# NASA - SATS
# Small Aircraft Transportation System

**Danville, Virginia**

**March 1, 2002**

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**NASA Langley Research Center**

# Office of Aerospace Technology

## Goal - Revolutionize Aviation

**Mobility Objective (Stretch)**

**Reduce door-to-door travel time by half in ten years and two-thirds in 25 year. Reduce transcontinental travel time by half within 25 years.**

# *Outline*

- **The Blueprint for 21st Century Aviation**
- **Leading Indicators for On-Demand, Distributed Air Mobility**
- **SATS Program Status**
  - **Technology development public-private partnership**
  - **2005 Demonstration**


# The Aeronautics Blueprint

## - A National Imperative -

# Blueprint Executive Summary


- Aviation is crucial to U.S. economic health, national security, and overall quality of life.
- There is a serious national crisis in aviation.
- Advanced technologies can help solve today's crisis and create a new level of performance and capability in aviation:
  - Advanced concepts for the airspace system
  - Revolutionary vehicles with significantly greater performance
  - New paradigm for safety and security
  - Assured development of the capable workforce of the future

- **The cost of inaction is gridlock, constrained mobility, unrealized economic growth, and loss of U.S. aviation leadership.**



*Figure 5*

# The Blueprint: Aviation is Critical to the U.S.

## Economic Growth
- Productivity
- Global Competition
- Fullest Commercial Use

## National Security
- Air Superiority
- Global Mobility

## Quality of Life
- Freedom of Movement
- General Welfare

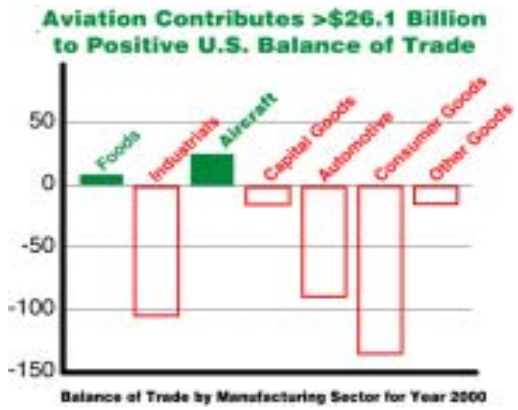







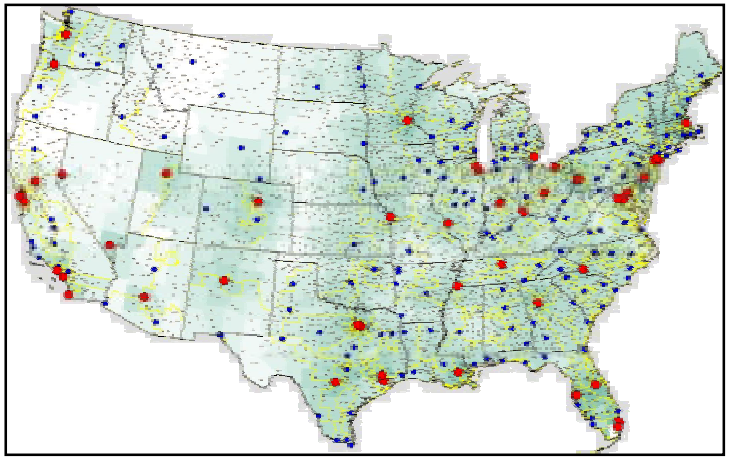
*Figure 6*

# On-Demand, Distributed Air Mobility

## NASA Aerospace Enterprise

### Revolutionize Aviation Goal

### Mobility Objective



- 93% of population within 30 minutes of SATS-type airport
- 41% within 30 minutes of any commercial airport
- 22%within 30 minutes of major/hub airport

**Mobility**
Enable people to travel faster and farther, anywhere, anytime

**Performance**
Less travel time at an affordable price

**Accessibility**
Safe reliable access to more locations, when & where you need it

**Cost**
User cost
System cost
Provider cost

**Time**
Doorstep to destination, with intermodal penalties

**Availability**
Convenient, on-demand, with mission reliability

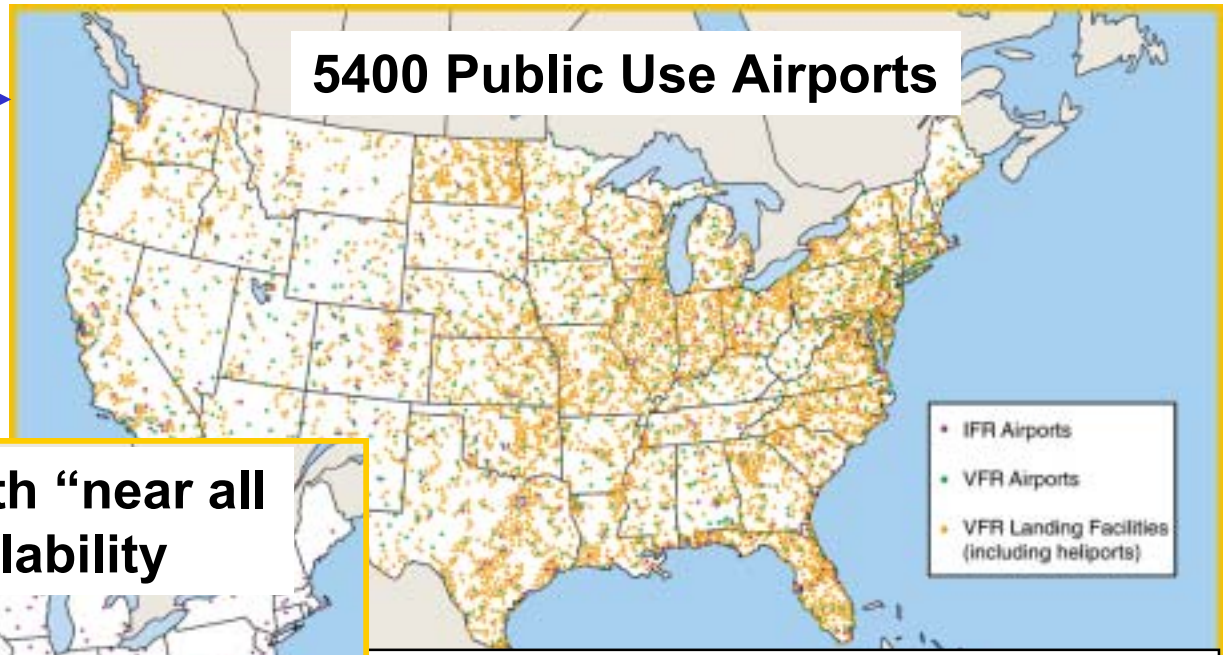
**Safety**
Proven safer
Perceived safer



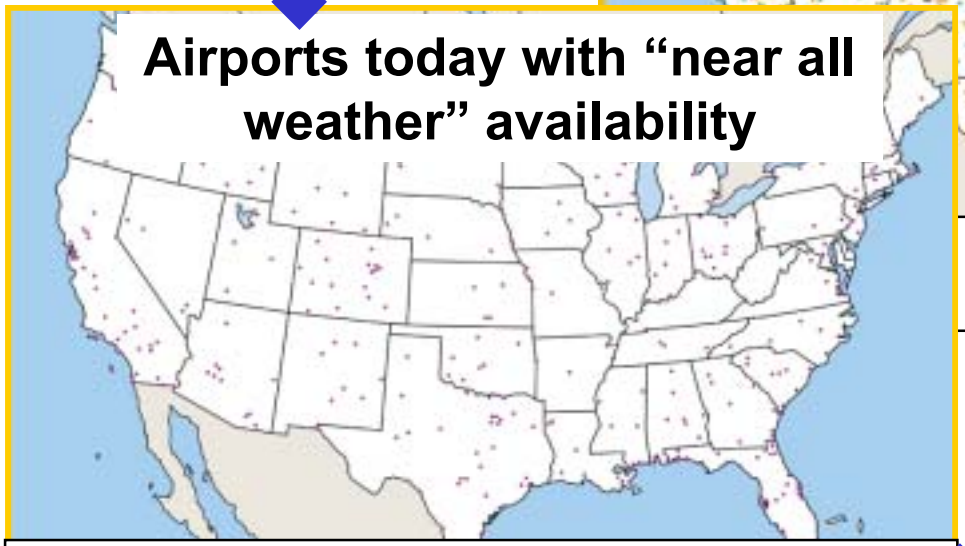
*Figure 7*

# Underutilized Airports and Airspace ...

## ... an Opportunity for Increasing Mobility




*Expanded Accessibility to several times more destinations*




Near all-weather accessibility to 5,400 public-use airports?

*Improved Performance saving more travelers more time by going directly to more airports*

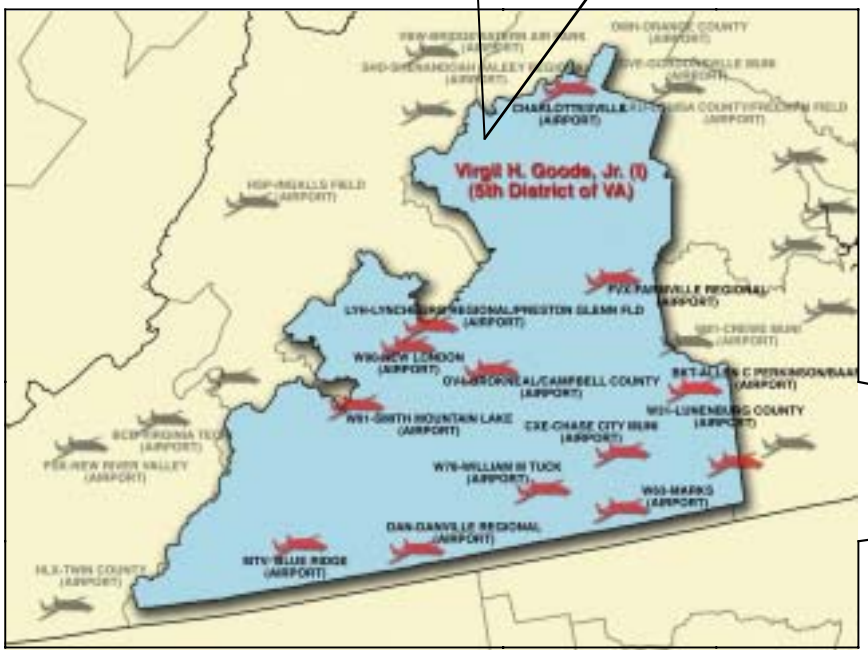
Of 5,400 public-use airports, only 715 (13%) have precision instrument approaches (ILS)



*Figure 8*

# Distributed Air Mobility

Virginia's 5th District
- 11 Airports
- 1 ILS
- 1 Control Tower
- 300 Based Aircraft
- 110,000 Operations/year (~30/day/airport)





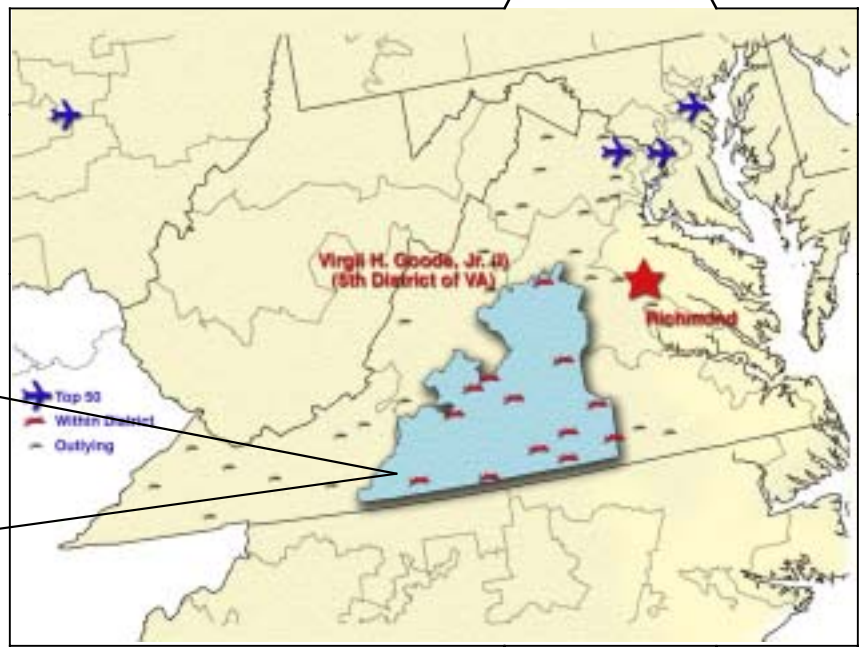




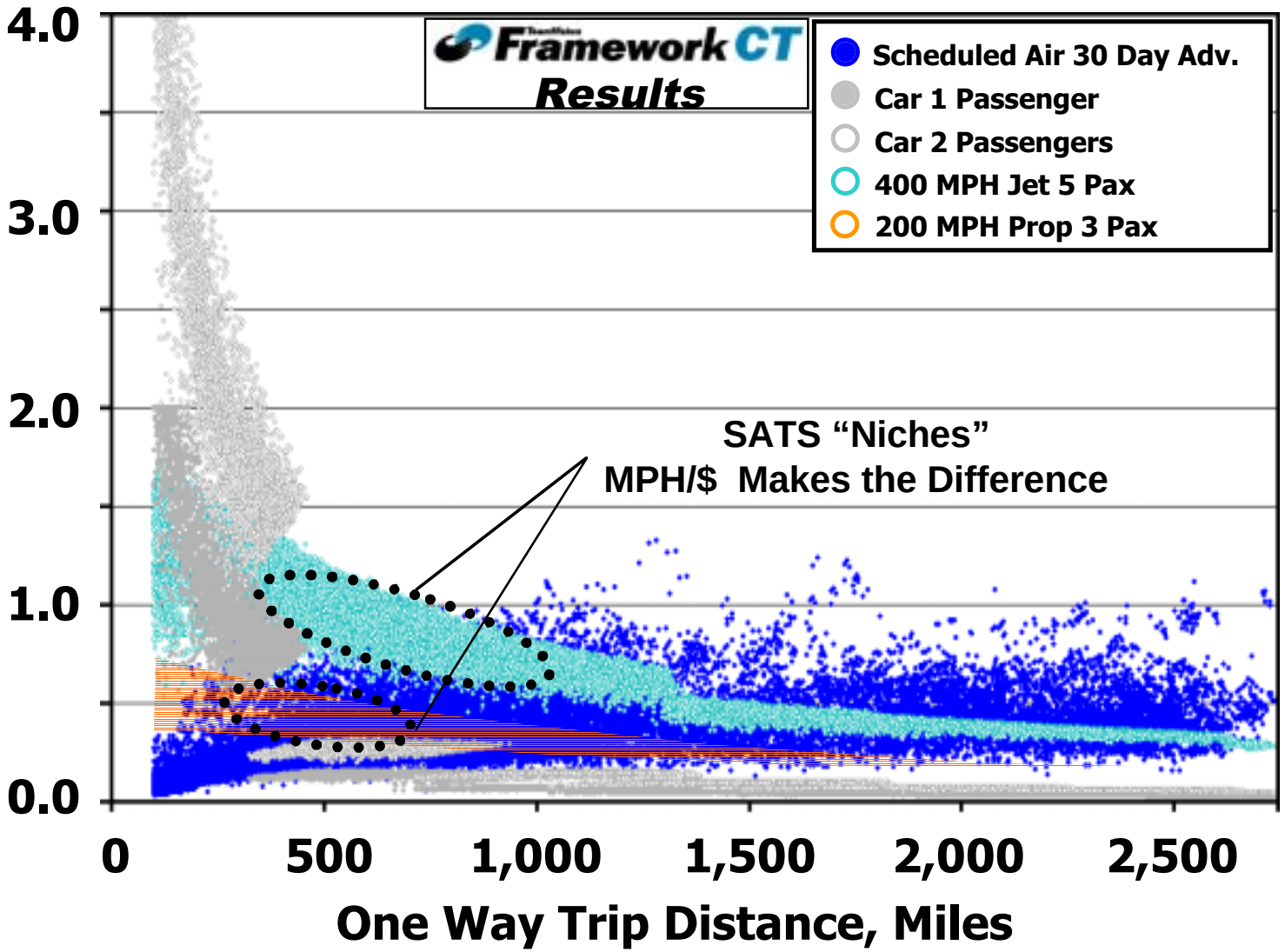

*Figure 9*

# Filling Gap in National Transportation System

**SATS Mobility Metric**

**Door-to Door Trip Speed, MPH**

**Trip-Dollars**



# Technical Revitalization is Nearing Completion

## (Based on Investments from 1994-2001)

**AGATE, GAP, SBIR/STTR,other investments since 1994 have created:**

- Aircraft deliveries up 300%
- Billings up 360%
- Fleet safety up 20%
- Exports up
- Jobs up 8% per year
- Industry is “technology-ready”

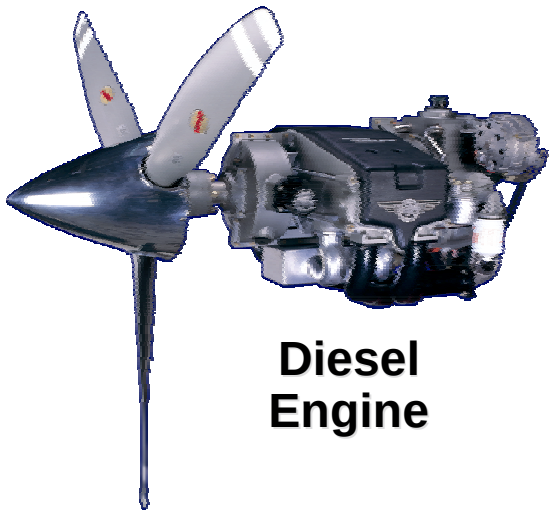
***Revitalized R&T Base for advancements in:***

- Primary Flight Displays
- Multi-Function Displays
- Highway in the Sky operating system
- Engine Info & Control Advisory System
- Solid-State Attitude-Heading Ref Syst.
- Databus
- GAP Turbines
- GAP “Diesels”
- Full Authority Digital Electronic Contr.
- Single Lever Power Control
- Quiet Propeller Design & Tools
- Integrated Private/IFR Pilot Certification
- COTS for Cockpits
- Composite certification simplification
- Composite Repair Standards
- Crashworthiness Design Guide
- Lightning Protection Design Guide
- Ice Protection & Avoidance Systems

# AGATE / GAP - Vehicle Focused Advancements

- **Vehicle-based**
  - Design Guidelines
  - System Standards
  - Certification Methods
- **New vehicle architecture**
  - supports application development
  - enables new operating capabilities





Diesel Engine

FJX-2

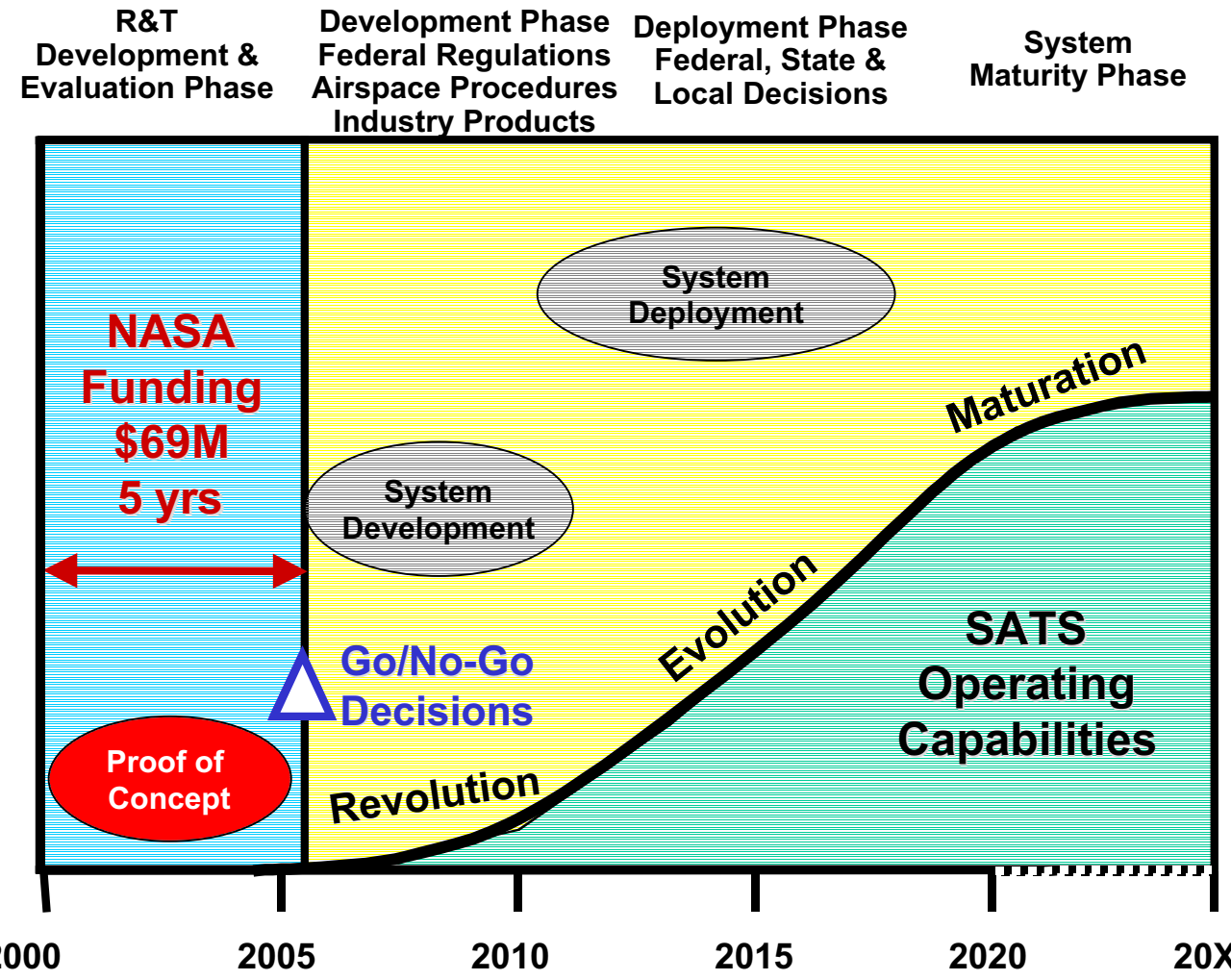
# Market Pull for Increased Mobility

- **Booming Business Aircraft Market**
  - Dramatic growth in fractional ownership (50%/year)
- **New class of microjets**
  - Low-cost: about $1.50/aircraft-mile
  - Designed to access small airports
  - On-demand services emerging in market




*And others….*

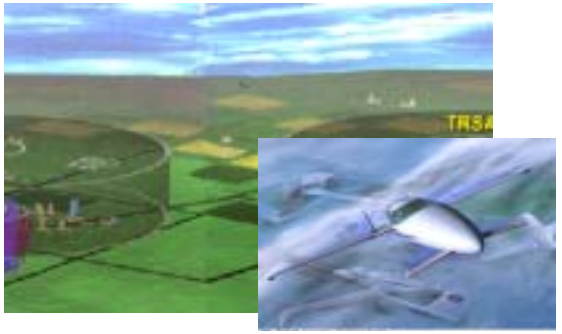
# First Step Is To "Prove SATS Works"



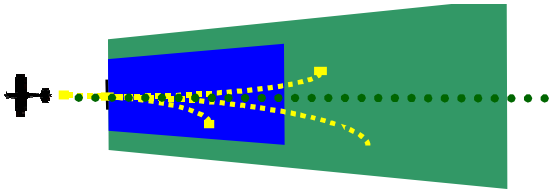

**Technical, Operational, & Socio-economic Basis**
**for National Investment & Policy Decision**

# SATS Operating Capabilities

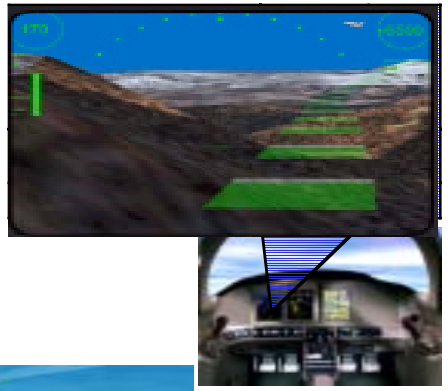
**Higher Volume Operations in Non-Radar Airspace and at Non-Towered Airports**



**Lower Landing Minimums at Minimally Equipped Landing Facilities**



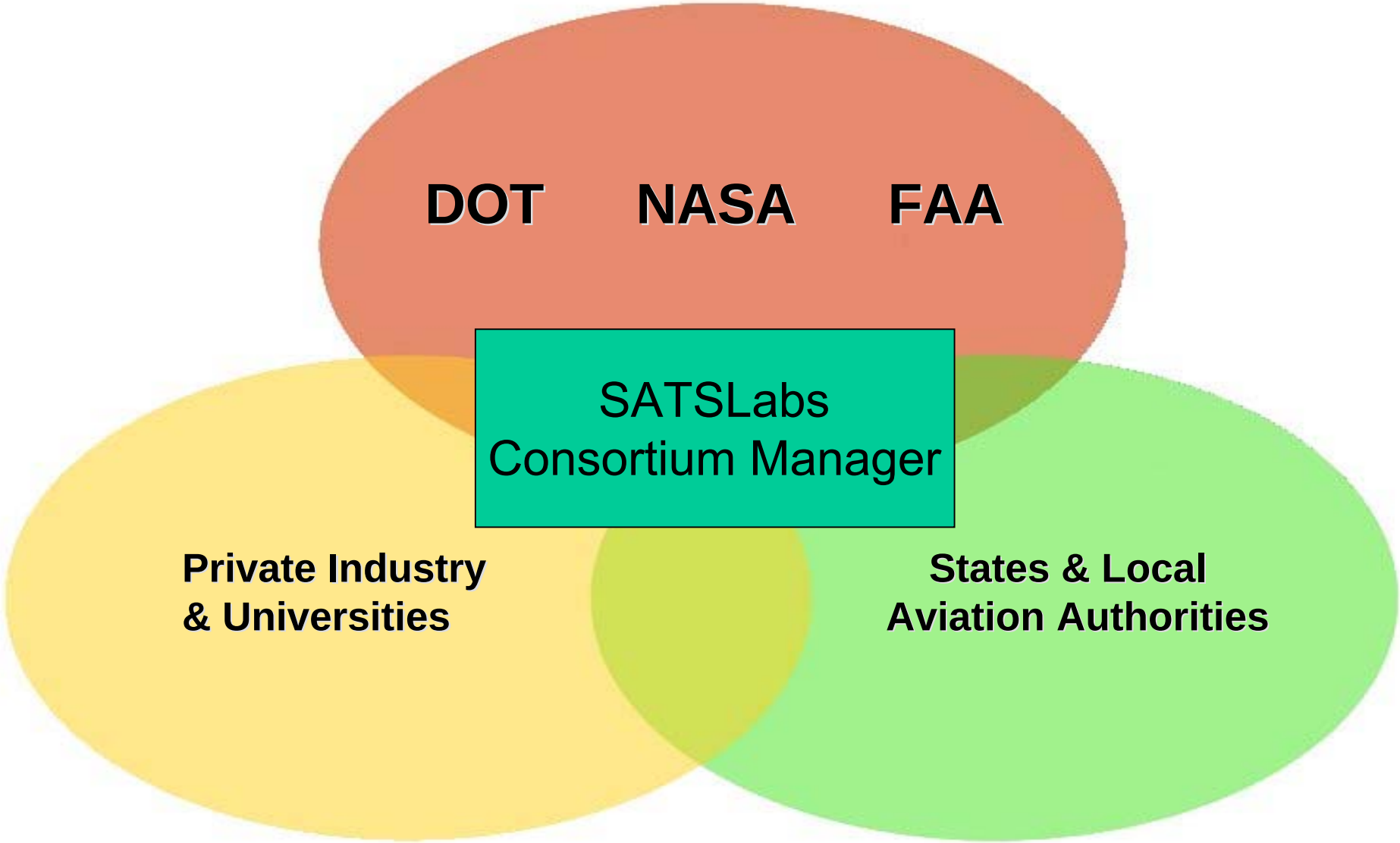
**Increase Single-Pilot Crew Safety & Mission Reliability**



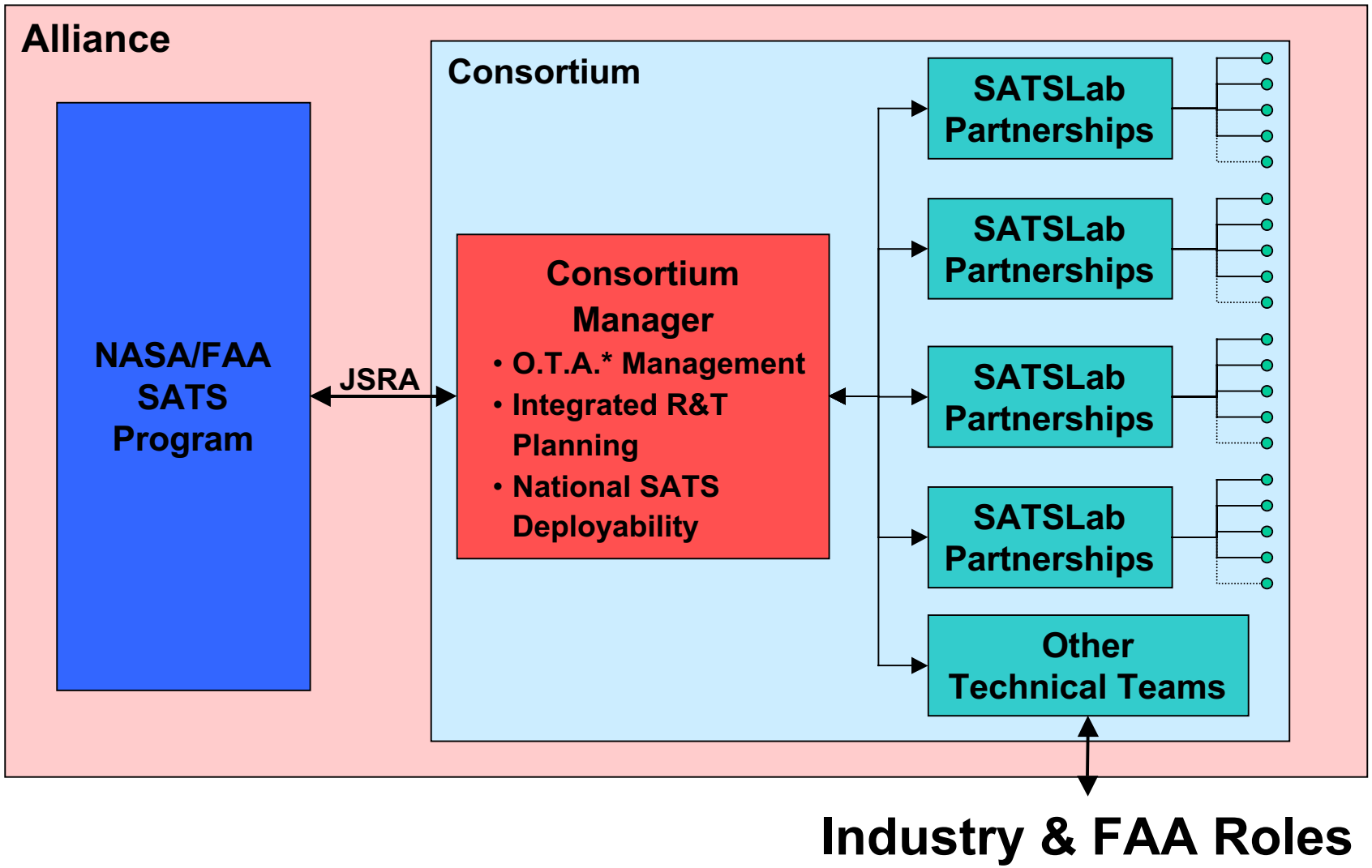
**En Route Procedures & Systems for Integrated Fleet Operations**

# Collaboration

***Public-Private*** ***Federal-State-Local***



# Alliance Operations



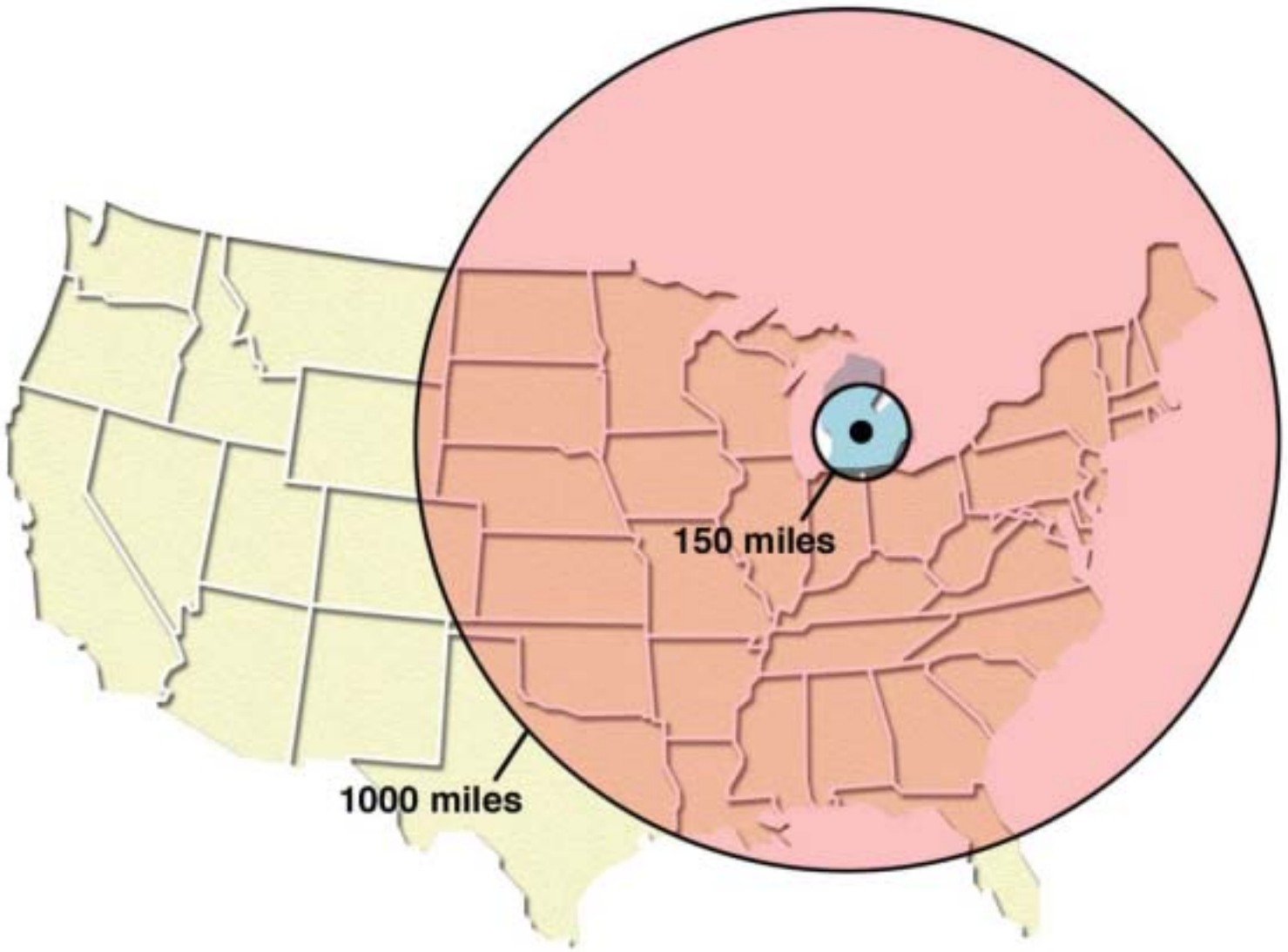

* Other Transaction Authorities (OTA business instruments require tailored design, implementation and management of intellectual property, financial procedures, governance, accounting and auditing.)

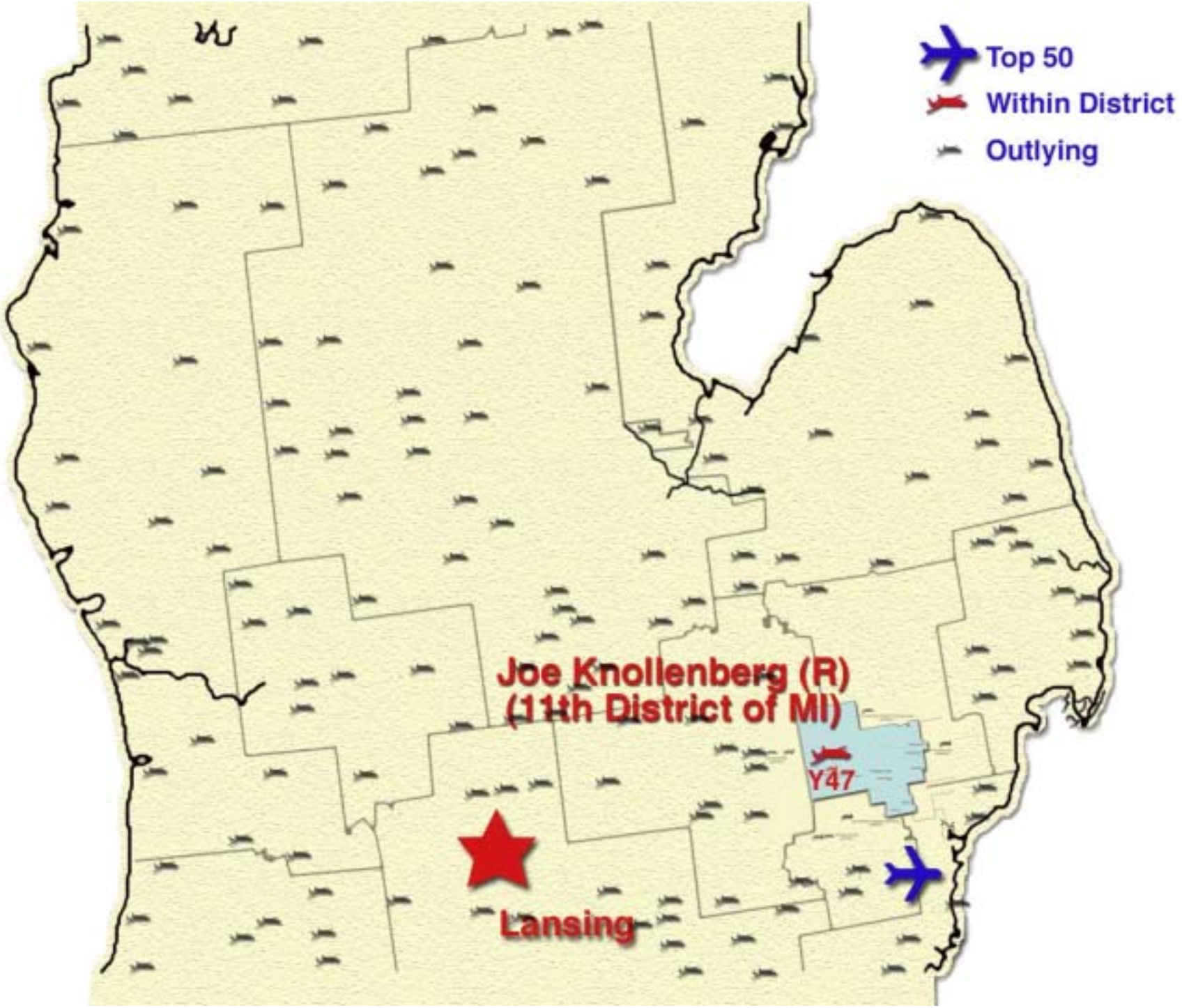
# Summary

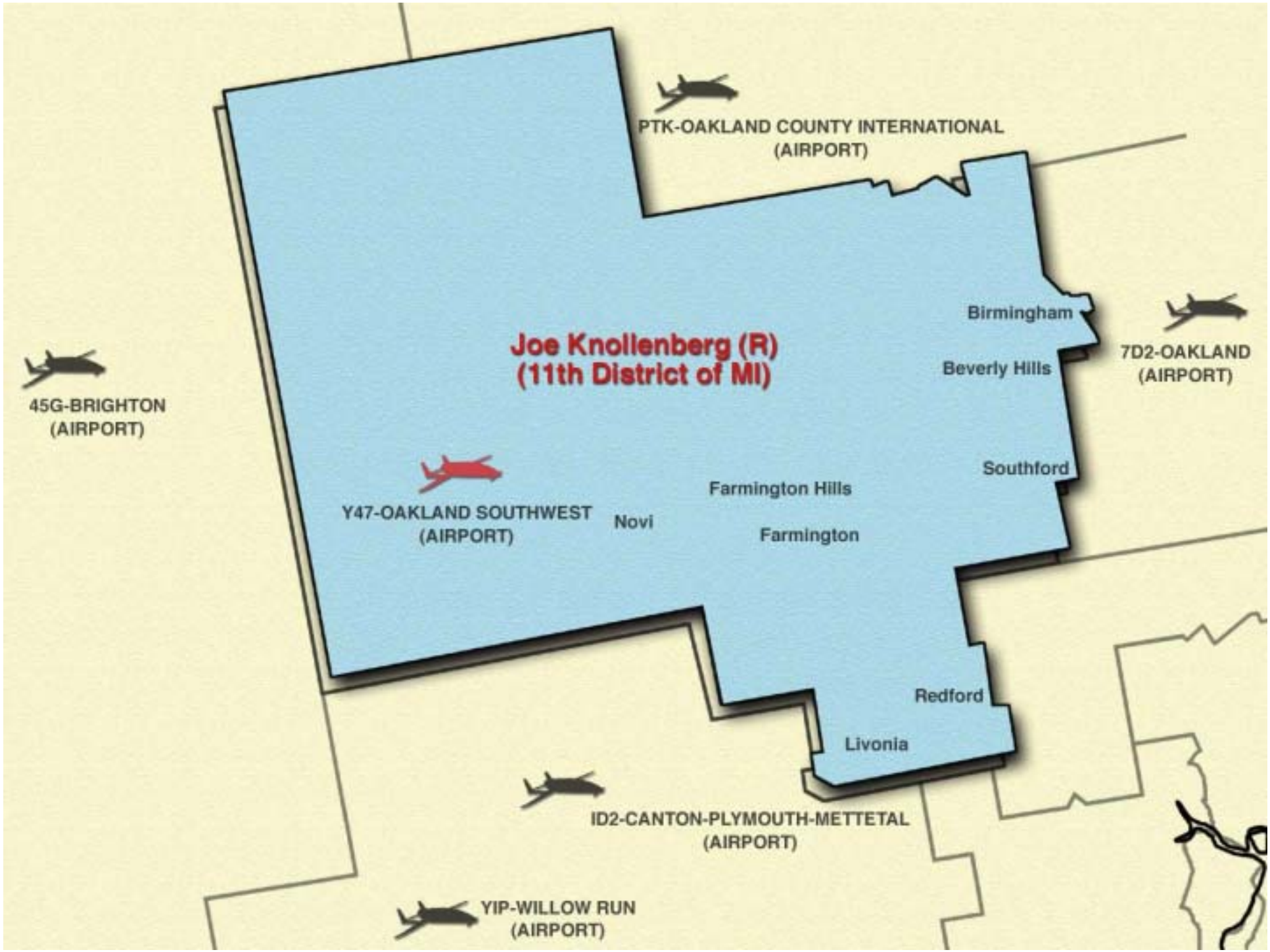
- **The NASA Blueprint provides the Administrator's technology strategy for SATS**
- **The leading indicators in the marketplace support the technology strategy**
- **SATS is a proof of concept R&D program, focused on reliable accessibility to thousands of destinations**
  - **Collaborative, cost-sharing public-private alliance**
  - **Flight experiments and simulations leading to a 2005 demonstration**
  - **State/local transportation authorities, policy-makers, and opinion leaders are the audience for the 2005 Demonstration**
  - **FAA plays a key role in translating SATS research outcomes for practical applications in the National Airspace System.**
  - **Industry plays a vital role in technology development, spearheading collaboration with FAA, and product development for SATS deployability**

For More Information http://sats.nasa.gov

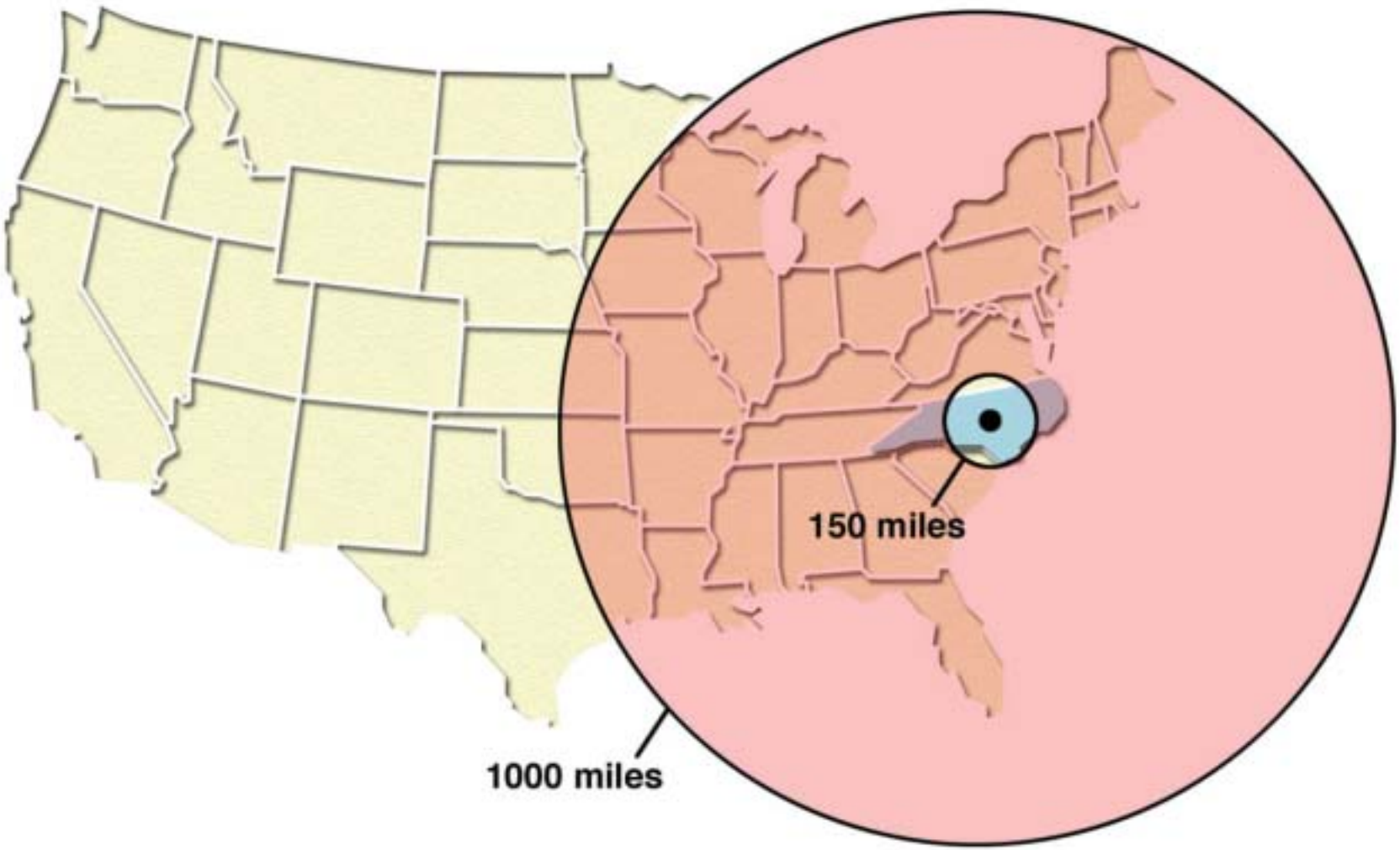
# SATS JET ONE DAY TRAVEL POTENTIAL

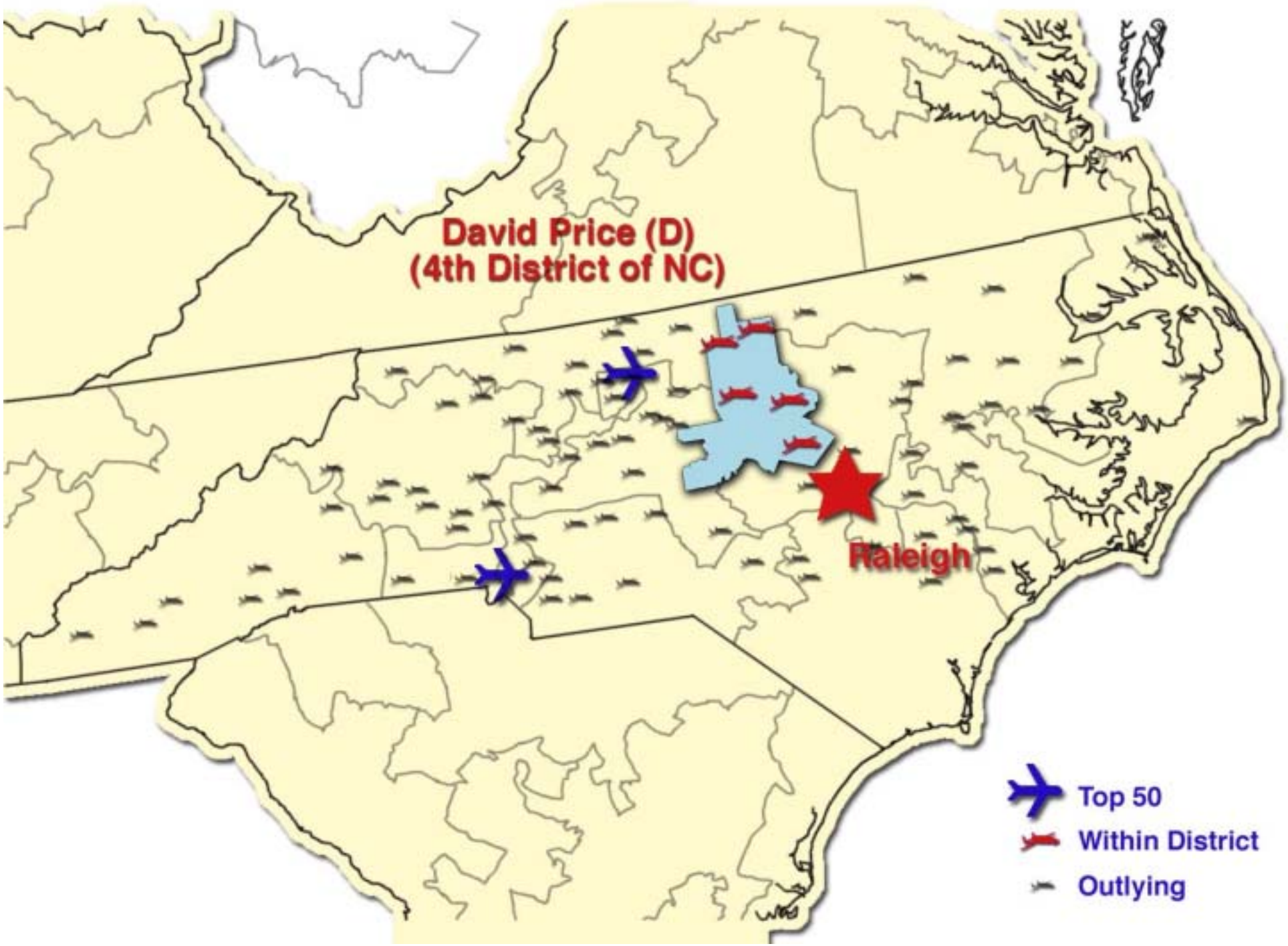


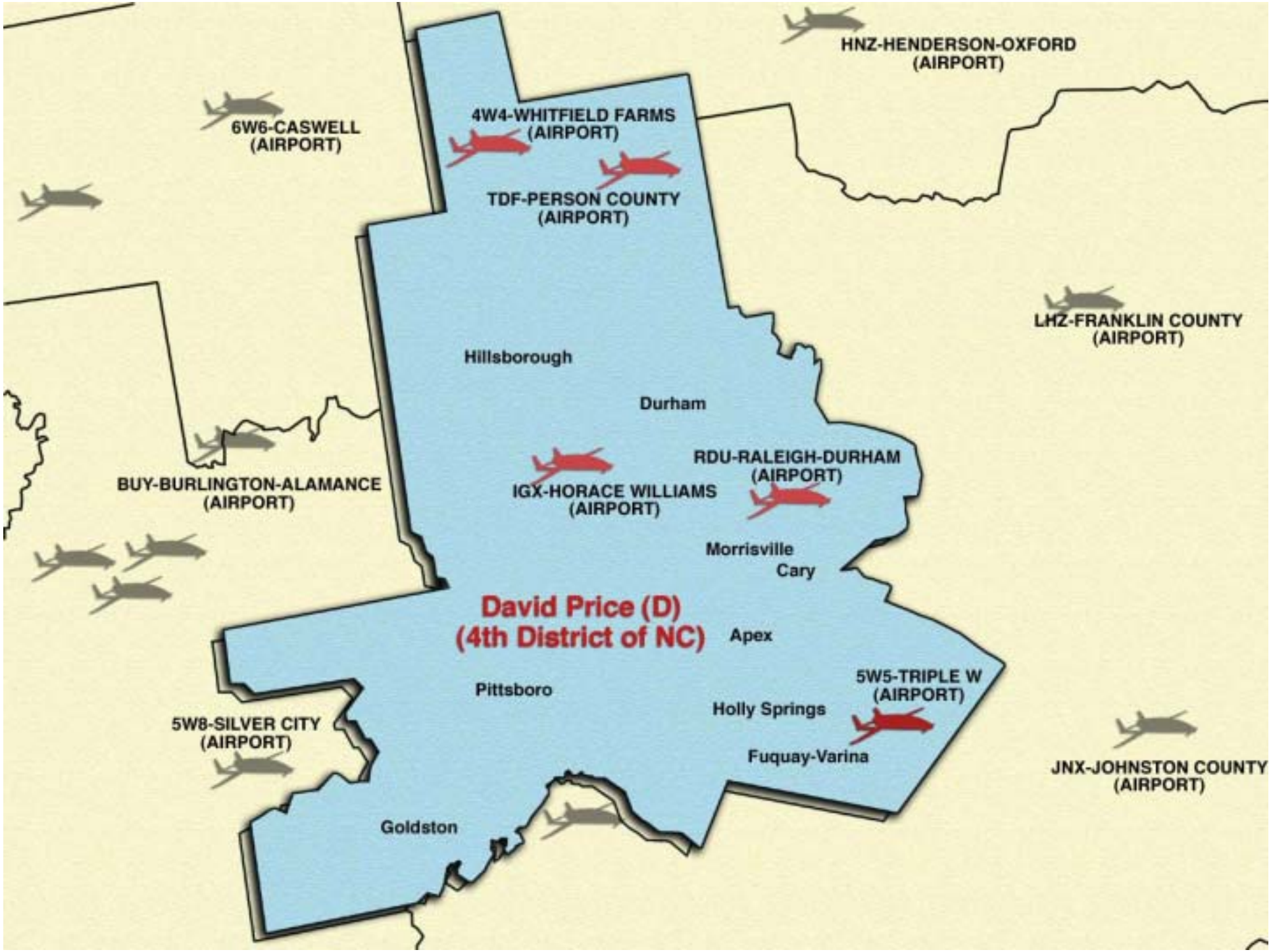

Top 50
Within District
Outlying
Joe Knollenberg (R)
(11th District of MI)
Y47
Lansing


PTK-OAKLAND COUNTY INTERNATIONAL
(AIRPORT)
Joe Knollenberg (R)
(11th District of MI)
Birmingham
Beverly Hills
7D2-OAKLAND
(AIRPORT)
45G-BRIGHTON
(AIRPORT)
Southford
Farmington Hills
Y47-OAKLAND SOUTHWEST
(AIRPORT)
Novi
Farmington
Redford
Livonia
ID2-CANTON-PLYMOUTH-METTETAL
(AIRPORT)
YIP-WILLOW RUN
(AIRPORT)

# SATS JET ONE DAY TRAVEL POTENTIAL




David Price (D)
(4th District of NC)
Raleigh
Top 50
Within District
Outlying


HNZ-HENDERSON-OXFORD
(AIRPORT)
6W6-CASWELL
(AIRPORT)
4W4-WHITFIELD FARMS
(AIRPORT)
TDF-PERSON COUNTY
(AIRPORT)
LHZ-FRANKLIN COUNTY
(AIRPORT)
Hillsborough
Durham
RDU-RALEIGH-DURHAM
(AIRPORT)
IGX-HORACE WILLIAMS
(AIRPORT)
BUY-BURLINGTON-ALAMANCE
(AIRPORT)
Morrisville
Cary
David Price (D)
(4th District of NC)
Apex
5W5-TRIPLE W
(AIRPORT)
Pittsboro
Holly Springs
5W8-SILVER CITY
(AIRPORT)
Fuquay-Varina
JNX-JOHNSTON COUNTY
(AIRPORT)
Goldston