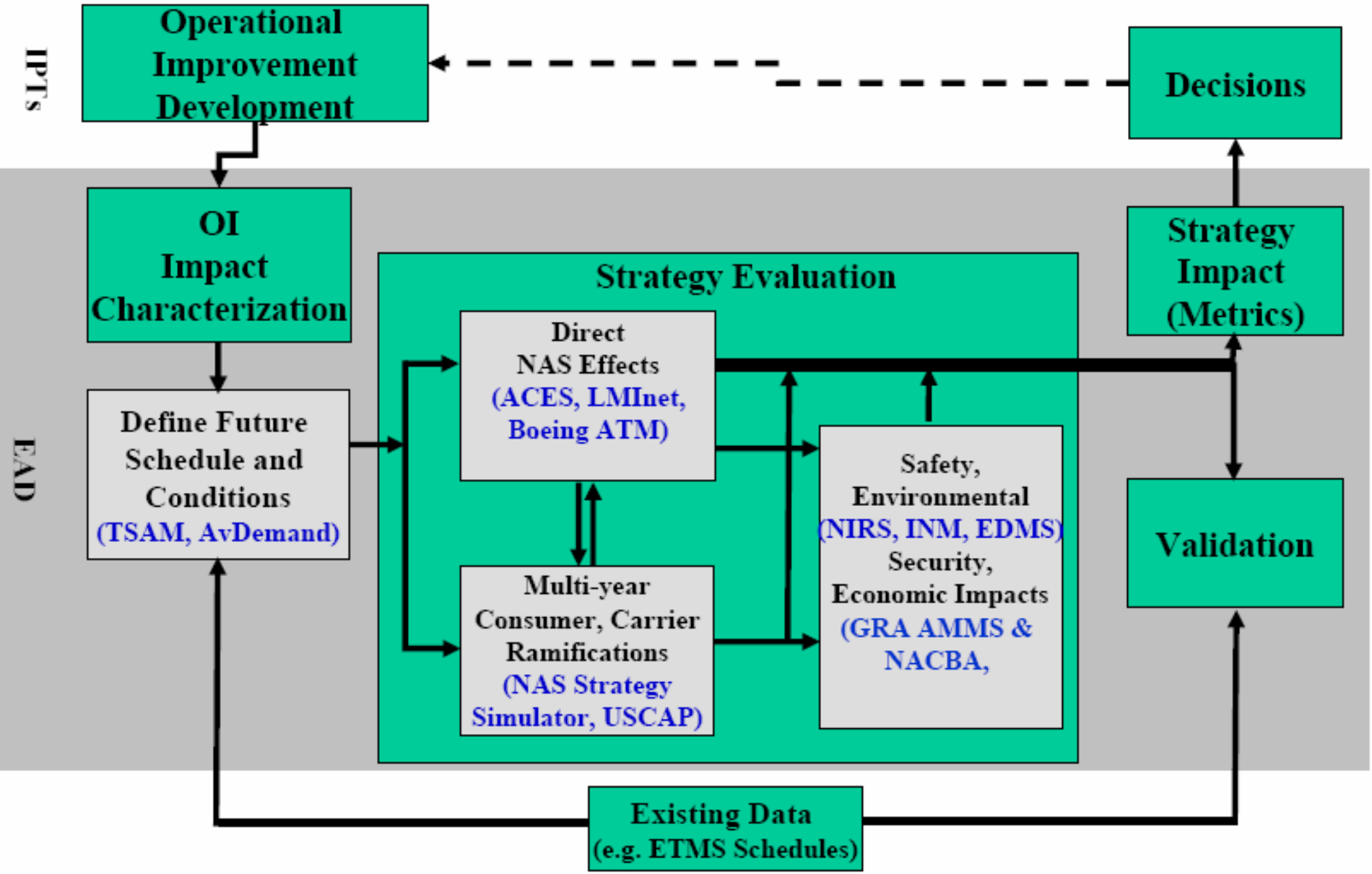
Simulation Analysis of the Future NAS: Overview of JPDO's Evaluation & Analysis Division

Dan Goldner (Ventana)

NEXTOR NAS Performance Workshop
Asilomar, March 2006

EAD Modeling Framework



Major Dimensions of the Air Transportation System

A. *Pax/Cargo Demand*

1) Current (1X)
2) TAF & TSAM Growth to 2014 & 2025 (1.2X, 1.4X)
3) 2X TAF/TSAM Based Constrained Growth
4) 3X TAF/TSAM

B. *Fleet Mix/ Aircraft Types*

1) Current Scaled
2) More Regional Jets
3) New & Modified Vehicles
   - Microjets
   - UAVs
   - E-STOL/RIA
   - SST
   - Cleaner/ Quieter

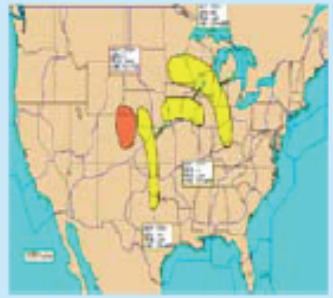
C. *Business Model/ Schedule*

1) Current (mostly Hub & Spoke)
2) More Point to Point + Regional Airports
3) Massive Small Airport Utilization

D. *NAS Capability*

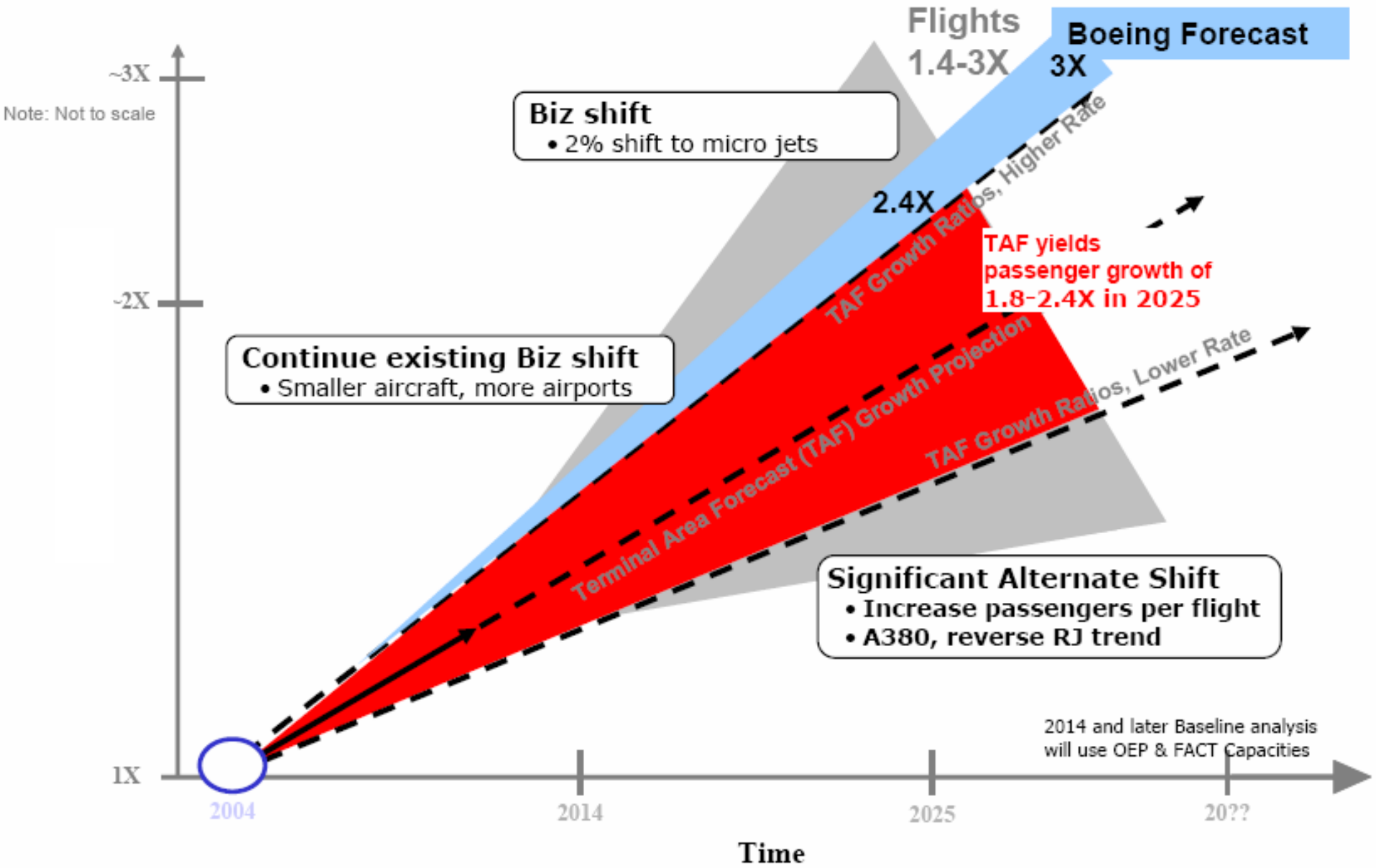
1) Current
2) 2014 OEP
3) Increased Capacity of:
   - Landside
   - Surface
   - Runways
   - Terminal
   - En route
4) Systemic:
   - CNS
   - SWIM
   - Wx Prediction

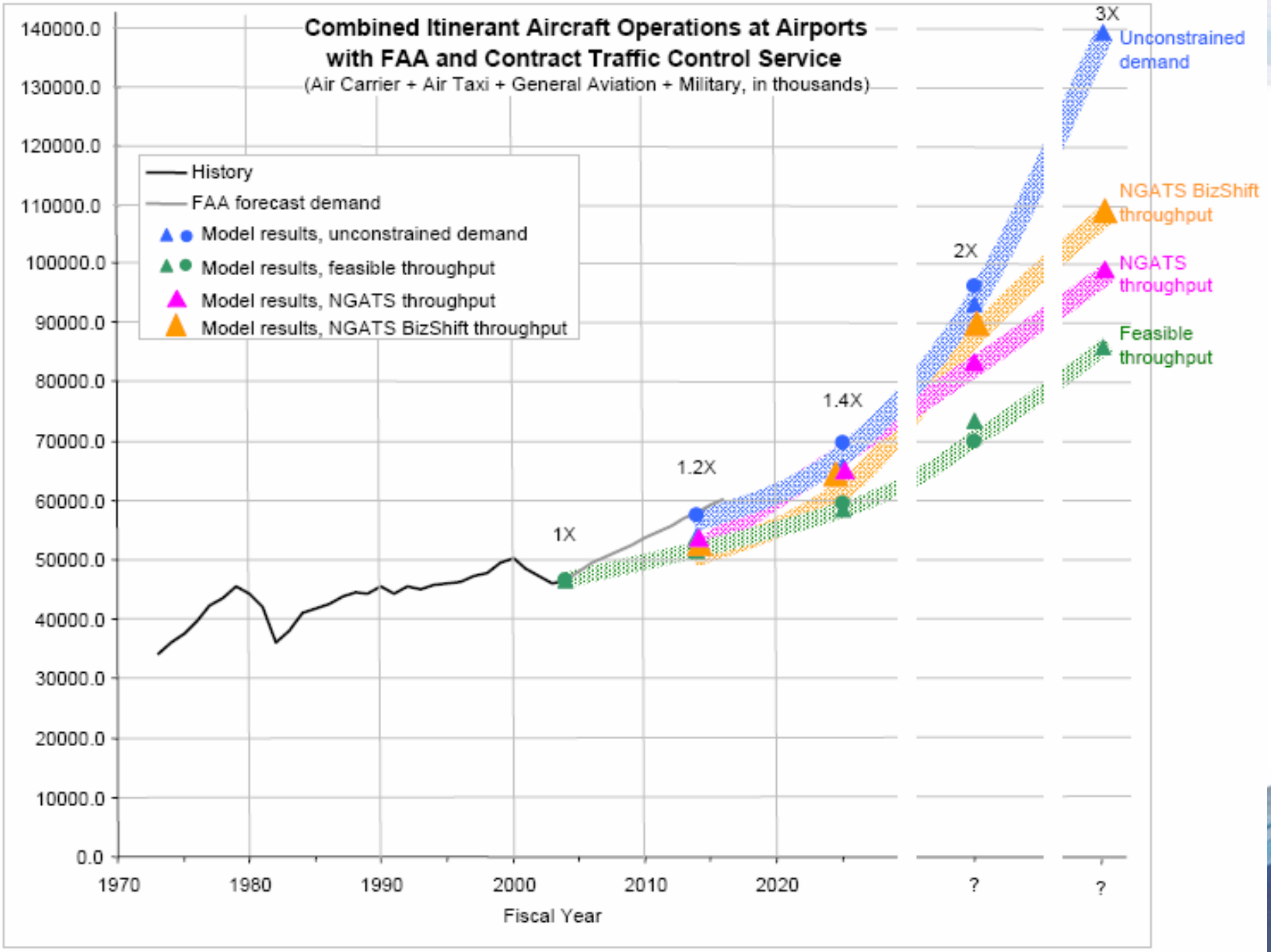
E. *Disruptions /Weather*



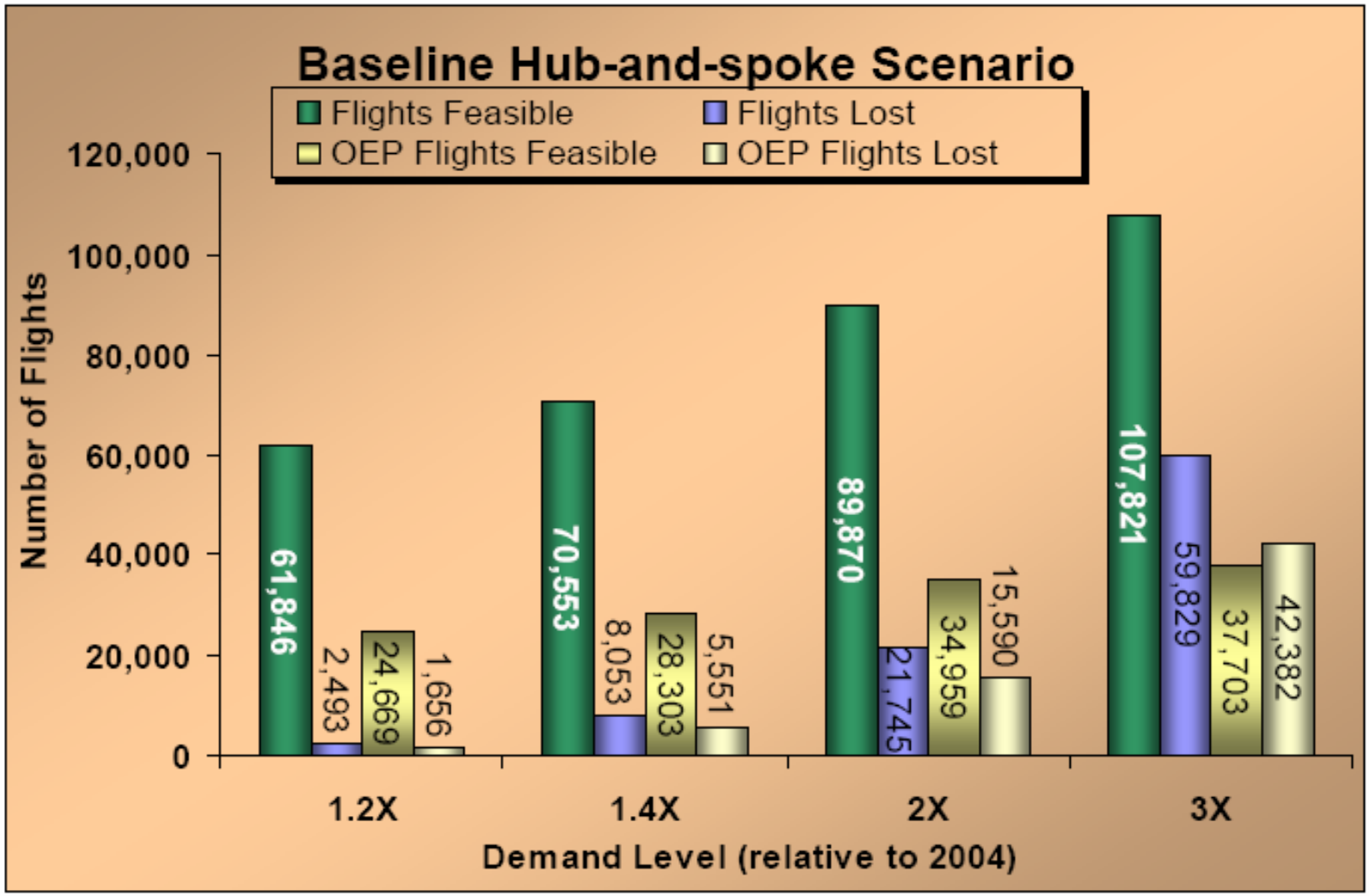
1) Good Weather (Wx)
2) Bad Weather
   - Airport IFR
   - En route
   - 7 Wx days
3) Disruption
   - Sudden Shutdown of an airport or region

Future Demand on the NAS

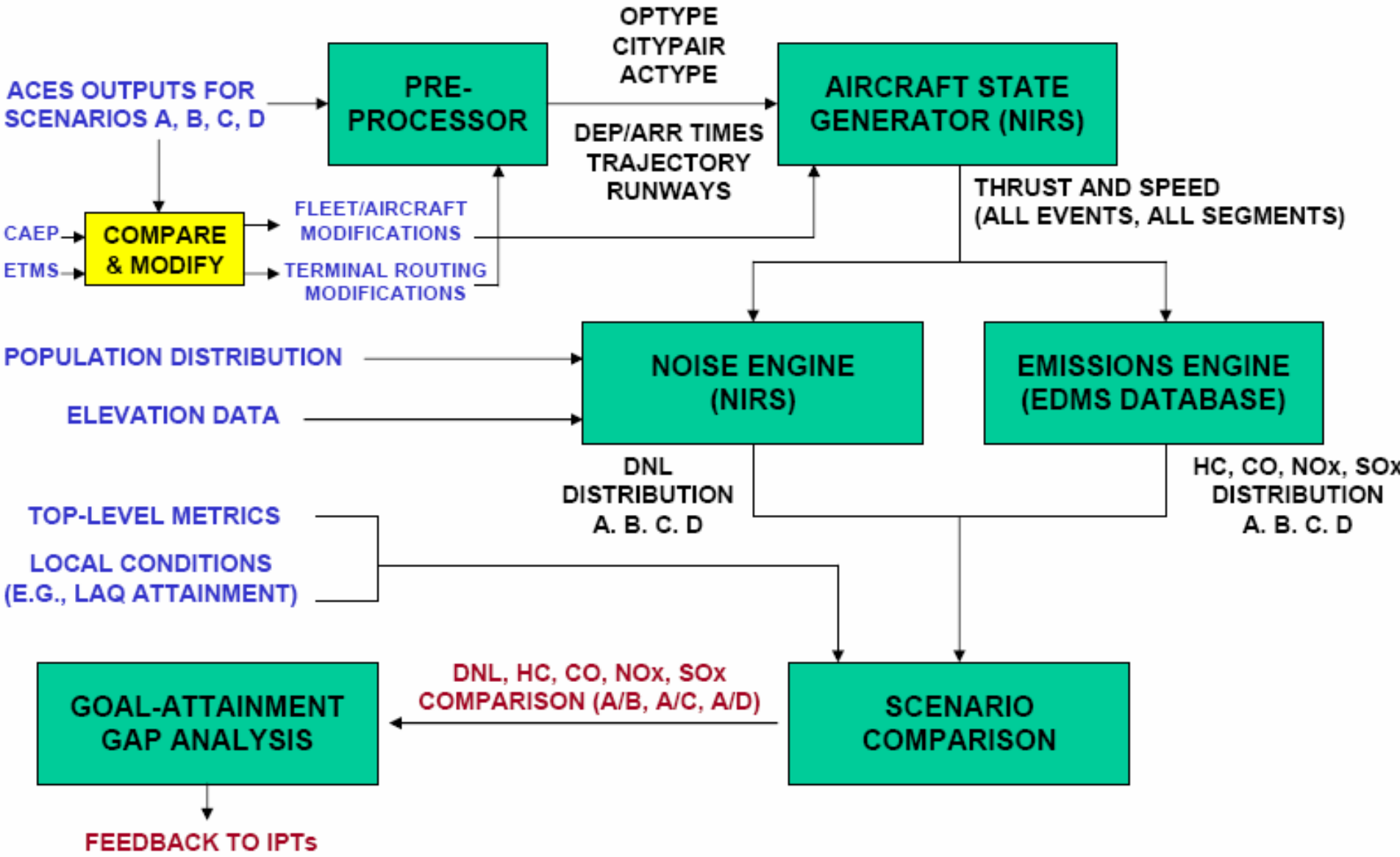



Combined Itinerant Aircraft Operations at Airports
with FAA and Contract Traffic Control Service
(Air Carrier + Air Taxi + General Aviation + Military, in thousands)
140000.0
130000.0
120000.0
110000.0
100000.0
90000.0
80000.0
70000.0
60000.0
50000.0
40000.0
30000.0
20000.0
10000.0
0.0
1970
1980
1990
2000
2010
2020
?
?
Fiscal Year
History
FAA forecast demand
Model results, unconstrained demand
Model results, feasible throughput
Model results, NGATS throughput
Model results, NGATS BizShift throughput
1X
1.2X
1.4X
2X
3X
Unconstrained demand
NGATS BizShift throughput
NGATS throughput
Feasible throughput

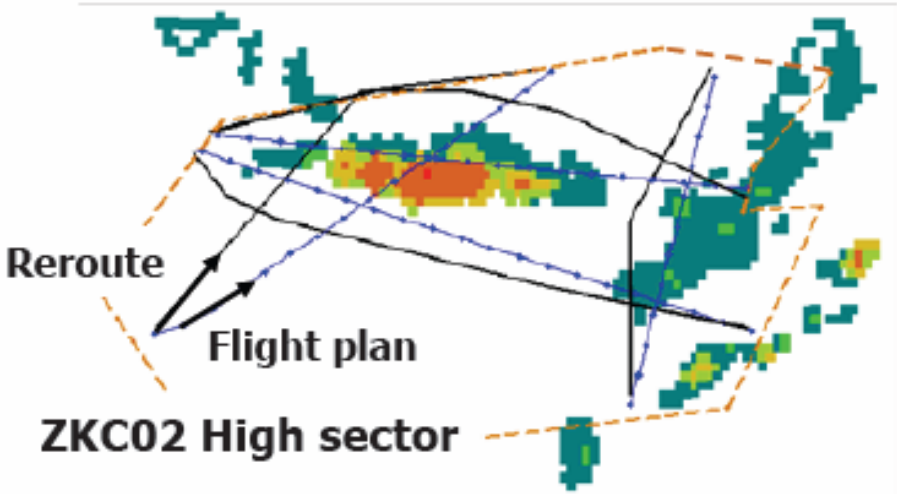
Future Capacity Shortfall by Airport Type



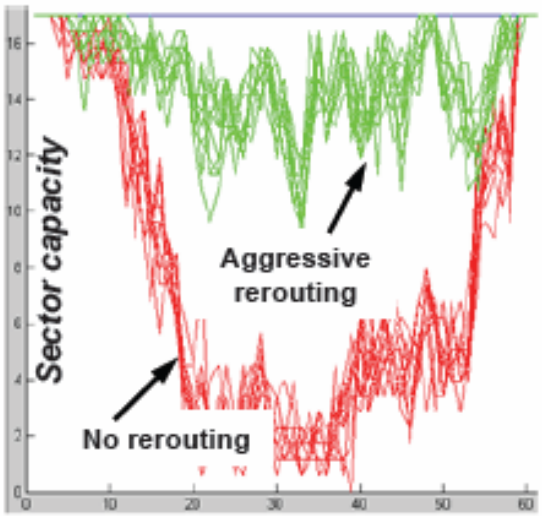
Environmental Modeling Process Flow

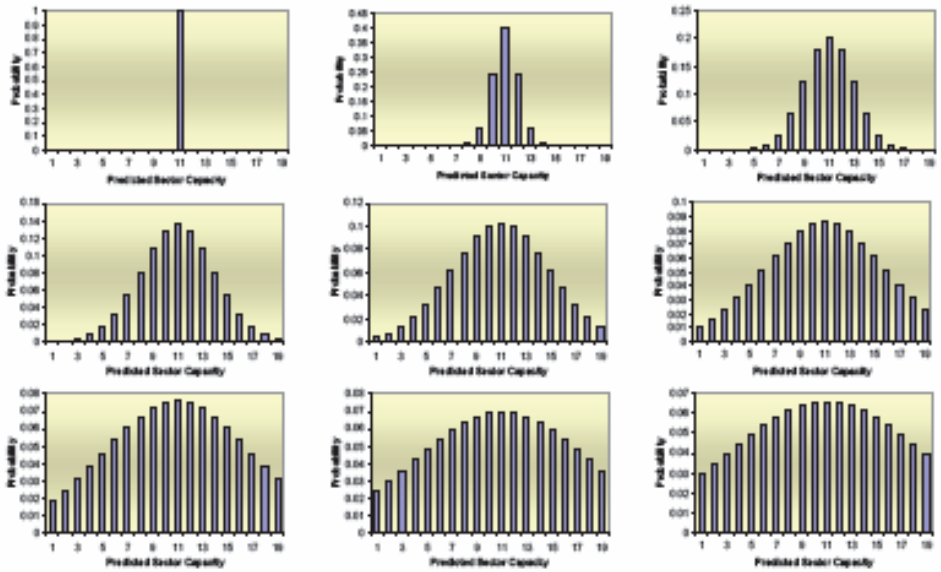


Modeling the Uncertainty

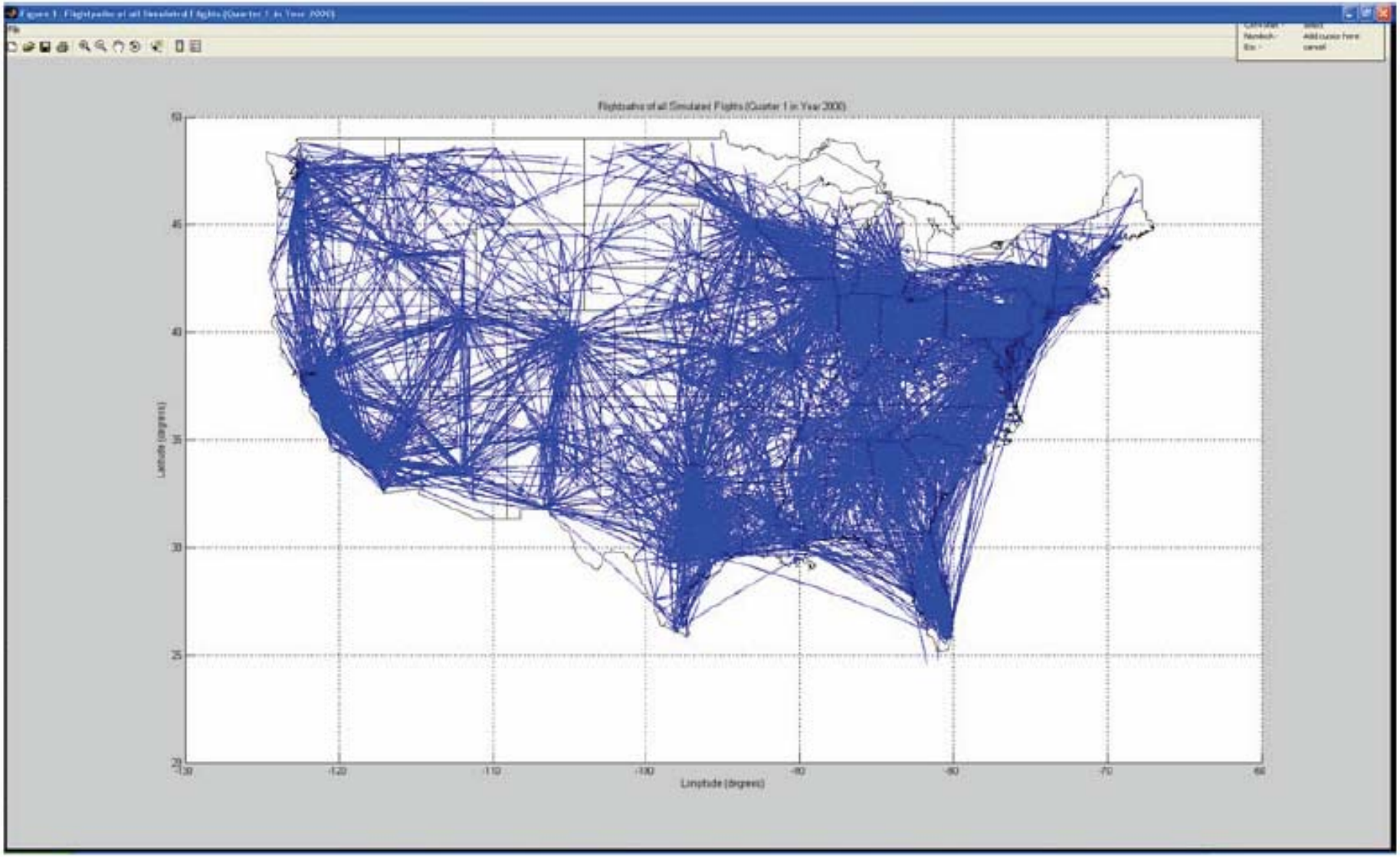


Uncertainty of weather and traffic grows with time horizon



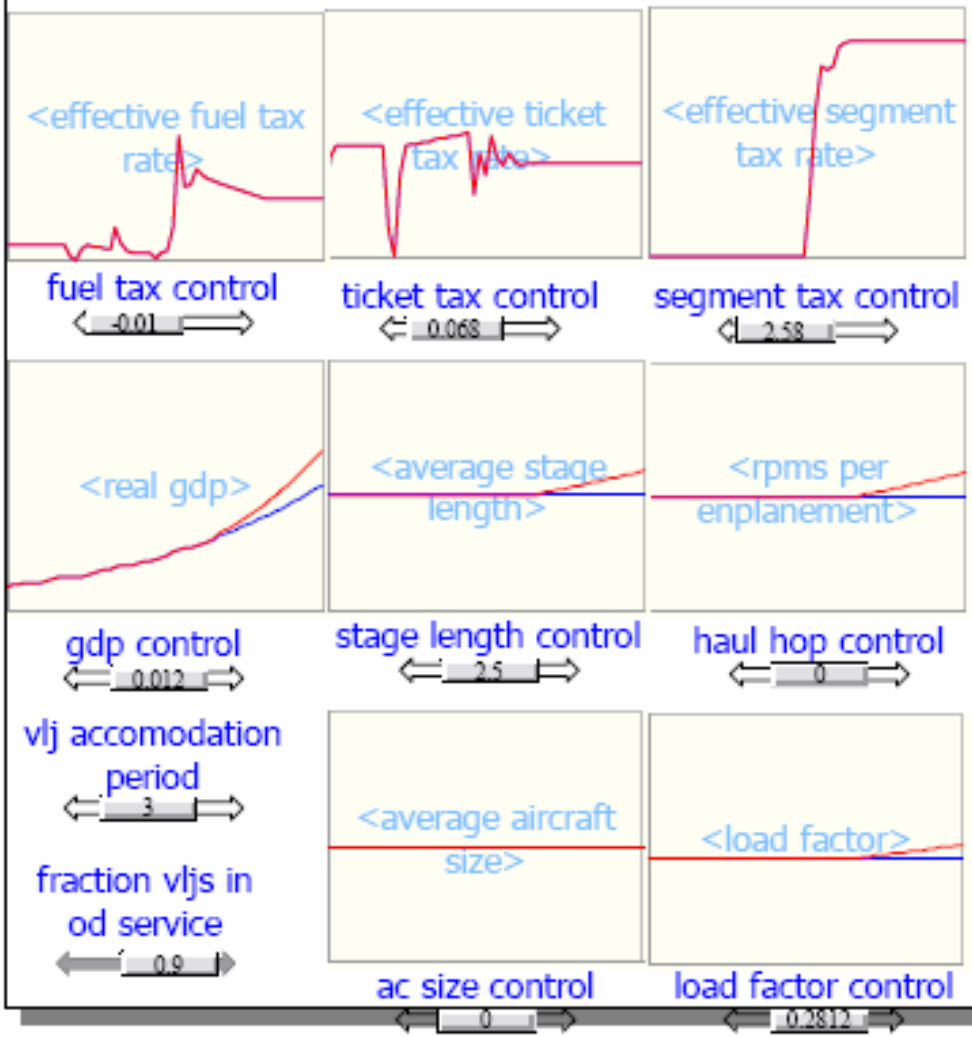


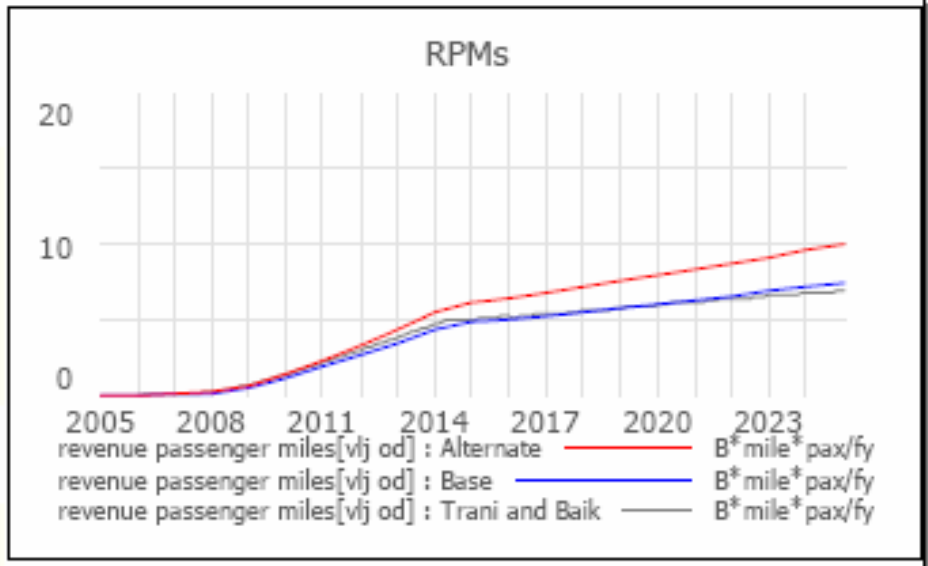
Spatial distribution of VLJ demand

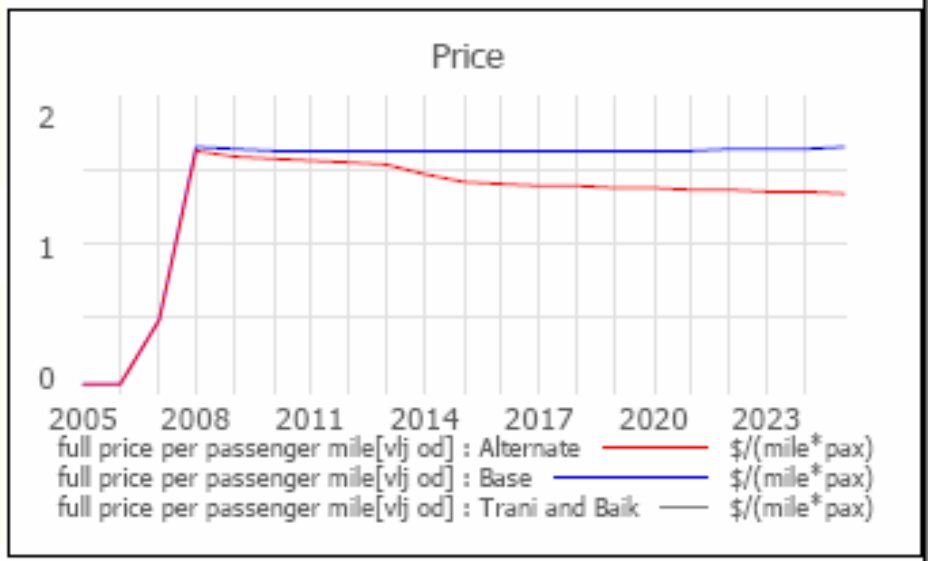


Home

VLJ On-Demand Service







Rough Portfolio Value (Demo) - Setup

Simulate | Record Changes | Reset | Load changes

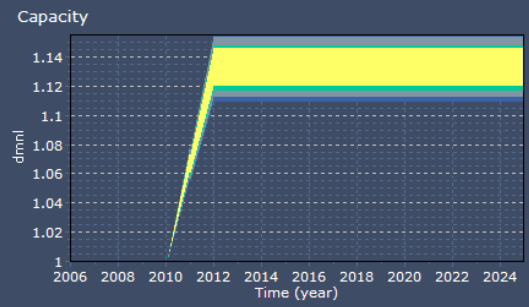
Dependence

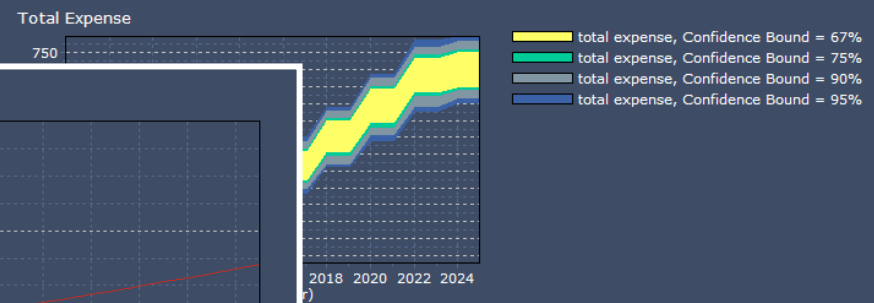
Programs Funded?

R&D Cost

R&D Duration

2025
Final Time





Rough Portfolio Value (Demo)

1.00 Network Info

1.00 Broad-Area Nav

1.00 Performance-Based

1.00 4D Trajectory

1.00 WX Info in Decisions

1.00 Layered Adaptive Sec

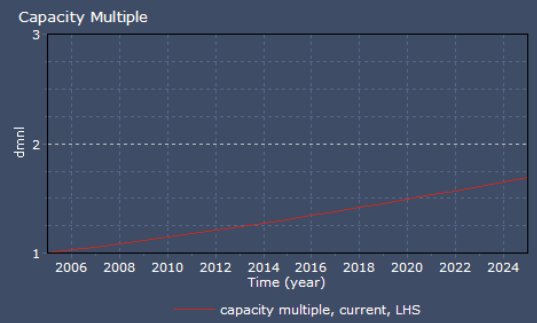
1.00 Equivalent Visual

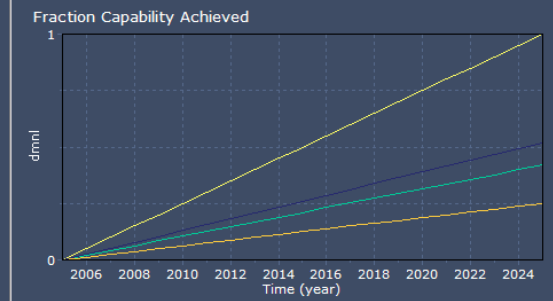
1.00 Superdensity

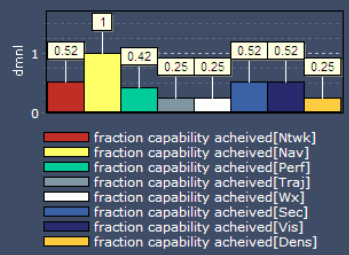
Start | Record Changes | Stop

2025
Final Time

Dependence







Showing values at Time = Final Time (year)

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Other EAD work by Asilomar participants

- Superdensity airport operations
  (M. Alcabin, Boeing)
- New airspace concepts
  (H. Swenson, NASA)
- Economic & policy analysis
  (R. Golaszewski with D. Ballard, GRA)