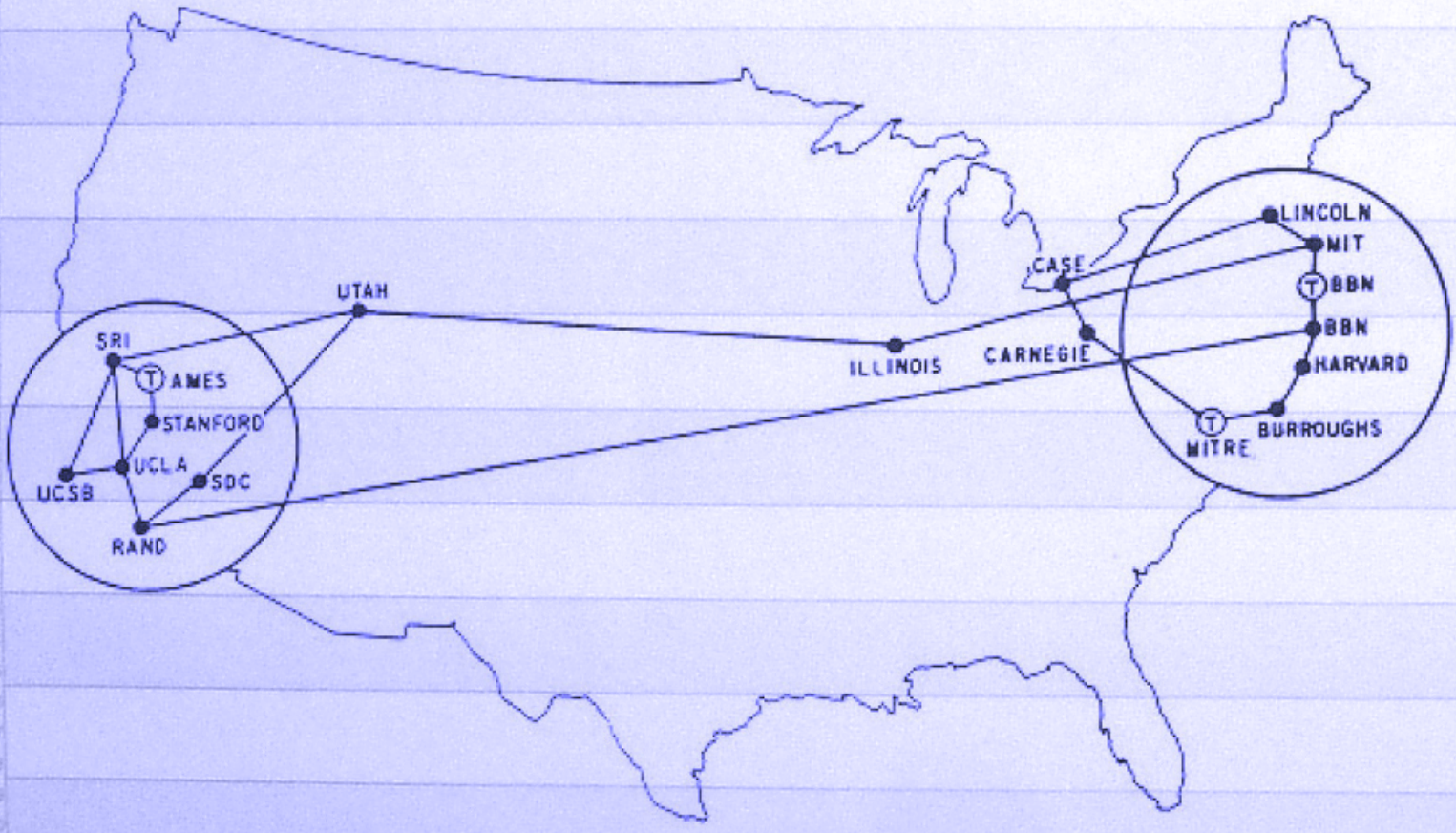
National Aeronautics and Space Administration

IT Talk

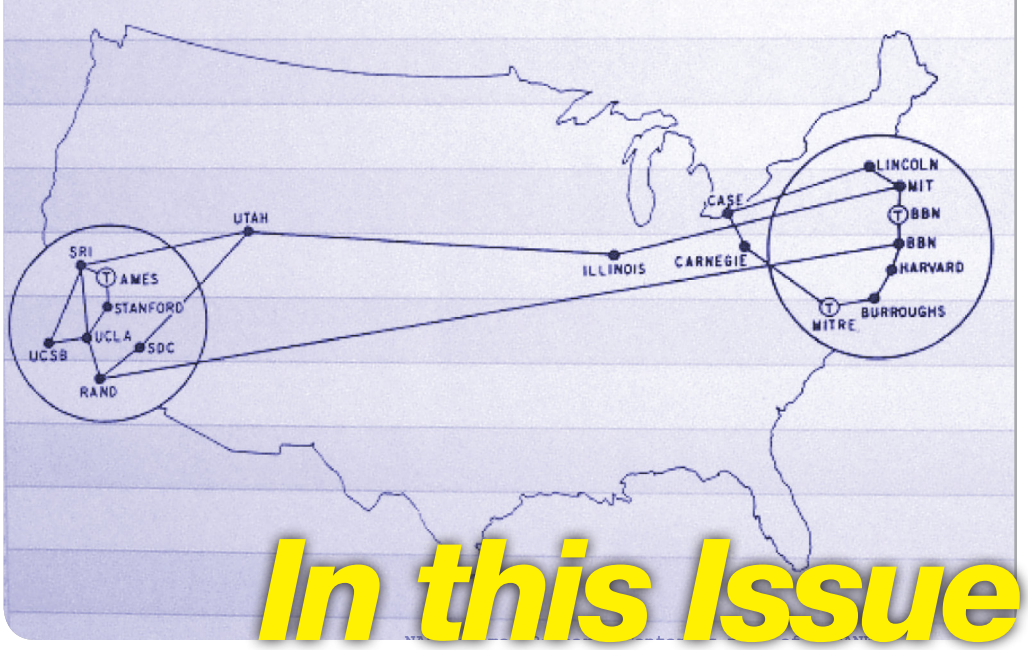
July - September 2019 Volume 9 • Issue 3

In the Beginning...



NASA's Ames Research Center as part of ARPANET, a precursor to today's Internet—September 1971.

HISTORY ISSUE



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Message from the NASA CIO

Since NASA first opened its doors in 1958, the Agency has accomplished many great scientific advancements in technology, air, and space. NASA's missions have enriched us all here on Earth in countless ways. In this issue, we'll take a stroll down memory lane as we look at the history of NASA information technology through the years.

And we'll take a peek inside Glenn's Reconfigurable User-interface and Virtual-reality Exploration (GRUVE) Lab. The GRUVE Lab focuses on visual-related data analysis.

NASA Technology, Data & Innovation (TD&I) Labs recently announced its 2019 class of IT research and development projects. This year, TD&I Labs has funded nine projects—one returning and eight new—with a total funded cost of $203,000. TD&I Labs empowers NASA's employees to develop new capabilities that will enhance and support NASA's ongoing needs. Each year, TD&I Labs seeks out and develops the best and brightest ideas.

And finally, this quarter, we are pleased to highlight some prestigious industry honors earned in the Jet Propulsion Laboratory's (JPL) Information Technology Directorate. Go, team!

We have a great lineup this issue, so I hope you enjoy what we have in store for you.

~Renee

OCIO and Center CIO leadership at the CIO Staff Meeting Face-to-Face hosted by NASA's Langley Research Center in Hampton, Virginia, June 10-14, 2019.

Communications Program Face-to-Face

By Sylvester Placid, Communications Strategist, Marshall Space Flight Center

The Communications Program (CP) held a Communications Subject Matter Expert (SME) F2F meeting at the Huntsville Botanical Garden in Huntsville, AL, from April 29 to May 2, 2019. CP communications SMEs from NASA Centers and CP customers attended the four-day event, which included an overview of the Communications Program and planned evolution over the coming years, roadmaps for CP service lines, network security, and an approach for the upcoming recompete of the NASA Integrated Communications Services (NICS) contract. The event also provided the opportunity for Comm SMEs to participate in a facilitated discussion about their Center priorities, challenges, and how CP can enable their Center missions.

The 30th Anniversary of the GVIS Lab:

Exciting Times with Brand-New CAVE Virtual Reality System

By Nora Peterson, Media Specialist, Glenn Research Center

This year marks the 30th anniversary since the founding of Glenn Research Center's Graphics and Visualization (GVIS) Lab. Since 1989, the Lab has been specializing in the exploration and implementation of cutting-edge data visualization solutions for the benefit of the scientific community. Consequently, the Lab has garnered extensive experience in the application of computer science and the administration of public outreach events and programs. In the early days, GVIS housed and utilized a state-of-the-art 3D animation and video-editing studio to create and experiment with renderings of scientific data. Today, GVIS investigates new applications of virtual reality and augmented reality technologies in the realms of natural user interfaces, interactive simulations, and virtual design.

One of the unique pieces of technology utilized by the GVIS team is its Cave Automatic Virtual Environment (CAVE) system. Located in its sister Lab, the Glenn Reconfigurable User-interface and Virtual-reality Exploration (GRUVE) Lab, the CAVE is a multiscreen 3D virtual reality environment that permits multiple people to view a visualization in 3D together. Powerful projectors and mirrors, in combination with an infrared motion-tracking system and active-shutter glasses, allow viewers to visualize 3D models and data in perfect perspective. 3D models effectively pop off the screen and remain proportional no matter where the pair of tracking glasses move in the environment. The GVIS team had been utilizing an older version of this system for almost two decades. Earlier this year, a brand-new CAVE system was installed in order to dramatically enhance the visualization capabilities available to the Center.

The most noticeable difference with this modern system is that the screens and the resolution of the projectors have significantly increased. The new GRUVE Lab CAVE has one front wall (135 square feet), two side walls (96 square feet), and a floor (135 square feet). In addition, the remote control, infrared tracking system, and active-shutter glasses are completely wireless. Because this CAVE is optimized for one pair of tracking glasses, spectator glasses are used to provide the same perfect perspective for other users when they are standing next to the tracked pair. The new CAVE features four large 4K digital laser projectors that, unlike the previous analog projectors, do not require the replacement of spent bulbs. The entire system is run by a pair of powerful computers equipped with state-of-the-art video cards. One computer features a Linux operating system, and the other features Windows. This enables the team to run applications developed for either operating system.

The GVIS team plans to use its new CAVE for modeling scientific results, viewing CAD-type geometries, and visualizing computational fluid dynamics (to name a few). Currently, the system is being used to visualize the Urban Air Mobility Communications Challenges project, which aims to overcome the hurdles that prevent drones from taxiing people around an urban environment. Within the CAVE, viewers can visualize scale models of these drones, examine their individual parts, watch them fly, and experience visualizations more directly. Accessible, user-friendly, prolific, and innovative, the new CAVE continues the GVIS legacy of sharing cutting-edge knowledge and technology at NASA and beyond.

2019 TD&I Labs Winners Announced

NASA Technology, Data & Innovation (TD&I) Labs is proud to announce its 2019 class of IT research and development projects. TD&I Labs empowers NASA's innovative employees to develop new capabilities that will enhance and support NASA's ongoing needs. By leveraging a crowdsourcing/entrepreneurship model and soliciting ideas from across NASA's brilliant workforce, NASA is better poised to identify, develop, and execute to satisfy both near-term and long-term needs.

Each year, TD&I Labs seeks out and develops the best and brightest ideas. This year, TD&I Labs has funded nine projects, one returning and eight new projects, with a total funded cost of $203,000.

This year's TD&I Labs Project Challenge Judge Panel included representatives from the Office of the Chief Information Officer (OCIO), the Office of the Chief Technologist (OCT), the Human Exploration and Operations Mission Directorate (HEOMD), the Aeronautics Research Mission Directorate (ARMD), and Center Chief Technology Officers (CTOs). This panel of experts reviewed submissions with the challenging task of selecting a handful of proposals out of 45 outstanding applications. To read about each winning project and view all the applications for this year, please visit the TD&I Labs Website (*https://labs.nasa.gov/SitePages/Default.aspx*).

Congratulations to the Winners!

Returning Project

Generate Parts List from Controlled Drawings Phase 2 (Returning)—Funded $25,000
Project Lead: Cuong Q. Nguyen (JSC)

New Projects

Future Light Information Technology Enhancement (FLITE)—Funded $25,000
Project Lead: Joshua Miltier (SSC)

Space System Digital Twin—Funded $25,000
Project Lead: Lui Wang (JSC)

Automated Data Tagging with Machine Learning—Funded $25,000
Project Lead: Truong Le (JSC)

Machine Learning for Materials Development—Funded $25,000
Project Lead: Stephen M. Casey (LARC)

Transfer Learning for Dynamic Ontology Construction—Funded $25,000
Project Lead: Brian A Thomas (HQ)

Artificial Intelligence for Software Testing—Funded $22,000
Project Lead: Scott B. Tashakkor (MSFC)

Facial Recognition Applications in Security—Funded $25,000
Project Lead: Lui Wang (JSC)

Rapid Model Import Tool (RMIT)—Funded $6,000
Project Lead: William L. Little (KSC)

NASA IT Strategic Plan—Goal #1: Excellence

By Jonathan Walsh, IT Strategic Planner, and Meredith Isaacs, Communications Specialist, NASA HQ

To achieve excellence in information technology (IT) service delivery, NASA's IT Strategic Plan, Fiscal Years 2018–2021 begins with the goal to partner with customers to consistently deliver excellence and enable mission success. NASA published this strategic plan in 2018 to enable the Agency's complex, multifaceted missions and business operations. To achieve our vision of managing IT as a strategic resource to securely unleash the power of data, NASA's IT community will deliver excellence, a data-driven approach, cybersecurity, value, and support and preparation for our people.

NASA's IT excellence will be driven by strategic partnerships and the delivery of consistent service quality, effectiveness, and productivity. Our relationship with our customers will improve when they are more integrated throughout the IT service planning and delivery life cycle. To help accomplish this, we will increase our use of agile enterprise services and publish clear service rules and availability.

Our IT community will improve customer satisfaction with our services by increasing end-to-end service usability and effectiveness and by enabling responsive, actionable service performance improvement. To help accomplish this, we will develop a continuous service-improvement model, implement digital systems that capture real-time performance information, and make greater use of data for planning and investment decisions.

NASA's IT Strategic Plan is reviewed annually and updated as necessary to reflect NASA's overall strategic direction and presidential administration priorities.

For more information, visit *https://www.nasa.gov/ocio/itsp* or e-mail *agency-itsp@mail.nasa.gov*.

NASA's Ames Research Center—80 Years of Contributions to Aeronautics on Earth, in the Skies, and in Space!

By Penny Hubbard, ARC CIO Communication Specialist, Ames Research Center

As many of us know, NASA has contributed mightily to the world through technology improvements across its storied history. As we move into the stars, NASA is now actively ensuring that this century's explorers arrive, survive and thrive on the Moon, on Mars, and beyond.[1] NASA's Ames Research Center, located in the heart of California's Silicon Valley, has provided its own share of amazing contributions to the world, including shepherding in the Internet.

With regard to technology improvements, who reading this humble article recalls the world before the commercial internet? Do you recall getting party invitations in the mail? Remember road trips and actually using paper maps? No commercial GPS, no search engines, no online games…no online at all. How did we communicate, connect and socialize? It wasn't long ago that computers and smartphones didn't exist. Taking a look at Ames' history reveals some interesting facts, including how we participated in ushering in the era of the information superhighway.

Ames was established eight decades ago, on December 20, 1939, as part of the National Advisory Committee for Aeronautics (NACA), and in 1958 NACA was absorbed into NASA. Joseph Ames (right), a founding member of NACA, instituted a research-based vision, focusing NACA on aerodynamics. After his death, Ames's colleagues carried on his vision and, during the 1944 dedication of the lab he helped to establish, leaders called him "the great architect of aeronautical science.... It is most appropriate that it should now be named the Ames Aeronautical Laboratory, for in this laboratory, as in the hearts of airmen and aeronautical scientists, the memory of Joseph S. Ames will be enshrined as long as men shall fly." I wonder if Dr. Ames and his colleagues ever envisioned that his aeronautics lab would one day become a part of NASA and not only fly aircraft, but also support space flight; human factors engineering; missions to the Moon, Mars and the stars beyond; and facilitate the infancy of the Internet here on Earth.

Let's go back to 1957, when the Soviets launched the first artificial satellite, Sputnik, into orbit. President Eisenhower had a firm grasp of how advances in technology helped lead the Allies to victory during World War II and had taken a keen interest in not permitting the Soviets to gain the technological upper hand during the Cold War. He immediately ordered the establishment of the Department of Defense Advanced Research Projects Agency, or ARPA, with two broad missions: missile research (work later taken over by NASA (in its development of rockets to launch spacecraft) and information technology (what would become the internet). Both missions would come to fruition in 1969. One would be on the front page of every newspaper everywhere around the world ("One small step…"); the other would go unnoticed for decades. Both, however, revolutionized the world.

Per Eisenhower's directive, ARPA launched the ARPANET,[2] an early packet-switching network – used for breaking information into packets, transmitting them to another system, then reassembling them – and the first network to implement the Transmission Control Program/Internet Protocol (TCP/IP) suite, which took all those packets and showed them where to go. In the early 80's both technologies became the technical foundation of the internet. Four federal agencies came together to broaden ARPANET for science, aerospace and energy applications at their organization: the National Science Foundation (NSF), NASA, the Department of Energy (DOE) and the U.S. Military.

Access to NSFNET was established through Federal Internet Exchanges (FIXes), via Internet Exchange Points (IXPs).[3] Two FIXes were established in June 1989: FIX-East at the University of Maryland and FIX-West at Ames Research Center. Access to the ARPANET was expanded in 1981 when the NSF funded national supercomputing centers at several universities and provided interconnectivity in 1986 with the NSFNET project - creating network access to the supercomputer sites in the United States from research and education organizations. The NSF permitted only government agencies and universities to use the network until 1989, when the first commercial internet service provider (ISP) (*https://en.wikipedia.org/wiki/Internet_service_provider*) emerged. By 1991, the NSF had removed restrictions on access, and the commercial ISP business grew rapidly into today's World Wide Web. In the 1990s, MAE-West,[4] hosted at Ames, was the second-busiest exchange point (a physical location (e.g., Data Center) through which Internet infrastructure companies connect with each other). on the internet. MAE-West handled, by some estimates, as much as 40 percent of the Nation's Internet traffic.

Today, Ames Research Center continues to be involved with the internet, operating one of 13 worldwide root servers for the Domain Name System (DNS). The DNS is how internet applications look up IP addresses associated with text-based domain names – we see www.nasa.gov, but our computers see something different. Ames not only supports the information superhighway, we also contribute with our core areas of expertise[5], making life better through research, applications and scientific breakthroughs in astrobiology, entry systems, supercomputing, next-generation air transportation, air traffic management, autonomy, robotics, and many more fascinating NASA missions.

Ames turns 80 this year. Here's to another 80-years of inspirational science for humankind, taking us further into space than we could ever imagine!

- To learn more about NASA's Ames Research Center, visit *https://www.nasa.gov/ames*.
- To view an interesting and surprising historical timeline of technology, beginning with the invention of paper and continuing through today's high-tech devices, visit *www.cybertelecom.org/notes/timeline.htm*.

References

1. The Moon to Mars Story – NASA's 50th Anniversary; Ames' Speaker Bureau Presentation
2. DARPA: *https://en.wikipedia.org/wiki/DARPA*
3. Wikipedia: *https://en.wikipedia.org/wiki/MAE-West* [and FIX, IXP, CIX links]
4. MAE is a registered trademark of Verizon for internet exchange services.
5. What we do—ARC Core Competencies: *https://www.nasa.gov/centers/ames/research/index.html*

NASA Communications Program History

1964: NASA Headquarters defined all longline communications operated by NASA as NASA Communications (NASCOM). Responsibility for NASCOM was assigned to Goddard Space Flight Center (GSFC).

1985: The Program Support Communications Network (PSCN) contract was awarded for building a time-division multiplexing (TDM)-based voice, video, and data Wide Area Network (WAN).

1989: The PSCN Internet (PSCNI) network, NASA's first programmatic internet supporting Space Station Freedom and Space Shuttle Program development, was created.

1994: Marshall Space Flight Center (MSFC) began building networks and IT services in Russia to support a newly formed cooperative agreement between Russia and the United States for building and operating the International Space Station (ISS).

1995: The NASA Integrated Services Network (NISN) was formed, combining NASA's NASCOM mission and administrative WAN into a single organization.

1999: NASA's backbone transitioned from TDM to Asynchronous Transmission Mode (ATM) technology.

2005: A WAN-R upgrade transitioned NASA's backbone from ATM to Synchronous Optical Network (SONet) and Dense Wavelength Division Multiplexing (DWDM) and utilized Carrier Independent Exchange Facilities (CIEFs, or "carrier hotels").

2008: The first connection to Amazon Web Services was established.

2010: The Mission Operations Voice Enhancement (MOVE) was implemented.

2010: The WANX upgrade increased the backbone's core capacity to OC-192 (10 gigabits per second).

2008–10: The General Services Administration (GSA) Networx contract was awarded and transitioned.

2011: The NASA Integrated Communications Services (NICS) contract was awarded to consolidate Mission and Corporate WAN and Center LANs, as well as voice, data center, and security infrastructure.

2015: Corporate LAN and WAN operations were integrated into the Consolidated Network Operations Center (CNOC).

2017: The Communications Service Office (CSO) became the Communications Program (CP).

2018: Enterprise Border Firewalls, VPNs, and content filters were deployed at NASA's Internet perimeter. Network Access Control capability was deployed across NASA corporate networks.

2018: NASA connected to Microsoft Azure Cloud Services and transitioned to O365 e-mail and Software-as-a-Service (SaaS).

2019: NASA connected to Google Cloud.

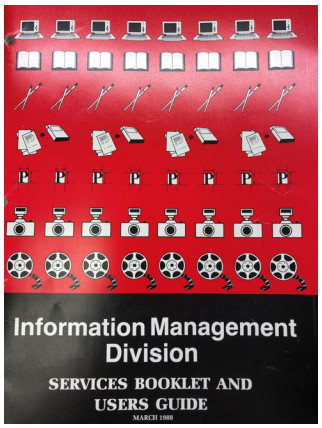
2019: NASA began the Enterprise Infrastructure Solutions (EIS) transition, including 100-gigabit-per-second backbone circuits.

2021: The NICS follow-on contract will begin.

2022: The EIS transition will be completed.

Looking Back To Move Forward: ITCD's Evolution at Goddard Space Flight Center

By Michelle Birdsall, Strategic Communications Specialist, with input from ITCD pioneers Mary Collins, Bob Freitas, April Hildebrand, Dwaine Kronser, and Tom Perricone, Goddard Space Flight Center



Taking time to look back as we move forward can provide reassurance, guidance, and perspective, especially when the road ahead for information technology (IT) promises opportunities and challenges yet to be discovered. For Goddard Space Flight Center's Information Technology and Communication Directorate (ITCD), ushering in technology that brings change involves enabling global science and mission work with external partners while also creating solutions that ensure NASA's network security. With unique IT requirements, Goddard's ITCD staff must guide customers through enterprise-level initiatives that update how IT services are provided and managed while preserving functions that are critical to ongoing partnerships.

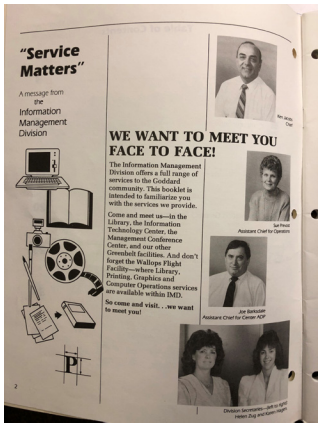
In talking about the history of ITCD at Goddard, staff who have been part of IT's evolution at the Center for more than 30 years explain that managing such change is not new. Several ITCD employees can recall a not-so-distant past when the Center's IT services were not provided and managed within a dedicated directorate and only some employees had access to e-mail.

In 1985, Goddard began its first microcomputer organization to offer business IT solutions, planting the seed for ITCD as employees know it today. Computers were running MS-DOS, if anyone can remember that far back. Throughout the early 1980s, only a few lucky employees were given an e-mail account, which was accessed on a server. Therefore, most communication happened either in person or over the phone.

It was not until the early 1990s that the Solutions for Enterprise-Wide Procurement (SEWP) contract was developed, a Government-wide acquisition contract authorized by the U.S. Office of Management and Budget that is managed by NASA and resides within Goddard's ITCD structure. Goddard employees reminisce about the arrival of the Outsourcing Desktop Initiative for NASA (ODIN), the IT leasing services support contract preceding Agency Consolidated End-User Services (ACES) and NASA End-user Services & Technologies (NEST), noting that the Center's scientists and engineers—accustomed to handling their own IT needs and budgets within their separate directorates—initially responded with resistance to the changes it brought to the way they acquired and maintained IT tools.

When Goddard established the new directorate for IT and communications on July 25, 2005, ITCD staff faced the challenge of addressing misperceptions and mistrust at Goddard as they began providing IT services at the Center level. ITCD eventually gained trust, albeit slowly, by continuously providing candid and frequent information, outreach, and education.

As NASA transitions to the new NEST contract for IT support services, implements the enterprise's Mission Support Future Architecture Program, and supports employees as they reap the benefits from the recent Office 365 migration, it helps to remember how far we have come as an IT community. Having ITCD staff who remember how they assisted customers in adapting to a world with increasing IT capabilities will guide the next generation through the continuing evolution of IT throughout NASA.



Early Adoption Leads to Handheld Digital Revolution at NASA

By Whitney Haggins, IT Communication Strategist, Jet Propulsion Laboratory, California Institute of Technology

When the iPhone was announced back at the end of June 2007, Jet Propulsion Laboratory (JPL) IT was in the formulation stage of defining how JPL IT could help to lead cultural and technological change. IT Chief Technology Officer Tom Soderstrom had already debuted the first list of IT Trends for the Next IT Decade, and number five on the list was Consumerization of IT.

Personal Digital Assistants (PDAs) were becoming more powerful, and, based on the public's first reaction to the iPhone, indications were that this new device from Apple had the potential to revolutionize the way we communicate. The JPL OCIO leadership made the decision to respond to the industry trend by partnering with key users to pilot the iPhone. During the lengthy and extensive evaluation pilot, users were asked to rate the iPhone's performance as a cell phone, when using JPL email, web browser capabilities, and rank functions that would be most useful in the JPL environment. Cybersecurity performed extensive analysis to determine whether the device's security features were sufficient for use in the JPL computing environment.

The feedback from the evaluation pilot enabled the OCIO to partner with Apple and AT&T on features that would be needed for JPL use. JPL met with Apple to give feedback on the four things that needed to be changed before JPL would adopt it. Apple made these changes and, in 2009, JPL became the first NASA Center to have the iPhone as an allowable PDA device (in 2009 there were over 600 Blackberry users on Lab). JPL then began working with NASA to include the iPhone as an allowable PDA for use at other NASA Centers. JPL utilized the same strategy and was the first within NASA to introduce the iPad as an allowable device in 2010.

DOUG – An Enduring Innovation

By Jaumarro Astran Cuffee, IRD Communications Strategist, Johnson Space Center

Information technology advances at a speed all of its own. An IT-decade has been described as about three years, and an IT-minute passes in barely more than a blink of an eye. The reality of this speed means one IT innovation quickly gives way to the next. However, one Virtual Reality innovation has proved to be timeless – Dynamic Onboard Ubiquitous Graphics (DOUG).

Developed in the early 1990s, DOUG has added elements of safety to human spaceflight –accommodating the complicated and crucial graphics for training simulations. Following its first flight aboard a Space Shuttle in 2001, DOUG was on all but one of the remaining Space Shuttle missions through the end of the Shuttle era in 2011. DOUG supported Extravehicular Activity (EVA) or spacewalk simulations, Simplified Aid for EVA Rescue (SAFER) training, and International Space Station (ISS) assembly using Space Station Robotic Arm for both training and situational awareness to avoid the arm coming into contact with other parts of ISS. As ISS continues its presence in low Earth orbit, DOUG is there maintaining a 3D model of ISS for continued training and activities.

Since DOUG was developed, many commercial advances have been made in the area of graphics and simulations. Although some commercial game engines have come into the picture, DOUG is still needed. According to Virtual Reality Technical Discipline Lead, Eddie Paddock, "There are many capabilities in DOUG for ISS and EVA training and onboard use that will take some time and resources to develop in these commercial game engines, so for now we need DOUG."

DOUG has served NASA well for Shuttle and ISS, but its work is far from over. DOUG continues to have a place in the future of spaceflight, including commercial activities. Considering ORION, Moon 2024, Artemis, and Gateway, Paddock says, "DOUG, as well as its companion tool EDGE (Engineering DOUG Graphics for Exploration), are being used for simulating 3D graphics visualization requirements, including Out the Window, Camera, Birds Eye views, and VR immersion. These simulations and DOUG graphics applications are used for design evaluations, analysis of vehicle performance and subsystems, flight software and avionics testing, and training for Orion, Gateway and Lunar missions including lander, EVA, and rovers...DOUG is used for 3D graphics and simulation requirements in SpaceX and Boeing commercial crew programs as well as cargo – [H2 Transfer Vehicle], Dragon, and Cygnus."

In a time where change is the only certainty, DOUG has proved time and again to be a timeless, adaptable, and invaluable IT innovation.

NASA Libraries

By Claire Little, IMPLibrary Lead and Dr. Jacob Cohen, Ames Chief Scientist, Ames Research Center; and Bob Sherouse, Library Program Manager, NASA Headquarters

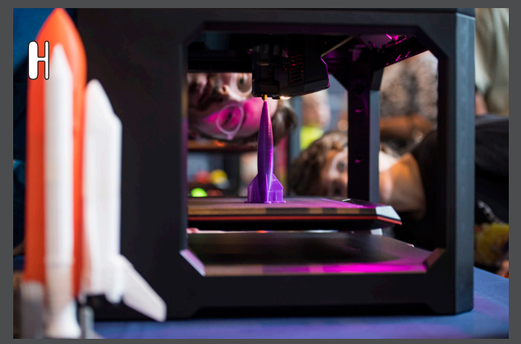
NASA's library program is a key tool for accomplishing the goal of returning to the lunar surface in 2024. In support of Chief Scientist Dr. Jim Green, Chief Information Officer Renee Wynn, and Library Program Manager Bob Sherouse, the Information Management Program (IMP) is committed to providing technical solutions that standardize user experience and provide improved access and discoverability of disparate reference collections.

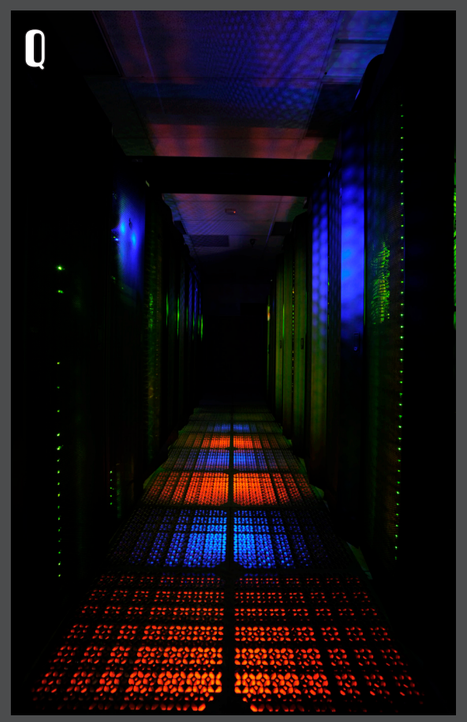
Currently, most journal subscriptions are procured by NASA's libraries at the Center, facility, or program office level, leading to duplication and inefficiency and causing user access to vary significantly across the Agency. To support the library's efforts to broaden content access and decrease subscription costs, the IMP is building a Journal Subscription Usage Dashboard to aggregate journal usage data. With this information, the library program will be able to consolidate subscriptions and provide access to the widest variety of research materials at the lowest cost to NASA. Built in Tableau, Phase I of the dashboard will visualize network traffic to ten high-priority subscription providers, along with procurement activities for those providers. Later phases will add more subscription providers and data sources.

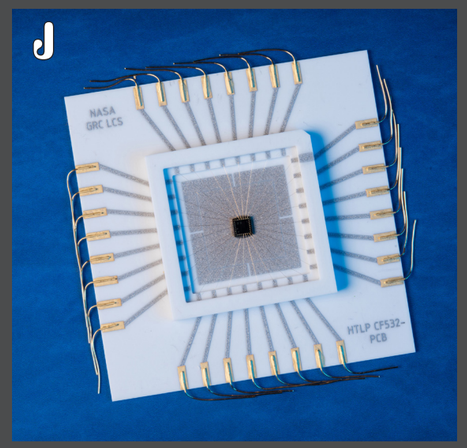
As journal subscriptions are consolidated, we will also streamline journal access. Instead of visiting multiple subscription providers' Websites or a local Center library page, users will be able to make single searches in a new Journal Access Portal that returns results from all subscription providers. This will standardize the user experience, improve content access, and provide important usage analytics. Users will also be able to easily request journals not yet available to them via the interlibrary loan service. Through integration with authentication systems, the portal will allow us to implement tokenized access and better control what kind of usage data subscription companies collect about NASA's users.

The final component of simplified access to library resources is a centralized Library Landing Page. Unlike current IP-gated Center library pages, the new Landing Page will be accessible to anyone on the NASA network and will be a one-stop shop for viewing journal content, requesting interlibrary loans, submitting questions to librarians, and more. Though this system will present a single NASA library user experience, each Center will still be able to customize content to advertise local events and functionality.

Keep an eye out for these new and expanded library services as the Information Management Program works with NASA Library Program Manager Bob Sherouse and the Office of the Chief Scientist to provide broader access to critical research reference collections!







These moments of NASA's IT history are revealed on p. 13

2019 Industry Honors for JPL IT Directorate, Tom Soderstrom

By Whitney Haggins, IT Communication Strategist, Jet Propulsion Laboratory, California Institute of Technology

NASA's Jet Propulsion Laboratory's (JPL) IT Directorate and JPL IT Chief Technology and Innovation Officer Tom Soderstrom were recently recognized with industry honors.

Soderstrom received the *Los Angeles Business Journal's* 2019 Chief Technology Officer (CTO) Lifetime Achievement Award April 22 in Los Angeles. The CTO Awards celebrate the inventiveness and technological achievements of women and men in the space technology industry. Soderstrom was recognized for his body of work, including his technology expertise, his ability to forge strong partnerships with academia, industry, and other IT partners; leadership and mentoring, speaking to audiences around the globe, and his never-ending pursuit of experimentation with new and emerging technologies.

On May 1, JPL was named to the 2019 CIO 100 by IDG's *CIO* magazine. The CIO 100, now in its 32nd year, honors 100 organizations that have distinguished themselves through their innovative use of technology in creating business value. The selection is JPL's eighth consecutive appearance on the CIO 100. The honorees will be celebrated at the annual CIO 100 Symposium & Awards in Colorado Springs, August 19-21, and they will be profiled in the August issue of *CIO* magazine.

On June 17, JPL was named one of the Best Places to Work in IT 2019 by IDG's *Computerworld* magazine and ranked number 18 among large companies. This is JPL's seventh consecutive appearance on the prestigious list, a ranking of the top 100 work environments for information technology professionals from *Computerworld* magazine, now in its 26th year. The list is compiled based on a comprehensive employee questionnaire regarding company offerings in categories such as benefits, career development, training, and retention. In addition, *Computerworld* conducts extensive surveys of IT workers, and their responses factor heavily in determining the rankings.

JPL Chief Information Officer Jim Rinaldi said of the recent honors, "Having the OCIO and Tom receive these prestigious awards is a fantastic honor and one I appreciate and don't take for granted. This type of recognition is vital for all of us in IT because it emphasizes the importance of being mindful of caring for our IT workforce and highlights individual team members and the OCIO's innovative support of the JPL mission."

JPL IT Expo: Where IT and the Users Met

JPL hosted its annual IT Expo on the JPL Mall on May 29. The theme of the Expo was Open Universe, a celebration and exploration of the many ways we utilize our data. It was a perfect Southern California day as more than 3,000 people visited the IT Expo, stopping by the "big white tent" on the Mall and the HR tent to learn more about the products, services, and applications available for use from the OCIO and IT partners. With over 70 exhibitors, attendees took part in a range of activities at the Digital Transformation booth, learned about the future of identity services, stopped by to learn how conference room capabilities are changing, viewed products from vendors like Apple, HP, Microsoft, and Dell; and learned about news apps and services at the HR tent. The Expo is also an opportunity for meaningful conversations between IT and user communities, building new relationships, enabling the exchange of ideas, and providing feedback or some on-the-spot training to help improve user experience. Expo was most definitely where IT was happening.

Moments in IT History—*Pictures on Pages 10-11*

A. *The 2007 workstation of Christel Van Arsdale. (Credit: NASA/Dominic Hart)*

B. *The BetaCom 700H computer graphic systems are shown at Ames Research Center in 1978. (Credit: NASA/George Olczak)*

C. *Attendants work on the UNIVAC 1103 computer for the 10- by 10-foot Supersonic Wind Tunnel at Lewis Flight Propulsion Laboratory in 1955 (now NASA John H. Glenn Research Center at Lewis Field). (Credit: NASA)*

D. *Doris Baron handles Bell computer manometer tape for the National Advisory Committee for Aeronautics (NACA), the precursor to NASA, in 1953. (Credit: NASA)*

E. *The NAS Origin 2000 Computer System for Ames Research Center's Data Assimilation Office is shown in 1999. (Credit: NASA/Tom Trower)*

F. *Robotic maneuver practice at a workstation aboard the International Space Station in 2018 with astronauts Ricky Arnold & Drew Feustel. (Credit: NASA)*

G. *Dr. Paul Kutler used this 1978 IBM terminal for his work on computational fluid dynamics. (Credit: NASA/Emerson Shaw)*

H. *A 3D printer renders a rocket at a 2017 pop-up makerspace, supported in part by NASA, in the Steven F. Udvar-Hazy Center in Chantilly, VA. (Credit: NASA/Aubrey Gemignani)*

I. *Harnessing the power of the Cray and SP-2 Supercomputers at NASA's Glenn Research Center in 1996. (Credit: NASA/Quentin Schwinn)*

J. *Developed at Glenn Research Center, the multilevel interconnected silicon carbide integrated circuit chip with co-fired ceramic package and circuit board can withstand high temperatures. (Credit: NASA)*

K. *An iPhone was used to make a nanosensor device for cellphone integration and a chemical-sensing network in 2009. (Credit: NASA/Dominic Hart)*

L. *During a 2017 prelaunch demonstration, Skip Owen of NASA Launch Services shows a mobile application launch simulation of the Tracking and Data Relay Satellite (TDRS)-M satellite on an Atlas V rocket. (Credit: NASA/Kim Shiflett)*

M. *Astronaut Dave Williams uses virtual reality hardware in 2007 to practice for work aboard the International Space Station. (Credit: NASA)*

N. *The 1994 Space Station Data Systems Advance Portable Workstation features NASA's retired "worm" logotype. (Credit: NASA)*

O. *Engineers use laptops and computer workstations in 2019 to conduct Space Launch System rocket testing in preparation for Exploration Mission-1. (Credit: NASA/Cory Huston)*

P. *Control Data Corporation computers at Ames Research Center are shown in 1980. (Credit: NASA/Tom Trower)*

Q. *Advancements in Earth science are aided by the 15K computer processors in the NASA Center for Climate Simulation's Discover Supercomputer. (Credit: NASA/Pat Izzo)*

R. *Flight control consoles and Flight Director Robert Castle on his laptop during a 1993 spacewalk servicing the Hubble Space Telescope. (Credit: NASA)*

The 300 block of E St. SW in Washington, DC, in front of NASA Headquarters, has been designated "Hidden Figures Way." NASA Administrator Jim Bridenstine, US Senator Ted Cruz, DC Council Chairman Phil Mendelson, and "Hidden Figures" author Margot Lee Shetterly dedicated the street on June 12, 2019.

Agency Honor Awardees

By Meredith Isaacs, Communications Specialist, NASA Headquarters

Two teams from the Office of the Chief Information Officer (OCIO) were recently recognized for their outstanding achievements with 2019 Agency Honor Group Achievement Awards. This award is given to groups whose accomplishments meet three of six criteria: substantial contributions to NASA's mission through a wide impact, effective management of cost and schedule, customer satisfaction, capacity for future contributions, development of innovative approaches and a contribution toward lessons learned; and success in responding to unforeseen crises.

The OCIO Diversity and Inclusion Team was honored for their work in expanding opportunities for collaboration and teamwork, including establishing regular events to provide spaces for sharing and diversity awareness among colleagues. The honorees are Dan Conway, Tereda Frazier, Leigh Anne Giraldi, Lara Petze, John Sprague, and Liz Weber.

Also receiving the Group Achievement Award are the 156 members of the NASA Personal Identity Verification (PIV) Team. This complex undertaking across Centers, missions, mission support organizations, and IT services achieved 89 percent compliance of PIV smartcard enforcement, eclipsing an 85 percent target. Driven by the Federal Information Security Modernization Act (FISMA), Cross Agency Priority (CAP) Goals, and the Office of Management and Budget (OMB), this achievement also positively impacts NASA's cybersecurity and risk management.

Congratulations to both the Diversity and Inclusion and PIV Teams for their incredible accomplishments and Agency Honor Awards!

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