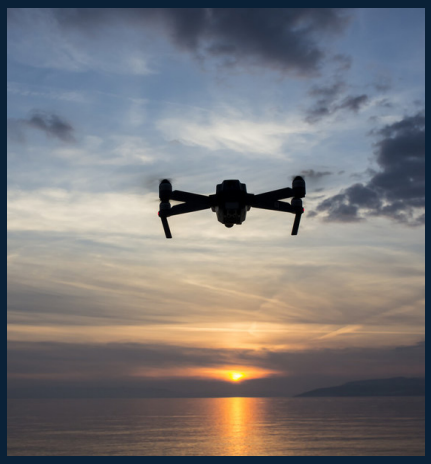
CENTER FOR INTEGRATED TRANSPORTATION

FY23 ANNUAL REPORT



MITRE | SOLVING PROBLEMS FOR A SAFER WORLD®

Center for Integrated Transportation

Center for Integrated Transportation

FY23 Annual Report


Center for Integrated Transportation

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INTRODUCTION

Strengthening MITRE's Transportation Impact

In 2023, MITRE established the Center for Integrated Transportation (CIT) to better integrate new opportunities in the transportation sector. CIT reflects MITRE's broader transportation mission and serves as an umbrella for MITRE's work across transportation, including aviation, surface, and rail. Within CIT, MITRE operates the Center for Advanced Aviation System Development (CAASD), which has served as the Federal Aviation Administration's (FAA) research and development center for over 60 years. The Center also encompasses transportation projects beyond aviation, including work for the broader U.S. Department of Transportation (DOT) and state and local governments, as well as internally funded research to address emerging surface transportation challenges.

CIT's creation is the result of the increasingly diverse work on which MITRE has embarked in the transportation arena in recent years—from exploring ways to better harmonize aviation operations globally to addressing new vehicle types, increasing automation, and new cybersecurity concerns in the aviation, rail, and automotive domains. The need for a more efficient, resilient, and integrated transportation ecosystem, especially given the impact of COVID-19 and supply chain interruptions, spawned recognition that the world needs a more efficient, resilient, and integrated transportation ecosystem—one that puts people first. CIT works closely with the MITRE's Integrated Systems Innovation Center and other partners in cross-cutting domains to meet evolving transportation needs.

> We see enormous benefits in expanding our surface and intelligent transportation systems work to ensure seamless integration with the work we do in aerospace and aviation, all of which will benefit our FAA sponsor and the broader transportation community.
>
> *Kerry Buckley, Ph.D.*
> *Vice President & Director*
> *Center for Integrated Transportation*

Staying True to Our Aviation Roots

As outlined in the FAA's report, The Economic Impact of U.S. Civil Aviation: 2020, all civil aviation activity, across both the direct and catalytic sectors, amounts to 2.3 percent of U.S. gross domestic product (GDP), and generated $0.9 trillion in total economic activity and supported 4.9 million jobs. As transportation systems evolve and expand to include multiple modes on the surface and into space, CAASD has broadened its capabilities to prepare for these future challenges. CAASD works in conjunction with other MITRE federally funded research and development centers (FFRDC) to bring knowledge and sponsor relationships to bear on the toughest cross-domain, cross-government challenges.

MITRE has worked with the FAA to improve U.S. and global air transportation systems since 1959, when the FAA replaced the Civil Aeronautics Administration. In 1990, the FAA formalized our partnership and established its FFRDC to perform the advanced research and development needed to modernize the National Airspace System (NAS). As an FFRDC, CAASD provides the FAA with advanced scientific and engineering technical capabilities in areas such as systems engineering, mathematics, and computer science. CAASD applies in-depth aviation domain knowledge of air traffic management (ATM), airspace operations, and uncrewed aircraft while partnering with aviation stakeholders relevant to the NAS and global aerospace operations.

As an independent organization, CAASD provides objective analyses and recommendations. It is an essential FAA resource because of its in-depth ATM operational knowledge, institutional memory, and extensive analysis capabilities developed over many years of FAA support. Such long-term relationships are a hallmark of FFRDCs—enabling extensive knowledge and capability development that could not be as effectively created or applied through competitive procurement. This combined knowledge and capability enables CAASD to address difficult issues that require multiple disciplines, special studies, and functional specialties and that are too broad or complex for other organizations to address in a manner as timely or as cost-effectively.

Adding Value and Impact to a Significant Economic Driver

In 2022, the demand for transportation ($2.3 trillion) accounted for nine percent of the U.S. GDP.[2] With CIT's deep technical expertise, cross-government work program, and partnerships with aerospace and transportation industries, we are uniquely positioned to address that demand. To create stronger, more formal connections with government, industry, and research partners, it is imperative that we grow our work and demonstrate impact with the DOT, international air navigation service providers, and the transportation community at large. The next section highlights CIT's fiscal year 2023 (FY23) mission accomplishments and impact, as well as a look ahead to 2024 and beyond.

The following sections address various themes related to the advancement of transportation technology and safety measures. These include the integration of new technologies like artificial intelligence (AI) and machine learning (ML), the development of new safety management strategies, the modernization of transportation infrastructure, and the implementation of new safety regulations. Inside, we also discuss the challenges faced in these areas, such as the need for improved data analysis tools, more efficient safety monitoring systems, and more effective collaboration between stakeholders in the transportation industry.

[1] The Economic Impact of U.S. Civil Aviation: 2020, Federal Aviation Administration, Washington, DC, August 2022

[2] Bureau of Transportation Statistics, Contribution of Transportation to the Economy: Final Demand Attributed to Transportation, 2022 Year in Review, https://data.bts.gov/stories/s/Transportation-Economic-Trends-Contribution-of-Tra/pgc3-e7j9/#:~:text=2022%20Year%2Din%2DReview,demand%20for%20transportation%20in%202022, Accessed March 8, 2024

MISSION IMPACT

Delivering the Data-Driven Solutions that Make the World's Transportation Safer

NAS CONCEPT OF OPERATIONS, ARCHITECTURE, AND INTEGRATION

Connected Aircraft

In 2022, the FAA outlined its vision for an Info-Centric NAS, highlighting the role of the connected aircraft (CA) concept in enhancing operations, infrastructure, and integrated safety management.

CHALLENGE: The FAA's vision necessitates ubiquitous flight deck connectivity, making the CA crucial. However, the current aviation spectrum's bandwidth constraints hinder adaptation to future needs. The CA overcomes this by using existing commercial spectrum, networks, and infrastructure, providing additional bandwidth without significant FAA capital investments. The CA enables cost-effective, scalable data exchange from the flight deck to ground systems, a process that is currently expensive and limited in Europe.

SOLUTION: CAASD collaborated with the FAA, its partners, and International Civil Aviation Organization (ICAO) expert groups to finalize the CA concept. CAASD also investigated potential human factor issues arising from CA implementation and continued to explore the use of the CA to provide trajectory data to ground-based ATM applications.

IMPACT: In 2023, the FAA used CAASD's analysis results to define the CA concept and its use within the NAS. The CA was demonstrated in a live flight as part of the Multi-Regional Trajectory-Based Operations (TBO) project, gaining international media exposure.

LOOKING AHEAD: The FAA will continue to validate the CA concept and further specify the exchange of aircraft-derived trajectory information through the CA. An evaluation of the CA for sharing aircraft-derived data is planned for summer 2024, which will also explore how such sharing might integrate with flight information sharing services.

ATM OPERATIONAL EVOLUTION

Complex Data Integration

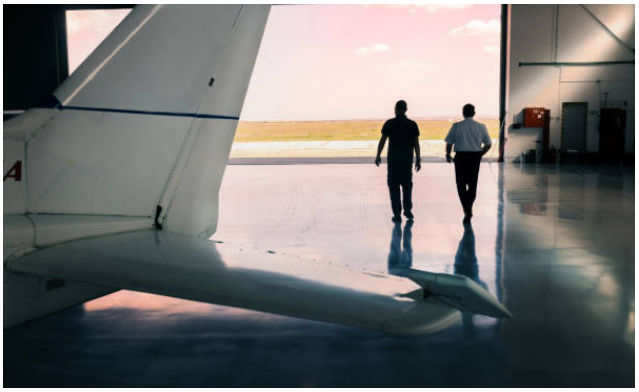
The FAA oversees various aspects of aviation performance data, including its collection, processing, preservation, and dissemination.

CHALLENGE: The growing volume and complexity of data require constant monitoring to maintain an enterprise-level data warehouse. The FAA, as an authoritative source for aviation data, must ensure the highest data quality and availability for all stakeholders. This necessitates a scalable and comprehensive data quality control plan and toolkit for proactive issue detection and mitigation.

SOLUTION: CAASD implemented a systematic, scalable data quality governance framework to help the FAA proactively detect and address data quality issues. This framework includes data quality algorithms, a platform for storing data quality issue history, communication and alerting mechanisms, and integration support for various database engines and automated processes using AI and ML.

IMPACT: This research developed a vision for the FAA's future data quality control and a systematic framework that effectively manages data throughout its lifecycle. The framework combines business-driven strategies and technical perspectives to deliver high-quality data solutions. By fully utilizing this framework, the FAA can offer a quality-controlled collection of NAS performance data, facilitating informed decision making and data sharing among organizations.

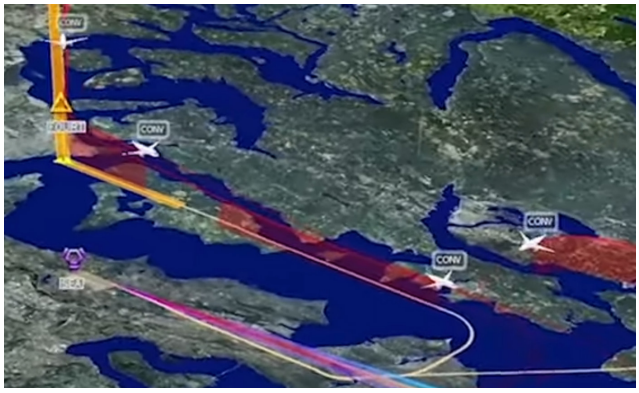
LOOKING AHEAD: The data quality governance framework is crucial to the FAA's mission of ensuring safety and efficiency in the aviation industry. CAASD will continue to help the FAA maintain and enhance the framework, adapting to the changing landscape of aviation data and technology. Future improvements may include rehosting the framework in a cloud environment, transitioning to real-time monitoring using advanced ML-based algorithms, and applying the framework to the FAA's Enterprise Information Management (EIM) environment.



AIRSPACE AND PERFORMANCE-BASED NAVIGATION

Airspace Modernization Roadmap

The FAA continually updates and modernizes its airspace services and infrastructure to enhance safety and efficiency while safely integrating new users and technologies into the NAS.



CHALLENGE: With the Metroplex program having ended in FY22 and new operations emerging, the FAA needs to develop integrated plans for airspace modernization. The FAA is collaborating with CAASD to create an Airspace Modernization Roadmap (AMR) for informed, agile, and data-driven decision making.

SOLUTION: CAASD partnered with the FAA on various Roadmap-related activities in FY23. CAASD refined the AMR Standard Operating Procedures (SOP) and developed a Reportable, Accountable, Supported, Consulted, Informed (RASCI) Matrix to clarify roles in airspace modernization. CAASD also used lessons learned from the initial AMR site selection to refine metrics and improve result presentation. Additionally, CAASD worked with the FAA on site-specific activities, including refining initial scope, schedule, and cost estimates.

IMPACT: While AMR activities are just starting, CAASD has positioned the FAA for success by leveraging prior airspace and instrument flight procedure (IFP) experience to develop a robust process, conducting analyses for data-driven decision making, and preparing the FAA to initiate well-planned projects in FY24.

LOOKING AHEAD: In FY24, CAASD will work with the FAA to refine the scope of initial projects and initiate work at those sites as funding permits. CAASD will continue to partner with FAA's Mission Support Services Airspace Modernization Group and the Service Center execution teams throughout the project lifecycle. CAASD will empower the FAA to act strategically to realize its airspace modernization potential and ensure the AMR evolves to help the FAA progress toward an Info-Centric NAS.

SAFETY AND TRAINING

Runway Safety Call to Action

In 2023, following several Category A/B runway incursions, the FAA Administrator called for a Safety Call to Action. This led to a safety summit at MITRE's headquarters in McLean, Virginia, involving pilots, controllers, unions, and airlines.

CHALLENGE: The FAA asked CAASD to assess data and existing metrics to answer questions about NAS operations, safety data trends, and recommended metrics for active safety monitoring of runway operations. The perceived increase in Category A/B runway incursions in early 2023 required CAASD to quickly analyze extensive safety data and provide recommendations.

SOLUTION: CAASD collaborated with FAA executives to provide quantitative analysis results, informing the Administrator about the current state of system safety across the NAS. CAASD also prepared material for Congress on the state of the NAS and participated in industry-wide forums, including the Safety Summit and the National Transportation Safety Board (NTSB) Roundtable on Runway Safety.

IMPACT: CAASD's analysis led to recommendations for re-evaluating Commercial Aviation Safety Team (CAST) and FAA safety metrics, enhancing NAS instrumentation and aligning core and precursor metrics for active NAS risk monitoring. The March 2023 FAA Safety Summit highlighted three major themes: system design and measurement, people and safety management, and instrumenting the NAS. The NTSB's Runway Safety Summit in May 2023 also highlighted several themes, including staffing levels, training, surface surveillance/situational awareness, and trust between airlines/operators and the FAA.

LOOKING AHEAD: In FY24, CAASD will continue to work with the FAA on addressing staffing challenges, enhancing training effectiveness, assessing technology solution readiness for surface surveillance and cognitive assistants, and promoting holistic analysis and data sharing.

CAASD's analysis led to recommendations for re-evaluating safety metrics, enhancing NAS instrumentation and aligning core and precursor metrics for active NAS risk monitoring.

COMMUNICATIONS, NAVIGATION, SURVEILLANCE, AND CYBERSECURITY INFRASTRUCTURE

Enterprise Architecture Products to Support Internet Protocol Suite

The introduction of air/ground Data Communications (Data Comm) for ATM Safety Services is one of the largest and most complex programs in the NextGen portfolio.

CHALLENGE: The FAA, aircraft operators, manufacturers, and aviation communication service providers need to synchronize their joint investments to implement Data Comm capabilities.

SOLUTION: CAASD leveraged its extensive expertise in policy, operations, economics, and technology to develop a Data Comm Services Roadmap and a companion Data Comm Infrastructure Roadmap. These roadmaps, informed by emerging opportunities, anticipated offerings, and international collaboration, outline the prospective evolution of Data Comm services and technologies.

IMPACT: The FAA is disseminating the Data Comm Services and Infrastructure Roadmaps to a broad audience to guide synchronized investment decisions.

LOOKING AHEAD: CAASD will continue working with the FAA to share the roadmaps with stakeholders and adapt them as needed.

CAASD developed roadmaps outlining the prospective evolution of Data Comm services and technologies.

UNCREWED AIRCRAFT SYSTEMS

UAS Collision Risk

Uncrewed aircraft systems (UAS) operations are growing rapidly, outpacing the development of necessary rules and standards for their integration into the NAS. A key concern is the collision risk UAS integration poses to existing crewed aircraft operations.

CHALLENGE: The FAA needs a data-driven, quantifiable risk assessment capability in a user-friendly decision support tool to aid FAA safety panels and waiver analysts in integration decision making.

SOLUTION: CAASD developed the UAS Risk Assessment Automated Tool, incorporating established safety management system (SMS) principles while assessing the collision risk of a proposed UAS operation. The tool simplifies the risk assessment process, improves collision risk estimations, and facilitates appropriate mitigations. It has been used by FAA lines of business (AJI, AFS, and AUS) to inform safety panel decisions for real-world UAS operations. Further collaborative development with the FAA is needed to fully realize the tool's potential.

IMPACT: CAASD's risk assessment capability significantly reduces the burden on FAA safety panels in determining the collision risk of integrating a proposed UAS operation into the NAS. In 2023, the FAA used this capability to evaluate the integration of UAS into complex airspace environments.

LOOKING AHEAD: CAASD is actively working with key FAA lines of business to secure funding for continued technical development of the UAS risk assessment process and to further expand its exposure.

SPECIAL STUDIES, LABORATORY, AND DATA ENHANCEMENTS

Transportation Data Platform

MITRE created the Transportation Data Platform (TDP) to offer an integrated ecosystem of data, analysis tools, and expertise to address critical transportation issues.

CHALLENGE: Transportation systems generate large, complex datasets. While valuable for evidence-based decision making, stakeholders often struggle to extract, process, connect, and apply this data for meaningful insights. Historical data may not suffice for today's challenges, as stakeholders need near-real-time information and predictive models for complex transportation systems.

SOLUTION: TDP uses advanced methods and tools to understand current operations, monitor systems and events, infer event relationships, and predict change effectiveness. It produces more than 100 interrelated analytics daily, reflecting NAS operations over the past 13 years. TDP recently introduced near-real-time streaming analytics and AI/ML model workflows, enhancing FAA published data services with additional context and derived information.

IMPACT: TDP provides a comprehensive ecosystem for users to answer complex research questions, build data-intensive applications, and create AI/ML models for transportation research. Hundreds of CAASD products have utilized TDP, and MITRE's Collaborative Research Environment (CRE) has enabled the FAA, its partners, and aviation stakeholders to access the TDP ecosystem for their research and decision making. CAASD and the FAA's EIM team are working to efficiently transfer TDP data into EIM for agency operational use.

LOOKING AHEAD: As CRE usage grows, TDP is transitioning its operations to a cloud environment to effectively facilitate collaborative research across the transportation stakeholder community. TDP also aims to share data assets more broadly with the transportation research community by leveraging publicly available data sources and MITRE's transportation analytic expertise.

GLOBAL IMPACT

With FAA approval, MITRE works with international air navigation service providers to share and apply lessons learned, knowledge, and best practices. Highlights from 2023 include:

Grupo Aeroportuario del Pacífico: MITRE is exploring ways to increase operational capacity at Mexico's western airports, including Guadalajara, Puerto Vallarta, San José del Cabo, and Tijuana. We're also assisting with the siting of a new executive aircraft airport in the Puerto Vallarta area.

Yokelet: MITRE is redesigning Buenos Aires' airspace, introducing an advanced air traffic controller trainer at Ezeiza Airport, and modernizing air traffic control in Yerevan, Armenia.

South Korea Advanced Air Mobility (AAM): In partnership with South Korea's Institute for Aerospace Industry-Academia Collaboration, MITRE developed an AAM concept of operations (CONOPS) for Incheon Metropolitan City, which could serve as a model for other cities worldwide.

MITRE Asia Pacific Singapore: The August 2023 contract extension with the Civil Aviation Authority of Singapore will continue aviation research and development for the region for an additional five years.

Airways New Zealand Partnership: MITRE extended its partnership with Airways New Zealand International to further support Asia Pacific aviation development.

SURFACE TRANSPORTATION

Virtual Open Innovation Collaboration Environment for Safety

The Virtual Open Innovation Collaborative Environment for Safety (VOICES) provides a platform for surface transportation researchers and technology testers to collaborate.

Voices
Virtual Open Innovation
Collaborative Environment for Safety

CHALLENGE: Siloed transportation safety research and testing limit potential impact and slow progress. This issue arises from a lack of interoperability, a common research language, shared priority areas, and concerns about protecting proprietary data. The challenge affects various organizations, including original equipment manufacturers, infrastructure owners and operators, simulation tool suppliers, mobile network operators, researchers, advocacy groups, industry trade associations, policymakers, regulators, insurance providers, and stakeholders in other transportation modes, like aviation, rail, and maritime.

SOLUTION: MITRE collaborated with the transportation safety research community to create a Minimally Viable Product (MVP) Portal and Platform, enabling multiple organizations to connect their research and testing tools, environments, and systems. We also established a motivated governing board to sustain VOICES and built a community of enthusiastic cross-sector collaborators.

IMPACT: The VOICES MVP Platform has proven its ability to enable easy, fast, and low-cost interoperability of research and testing tools, environments, and systems.

LOOKING AHEAD: MITRE plans to work with the VOICES Governing Board to expand the use of the VOICES MVP Portal and Platform in 2024. We aim to inform transportation researchers about the VOICES capability and the successful 2023 demonstration. User expansion in 2024 will require training, onboarding, technical support, and further technology development.

Washington Metropolitan Area Transit Authority/ MITRE Partnership

The Washington Metropolitan Area Transit Authority (WMATA) operates a regional public transportation system in the national capital area. WMATA aims to become a transit agency leader in safety and has partnered with MITRE to advance its safety management system (SMS).

CHALLENGE: The Federal Transit Administration requires WMATA to develop a Public Transportation Agency Safety Plan (PTASP). WMATA's PTASP outlines its SMS implementation strategy, aligning key measures with the four pillars of the SMS framework: safety policy, safety risk management, safety assurance, and safety promotion. MITRE is advising WMATA on implementing SMS, leveraging our extensive aviation industry experience.

SOLUTION: In 2023, MITRE worked with WMATA to advance its SMS implementation. We developed a CONOPS for a new unified Voluntary Safety Reporting Program (VSRP) and created a transit taxonomy for classifying safety and security events. We also assessed and are developing a data management strategy for WMATA's safety data use.

IMPACT: WMATA is using the VSRP CONOPS to implement a new unified VSRP, a VSRP reporting tool, and operating procedures. The VSRP concept was developed in partnership with WMATA's Department of Safety and the Joint Labor and Management Safety Committee.

LOOKING AHEAD: WMATA plans to use the transit taxonomy to streamline risk management, enabling more consistent data interpretation, efficient data analysis, and timely discovery of emerging safety trends. The ongoing development of the data management strategy will allow WMATA to seamlessly monitor trends and the effectiveness of corrective actions and policies over time.

CIVIL-MILITARY INTEGRATION

Air Force CNS/ATM Digital Transformation

The Air Force Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) Center of Excellence (CoE) ensures U.S. Air Force (USAF) aircraft comply with civil airspace access requirements and are interoperable with commercial air traffic. MITRE supports the USAF CNS/ATM CoE by representing the organization in various standards bodies and distilling these standards—currently a library of 27 requirements documents shared with 50+ USAF aircraft mission design series (e.g., aircraft types) programs—into a set of consolidated requirements documents.

CHALLENGE: Previously, the 27 requirements documents were static, read-only Microsoft Excel files, known as Generic Performance Matrices (GPM). These GPMs were tailored for each aircraft mission design series (MDS) program and became Tailored Performance Matrices (TPM). However, when standards change during a cockpit avionics modernization program, there's no efficient way to determine the potential impact until the final airworthiness certification verification.

SOLUTION: In 2023, MITRE collaborated with a new MDS program and the USAF CNS/ATM CoE to convert the 27 GPMs from Microsoft Excel format to a Magic System-of-Systems Architect digital toolset. This toolset allows architecture-dependent requirements to be tied to the contractor's proposed solutions, ensuring consistency, as each domain is typically worked on by a different subject matter expert.

IMPACT: Maintaining TPMs in a digital engineering toolset is expected to expedite the requirements verification and airworthiness certification of the aircraft. Additionally, having the GPMs in a digital engineering toolset will enable the CNS/ATM CoE to identify potential impacts caused by standards or implementation guidance changes earlier in the acquisition process.

LOOKING AHEAD: In 2024 and beyond, MITRE plans to establish the process around the configuration management of the GPMs in the digital engineering environment. The team also plans to engage various standards bodies and regulatory entities to determine how the original standards documents could be directly ingested into the digital engineering toolset using system modeling language.

Air Force Weather Cloud Migration

Since 2019, MITRE has been aiding the Air Force Weather (AFW) enterprise in transitioning eight global data centers operating in five security environments. This transition involves a range of data collection and analysis tools and weather applications to consolidate and display data across strategic, operational, and tactical environments. The enterprise processes 80 terabytes (TB) of data daily, with 5 TB output at the unclassified level and an additional 5 TB moved to higher security levels. The data is updated at different rates, affecting everything from application data refresh rates to computational lifecycle costs.

CHALLENGE: In 2023, MITRE worked on identifying resiliency solutions, improving user interfaces, and enhancing user design and agile software development processes. The transition to the cloud environment allowed the enterprise to redesign existing applications. New user interfaces were developed to utilize data application programmer interfaces provided by the enterprise using Amazon Web Services. This posed a system-of-systems integration challenge, with numerous interfaces inside and outside the Department of Defense.

SOLUTION: MITRE introduced chaos engineering to enhance resiliency. This methodology improves resiliency by deliberately injecting failures into a system to identify and correct flaws. MITRE performed technical and market research to identify potential requirements and available tools. The transition to the cloud also allowed MITRE to introduce human-centered design (HCD) and agile software development practices. The MITRE team refined the Bridging environmental Intelligence for Responsive Operational Support (BIFROST) Portal, replacing AFW Web Services (AFW-WEBS) and other legacy weather products.

IMPACT: MITRE recommended the establishment of a laboratory chaos engineering capability to test existing implementation in a test/staging environment and develop necessary processes and procedures. The HCD efforts resulted in the BIFROST design team adopting a material user interface (MUI) design system that significantly speeds up design and development. MITRE refined the design system into a style guide consisting of only the components that BIFROST needs. MITRE also conducted user research and designed mockup features.

LOOKING AHEAD: MITRE will continue to support the AFW enterprise by enhancing the system's resiliency through further integration of chaos engineering and advanced storage technology. The AFW enterprise is shifting from team-driven to capability-driven, requiring a reassessment of the overall enterprise architectures and governance. This will continue to emphasize MITRE's efforts as the HCD product owner for weather mission impact services and tactical weather forecasting capabilities.

In support of the Air Force Weather enterprise, MITRE introduced the concept of chaos engineering as a path toward enhancing resiliency.


IMAX

INNOVATION AND ACCELERATION

MITRE's mission-focused, systems thinking approach is the foundation for the comprehensive and innovative solutions, tools, processes, and training we provide to our sponsors and public and private sector partners worldwide. Our work is powered by mission-focused domain experts across 16 MITRE Labs Innovation Centers and six FFRDCs.

MITRE Innovation Program

In addition to the FFRDC Mission-Oriented Investigation and Experimentation program, MITRE invests in research across aviation, aerospace, and surface transportation domains under the MITRE Innovation Program. MITRE seeks to build toward a safer and more efficient U.S. transportation system by addressing key issues that pose risks to that future.

MITRE Labs

MITRE offers a wide array of state-of-the-art physical and virtual laboratories that support modeling, simulation, analysis, and more across MITRE's FFRDC sponsor base and beyond.

In the transportation arena, the Integration Demonstration and Experimentation for Aeronautics (IDEA) Lab features human-in-the-loop simulations with pilots and air traffic controllers to test and refine new operational systems. The IDEA Lab can connect with other MITRE Labs, including the Mobile Autonomous Systems Experimentation Laboratory—which features autonomous vehicles and drones—as well as partner labs to provide a fully integrated simulation.

In 2023, MITRE added three new labs to its catalog:

- The Driver Research for Intelligent Vehicles and Environments (DRIVE) Lab, which offers a highly customizable virtual environment designed to simulate any type of vehicle and its driving capabilities—from conventional passenger cars with limited automation or assistance systems to highly autonomous ones—to help create a safer surface transportation environment.
- The MITRE Immersion Lab, where users can engineer virtual environments that support human-machine collaboration by engaging our senses, emotions, and cognition and enabling diverse stakeholders from anywhere to work in virtual/augmented reality to solve complex challenges.
- In November, MITRE officially opened the new BlueTech Lab at its Bedford, Massachusetts campus, supporting MITRE's expanding marine technology work to safeguard national, economic, and climate security. The lab features a 620,000-gallon test tank, one of the largest in the region, and at 106 feet, the longest. The test tank can accommodate the use of uncrewed undersea and surface vehicles in a large, controlled space and enables the study of communication and acoustic sensing.

PARTNERSHIPS AND ADVOCACY

To support and accelerate the adoption of new technologies and methods, MITRE partners with industry, academia, non-profits, stakeholder organizations, and government to diversify interactions and engagements and maintain an innovative edge.

Partnerships are formalized through non-disclosure agreements; memorandums of understanding; collaborative research agreements; or licenses for intellectual property that enable the broad set of stakeholders to mature new ideas, operationalize concepts or prototype capabilities, and ultimately deliver improved safety, efficiency, and access to airspace users.

A primary objective of MITRE's FFRDCs is to share findings with the broader community, associated government agencies, and members of industry. MITRE researchers are encouraged to publish key findings, participate in forums and panels, and ensure that they are collaboratively contributing to the broader body of knowledge that will move the transportation domain forward.

CIT participates in a broad range of aerospace and transportation conferences each year to both learn and share. Staff are frequent contributors to technical papers and presentations and are often invited to serve as subject matter experts on educational panels and plenary sessions. Key technical personnel are also regular keynote speakers.

FY23 CIT Conference Highlights

- American Institute of Aeronautics and Astronautics: ASCEND, AVIATION, and SciTech
- American Meteorological Society
- Association for Uncrewed Vehicle Systems International XPONENTIAL
- ATCA: Tech Symposium, Global Annual Conference
- Digital Avionics Systems Conference
- FAA Managers Association Convention
- Integrated Communications Navigation and Surveillance
- NATCA Communicating for Safety
- Transportation Research Board
- CANSO AirSpace World
- Society of Automotive Engineers Government-Industry Meeting
- American Public Transportation Association

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MITRE's mission-driven teams are dedicated to solving problems for a safer world. Through our public-private partnerships and federally funded R&D centers, we work across government and in partnership with industry to tackle challenges to the safety, stability, and well-being of our nation.

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