

National Aeronautics and Space Administration



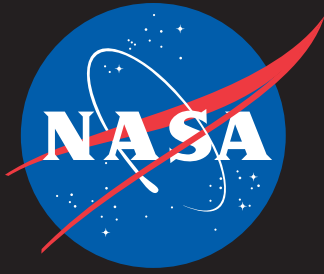
IT Talk

Apr - Jun 2021

Volume 11 • Issue 2

DATA

Unleashing the
Power of NASA's
Transformation



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Office of the CIO

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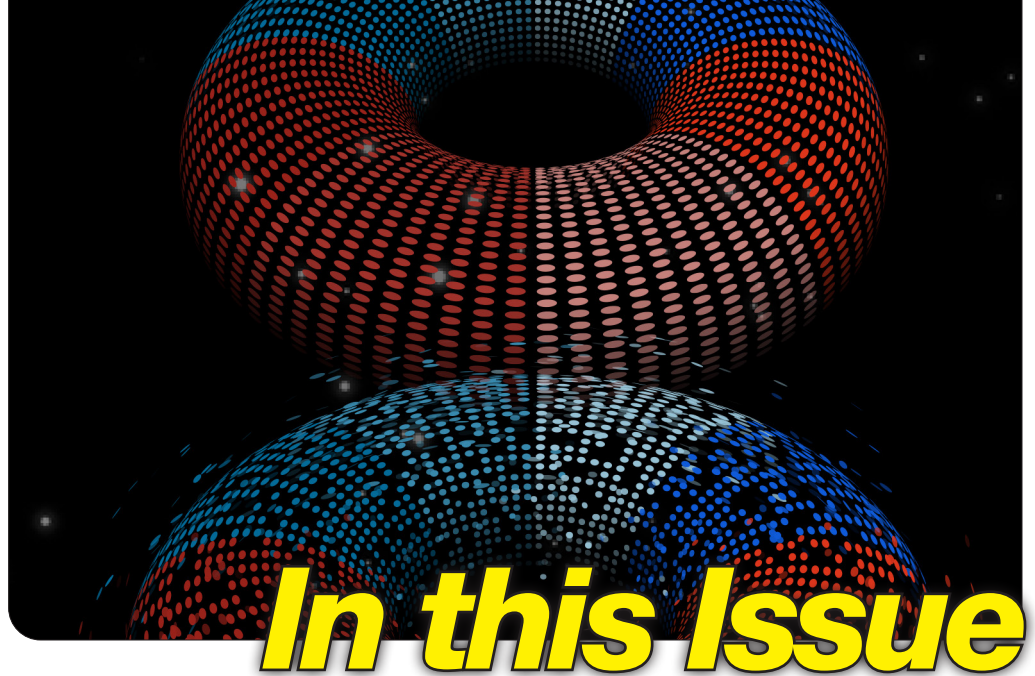
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Message from the NASA CIO

Imagine a future where NASA employees could have access to intuitive tools to locate, mine, harness, and translate NASA's data into timely actions and results. In this issue, we'll take a closer look at an Enterprise Data Platform (EDP), which is a suite of data management and analytics services to solve many common data management and analytics problems using an enterprise approach. This "one-stop shop" consists of industry-leading products for data virtualization and management, data modeling and analytics, and data visualization. It's a game changer for data sharing at NASA.

And we'll go behind the scenes at NASA's Jet Propulsion Laboratory (JPL) for an up-close and personal look at how information technology (IT) played a major role in the Mars 2020 Perseverance Rover Mission. On the rover's landing day, JPL IT helped the Mars team bring the thrills of Mission Control to homes across America with a newly developed camera system.

And finally, it has been one year since so many of us been home teleworking. The past year has certainly transformed nearly every aspect of our world. We'll look at how most of us have adjusted in our new at-home/work environment, which now consists of makeshift home offices, kitchen tables, spare bedrooms, the basement, or maybe even the garage.

Throughout it all, we have been able to provide our customers with secure, effective, and reliable IT capabilities. Those who are working from home have found tools and strategies to boost collaboration and work satisfaction. Each day, I'm grateful to the Office of the Chief Information Officer (OCIO) team for its commitment to working together and keeping the Agency moving forward during these unique and challenging times.

With gratitude,

Jeff Seaton

NASA Chief Information Officer



JPL Names Mattmann New CTIO

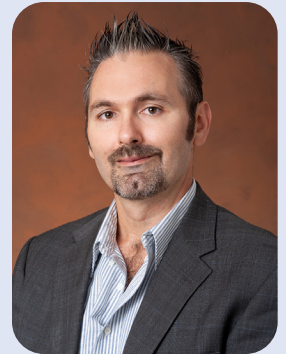
By Whitney Haggins, IT Communications Strategist, Jet Propulsion Laboratory, California Institute of Technology

Chris Mattmann was announced as the new Chief Technology and Innovation Officer (CTIO) of the Jet Propulsion Laboratory's (JPL) Information and Technology Solutions Directorate (ITSD), succeeding Tom Soderstrom. In this role, Mattmann will focus on defining, describing, and bringing in the innovations and bleeding-edge technologies that will matter for JPL's future. He will also serve as an emissary to the tech industry's IT pioneers with future technology vendors. Mattmann will remain as Division Manager for the Artificial Intelligence, Analytics and Innovative Development Division and continue to manage advanced IT research, open-source and technology evaluation, and user infusion capabilities.

Mattmann has been with JPL for over 20 years. He is the Laboratory's first Principal Scientist in Data Science and an internationally recognized expert in data science; cybersecurity; artificial intelligence (AI); informatics to multiple domains, including space science, Earth science, and planetary science; and other industries. He conceived and delivered the architecture for the next generation of reusable science data-processing systems

for NASA's Orbiting Carbon Observatory (OCO), National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) Sounder Product Evaluation and Test Element (PEATE), and the Soil Moisture Active Passive (SMAP) missions. He has received funding for his work from NASA, the Defense Advanced Research Projects Agency (DARPA), the Department of Homeland Security (DHS), the National Science Foundation (NSF), the National Institutes of Health (NIH), the National Library of Medicine (NLM), and private industry and commercial partnerships.

Mattmann is a champion/contributor to open source software code and was a member of the Board of Directors at the Apache Software Foundation (2013–18). He is the progenitor of the Apache Tika framework, the digital "Babel fish" and de facto content-analysis and detection framework.



Chris Mattmann

Ames Research Center Leadership Series: Reflections on 2020 Shines Light on Achievements in the Midst of a Pandemic

By Penny Hubbard, Ames IT Directorate Communication Specialist, Ames Research Center

March 8, 2021, marked the one-year anniversary of when the threat of COVID-19 became a reality for NASA's Ames Research Center. In the new Leadership Series: Reflections on 2020, Center Director Eugene Tu meets with Center leaders as they recount—in spite of all the difficulties of 2020—their impressive accomplishments and the challenges overcome, and they look to what lies ahead for their organizations.

The first of many informative sessions finds Center Director Eugene Tu speaking with Ames's CIO and IT Directorate (Code I) Leader, John Garrigues. In their reflections session, John covers the essential IT technology and systems, recounts the challenges of transition and technology for telework, and discusses what he and his team have learned during the pandemic. John highlights the challenges that Code I met during

“the COVID year” and how his team addressed the myriad details of keeping Ames personnel connected, established telework methods and best practices, and ensured that in-person interactions were pandemic-safe. John also covers NASA's cybersecurity posture and how NASA's Security Operations Center, including forensics and incident response, were successfully and securely managed from telework locations. The IT Directorate developed tools, not only for Ames, but in use across the Agency, such as the HR application tracking civil servant training, a dispatch tool for physical security and fire services to connect faster, and spectrum management programs ensuring better efficiencies for missions working with everything



Ames Center Director Eugene Tu (left) converses with Ames CIO John Garrigues during a virtual reflection on 2020

from radio frequencies (here on Earth) to small-satellite projects in space. Looking ahead, John is anticipating success as we continue to roll out “new normal” collaboration tools, balance onsite and remote offices, and leverage best practices for success at Ames and for all of NASA's missions.

View John Garrigues's and other Directorate Leader video sessions, including Ames Aeronautics and Exploration Directorates, here: <https://insideames.arc.nasa.gov/reflections-on-2020/>

CP Receives Five 2020 Agency Honor Awards

By Sylvester Placid, Communications Strategist, Communications Program, Marshall Space Flight Center

The Communications Program (CP) received five 2020 Agency Honor Awards, NASA's most prestigious honor awards presented to carefully selected individuals and groups who have distinguished themselves by making outstanding contributions to the Agency's mission.

CP individual and team recipients for 2020 include the following:

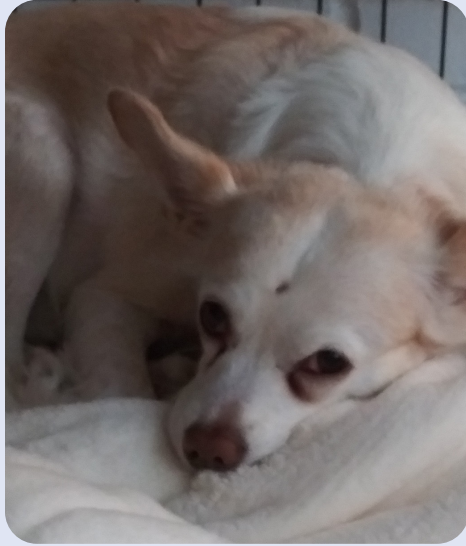
- **Kathy Hatley (Exceptional Achievement Medal)** For exemplary achievement as the Source Evaluation Board Chair for the Government Services Administration Enterprise Infrastructure Solutions Telecommunications contracts.
- **Jose Nunez-Zapata (Exceptional Achievement Medal)** For outstanding technical leadership in the deployment of software-defined networking at Langley Research Center for network automation and advanced cybersecurity.

- **IPTV Program Team (Group Achievement Award)** For exemplary performance in the design and implementation of the Communications Program Internet Protocol Television project.
- **Enterprise Voice Transformation Team (Group Achievement Award)** For exemplary performance in the design and implementation of the enterprise voice transformation to interconnect NASA Center voice systems.
- **Software-Defined Access Early Deployment Team (Group Achievement Award)** For exemplary performance in the deployment of a software-defined access next-generation network capability on the Langley Research Center production network.



A New Way of Working with JSC

As we mark one year since the transition to new working environments because of the COVID-19 pandemic, Johnson Space Center employees offer a look into some of their transformed workspaces and ways of working, including some new four-legged coworkers!



Working from home can be fun, at times—short commute, Teams meetings, finding the mute button. This old guy, Kris, doesn't make too much noise, and he does offer squirrel and Amazon delivery alerts.

—Lucie Delheimer, *COMIT Configuration Management, Information Resources Directorate*



Heights Mission Control. As a systems administrator, I follow the Mission Control N+1 need for monitors and data.

—Richard McIntyre, *COMIT Systems Administrator & Alternate Data Center Facility Manager, Information Resources Directorate*



My four-legged co-teleworker, Ace.

—Samuel Henry, *IT Specialist, Flight Operations Directorate*



Currently set up to work at home for almost a year, I share my desk with my grandkids, who are doing online schooling. On the weekends, we use my desk for fun, either playing a board game or finishing a jigsaw puzzle. Although I miss my office, peers, and management a lot, I find it a blessing being close to family and observing my grandkids' day-to-day schoolwork.

—Samia Chedid, *COMIT Multimedia Specialist, Information Resources Directorate*



Standing or sitting, I enjoy my continuously growing wall of images from work, postcards from colleagues, and pieces of the past.

In the first week of telework, my personal writing space became a more formalized workspace. Folding table and straight-back chair were replaced with newly purchased table, lift top, and office chair. They would be good for writing when I returned to the office in a few weeks—right? One year later, my workspace remains. Writing space is another wall with the same folding table complemented by a dry-erase board, huge sketch pad, and copper mug of candy canes. I am fortunate to have a designated workspace where I can close the door and a nearby window to the outside world.

In one sense, my home office is bigger on the inside. Where I once talked over my shoulder to ask officemates questions or answer theirs, I now post to Teams, where fellow teleworkers across NASA Centers ask and answer questions, exchange jokes and emojis, and support one another from afar. I still reach out to my local peeps. Instead of walking down the hall to engage in discussion, I click a camera icon to initiate a video call. Others reach out to me the same way for help with one of many applications or just a little support in their solitude.

Across the Agency and Johnson Space Center, we've been here for each other.

—Jaumarro A. Cuffee, *COMIT Communications Strategist, Information Resources Directorate*

Data: Unleashing the Power of NASA's Transformation

Providing NASA with the ability to simply mine, harness, and translate data into timely and actionable insights, at scale

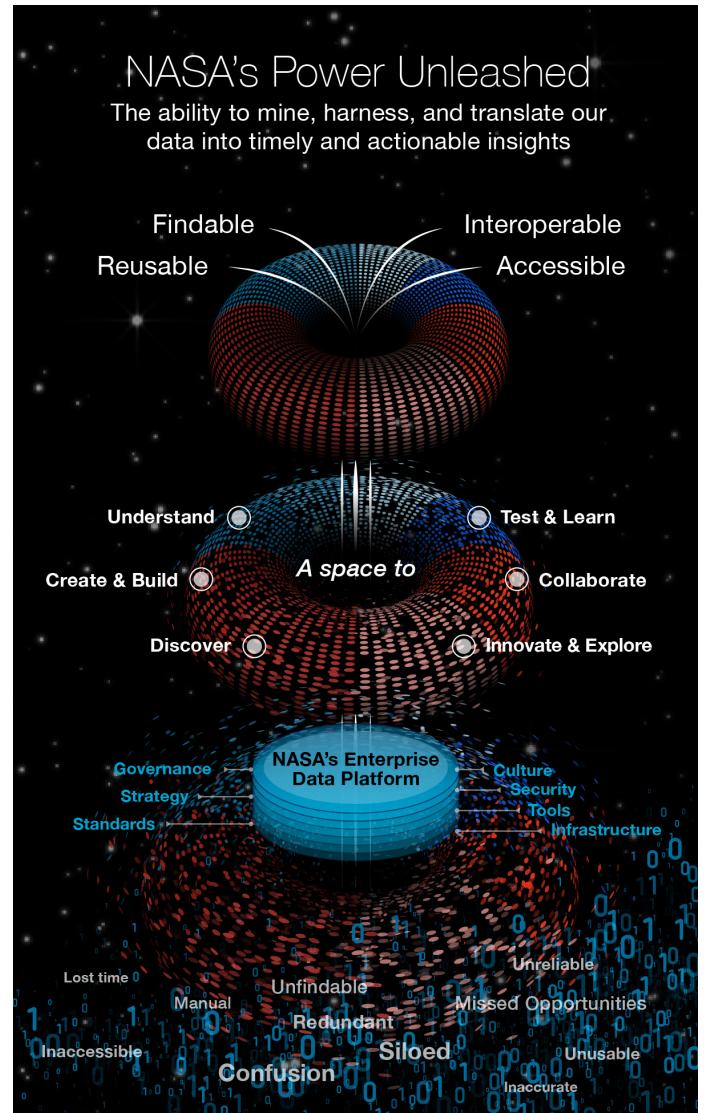
By Jason Duley, OCIO Information Management Program Executive and Digital Transformation Data Lead, Headquarters

Today, NASA's engineers, researchers, scientists, and technicians face challenges with finding, accessing, and sharing data. Gaining access to data for analysis is often resource-intensive, and an agile process is greatly needed as NASA leadership requires timely insight into datasets to gain situational awareness and make decisions at the velocity of business. NASA's data ecosystem is a massive source of untapped power, as NASA has as many pieces of data and information as there are stars and planets in the sky. Data are distributed across many platforms and organizations, a situation that adds complexity in leveraging data as a strategic asset. Firewalls and access controls create siloed data systems, which lead to incomplete data inventories, noncomprehensive search capabilities, and no common enterprise approach to data governance. In many cases, current tooling often requires a programming component and, in most cases, has a steep learning curve. NASA's workforce needs simple and intuitive tools to locate, mine, harness, and translate NASA's data into timely actionable insights; common and non-resource-intensive ways to fast-track data sharing; and a culture of "default to share" for data. We imagine a future in which NASA's more than 17,000 employees can get the data they need, when they need it, wherever they need it.

OCIO and DT partnership is critical for NASA data and information. What we are doing in our data work is putting the foundation for NASA to utilize data for better discussion making by providing hindsight, insight, and foresight to our information.

—Ron Thompson, NASA Chief Data Officer

To address these data challenges facing the Agency, in FY 2021, OCIO and the Agency Business Innovation Office (Digital Transformation Program) teamed to roll out an Enterprise Data Platform (EDP), which is a suite of data management and analytics services to solve many common data management and analytics problems using an enterprise approach. This "one-stop shop" consists of industry-leading products for data virtualization and management, data modeling and analytics, and data visualization. These tools are securely hosted in the cloud and give users the ability to tap into the full power of NASA data while lowering the barrier of entry for data storytelling. The EDP will contain a comprehensive data catalog or Yellow Pages of NASA datasets to greatly increase data discoverability. Combined with a cultural shift in data sharing and normalized data-sharing policies, data access can be accomplished in a more reusable manner as the EDP will provide our Agency's data stewards with an enterprise platform to govern key NASA datasets. By working in this manner, the months and weeks that were previously required to find and gain access to data can be drastically reduced to days and hours, enabling an agile data-analytics platform for Agency users. With the EDP's suite of tools, the workforce will be empowered with low-code tooling to gain hindsight, insight, and foresight into NASA's data.



What can you do to support this effort? The EDP is only as powerful as the data that feed it and the behaviors that drive it. Let us work together to get the most out of this untapped power source. You can (1) promote an open and collaborative data culture to enable more experimentation and discovery; (2) work with Agency data stewards to identify and contribute high-value datasets; and (3) become an early adopter of EDP by bringing use cases to test, learn, and evolve the platform. If you are interested in learning more about EDP or how we can work together, please reach out to Jason Duley at jason.duley@nasa.gov.



Completed Space Launch System (SLS) Core Stage at Michoud Assembly Facility (MAF) Credit: NASA/Jude Guidry

CP Drives IT Improvements To Improve SLS Manufacturing Performance

By Sylvester Placid, Communications Strategist, Communications Program, Marshall Space Flight Center

The NASA Communications Program (CP) collaborated with Boeing over the last two years to implement IT infrastructure improvements at the Michoud Assembly Facility (MAF) and Stennis Space Center (SSC) in support of Space Launch System (SLS) manufacturing for the Artemis missions.

At MAF, a comparison of performance benchmarks between July 2019 and November 2020 shows that joint CP and Boeing enhancements have improved overall network performance **around 90 percent**.

Network infrastructure improvements at MAF include wired and wireless performance for large file downloads, the printing of large files, and network bandwidth increases for MAF and SSC. Additional performance enhancements resulted from establishing direct fiber connections between NASA and Boeing, upgrading wireless access points at both MAF and SSC, and creating a specialized “partner network” for Boeing to allow seamless connectivity between wired and wireless users on the manufacturing floor.

The joint CP and Boeing team is not stopping with these improvements. Later this year, a new private long-term evolution (LTE) cellular network will be piloted for “shipside” support, enabling seamless network connectivity for SLS manufacturing even closer to the Artemis launch vehicle, where it is most needed.

Shifting Tides, High Winds, and Endangered Birds: Installing 20,000 Feet of Fiber-Optic Cable Across Wallops Marshland

By Sylvester Placid, Communications Strategist, Communications Program, Marshall Space Flight Center

Communications Program (CP) Cable Plant Service Element Manager Haig Arakelian and Service Manager Ted Dean knew that they had their biggest challenge ahead when they began work to install 20,000 feet of upgraded fiber-optic cable across 3.5 miles of protected marshland for launch operations at Wallops Flight Facility (WFF). The fiber not only supports NASA corporate and mission networks and launch operations at WFF, but also Northrop Grumman Cygnus cargo launches to the International Space Station (ISS), the Mid-Atlantic Regional Spaceport (MARS), Rocket Lab Electron launches, and U.S. Navy Surface Combat Systems Center operations and testing at Wallops Island. The upgraded fiber will support next-generation mission requirements, including faster data-transfer rates, 4K/8K video, and future capabilities over the next 30 years.

“The project was 32 months in design and procurement due to the complex-

ity,” says Dean. “It was a 10-month process to obtain Federal and state environmental permits.” The cable routing crosses outside NASA property and into the Chincoteague National Wildlife Refuge, operated by the U.S. Fish and Wildlife Service, and exits at the Unmanned Aerial Systems (UAS) runway airfield operated by MARS, so deconfliction plans were required to continue UAS flight operations during drilling for the project.

Environmental Challenges

Barges with drilling equipment travel 3.5 miles from Chincoteague Island to the work area while navigating rapidly shifting tides, high winds, and frequent heavy fog. Once the duct in the marshland is drilled, the fiber-optic cable will be jetted (or blown) into the duct with air pressure using vibratory plowing equipment across 4,200 feet of marshland.

The refuge is home to oyster beds, the Chincoteague wild ponies, and



Fiber duct drilling across Wallops Island marshland. (Photo courtesy Patrick J. Henderson)

endangered bird species, including the Eastern Black Rails, which nest there. The nesting period limits the construction period to just 7 months, adding time pressure to the complex project.

Shared Vision

Successful collaboration between Haig and Ted has been instrumental in accomplishing the project, particularly as Ted is based in Ohio and Haig is based in California.

“Haig’s background in running fiber cables for critical operations allowed us to maintain the same vision, and our common direction helps us quickly move forward with an enterprise model for cable plant across NASA,” says Dean. “Neither of us can successfully complete this project without the support of Chip Palumbo, our cable plant engineer, and Karalyn Springle, our NASA Office of the Chief Information Officer Project Manager.”

“Ted is a very enthusiastic and positive person,” says Arakelian. “He shares ownership of our vision to support NASA’s missions in the future with enhanced cable plant infrastructure, which should be seen as critical infrastructure just like power and gas. As wireless communications become more pervasive, the reliability of the backend cabling to ensure connectivity is more essential than ever.”



Ted Dean, Cable Plant Service Manager (left), and Haig Arakelian, Cable Plant Service Element Manager (right).



From top: A barge positions fiber optic cable on to marshland for drilling; horizontal directional drilling is used to create ducts that the cable will be jetted into with air pressure using vibratory plowing equipment; specialized, low pressure equipment carefully navigates the delicate marshland; equipment is moved across waterways after dense fog lifts. (Photos courtesy of Ted Dean)



MARS
PERSEVERANCE

How a Customized Camera System Connects the Mars 2020 Team

By Emily Tjaden, Communication Specialist, Jet Propulsion Laboratory, California Institute of Technology

In the past year, technology has played a pivotal role in maintaining connection and collaboration while people continue to remain socially distant, which is why the Mars 2020 mission enlisted the expertise of JPL IT to expand its digital toolkit for key surface flight operations team members.

To maintain valuable visual cues and situational awareness within mission rooms that would otherwise be lacking in a remote environment, a closed-circuit camera system was created. It contains ten strategically placed cameras livestreaming video to preapproved contacts through a secure website requiring two-factor authentication. On the streaming website, participants can customize their viewing experience by selecting which camera they want to watch, or they can have all ten streams simultaneously displayed in a grid format, ensuring that not a moment of the action will be missed.

The system all had to be designed built, installed, and operational within just a couple of months to allow for testing and any potential hardware delays. Fortunately, JPL IT recently developed and installed a motion-capture camera system for a custom application developed to enhance COVID-19 safety on Lab by monitoring the number of people in the cafeterias, which provided a similar framework for the Mars 2020 livestream needs. Repurposing the technology helped accelerate the development process, but it was a team effort by Mars 2020, JPL IT, Laboratories & Facilities, the Protective Services Division, and others to make sure all of the components were in place.

The team also found cost-saving opportunities despite the customized nature of the project. The unique casings and brackets were 3D-printed in-house by a member of the IT team. Each casing contains a relatively inexpensive Raspberry Pi camera, which

connects to AWS Cloud and turns off when not in use. This project is a six-month pilot, but if it is deemed a valuable asset to ongoing Mars 2020 operations, different missions, and other JPL projects, it will be slated as a future JPL IT service offering.

“We wanted to overcome the fact that we were not together,” said Michael Kimes, an enterprise software systems project manager who helped coordinate the project for Mars 2020. He went on to share how he hoped the mission team might take advantage of the technology: “Pick the room that you would have been sitting in or pick the group that you want to watch and please join and be as much a part of this as we can make it.”

IDG's CIO Names JPL a 2021 CIO 100 Award Winner

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

The Jet Propulsion Laboratory (JPL) has been named by IDG's CIO as a recipient of the 2021 CIO 100 award. The 34th annual award program celebrates the top 100 organizations and teams that are using information technology (IT) in innovative ways to deliver business value. The award exemplifies the highest level of operational and strategic excellence in IT and is an acknowledged mark of enterprise excellence. CIO Randi Levin said of the announcement, "I am thrilled with our selection to the 2021 CIO 100. Being named with this honor is another example of how JPL IT taps into the expertise of its people, enabling them to create innovative and effective IT solutions for JPL."

The 2021 CIO 100 class is special due to the pandemic; many honorees helped their organizations transition to a new reality through their creativity and expediting of new technologies. This is JPL's 10th consecutive selection to the CIO 100. The complete list of winners is available at <https://www.cio.com/article/3391918/2021-us-cio-100-winners-celebrating-it-innovation-and-leadership.html>.



The winning companies will be honored at the virtual 2021 CIO 100 Symposium and Awards Ceremony in August.

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