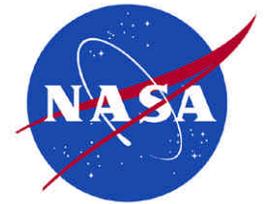


FactSheet

National Aeronautics and Space Administration

Ames Research Center
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VIRTUAL AIRSPACE MODELING AND SIMULATION (VAMS)

The VAMS Project: Building the foundations required to define and assess the next-generation air transportation system



Overview

The current National Airspace System (NAS) is on the verge of insufficient capacity and will not be able to accommodate the projected growth in air transportation operations, passenger enplanements, and cargo carrying demand of the next 15-25 years. In order to meet anticipated airspace system capacity demand, alleviate flight delays, and improve the air traffic management system of the future, NASA is working in cooperation with the FAA to explore and define revolutionary changes in airspace operations.

An integral element of the NASA Airspace Systems Program is the Virtual Airspace Modeling and Simulation (VAMS) Project, a research and development effort committed to building the foundations required to define and assess the next-generation air transportation system. An objective of the VAMS Project is to explore advanced operational air traffic management (ATM) concepts and associated technology roadmaps that will result in a significant enhancement in airspace system capacity, while maintaining safety and affordability. It will also provide a consistent framework for the evaluation of research investments in new technologies or infrastructure. To conduct this exploration, the VAMS Project is developing a national airspace modeling and simulation capability that will enable comprehensive evaluation and

assessment of the system-wide effects of new air transportation concepts. These efforts will support research and analysis of improvements in the nation's air transportation infrastructure, continued growth in the air transportation system, and growth in the national economy and aerospace industry.

VAMS Project Teams

The VAMS Project is divided into three elements or sub-projects that each deal with a specific portion of the overall development process: System Level Integrated Concepts (SLIC), Virtual Airspace Simulation Technologies (VAST), and System Evaluation and Assessment (SEA).

The SLIC element supports the VAMS Project by managing the air transportation concepts exploration effort. SLIC is supporting development of capacity-increasing airspace system concepts and technology roadmaps from various sources, including industry, NASA, and academia. These concepts extend to 2025 and address distinct operating domains of the NAS. Concept proposals include redefinition of airspace sectors and domains, improved integration of airspace operations, point-to-point travel using regional airports, automated surface traffic control, autonomous control in

the terminal domain, advanced automation/weather information integration, and modification of standards.

The VAST sub-project of VAMS is developing both a non-real-time modeling environment for system-wide assessments and a real-time modeling environment for specific human-in-the-loop assessments. The Airspace Concept Evaluation System (ACES) is a non-real-time simulation environment composed of interoperable models representing the gate-to-gate actions and highly coupled interactions between key participants within the NAS. The real-time simulation environment being developed by VAST is composed of software models and human interfaces integrated with a network of human-in-the-loop facilities, providing an environment for high-fidelity human performance and human factors studies.

The SEA element is responsible for the identification, development, and oversight of the common scenario sets, methods, and metrics used within the VAMS Project for assessment of the proposed air transportation concepts being developed by SLIC and of the modeling and simulation tools being developed by VAST.

Specific Objectives

- Define and assess system-level air transportation concepts that reach out to 2025.
 - Solicit, collect, and describe a set of system-level operational concepts, concepts of use, and architectures that provide detailed definitions of future (2010-2025) air transportation systems.
- Prepare Technology Roadmaps for selected concepts.
 - Address research paths, risks, and potential challenges for introducing selected concepts into the NAS.
- Develop the capability to model and simulate behavior of these concepts and prepare assessments of selected concepts.
 - Develop a set of analytical and computational models and methods to conduct detailed assessments of operational concepts.
 - Create a simulation environment that will enable safe investigation of advanced air transportation concepts and develop a deeper science of human performance interactions within it.
 - Conduct system-level assessments of these concepts to address potential operational benefits, identify risks and characterize limits, and evaluate performance, safety,

operations, and NAS infrastructure and transition challenges.

Milestone Accomplishments to Date

June 2002	Developed initial prototype VAST Non-Real-Time airspace model toolbox with system-level capabilities
Sep. 2002	Identified candidate future Air Transportation System capacity-increasing operational concepts
Sep. 2002	Completed definition of initial Real-Time experimental requirements
Sep. 2002	Completed VAST Real-Time environments definitions and preliminary design
Dec. 2002	Completed Build 1 VAST Non-Real-Time state-of-the-art airspace models toolbox, with the ability to assess economic impact of new technology and NAS operational performance and the ability to model the dynamic effects of interactive agents
Jan. 2003	Completed preliminary description of common scenario set & evaluation criteria for operational concept assessment
Jan. 2003	Completed operational concept definitions and technology roadmaps including wake vortex avoidance into the Air Transportation System
June 2003	Completed VAST Real-Time requirements and initial design
Jan. 2004	Completed Build 2 VAST Non-Real-Time modeling toolbox with the addition of dynamic airspace constraints, including response to the economic feedback of the NAS

Technical Interchange

The VAMS Project hosts periodic Technical Interchange Meetings (TIMs) to facilitate the exchange of information and research results among internal and external stakeholders. Participation in these meetings is sought from a wide range of aviation community representatives. Three TIMs have been conducted during the project's first two years. The outputs of these TIMs have been recorded in formal reports, which are available from the VAMS web site.

TIM Schedule and Focus

TIM 1	May 2002	Concept Development
TIM 2	August 2002	Modeling and Simulation
TIM 3	January 2003	Scenarios and Metrics
TIM 4	February 2004	Concept Self-Evaluations

Primary Customer

- NASA Office of Aeronautics

More Information

For more information, please visit our website at <http://www.as.nasa.gov/vams/>