TRANSFORMING TRANSPORTATION

You can't hit pause on our nation's transportation systems to try out new technologies and procedures. MITRE's state-of-the-art Integration Demonstration and Experimentation for Aeronautics (IDEA) Lab is equipped with the components necessary to run complex simulations and experiments to solve the challenges the nation is facing in aerospace and other transportation related domains.

To enable improvements to today's global transportation and aerospace systems—and to envision the needs and possibilities for tomorrow—researchers and decision makers need an evaluation setting in which concepts can be quickly matured and vetted with key stakeholder groups. The IDEA Lab provides that setting.

The lab supplies a robust environment consisting of a comprehensive and composable system of sytems representation of the air traffic management system for rapid and iterative development and testing, concept refinement, human-in-the-loop experimentation, consensus building, and informed decision making—all done in a way that considers the full range of stakeholder perspectives.

MITRE

> "MITRE's IDEA Lab is where people, processes, and technologies come together to transform transportation."
>
> Dr. Kerry Buckley, Vice President
> Center for Integrated Transportation

Enabling Faster, Better-Informed Decision Making

The IDEA Lab enables informed decision making on new capabilities and approaches. In the lab, we test and refine concepts, evaluate industry capabilities, develop fieldable prototypes, and translate ideas into sets of requirements and procedures for implementation.

A key part of this process is frequent stakeholder involvement. These stakeholders include pilots, air traffic controllers, avionics manufacturers, Federal Aviation Administration decision makers, airports, airlines, commercial space operators, advanced air mobility organizations, standards organizations, academia, the public, the military, and other research organizations. The lab brings these decision makers and end users together to demonstrate future environments, prototype operational improvements, estimate benefits, assess alternatives, and build consensus.

Our human factors engineers work with sponsors and stakeholders to identify research questions and create experiments to answer them. Our software developers create simulations of existing and envisioned systems to enable users to evaluate new technologies and procedures. These teams work with industry subject matter experts to fine-tune the simulations into realistic representations of existing and future operational systems.

With user feedback from simulated operations, our engineers refine concepts and requirements, and then quickly re-test. This rapid iterative prototyping and evaluation environment leads to faster implementation of beneficial enhancements.

Integrating Assets for Multi-Faceted Experimentation

The lab offers a broad range of capabilities. Its assets—which include simulations of terminal and en route air traffic control operations, traffic flow management, tower operations, large transport flight decks, umanned aviation systems, advanced air mobility, rotorcraft, commercial space operations, and a general aviation cockpit—can be connected to create multi-domain, multi-actor simulations. The integration of these components enables simultaneous visualization of concepts from multiple stakeholder perspectives.

Supporting Far-Reaching Exploration

The IDEA Lab is not limited by its physical space. It reaches stakeholders and partners beyond its walls via mobile and cloud technologies. Additionally, most of the lab's assets are portable, and many have been transferred or deployed both domestically and internationally. The lab can also integrate with third-party assets into a seamless simulation environment for the exploration of complex system-of-systems interactions.

The lab's capabilities extend beyond aerospace, as well. Its integrated simulation technology can be adapted to other transportation-related environments and even non-transportation domains. Our engineering skills and lab assets are situated to rapidly respond to new mission objectives and emerging challenges from autonomous vehicle safety to charting tomorrow's info-centric National Aerospace System.

MITRE'S CONTRIBUTIONS TO AEROSPACE

- Traffic Collision Avoidance System (TCAS)
- User Request Evaluation Tool (URET)
- Automatic Dependent Surveillance-Broadcast (ADS-B)
- Universal Access Transceiver (UAT) Beacon Radio
- Terminal Area Route Generation and Traffic Simulation (TARGETS)
- Performance-Based Navigation (PBN)
- Aviation Safety Information Analysis and Sharing (ASIAS)
- Arrival Departure Window (ADW)
- Digital Copilot
- Pacer

Find out more about MITRE Labs.
Contact labs@mitre.org.

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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