

# Jet:Wise

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FAA/MOIE

The logo for the MITRE Technology Program, featuring a stylized graphic of stacked blocks in yellow and orange to the left of the text.

**MITRE  
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# Problem

- **Airlines react to changes in their environment (e.g., increased delay, reduced passenger demand) by varying certain elements of their businesses such as modifying fares or adjusting schedules.**
- **The effects of these decisions are the results of numerous economic and operational interactions. With over 50,000 flights in the U.S. daily, modeling the number of interactions is not feasible using traditional methods.**

# Background

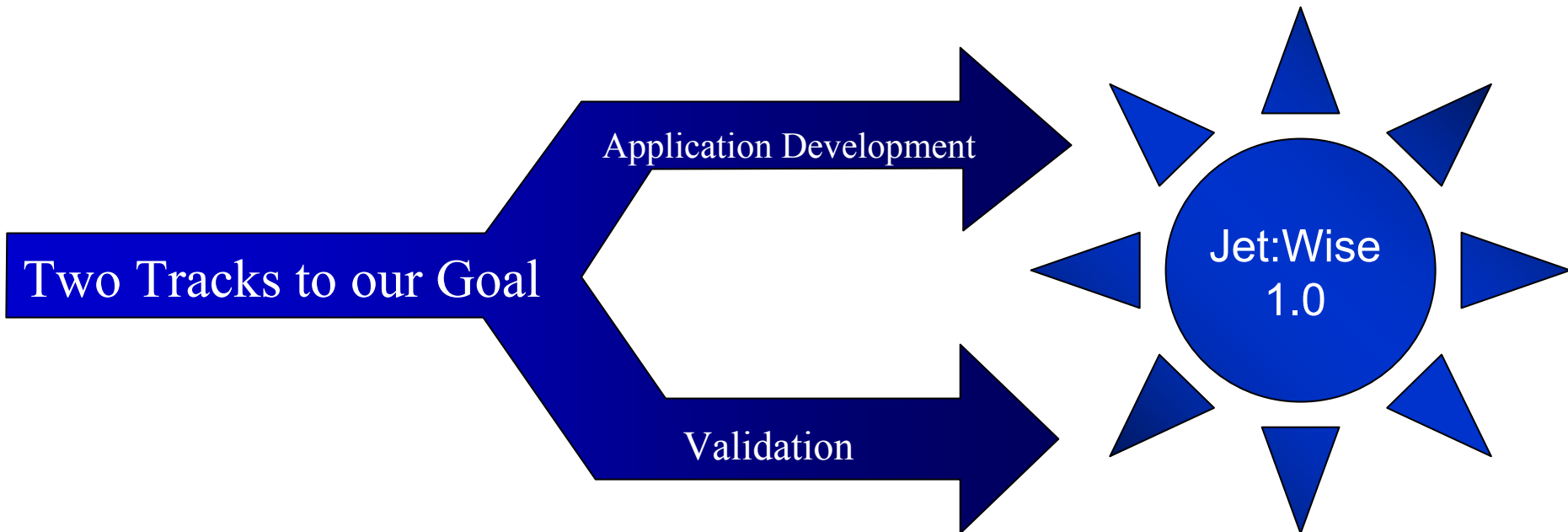
- **Agent-based modeling is a computing paradigm that attempts to model a system's behavior by modeling the interactions among internal system entities.**
- **Simple examples of systems that can be modeled with an agent-based model include schools of fish, beehives, ant colonies, and flocks of birds.**
- **Each is primarily a bottom-up phenomenon arising from the interactions of individuals with their neighbors.**

# Objective

- **Using agent-based modeling, the Jet:Wise project seeks to model airline interactions using individual agents that attempt to fulfill a specific objective function. In doing so, Jet:Wise should simulate the complex interactions of the real world.**
- **To examine and understand how airline decisions might evolve in response to changes in their environment and the decisions of competitor airlines**
- **To characterize whether Jet:Wise is sufficiently accurate to support insightful analysis of decisions involving the evolution of the NAS**

# Activities

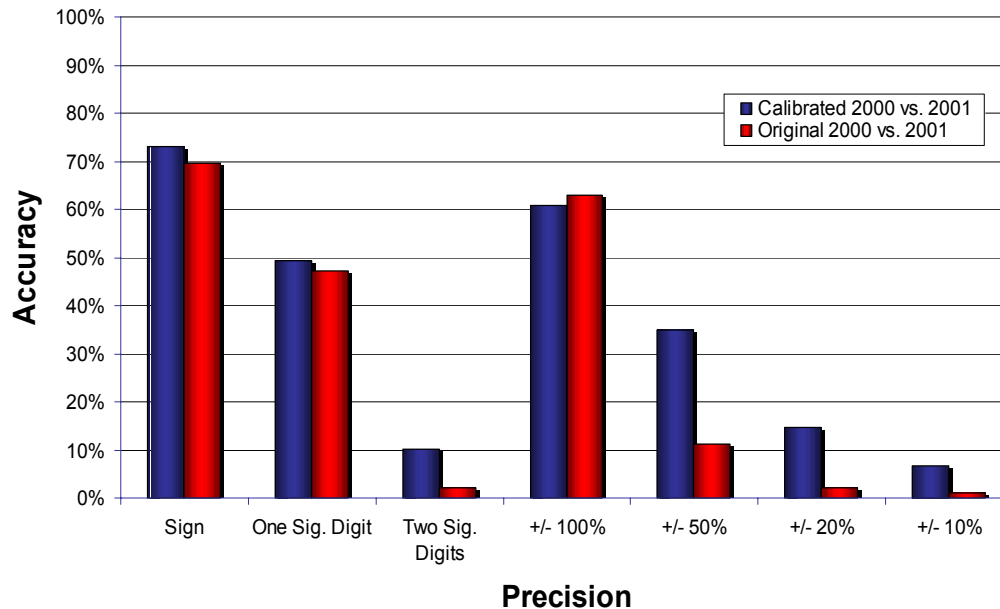
- Our focus this year has been on further modification of the model, improvement of code performance, and model validation.



# Highlight

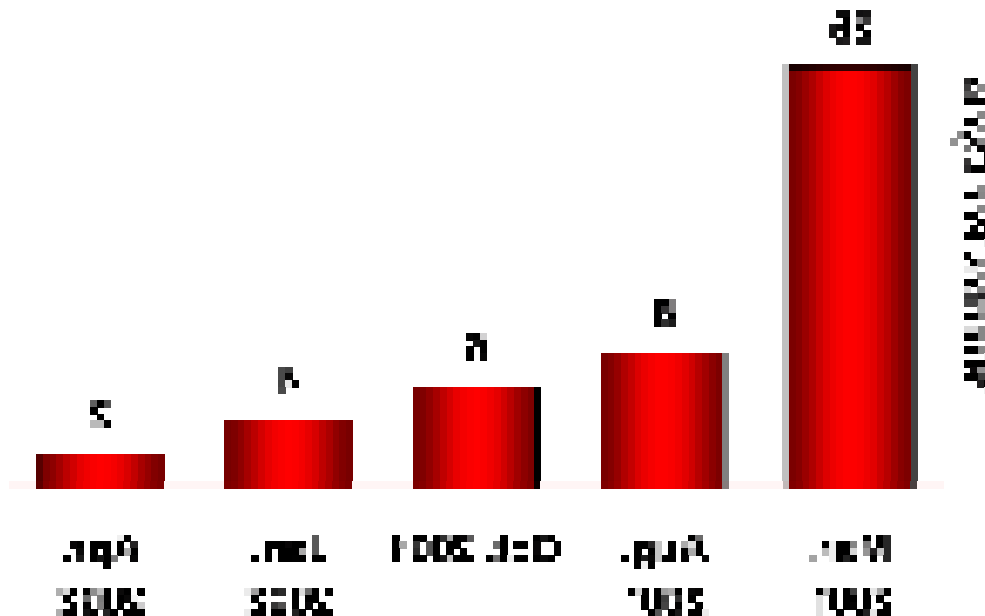
- Cost model comparisons of en route, overhead, and operational costs performed in Dec. 01

**Accuracy of Relative Total Costs**  
(by Airline/Equipment Type Pair)



# Highlight/Demonstration

- Steady performance improvements have reduced run times of the model



# Impacts

- **Enables analysts to gain insight about the implications of possible changes to the NAS**
  - predictions about how airlines will utilize capacity improvements
  - changes in policies governing NAS operations
  - effects of airline decisions on passenger fares, trip length, etc.
- **Provides MITRE with valuable experience**
  - large-scale simulation using agent-based models
  - describing the airline industry

# Future Plans

- **Application of Jet:Wise to analysis of situations where network feedback effects should be considered (e.g., benefits analysis of airline reaction to capacity enhancements such as building a new runway)**
- **Jet:Wise knowledge base and experience will be used as the foundations for an airport-centric agent-based modeling proposal in FY03.**