



NAS-Wide CNS Performance Impacts Analysis Using ACES Uncertainty Modeling

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**NASA's Airspace System Program,
Virtual Airspace Modeling and Simulation (VAMS) Project
is developing the:**

Airspace Concept Evaluation System (ACES)

**ACES is being developed under ATMSDI Contract Task Order CTO-7 (COTR: Karlin Roth);
Raytheon Prime, Seagull Technology is Technical Lead**



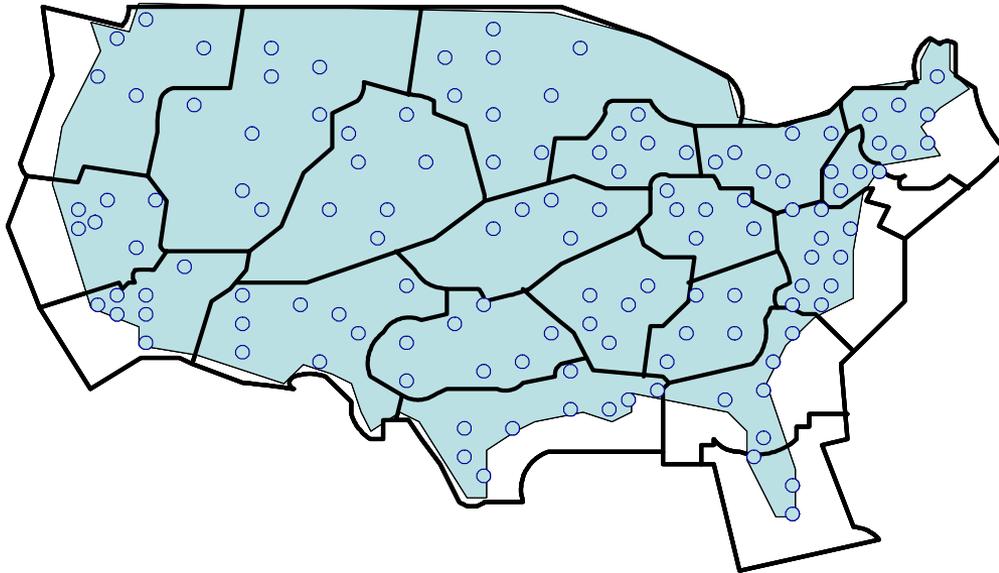
Airspace Concepts Evaluation System (ACES) is a fast-time, nationwide simulation of ATM-FD-AOC ops

ACES Simulates:

- Hundreds of airports with TRACONs
- All centers & sectors
- 10,000's of individual flights
- Gate-to-gate
- Full multi-day flight schedule w/flight plans
- 4-D gridded winds

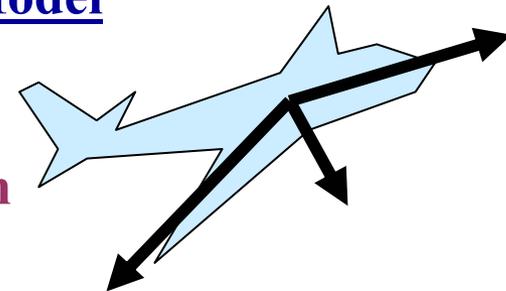
ACES Provides:

- Dynamic visualization
- Data recording/analysis tools



ACES has a high-fidelity 4-DOF Trajectory Model

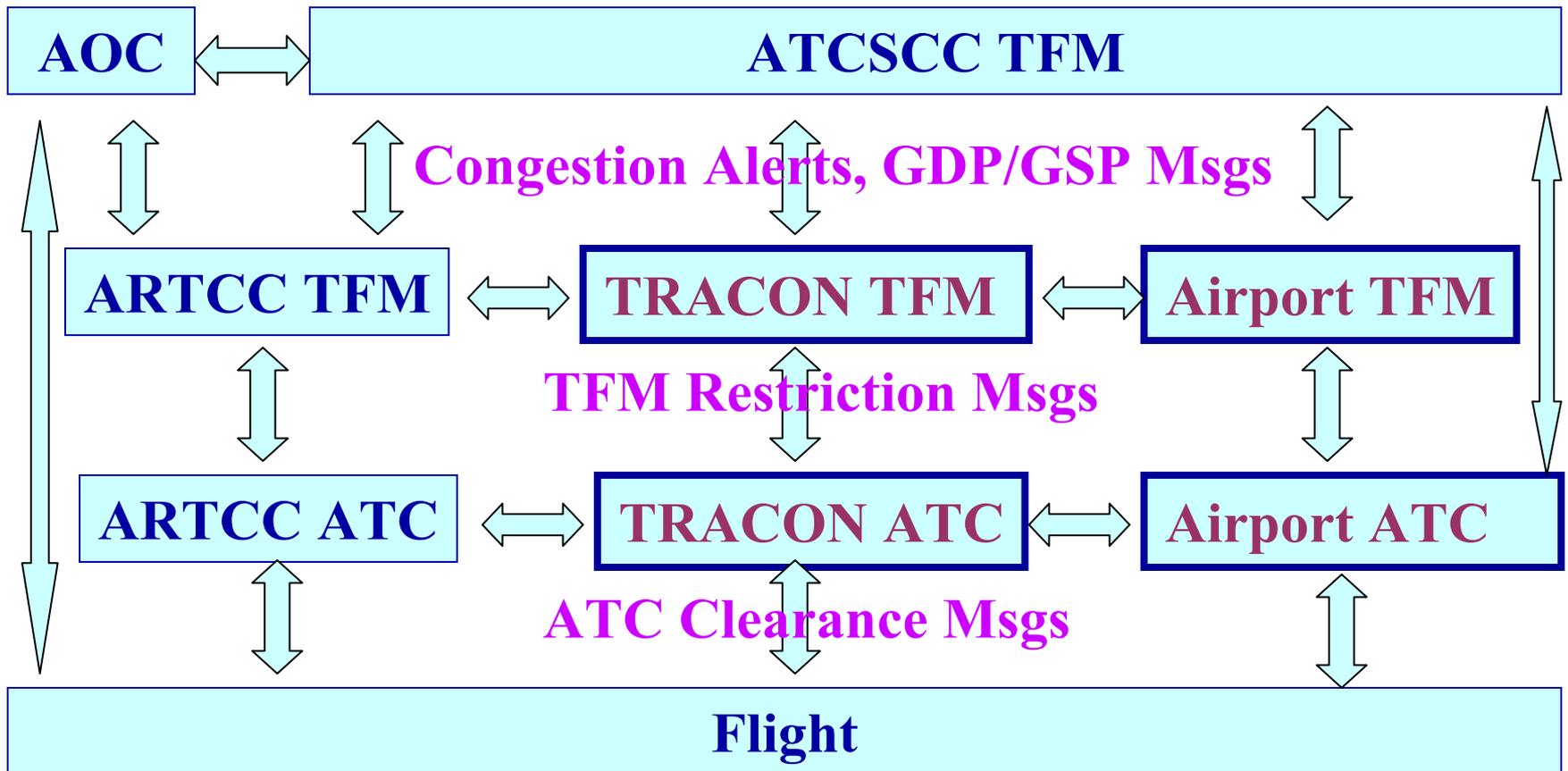
- Based on laws of physics and aerodynamics
- Realistic pilot-based control laws
- Includes elliptic-Earth trajectory propagation





Agent-based processes modularly simulate airspace/aircraft operations

Agents dynamically exchange operational information



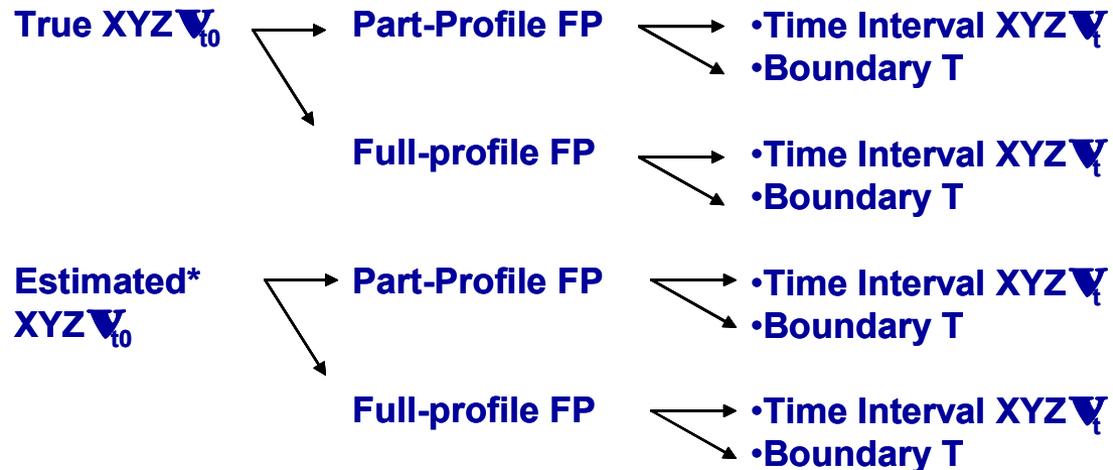


ACES Uncertainty Architecture Supports Modeling of Information Distribution Among ATM/FD/AOC Agents

ACES represents relative capabilities of air-ground and ground-ground Com system design alternatives to provide timely and accurate data



EG:





ACES Agents Can Model CNS Error Sources Relevant to DST Trajectory Tracking and Prediction

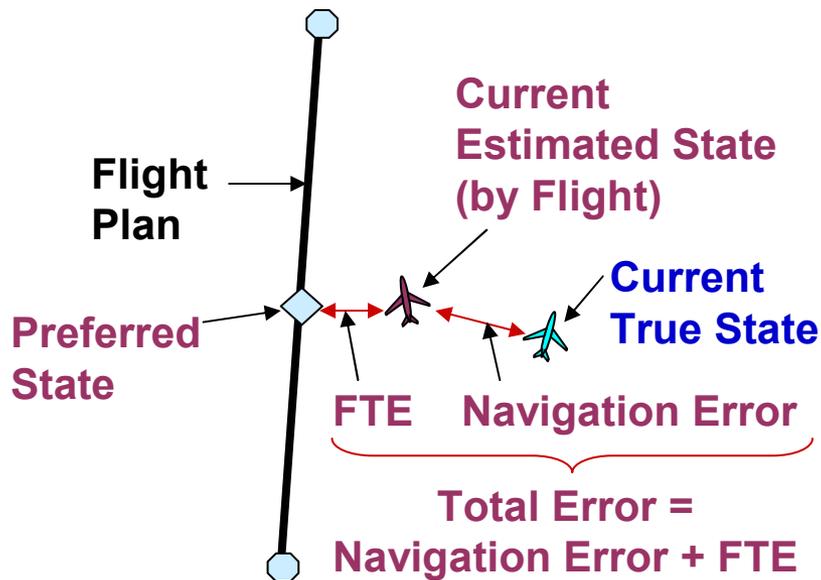
Guidance & Control

Navigation Error

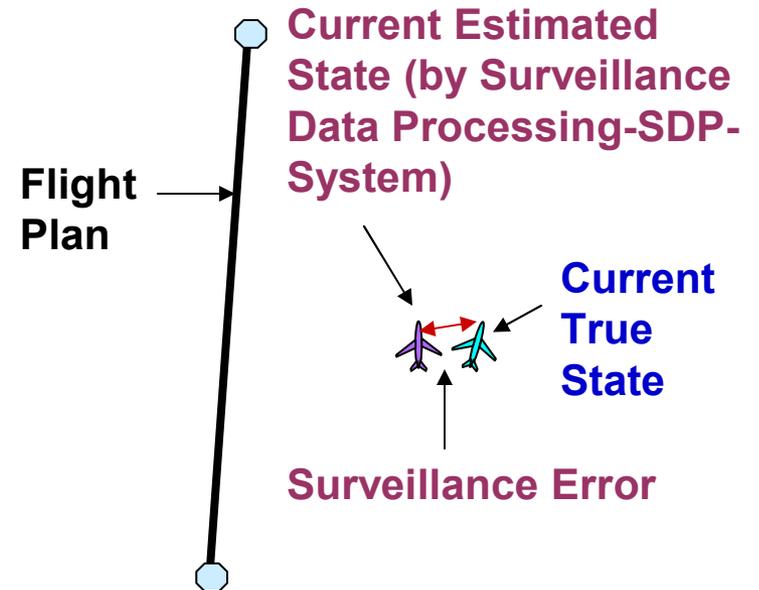
Steering Error

Control Error

Flight Technical Error (FTE)
includes wind change, etc. effects



Surveillance





ACES Can Analyze CNS System Design Impacts on ATM/FMS/AOC DST Performance

EG: COM System Requirements Assessment

