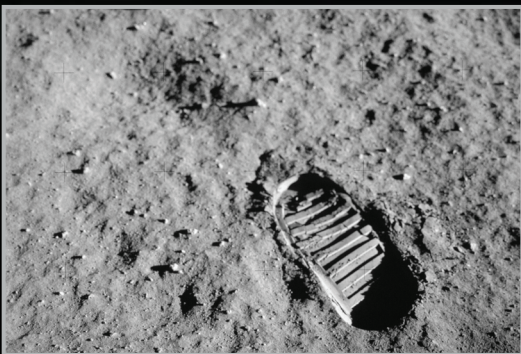
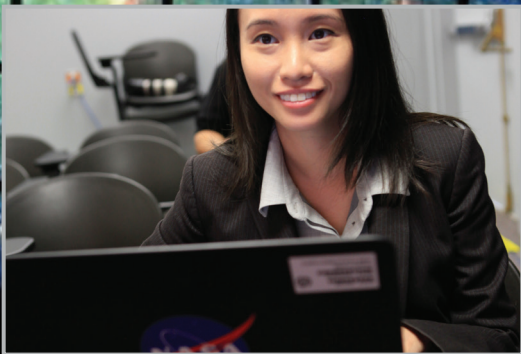
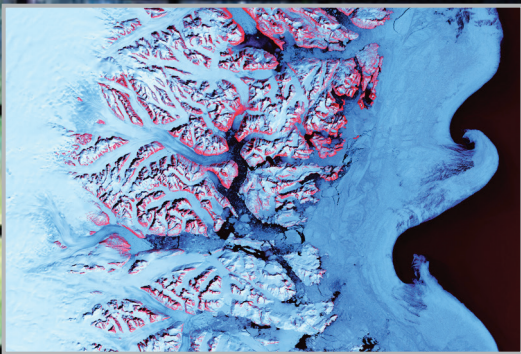
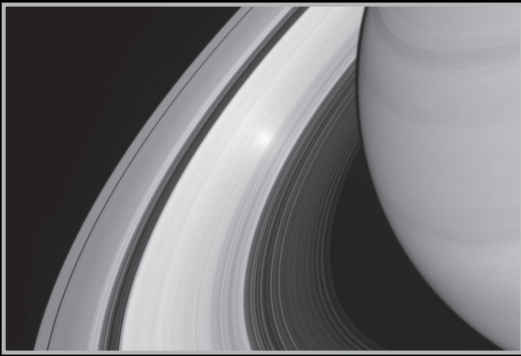
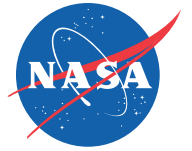


National Aeronautics and
Space Administration



NASA Information Technology

2018 ANNUAL REPORT

Securely
Unleashing
the Power
of Data

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Letter from the Chief Information Officer

I am pleased to share this NASA Information Technology 2018 Annual Report with you. This report highlights our accomplishments and progress towards meeting our overarching goals, as outlined in our [*Fiscal Years \(FY\) 2018-2021 NASA Information Technology Strategic Plan*](#).

The Office of the CIO strives to align the products and services we provide to best support NASA's vision to discover and expand knowledge for the benefit of humanity. NASA depends heavily on information technology. IT enables International Space Station operations and is critical for extending human exploration beyond low Earth orbit. IT helps us transform vast quantities of observational data into new insights on our Earth, solar system, galaxy, and the universe. Closer to home, IT powers research into safer, faster, sustainable, and more efficient air transportation.

In addition to highlighting some of the many key accomplishments in the CIO community last year, I want to draw your attention to the Highlights and Milestones area of this report. This section provides a glimpse into the sheer magnitude of NASA's information technology services and the scope of its impact across the Agency.

One of our big success stories this year is completion of the NASA's IT Business Services Assessment (BSA). This has and will continue to transform the way we provide information services by aligning with missions, strategically collaborating with our customers, identifying and implementing organizational and operational efficiencies, and reducing redundancy. The foundation established through our BSA efforts will drive us toward a better information technology environment for NASA.

Now that the BSA is complete, the OCIO team is focusing on the NASA initiative known as the Mission Support Future Architecture Program (MAP) to integrate IT services across the agency into an enterprise architecture. The goal is to optimize mission support services by moving towards a more interdependent model and freeing up resources to re-invest in facilities, information technology, and other capabilities necessary for achieving NASA's ambitious mission goals.

Finally, in our ever-changing threat landscape, cybersecurity remains a key focus throughout all of the work contained in this report. NASA has incorporated modern, innovative, and collaborative technologies with imbedded cybersecurity protections to help us accomplish our important work while minimizing impact on our workforce and balancing costs.

Our vision, policies, services, cybersecurity, and people must support the successful execution of NASA's multifaceted missions. We are working diligently to provide our customers with secure and reliable information technology. I hope you enjoy reading this report and learning more about how we support you and NASA's mission. We look forward to working with you in the year ahead.



A handwritten signature in dark ink, appearing to read 'Lynn P. ...'. The signature is fluid and cursive.

Benefits to NASA

NASA's Information Technology (IT) provides services to safely and securely support NASA's missions. NASA IT enables the use of data to drive advances in science, technology, aeronautics, and space exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth. It supports technology ranging from the computers aboard the International Space Station (ISS) to the mobile devices used by NASA employees, secures a vast array of data, and provides complex IT infrastructure across the agency. NASA IT ensures access to scientific data and promotes public participation in NASA's activities.

The Office of the Chief Information Officer (OCIO) provides leadership, planning, policy direction, and oversight for the management of NASA IT while ensuring that the investments align to the NASA Strategic Plan. NASA OCIO manages IT as a strategic resource to securely unleash the power of data throughout the agency. The NASA IT Strategic Plan outlines the Agency's IT strategy to achieve the outcomes listed below.

The strategic use of IT contributes to NASA's missions in several ways:

Shares NASA's data and results
through open, appropriate access

Increases mission quality & effectiveness
through data and technology

Accelerates mission results
through increased productivity

Increases mission safety and integrity
through adaptive and resilient cybersecurity

Increases mission cost-effectiveness
by driving efficiency and reinvesting the difference

Drives new discoveries and mission concepts
as a strategic partner on new capabilities like data science



IT Overview

The NASA Chief Information Officer (CIO) has responsibility for ensuring that NASA's information assets are acquired and managed consistent with Federal policies, procedures, and legislation. The agency uses its IT Strategic Plan to guide the direction, mission alignment, investments, and accountability of NASA's IT community.

IT Vision, IT Mission, & IT Values

- **IT Vision** - Manage IT as a strategic resource to securely unleash the power of data.
- **IT Mission** - Enable the secure use of data to accomplish NASA's Mission.
- **IT Values** - Being a Trusted Partner is earned through Customer Driven (Responsive, Making IT Easy), Continuous Learning (Insight Driven), and Accountable (Transparent) behaviors.

Who We Are

Information technology delivers applications, communications, computing, cybersecurity, data, end user, information management, and web services to customers across NASA. These services include:

Communication Services

- Wide and Local Area Networks (WANs/LANs)
- Security infrastructure at the network border
- Unified Communication (UC) and collaboration tools
- Voice, video, and data routing services
- Audio and video conferencing
- Firewalls, web content filters, and virtual private networks (VPN)
- Mission and corporate voice solutions
- Cable TV and video distribution
- Domain Name Services (DNS) and IP address management

Computing Services

- Data center architecture and investment
- Commercial cloud computing services

End User Services

- Compute, mobile, and print device management
- End-User software management
- Messaging/collaboration
- Infrastructure services
- IT security
- Enterprise Service Desk (ESD) 24x7 Help Desk

Information Management

- Information analytics and digital asset management
- Information architecture
- Systems mapping
- Metadata standards
- Scientific and technical information
- Research access and library portfolio management
- Information standards, policies, and governance processes
- Records, forms, Privacy Act, Paperwork Reduction Act, and 508 compliance

Applications

- Human Capital Information Environment (Satern Training, HR Portal)
- Integrated Collaborative Environment (ICE)
- Agency core financial system (i.e., SAP)
- Procurement for Public Sector (PPS)
- WebTADS (time keeping)
- Supply management and Real Property

Technology & Innovation

- Data science (Analytics Lab, interoperability)
- Digital environment, data visualization
- Open innovation (open.nasa.gov, data.nasa.gov)
- Technology infusion (virtual desktops, Software as a Service, prototypes)

Cybersecurity & Privacy

- Security Operations Center (SOC)
- Office of Cybersecurity Services (OCSS)
- Cybersecurity risk management, architecture, and engineering
- Governance, oversight, and compliance (FISMA)
- Privacy and data classification (CUI)
- Identity, Credential, and Access Management (PIV Smartcard, Launchpad)

Web Services

- NASA portal and Drupal
- Blogs, Wikis, WordPress
- Web content delivery and management
- Website development and hosting
- Bandwidth management
- Search capabilities
- Collaboration tools/services and collaborative architecture
- Web governance
- Managed cloud services



Users

>17.5K Civil Servants

>91.7K Contractors



Email

>68K Accounts



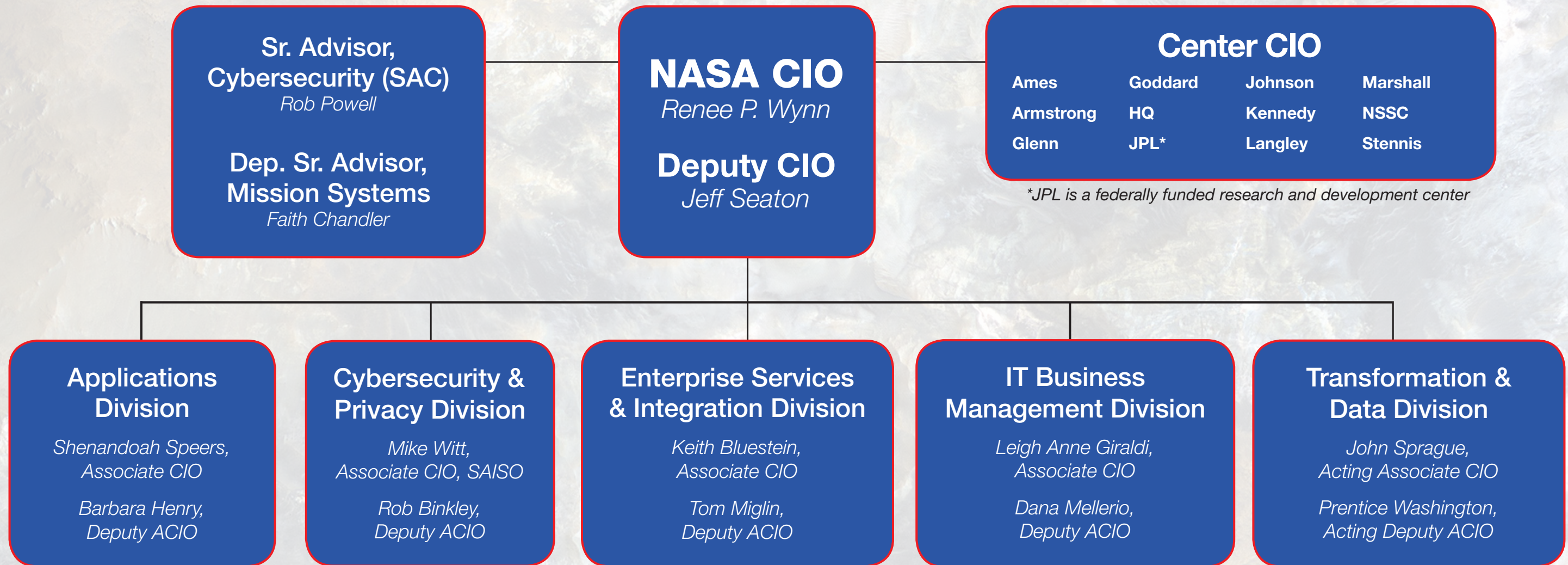
Data

>42.9K Data Sets

356 Code Repositories


50 Application Programming Interfaces (APIs)

OCIO Organization



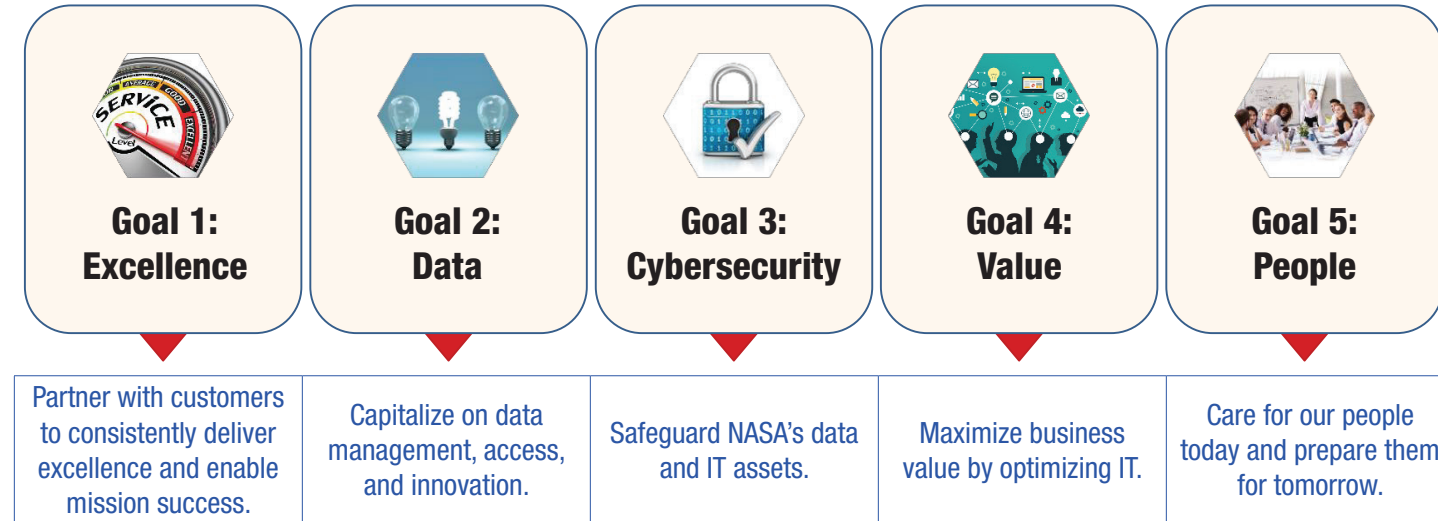
https://www.nasa.gov/sites/default/files/atoms/files/organizationchart_nov2015.pdf

2018 Highlights and Milestones

- 
- Achieved an overall score of 'Managing Risk' on the Federal Information Security Management Act (FISMA) Risk Management Assessment for the first time, demonstrating improvements in cybersecurity.
 - Introduced NASA's Strategy to Improve Network Security (NSINS) to better secure networks, systems, and data.
 - Launched preparations for the Mission Support Future Architect Program (MAP) to optimize mission support services with an enterprise architecture, freeing resources for reinvestment.
 - Plans are underway to allocate ~\$2 billion to NASA's IT in Fiscal Year 2020 across the agency, centers, and missions for delivery of IT services to customers.
 - Completed the Mission Backbone Transition Project (MBT), improving mission communications capabilities.
 - Completed OCIO reorganization to improve integration and function, align focus, and build for future evolution.
 - Established the Applications Division for the management and delivery of enterprise application projects and services.
 - Completed IT Business Services Assessment (BSA) implementation activities, enhancing collaboration, IT services, efficiency, and cybersecurity.
 - Surpassed the FISMA target score for Personal Identity Verification (PIV) compliance, with 87% of unprivileged users required to PIV-authenticate, expanding the more secure two-factor authentication to systems and applications.
 - Leading NASA's Digital Transformation (DT) with the Office of the Chief Technologist (OCT) to manage the influx of diverse technologies including cloud, robotics, Internet of Things (IoT), and big data.
 - Completed Continuous Diagnostics and Mitigation (CDM) Phase II deployment of Identity, Credential, and Access Management (ICAM) enhancements to further improve the agency's cybersecurity posture.
 - Commenced migration to Microsoft Office 365 Skype, Online Email, OneDrive, and OneNote services, delivering modern and innovative cloud-based collaboration tools to the Agency.
 - Chartered the Agency Software Management program and developed a plan to effectively manage NASA's software licenses, bringing cybersecurity, support, and cost benefits.
 - Deployed Enterprise External Border Protection (EBPro) and Enterprise Internal Border – Network Access Control (EIB-NAC), which provide network security enhancements.

NASA's IT Strategic Goals

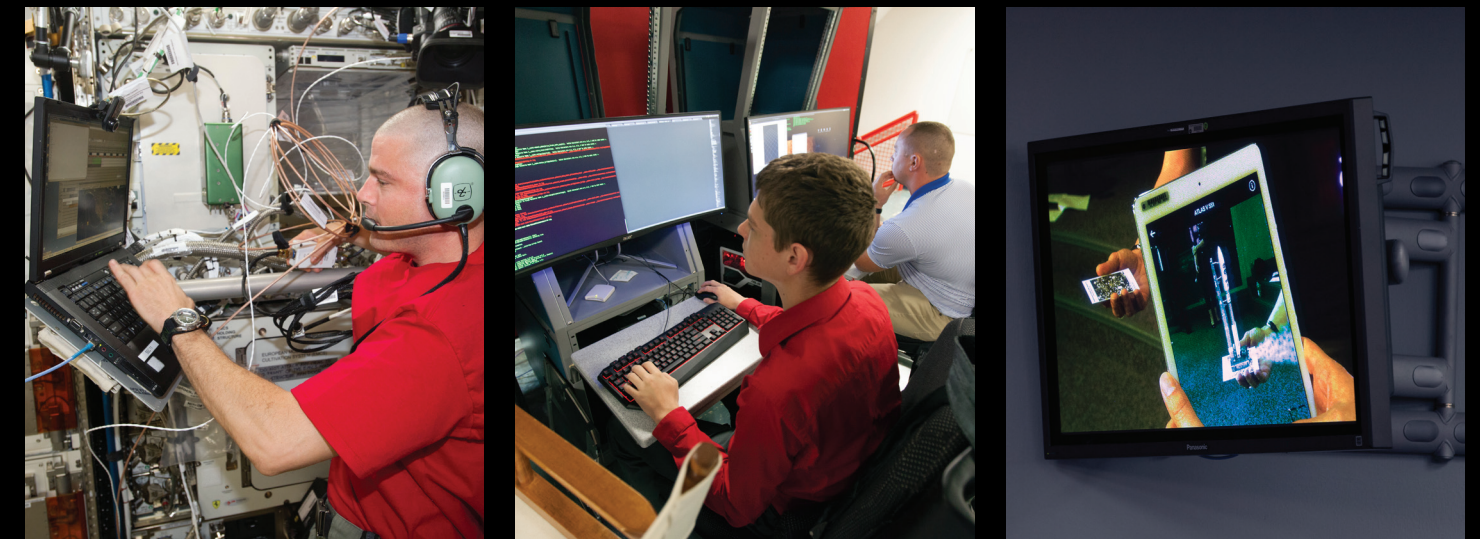
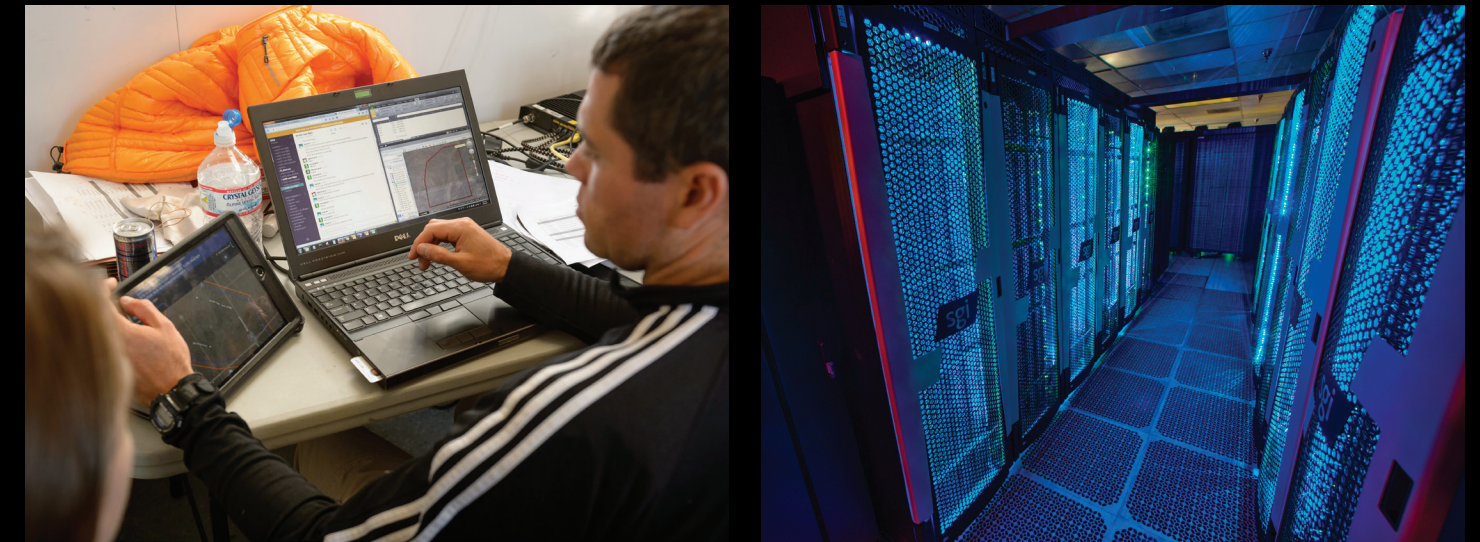
Fiscal Years 2018-2021



In April 2018, NASA published its FY 2018-21 IT Strategic Plan with the vision of managing IT as a strategic resource to securely unleash the power of data. This NASA IT Strategic Plan marks the first time that leaders and representatives from all Mission Directorates, centers, and Administrator Staff Offices were engaged throughout the planning process, culminating in approval of the plan by the agency's IT Council. The plan's five strategic goals focus on partnering with customers to deliver excellence, capitalizing on data and innovation, safeguarding our National data and assets, maximizing business value through optimization, and caring for our people and preparing them to achieve NASA's Mission and Vision.

NASA's IT Strategic Plan, in full: <https://www.nasa.gov/oci/itsp>

Information Technology at NASA



Excellence

The Applications Division (AD) is responsible for management of the planning, design, integration, and delivery of NASA's enterprise applications projects and services. This division has IT authority including investment review and architecture compliance for applications across the agency.

The Enterprise Services and Integration Division (ESID) manages the portfolios for all Enterprise IT services within the OCIO. ESID is responsible for the Communications, Computing Services, Information Management, and End User Services Programs.

In 2018, NASA reached for IT excellence. These are two of our stories:

Applications Fill the Gaps

SAP Procurement for Public Sector, a new contract writing solution, was implemented to achieve the objectives of NASA's Destination Paperless Initiative: e-Signature, a single enterprise data container, and archive/destruction capabilities. This implementation also supports the transition to electronic invoicing for federal procurements, resulting in increased efficiency and transparency and allows for more accurate reporting. As part of NASA's continued effort to improve computing services, we are transitioning from the current virtual machine architecture to a container platform architecture, with over 90 applications transitioned. Container platform architecture will provide faster development velocity, lower operating costs, improve cybersecurity compliance, and offer better computing with hybrid cloud services. We have also launched Box Software as a Service to provide an efficient method to share files across the agency.

Office 365

NASA has begun to rollout Office 365 (O365) to all employees, providing the agency with modern, innovative, and collaborative technology and providing our customers with increased mailbox sizes, online storage capabilities with OneDrive, and larger attendance per Skype meeting. Migrating our legacy, on premise email and collaboration services to the cloud is a key step in transforming and improving the customer experience, modernizing our IT systems, and adopting industry best-practices. The long-term cost savings for the agency will allow us to reinvest in other areas that keep us innovative and support agency missions. By the end of 2018, over 22,000 NASA users were migrated to Office 365.

Users

>22K Migrated to O365

Email

>68K Accounts

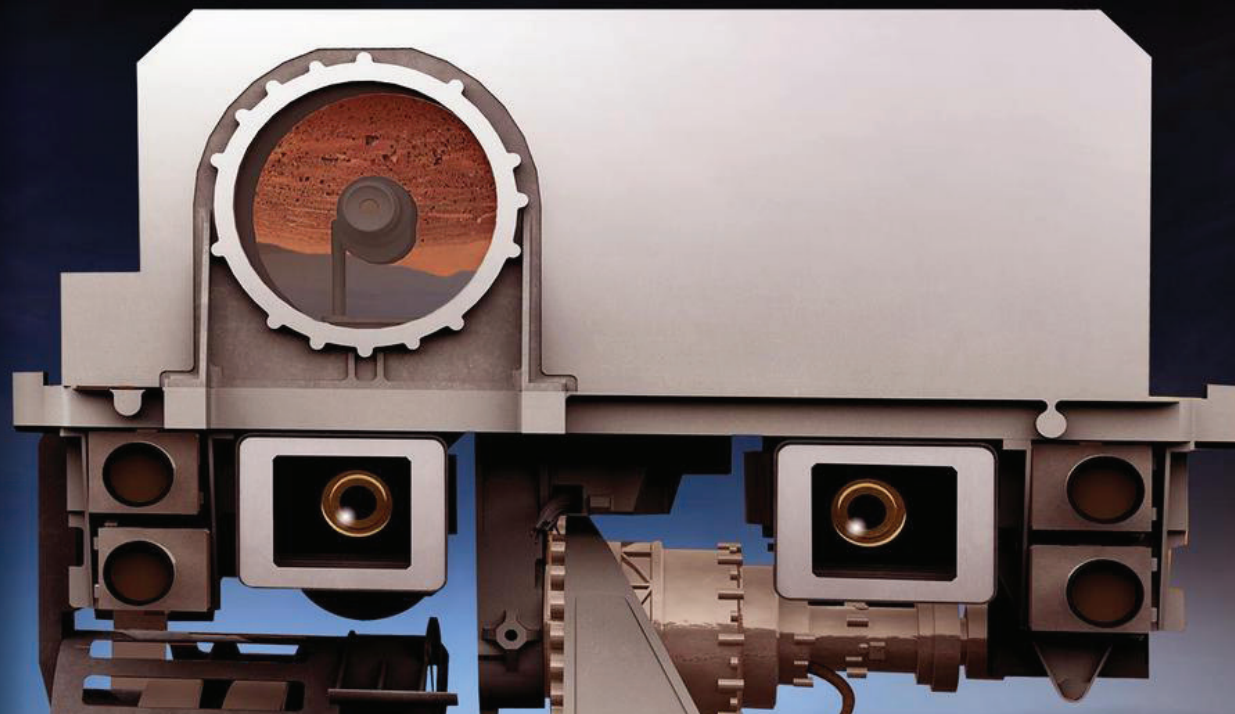
Sites

>3K Websites

Equip

>48K Enterprise Desktops/
Laptops

Data



The Transformation and Data Division (TDD) engages the brightest minds across the agency to guide NASA's data strategy, technology infusion, strategic investment decisions, and identifies emerging IT technologies to best support NASA's technology needs in a rapidly changing world. The Division serves as the advanced planning function of the OCIO and tackles policy and mission support functions, including rapid agile prototyping, technology pilots, enterprise architecture, open software and hardware, data management solutions, and future IT skillset development.

In 2018, NASA's data reached for new heights. These are two of our stories:

Digital Transformation

NASA's vision of Digital Transformation (DT) sees the agency fully leveraging the evolving digital technologies on a transformational journey to advance agency missions, enhance efficiency, and encourage a culture of innovation. DT is driven by accelerated technical and engineering innovation; increased efficiency and effectiveness

of business processes; efficient, reliable, and safe mission systems and missions; real-time, data-driven decision making; agile workforce, facilities, and IT infrastructure; integrated collaboration and partnerships; advancement of exploration, discovery, and science; and extended aerospace leadership. Digital Transformation will bring the rapid advancement and convergence of a broad range of powerful digital technologies, including automation and robotics; artificial intelligence and machine learning; and big data, mining, and analytics.

Data in Our Missions

HQ's Information Technology Communications Division (ITCD) established a localized lab/incubator for TDD to test Internet of Things (IoT) devices and technologies. This IoT wireless lab provides a dedicated wireless environment and secure isolated virtual laboratory where various IoT devices can be tested and piloted.

NASA has seen exponential growth of imagery data captured and downlinked daily from the International Space Station (ISS). With plans to

increase the amount and downlink capability of imagery feeds from ISS, the ability to store, catalog, and retrieve this and other repositories was a critical part of mission success. Johnson Space Center's (JSC) Information Resources Directorate (IRD) partnered with Hitachi to provide JSC customers real-time access to data and our ISS partner with the capability to process millions of files a day on an easily expandable system at minimal cost.

Stennis Space Center (SSC) combined the leading indicator information from the NASA Mishap Information System, Close Call Reporting System, Audit Tracking and Information System, Decision Data Management System, Integrated Risk Management Application, Maximo, and the Safety, Health, and Environmental Tracking System. The Safety and Mission Assurance Directorate (SMA) can use that collection of data to develop and test an algorithm to predict when and where there is a high probability of a safety incident occurring.

Data

>42.9K Data Sets

Code

356 Code Repositories

APIs

50 Application Programming Interfaces (APIs)

Labs

95 TDD Labs Projects Funded Since 2011

Cybersecurity

The Cybersecurity & Privacy Division (CSPD) manages the agencywide information and cybersecurity program to correct known vulnerabilities, reduce barriers to cross-center collaboration, and provide cost-effective cybersecurity services in support of NASA's information systems and e-Gov initiatives. The CSPD ensures that cybersecurity across NASA meets confidentiality, integrity, and availability objectives for data and information systems, to include disaster recovery and continuity of operations for systems, in order to support the business continuity requirements of critical agency programs and processes. The CSPD develops

and maintains a cybersecurity program that ensures consistent security policy, identifies and implements risk-based security controls, and tracks security metrics to gauge compliance and effectiveness.

In 2018, NASA continued to strengthen agency cybersecurity. These are two of our stories:

NASA's Strategy to Improve Network Security

In July 2018, OCIO began a major initiative to improve NASA's IT capabilities while better securing the networks, systems, and data we

depend upon to achieve our missions. Threats against, and attacks upon NASA systems continue to increase significantly, and changes must be implemented to the current IT landscape in order to secure the agency's most important assets—our people and our data. Some of the changes impact the way employees currently access NASA data, systems, and resources. The first step began with blocking access to gaming sites from NASA-owned networks and removing gaming software and other unapproved software from NASA systems. NASA also incorporated modern, innovative, and collaborative technologies with imbedded cybersecurity protections to help us accomplish our important work while balancing cost.

Cybersecurity Posture

During 2018, the CSPD has continued to enhance the cybersecurity posture at NASA. For the first time, NASA achieved an overall score of "Managing Risk" for our Federal Information Security Management Act (FISMA) Risk Management Assessment. Personal Identity Verification (PIV) compliance has also surpassed the FISMA target score of 85%, indicating that 87% of unprivileged users are required to PIV-authenticate. We have completed the Continuous Diagnostics and Mitigation (CDM) Phase II deployment of Identity, Credential, and Access Management (ICAM) enhancements and Phase I of CDM for the corporate network (mission environment deployment is expected to be completed in FY 2019), allowing visibility into the NASA IT infrastructure. At full execution, CDM will ensure cybersecurity risks are identified and prioritized on an ongoing basis and remediated appropriately. Additionally, the Office of CyberSecurity Services (OCSS) was established and is currently transitioning local cybersecurity services into a consolidated service delivery model for improved effectiveness and efficiency.

FISMA

Managing Risk

Cyber

76% Drop in Incidents from Last Year

Use

95% Greatest Reduction in Improper Use Incidents

Value

The IT Business Management Division (BMD) is NASA's central business management and policy division within the OCIO. BMD administers NASA's information technology strategic planning process, evaluates agency IT, and monitors compliance with IT policies, principles, standards, and guidelines. Business management activities include Capital Planning and Investment Control, which coordinates the selection, control, and evaluation reviews of IT programs, initiatives, and operational activities.

In 2018, NASA enhanced the value of IT. These are two of our stories:

IT Portfolio Insights

Due to improved reporting accuracy that reflects NASA's true IT footprint, NASA plans to allocate ~\$2 billion to IT in Fiscal Year 2020 across the agency, centers, and missions for delivery of IT services to customers. OCIO worked closely with NASA's centers and missions to align the IT investment structure with the agency's budget structure: Mission, Theme, Program, and Project. This improved methodology and data collection process has significantly increased the utility and quality of the IT portfolio data, improving NASA's ability to determine planned IT expenditures across NASA projects. NASA reported three new Major IT Investments and

updated seven existing Major IT Investments to the Office of Management and Budget (OMB), reflecting some of the agency's most critical projects with IT.

Software and Vendor Management

OCIO appointed a new Agency Software Manager within the Applications Program (AP) and the AP formulated a multi-year plan to effectively manage software licenses across the agency and optimize software licensing and configurations. In alignment with the software management initiative, OCIO approved a phased vendor management implementation approach. NASA FAR Supplement Parts 1807, 1808, and 1811 have been updated, mandating strategic sourcing and specifically mandating the use of the agency's enterprise contracts to help reduce redundant contracts and minimize security risk. NASA created a strategic sourcing website and searchable repository of contracts and program initiatives that are available for use throughout the agency to reduce redundant contracts. NASA also established the Acquisition Portfolio Assessment Teams to drive an agencywide procurement process to optimize interdependencies, reduce redundancies, and strategically acquire goods and services to meet the agency's needs.

IT Fund

~\$2B Allocated to IT
In FY '20

Budget

~10% of NASA's Total Budget

FITARA

B+ Dec. '18 FITARA
Scorecard

Server

59 Reduction in Data Centers
Since 2010

People

NASA's IT Business Services Assessment (BSA) was completed and transformed the way the agency does business by optimizing mission support services. NASA expanded investment and compliance insight; adopted a cybersecurity risk framework for heightened network and data protection; supported communications, cybersecurity, and end user enterprise service migration; closed 59 data centers since 2010 and adopted a Cloud First strategy; and established six IT service programs to manage and deliver enterprise services for our customers.

The Mission Support Future Architect Program (MAP) builds upon the work of the BSA to transition to enterprise management of all Mission Support services. Through collaboration and realignment, MAP aims to lower operating costs, deliver service standardization, result in less duplication, be more flexible, and provide consistency for employees under Mission Support. These changes will allow Mission Support to enable NASA's Mission.

In 2018, the people of NASA's IT partnered with missions to reach for the stars. These are our stories:

Ames Research Center

Silicon Valley, CA

Ames CIO's IT Management Division increased customer outreach activities and messaging regarding changes and rollouts of enterprise services, including Unauthorized Devices (UD), O365, and new Cisco VPN services. This raises customer awareness and education and allows Ames' CIO to get valuable and timely feedback on impacts to projects and programs. The Ames Chief Information Security Officer's (CISO) team continues to work with the user community on cybersecurity awareness and training. They actively participate in several center program reviews, including the Aviation Flight Safety Board and the Software Release Review Board, to provide guidance on cybersecurity best practices and ensure the proper implementation of security controls.

Armstrong Flight Research Center

Edwards, CA

In May 2018, the Department of Defense (DoD) ordered all commercial-off-the-shelf (COTS) small Unmanned Aerial Systems (sUAS) on all DoD ranges be suspended due to cybersecurity vulnerabilities. The Armstrong OCIO, in partnership with the NASA Headquarters OCIO, launched a collaborative effort with the Flight Operations and Programs Directorates to restore COTS sUAS flight operations for Armstrong. By utilizing an existing local cybersecurity mitigation process, the NASA team developed a risk management strategy resulting in two approved exemptions and the resumption of COTS sUAS flight operations in the Edwards Range.

Glenn Research Center

Cleveland, OH

Working with the Communications Service Office and Kennedy Space Center, Glenn completed the design, coordination, installation, configuration, and testing of network equipment and cable plant infrastructure at the Space Environments Complex at Plum Brook Station in preparation for ORION vehicle testing scheduled for FY19. GRC also partnered with the Office of Communications to launch an improved digital web presence, enabling improved access to NASA and center services, competencies, and facilities.

Goddard Space Flight Center

Greenbelt, MD

GSFC developed the Secure Lab Enclave (SLE) to provide a network environment to share NASA's scientific research and spaceflight missions with other NASA labs. The SLE protects lab computers and instrumentation from hostile network and Internet activity through the use of Goddard-managed and multi-layered security controls while allowing completion of mission lab tasks.

Jet Propulsion Laboratory

Pasadena, CA

The JPL OCIO played a huge role in the support of the InSight mission critical events this year. The InSight mission is now performing science operations on the Martian surface. The team supported launch operations at JPL, at the Vandenberg Air Force Base (VAFB) site, and at Lockheed Martin Space Systems Company (LMSSC). This included establishing heightened 24/7 support of critical infrastructure elements and enterprise support. After launch, the JPL OCIO provided dedicated high performance compute (HPC) to mission planners for trajectory course corrections and entry, descent, and landing (EDL) modeling.

Johnson Space Center

Houston, TX

JSC's Information Resource Directorate (IRD) received the Hitachi Transformation Award for its partnership on a solution for storing data downloaded daily from the International Space Station. The storage system can process millions of files a day at minimal cost, and has disaster recovery and provides state-of-the-art capabilities, such as automated meta-data tagging and advanced analytics.

Kennedy Space Center

Cape Canaveral, FL

KSC IT utilized small Unmanned Aerial Systems (sUAS) to support agency missions. The sUAS have performed imaging and inspection of center facilities and captured aerial video footage of key NASA missions. KSC IT upgraded and replaced legacy IT systems in preparation for the Exploration Mission 1 (EM-1). The improvements also included Wi-Fi coverage to custom developed hardware and software used to control high-speed film (400 frames per second) cameras.

Langley Research Center

Hampton, VA

The Langley Center Automation Transformation Team launched ten applications on the center's integrated cloud-based process automation platform using ServiceNow, with another two planned by December 2018. Two of the applications launched replaced unapproved, unsecure cloud solutions, and two others replaced existing inefficient or end-of-life applications. The LaRC IT Security team collaborated with mission partners to incorporate appropriate IT planning and securely enable the successful execution of projects, including a centerwide system security plan to enable the secure development, testing, and research related to unmanned aircraft systems.

Marshall Space Flight Center

Huntsville, AL

The IT Security team is supporting MSFC's Imaging X-Ray Polarimeter Explorer (IXPE) satellite mission by providing expertise in helping to protect science assets and mission data through analysis of IT systems and architecture, assessment and application of appropriate cybersecurity controls, and mitigation of IT risks. This partnership allows the IXPE project team to focus on the design of the spacecraft, knowing that IT risk and mitigation expertise is in place.

NASA Headquarters

Washington, DC

The Information Technology and Communications Division (ITCD) supported the Office of Procurement (OP) MAP activities. These include modernizing internal and external websites; updating application and system core capabilities; and making recommendations for application consolidation, retirement, and how to use Enterprise technology, capabilities, systems, and applications. Headquarters supported several centers as they migrated to the Managed Cloud Environment (MCE) by providing cloud support, resources and guidance to Langley's machine learning project, Goddard's emerging cloud storage capabilities, and Johnson center cloud services.

NASA Shared Services Center

Stennis Space Center, MS

NASA was the first agency in the Federal government to implement Robotic Process Automation (RPA). NSSC's Information Resource Division, in collaboration with the Strategic Integration and Communications Division and the Enterprise Services Division, established the foundation for NASA's RPA implementation which created new opportunities for process automation. The automated data-processing capability of RPA frees up existing employees' time for more complex, higher-value tasks. The introduction of "bots" supplements and complements the work of the existing NSSC workforce. In addition, these digital employees have the potential to enhance productivity of the NASA workforce.

Stennis Space Center

Stennis Space Center, MS

Stennis is in the process of establishing a state-of-the-art innovation space to house a new Collaboration Space and Technology Infusion Laboratory (TIL). The TIL will provide a safe, secure environment where new technologies can be brought in, tested and evaluated against the business needs or process pain points of Stennis organizations. It will also foster creative exploration and change, encourage teamwork, and inspire transformation and efficiencies. In anticipation of Space Launch System (SLS) testing, the Stennis Data Center upgraded its Tier-1 disk subsystem for over 50% increase in disk capacity while curtailing latency, lowering energy consumption, and using a smaller footprint.

Russia Services

Baikonur, Kazakhstan

Supporting NASA's Russian operations far from most centers has its own special challenges. Through 41 mission events, with an average of 42.25 days on the ground per person, the Russia Services group maintains and upgrades network systems, equipment, and cybersecurity. These projects include hosting the agency and Johnson CIOs' Russia Operations Tour, installing mobile device management (MDM) on TTI Driver/RSVG iPhones, wireless network security upgrades, enforcing UD policy, network and equipment upgrades, circuit installation and upgrades, and the RSC-E-to-NASA network redesign.

On the Horizon

Goal	2019 Planned Milestones*	Benefits
Excellence	Implement cloud-based e-mail and collaboration capabilities across NASA	Modernize productivity capabilities, optimize resources, secure data management and accessibility, and improve workforce mobility
	Enhance and improve customer satisfaction	Ensure customers are satisfied with NASA's IT services and how we work together
Data	Share data and secure collaboration with external partners	Optimize agency-managed collaboration capability and strengthen cybersecurity
	Expand availability of research and development data and make reproduction of publications easier	Increase accessibility to and sharing of NASA's data to drive discovery and create value
Cybersecurity	Execute NASA's 'Strategy to Improve Network Security'	Improve resilience and cybersecurity posture by strengthening ability to protect NASA's people, systems, and data
	Implement continuous monitoring across all applicable mission and corporate hardware assets	Improve visibility into NASA's cybersecurity risk to enable targeted resiliency enhancements
Value	Transition NASA to a more efficient and effective operating model for end user IT	Optimize resources and improve customer satisfaction
	Transition agency mission and science computing capabilities into the cloud	Enable customers to obtain and use enhanced computing capabilities
People	Define the agency IT operating model that aligns to NASA's enterprise mission support model	Enable more efficient and cost effective services with flexible and agile operations supported by strong professional capabilities
	Strengthen NASA's IT workforce strategy	Align and strengthen employee competencies and increase employee satisfaction, retention, and productivity

* Milestones depend on planned funding levels for fiscal year 2019. Reduced funding could postpone achievement of part or all of an impacted milestone.

Conclusion

As we look ahead to the future, NASA continues to strengthen its management and oversight of IT investments across the agency. With the maturation of IT management processes, NASA is enhancing the way that it invests in IT in centers and Missions.

NASA has prioritized cybersecurity enhancements required to protect agency data against the continuously evolving threat landscape. The agency will continue deploying cybersecurity tools on its mission networks to gain a holistic view of what devices are on its networks. By including mission networks, NASA will gain new levels of visibility into cybersecurity risks and vulnerabilities.

And the agency is developing, strengthening, and focusing on enhancements to enterprise collaboration, governance for applications, and websites across the agency.

NASA depends heavily on information technology. IT also helps us to explore our solar system and the universe. And it enables the agency to operate the International Space Station and prepare for human exploration beyond low-Earth orbit. IT helps drive discovery and share NASA's results, so the information systems our customers depend on must work effectively. It's critical that our IT vision, policies, services, cybersecurity, and people support the successful execution of these multi-faceted missions.

Photographs

Cover: from top to bottom

NASA's Cassini spacecraft captured this visible light view of Saturn and its rings from 940,000 miles away. Credit: NASA/JPL-Caltech/Space Science Institute

Rachel Power (left), Bethanne Hull, and Krista Shaffer in Kennedy Space Center's Vehicle Assembly Building (VAB) on Introduce a Girl to Engineering Day. Credit: NASA/Glenn Benson

Summer fjords give way to icebergs and sea ice, which are then shaped by the East Greenland Current off the southeast Greenland coast. Credit: USGS/NASA/Landsat 7

Felicia Chou moderates online questions during a Transiting Exoplanet Survey Satellite (TESS) science briefing at Kennedy. Credit: NASA/John Smegelsky

An astronaut's footprint from the first moonwalk, during the Apollo 11 mission. Credit: NASA

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2017's solar eclipse, with the Sun's corona visible, taken from Belton, South Carolina just after totality. Credit: NASA/Michael Porterfield

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Astronaut Kate Rubins works on the International Space Station's Nitrogen and Oxygen Recharge System (NORS). Credit: NASA

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The NASA Center for Climate Simulation (NCCS) 'Discover' supercomputer. Credit: NASA/Bill Hrybyk

Goddard Space Flight Center's Networks Integration Center coordinates communications for the Orion vehicle and Delta IV rocket during a test flight. Credit: NASA/Amber Jacobson

A mobile application simulates the launch of the Tracking and Data Relay Satellite (TDRS-M) on an Atlas V rocket. Credit: NASA/Kim Shiflett

NASA interns Thomas Muller (left) and Austin Langdon in Kennedy's Swamp Works Laboratory. Credit: NASA/Bill White

Astronaut Reid Wiseman works on a computer in the Columbus Lab on the International Space Station. Credit: NASA

NASA Headquarters employees use a smartboard during the Information Technology & Communications Division (ITCD) IT Expo - 'A Day with ITCD.' Credit: NASA/Garrett Shea

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Astronauts aboard the Apollo 8 spacecraft took this close-up picture of the lunar surface as they flew by on Christmas Eve, 1968. Credit: NASA

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This is an artist's concept of the Mars 2020 rover, scheduled to launch by August 2020 and land on Mars in February 2021. Credit: NASA/JPL-Caltech

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NASA's Security Operations Center at Ames Research Center monitors the Agency's cybersecurity posture in real-time and remediates all cyber incidents and threats. Credit: NASA

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This Goldstone Beam Waveguide is part of the Goldstone Deep Space Communications complex, supporting the Deep Space Network, in California's Mojave Desert. Credit: NASA/JPL-Caltech

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Looking out over the horizon, from the ISS during Expedition 7. Credit: NASA

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Astronaut Mike Hopkins fixes a water pump on the International Space Station. Rick Mastracchio is reflected in his visor. Credit: NASA

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Viewing the Milky Way, as taken by the NASA Spitzer Space Telescope and displayed on Ames' 23-foot wide LCD science visualization screen. Credit: NASA/Ames/JPL-Caltech

