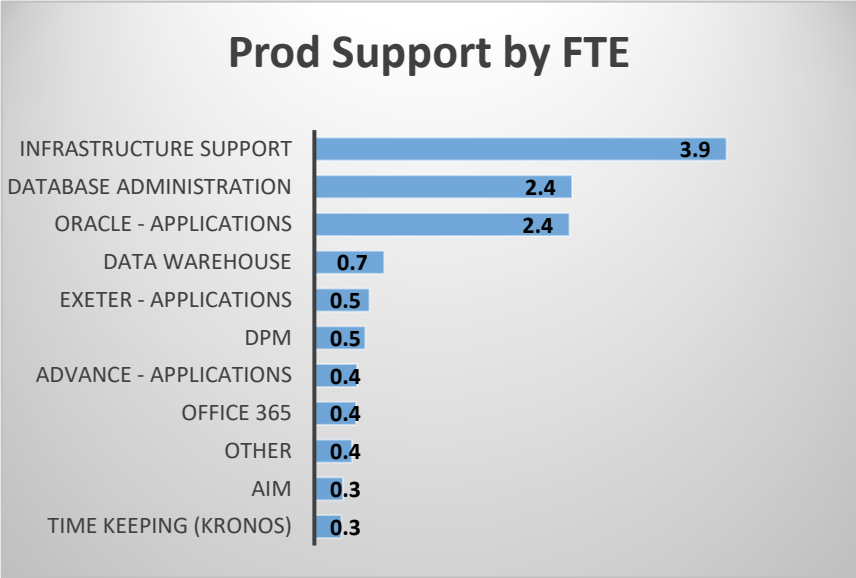
Exeter – Infrastructure

Upgraded the operating system to **Red Hat Enterprise Linux 8** for Advance database servers. January and July **Oracle critical patches** were applied to maintain system integrity.

Infrastructure Support

The operating system for **Advance database servers** was upgraded to **Red Hat Enterprise Linux 8**, and Oracle critical patches were applied in January and July to ensure ongoing infrastructure support and security.

Production Support: Users can initiate support requests by submitting tickets through **Caltech Help**, which are then addressed by the IBS team. These tickets may involve correcting defects and malfunctions, implementing minor enhancements, or providing guidance on the proper use and operation of the system. Throughout this reporting period, the IBS team successfully processed over **3,171** tickets, demonstrating their commitment to user support and system efficiency.



BY THE NUMBERS

2024	2023	2022	
32	41	43	Total FTE Count
12	12	12	People Systems Support (HR and Students)
12	12	13	Financial Systems Support
0	3	4	AAR Systems Support
4	4	3	Division Services Support
0	6	6	Business Infrastructure
3	3	3	Project Management Office
1	1	1	Director
			Projects
326,395	331,834	316,131	Internal Charges - Transactions processed
119,877	116,011	111,505	Oracle Payroll - Payrolls run by assignments
45,364	49,246	55,555	PTA – Queries run
25,987	31,366	33,544	RADR - Documents viewed
37,832	35,984	36,460	REGIS - Grades updated
16,805	19,168	19,474	Oracle Accounts Receivable - Sponsored research invoices
21,067	13,565	13,593	Oracle General Ledger – Journals posted in GL
10,170	10,245	9,764	Advance - Number of gift transactions processed
14,061	13,783	13,670	Building Space Data System – Active rooms on campus
5,996	6,211	4,894	Grad Degree Progress - Requirements Approved/Waived/Passed
3,091	2,741	2,413	Parking - Permits processed
4,650	4,357	4,056	Online W2 - Number of users that have opted for electronic W2
1,458	1,484	1,448	Division Personnel Management - Action forms created
1,090	1,000	893	Gym Membership - Currently enrolled via payroll deduction
964	1,074	1,091	Onboarding - New Hires and transfers processed
750	815	-	Production deployments - code changes and data fix for all supported systems
318	358	-	Clones - of our databases
102	133	-	Patches – to applications, databases and servers
	12	-	Upgrades – to databases, software development tools and ORDS
39943	-	-	Snapshots – of our systems

NETWORKS and SUPPORT SERVICES

The **Networks and Support Services group** is responsible for key areas within IMSS, covering IMSS Administration, Data Networks, Voice Networks, Help Desk, and Advanced Support. **IMSS Administration** manages essential organizational functions, including payroll, purchasing, and supplies. **Data Networks** oversees the campus's wired and wireless network infrastructure, ensuring seamless connectivity. **Voice Networks** maintains reliable local and long-distance communication through the campus voice network. **Help Desk and Advanced Support** teams provide managed computing, software, and collaboration support, offering technical assistance to customers across campus.

MAJOR ACCOMPLISHMENTS

Administrative

The IMSS Administrative team made significant contributions by supporting both department and customer needs through various initiatives, including:

- Managing expense and credit reporting
- Handling timekeeping and payroll activities
- Providing purchasing and payment support
- Overseeing maintenance, membership, and license contracts for all IMSS teams

Advanced Support, Help Desk, and Telephone Office Accomplishments

During FY24, the Advanced Support, Help Desk, and Telephone Office teams achieved several key milestones, including support, implementation, and maintenance initiatives:

Support

- Assisted faculty, students, staff, guests, and visitors across campus and at off-campus facilities.
- Provided support for new systems and upgrades, including VPN, Oracle, Kronos, Wireless, Microsoft Windows, Mac OS, and more.
- Facilitated Board of Trustee meetings in person and via Zoom.
- Maintained a 93% "Very Satisfied" rating from 404 completed Help Desk surveys.
- Continued to manage our computing, Mac, and mobile services.
- Supported and maintained critical systems such as Zoom, CrashPlan, Box, Microsoft Windows, Office, Adobe Acrobat, Adobe Sign, CrowdStrike, JAMF, DUO, Teams, SharePoint, and more.

Implementation

- **Microsoft Intune & Windows Autopilot:** Launched a strategic project to implement Intune and Autopilot, streamlining the management and deployment of Windows desktops. These cloud-based tools enhance efficiency and security, allowing for stronger remote device management, reduced setup time, and the transition from Altiris and Active Directory to a cloud-managed environment.
- **CrowdStrike:** Enhanced endpoint security and reduced vulnerabilities across the managed environment using CrowdStrike.

- **Procurement Streamlining:** Transitioned the purchase of new computers to the Caltech Bookstore, reducing administrative workload and ensuring compliance with institutional purchasing standards.
- **Zoom Rooms:** Increased the number of Zoom Rooms on campus to 19, offering flexible video conferencing solutions for faculty and staff.
- **System Migrations and Upgrades:**
 - Assisted the Office of General Counsel in moving to their new iManage system.
 - Supported the implementation of DUO on VPN.
 - Initiated upgrades of managed Windows 11 computers to version 24H2 and Windows 10 computers to Windows 11.
 - Completed upgrades of all managed Mac computers to macOS 14.
 - Assisted with implementing AI tools such as Zoom AI Companion and Microsoft Copilot.
 - Upgraded the VDI environment to support Windows 11.
- **Device Deployment:** Deployed over 200 computers to managed users.
- **Maintenance Management:** Coordinated 26 maintenance windows across managed devices, including:
 - OS upgrades (Windows, Mac, iOS)
 - Software upgrades for critical applications such as Firefox, Chrome, Zoom, Adobe Acrobat, Cisco AnyConnect, Java, Putty, Slack, Box Sync, Edge, TeamViewer, VMware, and others.
- **Zoom & Box Services:** Expanded Zoom services to support remote education and work, and added more users to Box Sign.
- **Collaboration:** Partnered with the Communication team on multiple projects.

Maintenance

- Maintained contracts for Zoom, Adobe Products, CrashPlan, JAMF, Altiris, and AWS Workspaces.
- Ensured up-to-date patching for all managed computers.

Voice and Data Networks

The Voice and Data Networks teams' accomplishments during FY24 include:

Voice Network

- Supported **15 renovation projects** and major construction efforts.
- Completed provisioning of **Voice and Data services** at the Resnick Sustainability Center.
- Participated in final design reviews for the **Ginsburg Center for Quantum Precision Measurement**.
- Supported both **remote and on-campus telephony needs**, including Zoom phones and legacy telephone systems.
- Processed over **300 invoices** and closed more than **800 ticket requests**.
- Completed over **200 phone moves** across campus.
- Facilitated the **Zoom phone migration** for various campus divisions.

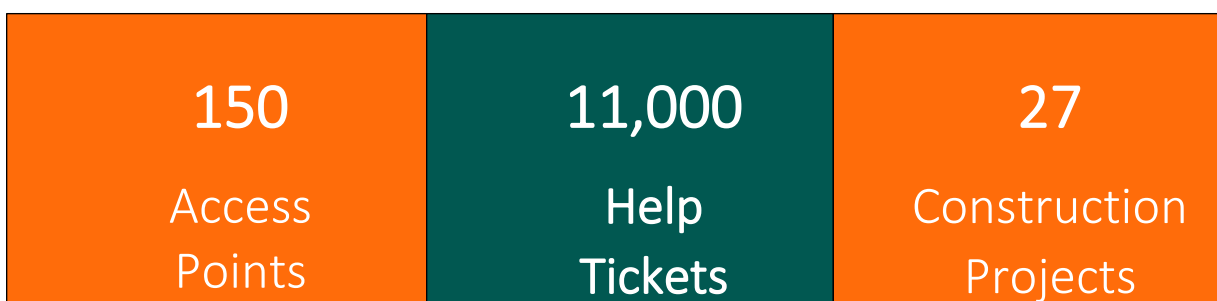
Upcoming Initiatives:

- **Emergency Phone Replacement:** Upgrading from Ramtel to Talkphone to enhance voice quality.
- **Wall-Mount Ephones:** Installing additional units to expand communication coverage.

Data Networks

- Maintained full operational status of **internet and research backbones** at multiples of 100G, supporting optical and ISP failover with path diversity.
- Kept **Cloudflare DDoS mitigation services** fully available:

- "Always on" for Chester Data Center.
 - "On-demand" for the campus network.
- Upgraded **fiber infrastructure** at key locations, including Spalding and Lauritsen.
- Supported **15 renovation and construction projects** in spaces like East Bridge, Beckman Behavioral Biology, Linde Lab, and the American Institute of Math in Caltech Hall.
- Continued support for the **Resnick Sustainability Center** construction and design reviews for the **Ginsburg Center**, including relocating services from California Blvd.
- **Wireless Network Enhancements**
 - Completed **Caltech Secure** setup across all campus buildings.
 - Added **six outdoor access points (APs)** in Beckman Mall to enhance wireless coverage for commencement.
 - Implemented **Anyroam** for visitor authentication, replacing text-code access.
 - Upgraded **wireless controller code** for improved network performance.
- **Campus Fiber Upgrades**
 - **Inter-Building Fiber:** Provided new fiber connections to 21 academic and 11 administrative buildings.
 - **Intra-Building Fiber:** Upgraded fiber in Spalding for enhanced connectivity.
- **Campus Router Upgrades**
 - Installed new fiber in **21 academic and 11 administrative buildings**, with equipment currently undergoing lab testing.
- **Other Network Projects**
 - Selected **Ekinops** for LosNettos optical refresh to downtown LA.
 - Replaced **NTP appliances** in Powell Booth.
 - Enabled **Multi-Factor Authentication (MFA)** for VPN access campus-wide.
 - Completed a **wireless upgrade study** for mechanical spaces; master plan submitted to facilities.
 - Added **Personal Wireless Network** support for select campus locations via Caltech's wireless infrastructure.
 - Integrated **automation software** to manage the campus network and streamline software upgrades.
 - Replaced approximately **200 end-of-life (EOL) switches and routers** in key locations, including IST, Keith Spalding, UGA, Catalina, Linde Lab, Keckhouse, CSS, and Jorgensen.
- **Upcoming Initiatives**
 - Ordering **150 more EOL switches** and **50 routers** for replacement.
 - Migrating to a **400G optical link** for CENIC and HPR services.
 - Providing additional **100G links** to support campus research groups.
 - Implementing a **perimeter firewall** for enhanced security.
 - Upgrading to a **next-generation routing core**, supporting 400Gbps and network segmentation.



BY THE NUMBERS

2024	2023	2022	
27	28	28	Total FTE Count
2	2	1	Admin
3	3	3	Voice
11	11	10	Data
11	11	13	Help Desk and Advanced Support
1	1	1	Director
Data Networks			
70TB	31PB	92TB	Total external traffic (within a 24-hour period)
19.03TB	15.09TB	11.24TB	Wireless traffic (within a 24-hour period)
967.61GB	1.28TB	2.14TB	VPN traffic (within a 24-hour period)
248	244	270	Additional wireless access points (Caltech Secure)
41,682	0	0	Total campus active wired ports
150	252	507	Additional wired ports (non-projects)
27	15	15	Additional projects supported
27	15	15	Construction projects supported
Advanced Support, Help Desk and Telephone Office			
156,603	156,926	193,697	Zoom – Online meetings
18,998	17,753	15,958	Zoom Recordings (Total in System)
11,619	12,764	14,912	Caltech Help – Number of tickets processed by the Help Desk teams
1,431	1,459	1,333	Managed computers
26	26	26	Maintenance windows
865	820	737	VPN – Number of requests processed
8,900	8,600	8,775	DUO – Users with DUO on their email accounts
241	205	179	Managed Mobile Devices (iPhones, iPads)
187	175	174	Managed Virtual Desktops (VDI)
248	249	199	Managed Mac Computers
8,421	8,977	11,312	Zoom Help Desk Call Queue
164,765	61,327	125,387	Zoom Phone Calls
314	261	189	Zoom Phone Users
19	8	4	Zoom Rooms

We welcome your feedback regarding emergent opportunities and how we can be more effective.

Information Management Systems and Services

