



Integrated ATM Laboratory

To enable improvements to today's air traffic management systems, and to envision the needs and possibilities for tomorrow, analysts need an experimental setting in which concepts can be matured and vetted with key stakeholder groups. This environment must be robust enough to handle a range of exploratory concepts, and yet realistic enough to provide a quality user experience. It is with these needs in mind that The MITRE Corporation's Center for Advanced Aviation System Development (MITRE/CAASD) developed its Integrated Air Traffic Management (ATM) Laboratory. The Integrated ATM Laboratory is an extensible, scalable, real-time distributed simulation environment based on an open, layered architecture. It brings together a broad set of integrated air traffic management capabilities for human-in-the-loop simulation and visualization.

Enabling Faster, Better-Informed Decision Making.

In MITRE/CAASD's Integrated ATM Laboratory, pilots, controllers, airlines and other key stakeholders can work with and view simulated concepts individually, side-by-side or in an integrated, end-to-end fashion. The lab provides an environment for all parties to share the experience of a proposed concept change, discuss their concerns on workload, communication, safety, roles and responsibilities, and other topics. Because this allows them to come to an agreement more quickly through visualization, iterative changes and evaluations, it can lead to faster implementation of beneficial enhancements.

Fully Integrated Technology for Far Reaching Results.

The Integrated ATM Laboratory offers a broad range of integrated capabilities:

- Cockpit Simulation: A medium-fidelity re-configurable fixed-base cockpit simulator coupled to an out-the-window visualization system with a 124 degree field of view.
- En Route Simulation: An air traffic control simulation capability that provides a sector suite configuration and interactive sim-pilots. The sector suite configuration includes emulated radar displays, strategic planning and decision-support tools including a conflict detection, trial planning and flight information management through the User Request Evaluation Tool (URET). The en route simulation capability can simulate any number of sectors across the country with current or future airspace adaptation.
- Terminal Simulation: A TRACON simulation capable of simulating a variety of current and future operating environments including the ARTS/3E or Common ARTS radar displays. This simulation capability also includes sim-pilot capabilities.
- Tower Simulation: A tower simulation capability that includes a BRITE display and provides surface movement of aircraft. This capability can also be used to look at future airport configurations.
- Traffic Flow Management: The Collaborative Routing Coordination Tool is a high-fidelity prototype of an integrated collection of traffic management automation functions.
- Portable Aviation Visualization Environment: A 3-D Visualization environment that is used in conjunction with the cockpit simulation, tower simulation or separately to provide visual representation of physical and abstract concepts.

Integrated Simulation Testing Leads to ATM Advances.

Working in the Integrated ATM Laboratory together with the Federal Aviation Administration, National Air Traffic Controller's Association, Air Line Pilots Association, civil aviation authorities of various countries, and other organizations, MITRE/CAASD has helped improve ATM systems in a number of key areas, including:

- Runway safety initiatives
- Airspace redesign
- Traffic Flow Management
- Enroute Decision Support Systems
- Applications of the Automatic Dependent Surveillance-Broadcast/Cockpit Display of Traffic Information (ADS-B/CDTI) to procedural applications
- Airport/Runway Siting

Towards Global ATM Integration. One of the newest capabilities added to CAASD's Integrated ATM Laboratory is a real-time ATM simulation network using standard internet technology, called AviationSimNet. AviationSimNet enables ATM simulation labs anywhere on the global internet to integrate and work together simultaneously. Developed by MITRE/CAASD and implemented across the aviation community, this capability facilitates worldwide collaboration of real-time human-in-the-loop ATM simulation.

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