

## NAS Advanced Concepts Branch, ACT-540

**The NAS Advanced Concepts Branch conducts applied research to validate new aviation concepts, technologies, and procedures using state-of-the-art modeling, rapid prototyping, and real-time human-in-the-loop simulation techniques. The Branch adheres to a system engineering validation process to assess the operational and technical feasibility of proposed system changes. Products resultant of the research efforts are used to support the investment and implementation decision-making process for NAS modernization.**

Primary sponsors of the work performed include:

Air Traffic Service (ATS)

- Office of System Capacity (ASC-1)
- Air Traffic Operations Planning Division (ATO-400)

Office of Research Acquisition (ARA)

- Architecture and System Engineering (ASD-100)

### **Modeling and Simulation Studies**

#### **Operational Concept Development and Validation**

Operational concept validation studies are conducted to provide the necessary data for NAS designers, developers, and operational personnel to make decisions regarding operational procedures, training, and systems required to support improvements in system safety, capacity, and efficiency. Issues associated with pilot and controller workload, roles and

responsibilities, equipment usability, and overall system efficiency due to planned changes are evaluated.

#### **Airport and Airspace Capacity**

Airport and airspace capacity studies are conducted to evaluate planned improvements and provide recommendations to enhance existing airport and airspace capacity, accommodate future forecasted traffic demand, decrease delays, and improve overall airport efficiency.

#### **Procedural Development**

Procedural development, human-in-the-loop (HITL) simulation studies are conducted to assist operational personnel in assessing the impact of planned system changes on the human operator. These changes are evaluated in terms of safety, considering the capabilities and limitations of the human operator (pilots, controllers, etc.).

#### **Modeling and Simulation Infrastructure**

The William J. Hughes Technical Center has an array of state-of-the-art "fast time" and "real-time" simulation capabilities to support the studies conducted under the auspices of the NAS Advanced Concepts Branch. To the extent possible and based on the objectives of a particular study, the following fast-time modeling tools are used as a precursor to performing real-time human-in-the-loop simulations:

- National Airspace System Performance Analysis Capability (NASPAC)
- Airport and Airspace Delay Simulation Model (SIMMOD)
- Airport Delay Simulation Model (ADSIM)
- Runway Delay Simulation Model (RDSIM)
- Runway Capacity Model

Efficiency  
System



If the study requires a higher level of fidelity, a large-scale distributed network of NAS laboratories and facilities exist to support the real-time HITL simulations. These laboratories and facilities include:

- Enroute System Support Facility
- Terminal System Support Facility
- Integration & Interoperability Facility
- Simulation Display Laboratory
- Research Development and Human Factors Laboratory (RDHFL)
- NASA Ames Cockpit Simulators

Additional information can be obtained by contacting:

ACT-540  
Federal Aviation Administration  
William J. Hughes Technical Center  
Atlantic City International Airport, NJ 08405  
Phone: (609) 485-4751  
<http://www.tc.faa.gov>

System Efficiency