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National Aeronautics and Space Administration

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AeroSpace

Glenn Welcomes NASA Leadership



Columbia Lessons Learned

This year marks the 20th anniversary of the loss of the shuttle orbiter Columbia and its crew (STS-107). As a part of Day of Remembrance activities, all civil servants are to complete the Columbia Case Study in SATERN by April 1. As we reflect, I ask all of you to remember the lessons learned from this unfortunate event: resist normalization of deviance; recognize cognitive biases; avoid organizational silence; and nurture a positive safety culture. Let us honor the legacy of those we lost by practicing these lessons learned in all that we do, each day. Thank you for your commitment to safety and mission excellence.



AeroSpace Frontiers

is an official publication of NASA's Glenn Research Center. It is published the second Friday of each month by the Office of Communications in the interest of the Glenn workforce, retirees, government officials, business leaders, and the general public.

Submit short articles and calendar items to the editor at doreen.b.zudell@nasa.gov.

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NASA Leadership Shares Moon to Mars Objectives



Nelson and panelists address employees' questions during the Center Town Hall.

NASA Glenn welcomed Administrator Bill Nelson, Deputy Administrator Pam Melroy, and several key leaders from NASA Headquarters to Lewis Field on Jan. 10. The visit provided opportunities for NASA leadership to share the Moon to Mars (M2M) framework with employees and Glenn's role in these exploration efforts.

That morning, a standing-room-only audience of employees greeted the administrator and guests in the MIC Auditorium, with more than 1,300 viewers online, for a Center Town Hall Meeting. Nelson stressed the value of Glenn's contributions to the agency and highlighted agency accomplishments in 2022. He called this a "golden era of space exploration."

Dr. Kurt Vogel, director of Space Architectures; Walt Engelund, deputy associate administrator for programs in the Space Technology Mission Directorate; and Jim Free, associate administrator for Exploration Systems Development joined Nelson and Melroy in presenting M2M Objectives.

"As the experts get into the M2M Objectives for you, I want you to reflect on where you fit in," Nelson said.

The M2M framework centers on an objectives-based approach to human deep space exploration efforts. This approach, in contrast to a capabilities approach, focuses on the big picture, the "what" and "why" of what NASA should be doing in terms of deep space exploration before prescribing the "how" (e.g., a specific launch vehicle, technology, or acquisition method).



3-C- 00145 Photo by Marvin Smith Nelson talks with employees after the Town Hall.

After the presentation, the panelists took questions from employees and participated in an informal meet-and-greet with many in attendance at the conclusion of the meeting.

The full day of events also included a presentation on strengthening acquisition and program management within the agency and a casual lunch between Nelson and early- and mid-career employees. After lunch, an Executive Roundtable Discussion welcomed senior leaders, elected officials, and economic/community partners to discuss the importance of the work being done at Glenn to Northeast Ohio.

Ohio Sen. Sherrod Brown joined Nelson, Melroy, and Center Director Dr. Jimmy Kenyon for a briefing with representatives from the media. The leaders discussed some of the work

Nelson enjoys lunch and conversation with early- and mid-career employees.



being done at Glenn in support of M2M. A tour in the Simulated Lunar Operations (SLOPE) Lab highlighted tires being tested for the Moon and advances in shape memory alloys.

Brown expressed his support for Glenn's research and economic impact on Northeast Ohio. "People are beginning to see what this [Glenn] means to Cleveland," he said. "3,500 jobs are here and we know those jobs lead to all kinds of other jobs."

The tour concluded with a demonstration of Astro, the robotic dog, who is helping with noise-reduction efforts for employees.

To learn more about the M2M Objectives, visit https://go.nasa. gov/3BUkHGL.

By Doreen B. Zudell



GRC-2023-C-00370 Photo by Bridget Caswell Erin Rezich briefs Nelson on tires being tested for the Moon in the SLOPE Lab.

On the cover: Glenn Center Director Dr. Jimmy Kenyon, right, welcomes NASA Administrator Bill Nelson to Lewis Field. Photo by Marvin Smith GRC-2022-C-10862

Glenn Develops Advanced Space Communications Protocol

Communicating in space can be difficult due to extreme distances that cause signal delays not present on Earth. As humanity prepares to journey back to the Moon with Artemis, NASA will need advanced networking concepts to stay connected.

To overcome signal disruption, NASA developed a communications networking protocol called Delay Tolerant Networking (DTN). DTN uses an automatic store-and-forward process to ensure the delivery of information. The store-and-forward mechanism allows systems to either forward data on as it is received or store it for future transmission if the signal becomes disrupted—a feature that enables internet-like capabilities in space.

Glenn researchers recently established the High-Rate Delay Tolerant Networking (HDTN) project, an advanced DTN protocol that provides data transfer speeds four times faster than the current DTN architecture.

"We've been developing DTN implementations, which will revolutionize space communications by extending internet-like capabilities found on Earth into space," said Dr. Daniel Raible, HDTN project principal investigator. "High-Rate DTN is designed with speed and efficiency in mind to keep up with the data rates of newer laser and radio frequency communication systems."

After multiple rounds of successful in-lab testing at NASA's Johnson Space Center and NASA's Goddard Space Flight Center, HDTN is ready for liftoff.

"Glenn's HDTN project has been collaborating with the International Space Station team to demonstrate a



GRC-2022-C-08659

Photo by Bridget Caswell

HDTN team members, left to right: John Nowakowski, Dr. Dudukovich, Nadia Kortas, Blake LaFuente, and Brian Tomko.

high-rate DTN gateway onboard. The HDTN gateway will provide science payloads on the space station with storeand-forward capabilities over the existing radio frequency and future laser downlink paths," said Dr. Rachel Dudukovich, Glenn HDTN software development lead. "HDTN has successfully demonstrated gigabit-per-second rates in highly realistic test environments similar to the network on the space station."

HDTN is also preparing for integration on the Laser Communications Relay Demonstration (LCRD), NASA's

> optical communications terminal. LCRD launched in 2021 to test in-space optical, or laser, communication capabilities. Currently, most space missions use radio frequency communications to send and receive data, as radio waves have a proven track record of success. However, optical communications allow for larger data returns, a significant benefit for future exploration.

> The Space Communications and Navigation technology initiative will be integrated on the International Space Station and LCRD this spring.

> > By Molly Kearns

Illustration of the HDTN protocol being used on the Laser Communications Relay Demonstration to transfer radio and optical communications between Earth and space.



FEBRUARY 2023

Promotion

Dr. Cheryl L. Bowman has been selected chief, High Temperature and Smart Alloys Branch, in the Research and Engineering Directorate. She previously provided leadership to the branch as deputy branch chief, was a former technical lead for electrified propulsion, and was a material lead for nuclear power and propulsion.



Dr. Bowman

Retirements

Jeff Berton, Propulsion Systems Analysis Branch, retired Dec. 31, 2022, with 35 years of NASA service.

Carlos R. Gomez, Office of Communications, retired Dec. 31, 2022, with 36 years of federal service, including 32 with NASA.

J. Mark Hickman, Space Science Project Office, retired Dec. 31, 2022, with 35 years of NASA service.

Daniel G. Kocka, Fabrication Division, retired Dec. 31, 2022, with 35 years of NASA service.

Carlos R. Morrison, Rotating and Drives Systems Branch, retired Dec. 31, 2022, with 33 years of NASA service.

Tom Palisin, Office of Procurement, retired Dec. 31, 2022, with 33 years of NASA service.

Renee D. Palyo, Facilities Infrastructure Division chief, retired Dec. 31, 2022, with 33 years of NASA service.

Paul Raitano, Thermal Energy Conversion Branch, retired Dec. 31, 2022, with 38 years of NASA service.

Steven J. Schneider, Chemical and Thermal Propulsion Systems Branch, retired Dec. 31, 2022, with 37 years of NASA service.

Christopher A. Snyder, Propulsion Systems Analysis Branch, retired Dec. 31, 2022, with 39 years of NASA service.



John Zuzek, Space Communications and Spectrum Management Office, retired Dec. 31, 2022, with 39 years of NASA service.



Gomez



Hickman



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Morrison







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Zuzek

More Than a Memory

Blankenship Built Cybersecurity Resilience

Ryan "Jamie" Blankenship, 37, a Peerless Technologies Corp. employee working as a software developer in the Office of Chief Information Officer (OCIO), died Dec. 18, 2022. He was a U.S. Army veteran.

Blankenship was a highly skilled ServiceNow software developer and member of the OCIO's Cybersecurity Services. He was instrumental in leveraging enterprise tools to bring automation, consistency, and efficiency to many of the OCIO's cyber delivery services, including supply chain risk management, incident reporting, and cyber engineering request management.

"Ryan's contributions will continue to have a lasting and meaningful effect towards NASA's cybersecurity resilience," said his supervisor, Deanna Gullett.

Kelley Created Risk Mitigation Strategies

Kevin Kelley, 60, a Peerless Technologies (PACE contract) employee working as a cybersecurity analyst in the Risk Management and Security Office, Office of Chief Information Officer, died Oct. 24, 2022.

Kelley started at Glenn in 2016. He was responsible for reducing safety risks by creating and then implementing risk-based mitigation strategies.

"We are devasted by Kevin's passing," said Kevin Bradley, Kelley's work area manager. "Kevin's work ethic and attention to detail are missed. More importantly, his sense of humor, friendship, and kindness will be a lasting memory of Kevin for all of us."



Jack Kovacs, 85, a 1995 retiree with 25 years of NASA service, died Dec. 15, 2022. Kovacs began his career in the Computer Services Division (CSD), working in digital recording and engineering, engineering applications development, and data services. In the 1980s, he transferred to the Software Branch in the Space Station Freedom Directorate. In 1994, he returned to CSD, serving in the Mainframe Systems Branch. Kovacs earned a Sustained Superior Performance Award (1991) and a Group Achievement Award (1992).

Ernesto (Ernest) P. Petti, 102, a 1984 retiree with 25 years of federal service, including 22 with NASA, died Oct. 20, 2022. He served in the Army during World War II. Petti was a tradesman who worked in electronic equipment installation and maintenance. He served in the Facilities Operations, Computer Services, and Test Installations divisions, and worked on various research projects involving telemetry. Petti was part of a Space Flight Awareness group award for the Plasma Interaction Experiment II (PIX II) program (1983).



Blankenship



Kelley



Hauser



Petti

IMAGINAVIATION

Mark your calendar for Feb. 28–March 2 for ImaginAviation 2023. NASA's Transformative Aeronautics Concepts Program will hold this three-day virtual event that focuses on the future transformation of aviation. Register at https://nari.arc. nasa.gov/imaginAviation/.

POC: angela.d.surgenor@nasa.gov

Information Café

Join the Library staff on Wednesday, Feb. 15, for a demo of the O'Reilly Learning Platform, from 11–11:45 a.m., in building 142, room 188, or on Microsoft Teams. Check Inside Glenn for the link.

POC: robin.n.pertz@nasa.gov.





Visit the New Glenn Café!

RSB Cafeteria (upper level), Bldg. 164 Monday through Friday Breakfast: 7 to 10:30 a.m. Lunch: 10:30 a.m. to 2 p.m.

POC: lori.a.manthey@nasa.gov



Deadline for small items in the March issue is **Wednesday, Feb. 15**, noon. News and feature stories require additional time.

Future Generations Explore at Glenn

Robotics in Action

More than 50 high school students jumped at the chance to become NASA engineers and scientists for a day. Glenn welcomed four FIRST (For Inspiration and Recognition of Science and Technology) Robotics teams on-site to tour state-of-the-art facilities, explore the latest technology, and learn about internships and career opportunities.

Through center tours, Cleveland Metropolitan School District students saw how the robotics concepts they use in the FIRST program apply in the real world. Each year, these FIRST Robotics teams—sponsored by Great Lakes Science Center spend six weeks designing, programming, and building a robot that will ultimately compete in the FIRST Robotics Competition, a nationwide head-to-head challenge.

To learn more, visit https://go.nasa.gov/3uQIfYX.



GRC-2022-10146 Photo by Jef Janis Cleveland Metropolitan School District students interact with virtual and augmented reality in Glenn's Graphics and Visualization (GVIS) Lab.

Testing Futuristic Hardware



GRC-2022-C-10244 Photo by Jef Janis Research assistants and a doctoral candidate conduct tests on aircraft hardware at NEAT.

The scene inside a NASA test facility sometimes looks a lot like the set of a science fiction movie. That is certainly the case with a 1-megawatt electric machine with an integrated power electronics system university students are now testing with NASA support.

This innovative hybrid electric technology is not fictional. It is reality, and could someday help single-aisle commercial aircraft reduce fuel consumption and produce fewer carbon emissions.

The machine, which can operate as a motor or generator, is being tested in NASA's Electric Aircraft Testbed (NEAT) at Neil A. Armstrong Test Facility. It is the capstone deliverable for a project led by The Ohio State University and its academic partners, one of five university teams that were awarded in 2017 during the very first round of NASA's University Leadership Initiative.

To learn more, visit https://go.nasa.gov/3FMTdDF.

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