

SERVICES

- Provides a focal point for planning, developing, managing, and conducting National Airspace System (NAS) human-in-the-loop (HITL) simulations to test and evaluate innovations, advanced concepts, and solutions.
- Provides a focal point for planning, developing, managing, and conducting NAS fast-time modeling and simulation to test and evaluate innovations, advanced concepts, and solutions.
- Participates in research, both domestic and foreign, to develop innovations, advanced concepts, and solutions through cooperative agreements.
- Conducts human factors research as requested by an FAA office or service. Conducts analyses to determine relative impacts of man/machine error, workload capacity, human performance, communications, proficiency, and system design.
- Conducts modeling and simulation research as requested by an FAA office or service.
- Participates in the validation and testing of modeling and simulation tools.
- Conducts analyses leading to the development of air traffic system performance measures, criteria, and standards. Applies results to forecasted traffic scenarios to determine required ATC system improvements in domestic and international airspace.
- Develops or translates advanced aviation concepts into analytical and logical models for analysis, testing, and validation. Analyses result in criteria for system factors such as safety and capacity, controller and pilot workload and performance, and cost/benefit in the overall aviation system.
- Performs the accuracy testing of the operational implementation of Decision Support Tools.
- Develops scenarios based on recorded air traffic data for the testing and evaluation of both existing ATC systems and advanced ATC concepts.



Air Traffic Controllers monitoring simulated sectors in an En Route Lab.

Simulation & Analysis

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Simulation and Analysis



U.S. Department of Transportation



Federal Aviation
Administration

Simulation & Analysis



MISSION STATEMENT

The mission of the Simulation and Analysis Group, is to conduct research to validate new aviation concepts, technologies, and system capacity issues and to evaluate the performance of both emerging and existing systems within the National Aviation System (NAS). The research utilizes a variety of engineering and scientific disciplines such as modeling, rapid prototyping, fast-time simulation, applied statistical methods, object oriented programming, and real time human-in-the-loop simulation techniques. The Group adheres to a system engineering validation process to assess the operational and technical feasibility of proposed system changes to the NAS concept of operations. Products resulting from efforts are used in support of investment decision making for NAS modernization.



Air Traffic Controller in Target Generation Facility (TGF) Lab

Fast- Time Simulation

The Simulation and Analysis Group has an array of state-of-the-art fast-time simulation capabilities used to support concept validation. The following fast-time tools are used as a precursor to performing real-time HITL simulations and post-analysis after real-time HITL simulations:

AERLIB - is designed to meet both the R&D prototyping and operational implementation requirements.



AWSIM®

AWSIM® is a suite of trajectory, simulation, conflict prediction, conflict resolution and metric tools that can perform a wide range of air traffic simulation and evaluation task

NASPAC - refers to an integrated set of computer program modules designed to model the entire National Airspace System, the en-route structure and traffic flows, as a network of inter-related components, reflecting the effects of weather conditions, air-traffic control procedures, and air-carrier operating practices.

RAMS™ is a fast-time discrete-event simulation software package providing functionality for the study and analysis of airspace structures, Air Traffic Control (ATC) systems and future ATC concepts.

SDAT - is intended to provide the airspace designer with a fast, easy, and accurate way to develop and evaluate proposed changes to airspace structure and/or traffic loading.

SIMMOD - is intended to provide the airspace designer with a fast, easy, and accurate way to develop and evaluate proposed changes to airspace structure and/or traffic loading.

Human-In-The-Loop Simulation

If a study requires an understanding of the role of or impact to the human operator in a current or future aviation system, the Simulation and Analysis Group can perform HITL simulations to address the research questions. If the study requires a high level of fidelity, a large scale distributed network of NAS laboratories and facilities exist to support the simulations. This end-to-end capability allows for research to be conducted on operators across the NAS from air traffic control, technical operations, and flight deck perspectives. HITL simulations provide an unparalleled environment for evaluating concepts, procedures, and technology, and their impacts on human performance.

Accuracy Testing

Within the Simulation and Analysis Group, the Conflict Probe Assessment Team (CPAT) is chartered to evaluate the accuracy of the conflict probes found in Decision Support Tools. CPAT has measured the conflict prediction accuracy of the User Request Evaluation Tool (URET), measured the trajectory modeling accuracy of both the URET and the Center TRACON Automation System (CTAS), assisted in the accuracy testing of the URET Current Capability Limited Deployment (CCLD), which is the operation implementation of the URET, and has been involved with the regression testing of the URET as it has been deployed throughout the National Airspace System (NAS). As a result of both the individual and team expertise and the suite of software tools created through these activities, CPAT is leading an effort to develop metrics for testing the accuracy of the En Route Automation Modernization (ERAM) system, which is the replacement system for modernization of the NAS.