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In Today's Edition

Science & Discovery

NASA's CAPSTONE Completes Extended Mission Testing Lunar Technologies

Life & Culture

Ann Patchett, Martin Scorsese, Cynthia Erivo: The 2026 National Book Festival

Animals & Wildlife

Partners release second generation of "headstarted" turtles at Great Meadows National Wildlife Refuge

Nature & Environment

Connect with the CASCs at the 2026 Ecological Society of America Meeting

Technology & Innovation

NSF launches Project Triad to advance quantum technology for real-world applications

Activity Time

Word Search Puzzle

"Don't waste your time with explanations: people only hear what they want to hear."

— Paulo Coelho

NASA's CAPSTONE Completes Extended Mission Testing Lunar Technologies

5 Min Read NASA's CAPSTONE Completes Extended Mission Testing Lunar Technologies The Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment (CAPSTONE) has achieved all primary and extended mission objectives. Credits: NASA As NASA prepares for a sustained human presence on the Moon, missions will increasingly require spacecraft that can navigate and communicate without a direct connection to Earth. NASA's Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment, or CAPSTONE , validated and advanced these capabilities. Designed to test and validate technologies in lunar orbit, CAPSTONE launched in June 2022 and became the first U.S. commercial mission at the Moon. The spacecraft tested operations in three-body orbits around the Moon, using the combined gravity of Earth and the Moon to reduce the fuel needed to maintain a stable lunar path. It became the first spacecraft to fly and characterize this orbit for future exploration and science missions. Owned and operated by Advanced Space, the microwave-sized spacecraft then received a 15-month mission extension, becoming a testbed for advanced communications, networking, autonomous navigation, and software-defined satellite technologies. Dylan Schmidt, CAPSTONE assembly integration and test lead, right, and Lachlan Moore, systems integration

engineer, left, install solar panels onto the CAPSTONE spacecraft at Tyvak Nano-Satellite Systems, Inc., in Irvine, California. NASA/Dominic Hart Rather than launch a new satellite, NASA's Research and Technology Mission Directorate demonstrated that CAPSTONE's existing hardware could host new applications after launch, transforming the spacecraft into a cost-effective, flexible lunar technology demonstration platform. NASA's SCaN (Space Communications and Navigation) Division will now use the data to demonstrate innovative networking and navigation techniques on future experiments. "Operating multiple experiments simultaneously aboard the same spacecraft allows NASA to evaluate how these technologies perform together in a real lunar environment," said Greg Stover, director of the Advanced Research and Technology Division within NASA's Research and Technology Mission Directorate at NASA Headquarters in Washington. "Investments in autonomous operations and resilient communications infrastructure are essential to ensuring U.S. leadership as activity around the Moon continues to increase." Two experiments aboard CAPSTONE used software-defined infrastructure to advance two future mission essentials: autonomous navigation and deep space communications. The autonomous Navigation, Guidance, and Control software, or autoNGC, is designed to allow a spacecraft to determine where it is, where it is going, and how to get where it needs to be without waiting for instructions from the ground. While portions of the software had previously flown in Earth orbit, CAPSTONE marked the first time autoNGC was tested at the Moon. "To really demonstrate that

something works, you have to fly it,” said Sun Hur-Diaz, principal investigator for the autoNGC technology development project at NASA’s Goddard Space Flight Center in Greenbelt, Maryland. “The real environment is key.” To really demonstrate that something works you have to fly it. The real environment is key. Sun Hur-Diaz Principal Investigator for the autoNGC Project, NASA Goddard Space Flight Center Researchers also evaluated how autoNGC performed with limited contact to Earth. While NASA’s Deep Space Network antennas were supporting the Artemis II crewed test flight around the Moon, CAPSTONE’s communications window dropped to just a few passes per week. Those gaps became one of the experiment’s most valuable tests. Without data from Earth, autoNGC determined CAPSTONE’s location using an onboard star tracker camera to image the Moon, Earth, and other celestial bodies. The camera-based system, known as optical navigation, at times outperformed ground-based methods for real-time onboard navigation, advancing technologies for future deep-space missions. Alongside autonomous navigation testing, CAPSTONE also tested delay/disruption tolerant networking (DTN), a communications architecture designed for deep space. Unlike Earth-based internet systems, deep space communications must function despite long delays and frequent signal gaps. The DTN system addresses those challenges by storing information on the spacecraft when no connection is available and automatically forwarding it once communications are restored. With these demonstrations, CAPSTONE became the first to fly the latest DTN protocols beyond Earth orbit and the first to run them in

NASA's core Flight System, an open-source framework that can be implemented on any spacecraft. In one demonstration, engineers began transmitting data from CAPSTONE to Earth, but the connection ended before the transfer was complete. The spacecraft stored the remaining data until the next communications opportunity, and transmission resumed automatically. Every piece of data made it home. Artist's rendering depicting astronauts, habitats, rovers, power systems, and cargo operations supporting sustained human activities at the Moon Base near the lunar South Pole. The technologies CAPSTONE tested may be key to NASA's growing lunar communications and navigation infrastructure. NASA "You can imagine an astronaut walking behind a lunar hill or descending into a crater and temporarily losing connectivity," said Ben Anderson, a systems engineer for the Near Space Network at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "This technology allows that data to be automatically retransmitted once communications are restored." In addition to its primary achievements, CAPSTONE's second life as a software-defined testing platform demonstrated that new technologies can be affordably tested and proven directly in their operational environment. After nearly four years of technology maturation, NASA's activities on CAPSTONE concluded in June 2026, while Advanced Space will continue to use the spacecraft as a technology development testbed. The CAPSTONE spacecraft was designed and built by Terran Orbital and is owned and operated by Advanced Space. NASA's Research and Technology Mission Directorate managed the mission through the Small Spacecraft

and Distributed Systems program, based at NASA's Ames Research Center in California's Silicon Valley. Elements of the CAPSTONE technology suite were supported by NASA's Small Business Innovation Research program. The autoNGC and DTN demonstrations conducted during CAPSTONE's extended mission were managed by NASA's SCaN Division, based at NASA Headquarters in Washington. About the Author Korine Powers Lead Writer and Communications Strategist Korine Powers, Ph.D. is a writer for NASA's SCaN (Space Communications and Navigation) Program office and covers emerging technologies, commercialization efforts, exploration activities, and more. Share Details Last Updated Jul 06, 2026 Editor Jimi Russell Contact Korine Powers korine.powers@nasa.gov Location Ames Research Center Related Terms Communicating and Navigating with Missions Ames Research Center Earth's Moon Goddard Space Flight Center Small Business Innovation Research / Small Business Small Spacecraft Technology Program Space Communications Technology Explore More 2 min read NASA Transfers 'Hundred Acre Wood' to Patuxent Research Refuge Article 15 hours ago 3 min read NASA's New Horizons Spacecraft Wakes from Hibernation in Good Health Following its longest hibernation period ever of nearly a year, NASA's New Horizons spacecraft has... Article 15 hours ago 6 min read NASA Webb Uncovers Unusual Galaxy Shaped by Cosmic Collision In new images from NASA's James Webb Space Telescope to celebrate its fourth science anniversary,... Article 2 days ago Keep Exploring Discover

More Topics From NASA CAPSTONE Communicating with Missions
SCaN & Moon to Mars Moon Base

Ann Patchett, Martin Scorsese, Cynthia Erivo: The 2026 National Book Festival

-This is a guest post by Deb Fiscella, a public affairs specialist in the Office of Communications. You can watch director Martin Scorsese screen some of his favorite film clips, listen to “Wicked” star Cynthia Erivo talk about being just too much for some people and get a kick out of Ann Patchett chatting about her new bestselling book at the Library’s National Book Festival this year, coming to the Washington Convention Center on Saturday, Aug. 22. Literary and multimedia stars such as Patrick Radden Keefe, Kate McKinnon, Tia Williams, Tayari Jones, Frank Miller and Karin Slaughter are also among more than 80 authors who will fill out the day. The festival, an annual tradition since 2001, this year is part of the Library’s series of programs, America 250: It’s Your Story, to observe the nation’s 250th birthday. An important heads-up: Free tickets will be required for festival entry (this is a first), but not for individual programs. Tickets can be reserved at loc.gov/bookfest . Ann Patchett, the 2026 Library of Congress Prize for American Fiction recipient, will be at the NBF to discuss her new novel, “Whistler.” Photo: Emily Dorio. No worries if you can’t make it – events on the Main Stage will be livestreamed on loc.gov/bookfest . Videos of presentations will be made available on the Library’s website and YouTube channel in the days after the festival. As always, there’s much to choose from, with several

multiplatform events. Historians Douglas Brinkley and Annette Gordon-Reed will discuss their contributions to National Geographic's "1,000 Days in America: An Illustrated History of Moments That Defined a Nation," in a special live recording of C-SPAN's "America's Book Club." (C-SPAN will also livestream some events and interview authors.) Bestselling author Max Brooks will present a radio play adaptation of his graphic novel "The Harlem Hellfighters." And The Kitchen Sisters (Davia Nelson and Nikki Silva) will host a live podcast of their Peabody Award-winning NPR series, as well as presenting a workshop on creating your own podcast. Director Martin Scorsese, who has five titles in the National Film Registry, will be at NBF this year. Photo: Brigitte Lacombe. The complete lineup will tell you more about each author, but here's a bit about a few of the headliners: Cynthia Erivo – The award-winning actress, singer, author and producer shares her work and her new memoir, "Simply More: A Book for Anyone Who Has Been Told They're Too Much." Martin Scorsese – Award-winning movie director Scorsese, with five films in the National Film Registry, discusses his filmmaking philosophy and the importance of preserving the nation's film heritage while screening select film clips. Kate McKinnon – McKinnon talks about "Secrets of the Purple Pearl," her new sequel in the New York Times No. 1 bestselling series "The Millicent Quibb School of Etiquette for Young Ladies of Mad Science." Ann Patchett – The 2026 Library of Congress Prize for American Fiction recipient provides insights into her recent New York Times No. 1 bestseller "Whistler." Arthur Sze – U.S. Poet Laureate Sze

delves into his signature project, as well as his personal guide to poetry in translation titled “Transient Worlds: On Translating Poetry.” Frank Miller – The award-winning comic book writer, artist, novelist, inker, screenwriter, film director and producer, best known for “Sin City” and “300,” his comics featuring Marvel superhero Daredevil, and his miniseries “Batman: The Dark Knight Returns,” discusses his new memoir, “Push the Wall,” which also serves as a masterclass for aspiring creators. Tia Williams – Acclaimed romance novelist Williams, whose book “The Perfect Find” is now a Netflix film starring Gabrielle Union, makes her festival debut with “The Missed Connection.” Silvia Moreno-Garcia – Award-winning Moreno-Garcia makes her second appearance at the festival with her new suspenseful noir novel “The Intrigue.” Geoff Bennett – Peabody Award-winning journalist and co-anchor and co-managing editor of “PBS NewsHour,” Bennett discusses his debut book, “Black Out Loud: The Revolutionary History of Black Comedy from Vaudeville to ’90s Sitcoms.” Isaac Fitzgerald – Bestselling author and frequent “Today” show guest, Fitzgerald makes his festival debut with “American Rambler: Walking the Trail of Johnny Appleseed.” Jenny Lawson – The award-winning humor writer and activist also known as the Bloggess shares insights from her new book “How to Be Okay When Nothing is Okay: Tips and Tricks That Kept Me Alive, Happy and Creative in Spite of Myself.” Tayari Jones – Jones returns for her third festival, this time to discuss her latest novel, “Kin,” an Oprah’s Book Club selection. Sasha Waters – The documentary director screens clips from her upcoming film

“Mary Oliver: Saved by the Beauty of the World” and shares insights into the poet whose papers are held by the Library. Romance novelist Tia Williams will discuss her new book, “The Missed Connection” at this year’s NBF. Photo: Chandra Wicke. The festival will also offer a wide range of family-friendly activities. These include storytelling at the Story District; hands-on activities that connect science and storytelling at the STEM District; learning opportunities in the Workshop Space; presentations from Library experts about innovative work happening at the nation’s Library; and a literary trip around the country in the Roadmap to Reading area. Doors will open at 8:30 a.m. and the first programs start at 9 a.m. We close at 8 p.m. Subscribe to the blog— it’s free!

Partners release second generation of "headstarted" turtles at Great Meadows National Wildlife Refuge

After two decades of slow and steady progress, Blanding's turtle headstart program celebrates major milestone Young turtles released this spring are first known offspring of another turtle that has been through headstart program at the refuge Jul 7, 2026 Written By Bridget Macdonald The two young turtles were raring to go, swimming in place in shallow water in their temporary holding tank as they awaited release into a nearby wetland. "They aren't usually this active," said Deborah Jon Toupouzis, senior zookeeper at the Stone Zoo. "We think they can smell the swamp." But the crowd of about 40 people who had gathered at Great Meadows National Wildlife Refuge in Concord, Massachusetts, to see the turtles off wanted to savor the moment. "It's taken two decades to get here," said Grace Bottitta, project leader for the Service's Eastern Massachusetts National Wildlife Refuge Complex. "The turtles we're releasing tonight are living proof that when we invest in habitat, science, partnerships, and the next generation of conservationists, we can make a lasting difference for species in need." The small turtles pinning for the swamp were nine-month-old Blanding's turtles that had just graduated from Zoo New England's Headstart Program, established to give a leg up to this state-listed species. The program places hatchling turtles in the care of facilities, including local schools, over their first winter when they are most

vulnerable simply because they are so small — about the size and weight of a quarter. Blanding’s turtle hatchlings that overwinter in the wild are still about the size of a quarter in the spring. But the hatchlings that spend the winter in a facility come out significantly bigger — the two in the tank each weighed about a third of a pound — increasing the likelihood that they will survive to adulthood. Since the program started in 2003, more than 800 headstarted Blanding’s turtles have been released at Great Meadows National Wildlife Refuge and surrounding wetlands. So, what’s so special about these two? Their mom was a headstart, too. Follow that turtle

In the spring of 2010, a female Blanding’s turtle climbed out of a marshy wetland at Great Meadows National Wildlife Refuge and began searching for a place to nest. She had traveled more than a mile by the time she found the perfect spot: the landscaping at a nearby office park. She made a nest that produced 11 hatchlings — including a small female nicknamed Ivy who was taken to the Stone Zoo to headstart. The following spring, Ivy and her siblings were released back into the wild at Great Meadows National Wildlife Refuge with small notches in their shells to enable researchers to identify them. But Ivy wasn’t seen again for a decade. During a routine field survey in 2023, Zoo New England field technicians finally tracked her down. “She looked big and strong, nearly reproductive size,” said Emilie Wilder, Associate Director of Conservation Engagement for Zoo New England. Zoo staff outfitted her with a radio transmitter to track her movements, hoping to find her nest in the coming years. Then in the spring of 2025, senior field conservationist Jimmy

Welch picked up the signal from Ivy's transmitter and followed her as she left the refuge wetlands to search for a place to nest. When she finally selected a site in the wee hours of the morning, on adjacent conservation land owned by the Town of Concord, Welch was waiting nearby to mark and protect the nest. Her nest produced seven healthy hatchlings and a conservation milestone: the first documented offspring from a turtle that had been through the headstart program. A bright horizon

The crowd that gathered at Great Meadows National Wildlife Refuge in late June to witness the release of two of Ivy's offspring (the others were headstarted by local schools and released with the students before the end of the school year) reflected the community of partners that made this conservation milestone possible. There were representatives from Zoo New England, the Town of Concord, the Concord Land Conservation Trust, and the Massachusetts Department of Fish and Game, including Commissioner Tom O'Shea and Acting Director of the Division of Fisheries and Wildlife Eve Schlüter . There were field technicians and animal care specialists, volunteers and interns, retired teachers whose students had headstarted turtles in the classroom, and residents of the nearby neighborhoods where female Blanding's turtles make their nests. And in addition to the young turtles, there was another guest of honor: Dr. Bryan Windmiller, founder of Zoo New England's Blanding's turtle conservation program at Great Meadows National Wildlife Refuge, who led the program from its inception until retiring this year — just in time to see the second generation launch. “Bryan has devoted his career to species conservation, building

programs that have measurably reduced the decline of turtle species across the commonwealth,” said Eric Baitchman, Vice President of Animal Health and Conservation at Zoo New England. Windmiller’s unique approach — a participatory model that engaged both children and adults in conserving natural treasures in their communities — was as important as the outcomes. “His work had an outsized impact on both rare species and the people who share their habitats,” Baitchman said. Windmiller’s successful model is now being replicated at other locations in Massachusetts, including Assabet River and Oxbow National Wildlife Refuges. This collaborative approach to species conservation isn’t just nice to do — it’s the only way to ensure a future for a highly mobile turtle species in a densely populated state. Strong community engagement also fosters a sense of guardianship that helps protect turtles from another threat: illegal collection and trade. “There is a repeated truism that for Blanding’s turtles to persist, you need vast landscapes, huge unbroken landscapes, that are really hard to find in Massachusetts,” said Mike Jones, state herpetologist for MassWildlife. “But the Zoo New England team has shown that it’s possible to muster a network of unconventional partners to help this species persist in relatively developed areas like Concord.” Jones noted that in a protected landscape like Great Meadows National Wildlife Refuge, Blanding’s turtles can reach 80 years or older. “The turtles we release tonight may outlive some of us,” he said. It sounded more like a hope than a hypothetical. At the conclusion of the remarks, attendees walked to the edge of a wetland where Welch, Windmiller, and senior field

conservationist John Berkholtz waded into the water to release the next generation of Blanding's turtles. The sun was starting to set as the turtles swam away, but the horizon for Blanding's turtles at Great Meadows National Wildlife Refuge is getting brighter and brighter. Story Tags At-risk species Written By Bridget Macdonald Published Jul 7, 2026 Our Partners Facilities Great Meadows National Wildlife Refuge Latest Stories From Hatchery to Hook and Line Jul 7, 2026 Our Partners Songbirds & Strings: A Symphony of Wildlife, Community, and Culture Jul 6, 2026 Endangered Species Act Snapshot: Community Effort Saves Hundreds of Endangered Sunflowers in South Carolina Jul 6, 2026

Connect with the CASCs at the 2026 Ecological Society of America Meeting

Connect with the CASCs at the 2026 Ecological Society of America Meeting By Climate Adaptation Science Centers July 6, 2026 Explore CASC representation at the 2026 Ecological Society of America Meeting (July 26 - 31, 2026). Connect with scientists from across the CASC network at the 2026 Ecological Society of America (ESA) meeting in Salt Lake City, Utah, from July 26 - 31, 2026. The theme of this year's meeting is "Ecology in an Era of Uncertainty". Organized Oral Sessions Session: Advances in Climate-Resilient Agroecosystems in the Anthropocene Contributor : Laura Thompson (National CASC) Talk Title : Assessing the climate resilience of carbon credit projects: overlap of offset sites with drought, flood, and fire risks When : Tuesday, July 28 | 10:00 - 11:00 AM Session: Climate Adaptation at ESA: Moving from Theory to Practice to Change (with) the World Contributors : John Bradford (Northwest CASC), Sarah Love (Northeast CASC), Toni Lyn Morelli (Northeast CASC), Laura Thompson (National CASC) Talk Titles : How Climate Adaptation is Enabling Ecology to Optimize Outcomes (Morelli) Synthesizing changing oak species distributions, mast availability, and effects on wildlife species under future climate, social, and land-use change (Thompson) Climate resilience and adaptation opportunities in sagebrush shrublands and pinyon-juniper woodlands (Bradford) Navigating Ecolo-

gical Change by Embracing Complex Decision Making (Love) When : Wednesday, July 29 | 1:30 – 3:00 PM Contributed Oral Sessions Session: Ecosystem Management Contributor : Sarah Love (Northeast CASC) Talk Title : Navigating Ecological Change by Embracing Complex Decision Making When : Thursday, July 30 | 3:30 – 5:00 PM Session: Climate Change: Plants 4 Contributor : Sierra Perez (Southeast CASC) Talk Title : Interacting precipitation and temperature anomalies alter percent cover in a subset of plant species across the Southeastern U.S. When : Thursday, July 30 | 1:30 – 3:00 PM Symposia Uncharted: Disease Ecology Amidst Uncertainty Contributor : Toni Lyn Morelli (Northeast CASC) Talk Title : At the intersection of biological invasions and climate change, Translational Ecology can help When : Wednesday, July 29 | 10:00 – 11:30 AM Inspire Sessions Science in Service: Co-Producing Actionable Science for Climate Resilience Contributor : Toni Lyn Morelli (Northeast CASC) Talk Title : Translational Ecology for a Better World When : Wednesday, July 29 | 3:30 – 5:00 PM Posters Evaluating ecological efficacy of climate adaptation actions can improve natural resource management Contributors: Meagan Oldfather (North Central CASC), Sarah Weiskopf (National CASC) Additional details pending Workshops Delivering the Science Managers Need for Climate Adaptation Amidst Uncertainty: Connecting Ecological Research to Resist-Accept-Direct (RAD) Decision-Making This workshop introduces the Resist–Accept–Direct (RAD) framework—an adaptive management approach that helps practitioners evaluate whether to resist ecological transformation, accept transformation, or

direct ecosystems toward new, desirable trajectories. Participants will gain grounding in RAD concepts, learn how the framework is being implemented by practitioners, and explore the types of ecological data, analyses, and evidence needed to strengthen RAD decisions. By the end, participants will understand where the research community can contribute to more robust, decision-ready RAD applications in a rapidly changing world and identify opportunities for new research that directly advances climate adaptation practice. Contributors : Sarah Love (Northeast CASC), Laura Thompson (National CASC), Sarah Weiskopf (National CASC) When : Wednesday, July 29 | 11:45 - 1:15 PM

Generating Plant Functional Types Across a NEON Site: A Hands-On Tutorial In this workshop we will create a map of plant functional composition across a site in the National Ecological Observatory Network (NEON, <https://data.neonscience.org>). We will classify PFTs from NEON's airborne lidar and hyperspectral data and train the model on ground-based inventories. In this hands-on code-along, we will follow a publicly available tutorial and discuss ways that researchers can modify the presented example for their own needs (e.g., selection of a different site or PFT subset). This data science workshop will be of interest to land surface modelers and other ESA attendees who want to characterize the functional makeup of their study systems at a fine spatial scale. Basic familiarity with coding is required for participation in this workshop. The workflow uses both R and python. Contributors : Anna Spiers (Alaska CASC) When : Tuesday, July 28 | 1:30 – 3:00 PM

Social Events Connecting with CAS: the Climate Adaptation Section Mixer This

event is designed as a social gathering to foster connections among ecologists interested in climate adaptation. It provides an informal space for attendees to meet, share experiences, and build new professional relationships within the field. The session will be accessible to all ecologists attending the meeting, regardless of their specific background or expertise. Contributors : Toni Lyn Morelli (Northeast CASC), Laura Thompson (National CASC) When : Tuesday, July 28 | 6:30-8:00 PM

Southeast Chapter Social This is a casual time for networking, socializing, sharing news and events, and planning for the chapter's future. Feel free to bring folks who are not chapter members. Contributor : Sarah Love (Northeast CASC) When : Tuesday, July 28 | 12:00 - 1:00 PM

NSF launches Project Triad to advance quantum technology for real-world applications

NSF News NSF launches Project Triad to advance quantum technology for real-world applications First-of-its-kind initiative will integrate quantum sensing, networking and computing into a single operational system to strengthen American economic competitiveness and national security July 7, 2026 The U.S. National Science Foundation today announced Project Triad, a first-of-its-kind initiative to integrate quantum sensing, quantum networking and quantum computing into a single operational system. By bringing these three capabilities together for the first time, Project Triad will move quantum technology out of the lab and into real-world use — with applications spanning safety, healthcare, energy, manufacturing and more. The initiative will lay the scientific and technological foundation needed to refine, scale and commercialize these systems through U.S. industry, strengthening American economic competitiveness, national security and quality of life. "NSF Project Triad will unite the research enterprise to advance the administration's vision, ensuring public investments translate into strategic advantages in quantum technology for all Americans," said Brian Stone, performing the duties of the NSF director. "Project Triad, in alignment with the executive order 'Ushering in the Next Frontier of Quantum Innovation ,' continues NSF's leading role in advancing innovation that improves American prosperity,

quality of life, national security and creates jobs for American workers." Quantum technologies make use of quantum properties (such as entanglement and superposition) found in particles of matter and energy, like atoms and photons. This allows quantum sensors to detect finer details and quantum computers to potentially solve problems that would otherwise take years, or even centuries, to tackle. Combining quantum sensors, networks and computers in integrated quantum systems opens a new frontier of possibilities: Navigation and secure communications for first responders and military personnel operating in areas without access to GPS or other satellites. Detecting underground oil, gas and mineral deposits with less exploratory drilling. Precise medical imaging and diagnostic data to produce individually tailored medicines that effectively treat a range of illnesses. "Achieving Project Triad will require exceptional fundamental scientific work alongside translational research to utilize quantum data to its utmost," says NSF Chief Science Officer Simon Malcomber. Quantum technology is advancing fast globally, and the U.S. needs to move quickly, but also smartly. Project Triad takes a systematic approach to identifying which quantum breakthroughs are ready to scale, cutting the ones that aren't, and accelerating the most promising ideas from lab to market. It does this through three interlocking programs that bring together government, universities and private industry — making it the first effort to build a fully integrated quantum environment in the United States. NSF National Quantum Virtual Laboratory (NSF NQVL) will deliver Project Triad's proof-of-concept integrated quantum system

for experimentation and testing. Currently in the design phase, NSF plans to accelerate several NSF NQVL projects from design to implementation by December 2026 (pending funding availability). NSF X-Labs are independent teams of researchers, engineers and entrepreneurs pursuing milestone-based federal funding to solve specific scientific challenges, including quantum systems involving interconnects and photonics. Such technology will play a critical part in enabling integrated quantum systems to transfer quantum information between devices. NSF Quantum+X will work directly with industry to identify promising use cases and potential applications for integrated quantum technology. NSF is now actively seeking partnerships for the launch of an initial set of NSF Quantum+X funding tracks that could span the energy, finance, biotechnology and pharmaceutical sectors, among others. Project Triad draws on NSF's existing portfolio of quantum research programs — including its network of specialized institutes, engineering centers and national research infrastructure — giving Triad access to the latest findings and discoveries for real-world testing within the integrated quantum system. These programs also train the next generation of quantum scientists and engineers, ensuring the workforce is ready to build on what Project Triad delivers. Project Triad is creating strategic advantages for America by integrating three powerful quantum technologies. Learn more about Project Triad. Research areas Directorate for Mathematical and Physical Sciences (MPS) Directorate for Technology, Innovation and Partnerships (TIP) Directorate for Biological Sciences (BIO) Directorate for Computer

and Information Science and Engineering (CISE) Directorate for STEM
Education (EDU) Directorate for Engineering (ENG) Office of
International Science and Engineering (OD/OISE)

Activity Time - Word Search

Find the words below in the puzzle. Words go across or down only.

Words to Find:

