



MIT International Center for Air Transportation

Implications of Very Light Jets for the Air Transportation System

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/Airline Industry Consortium Joint Meeting**

MIT

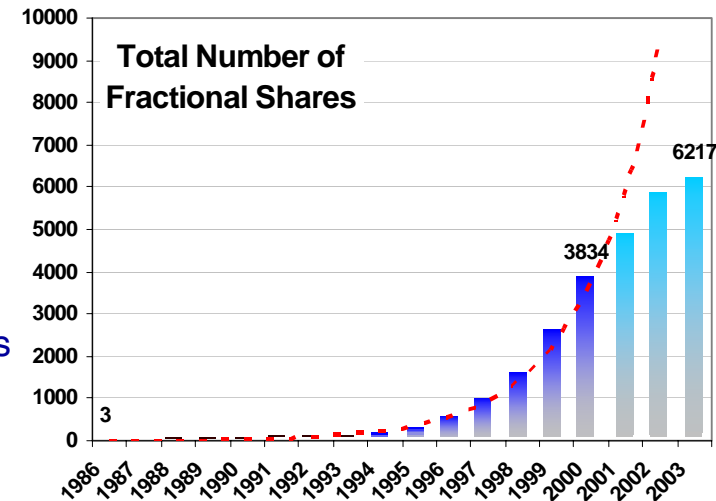
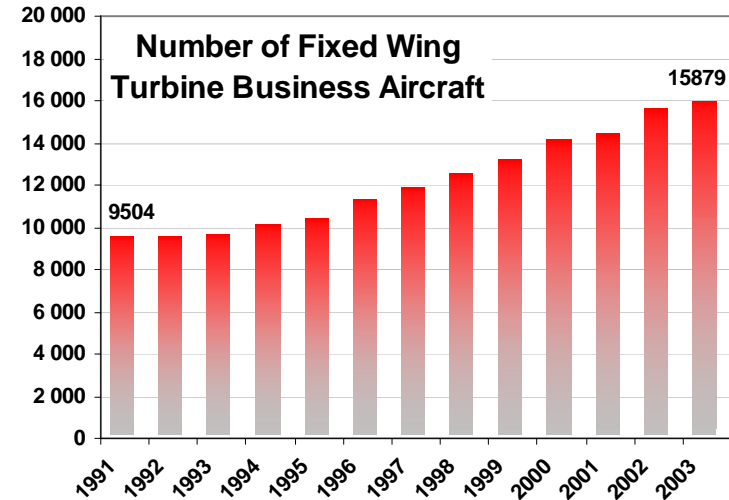
November 4th 2005

Business aviation industry

- Segment of the General Aviation industry:
 - 37 B\$ annually (0.4% of 2000 GDP)
 - Employment: 511 000
- Growing Industry
 - +67% in # of aircraft (turbine) over the last 10 years
- Emerged Models in the 1980s:
 - Fractional Ownership Programs

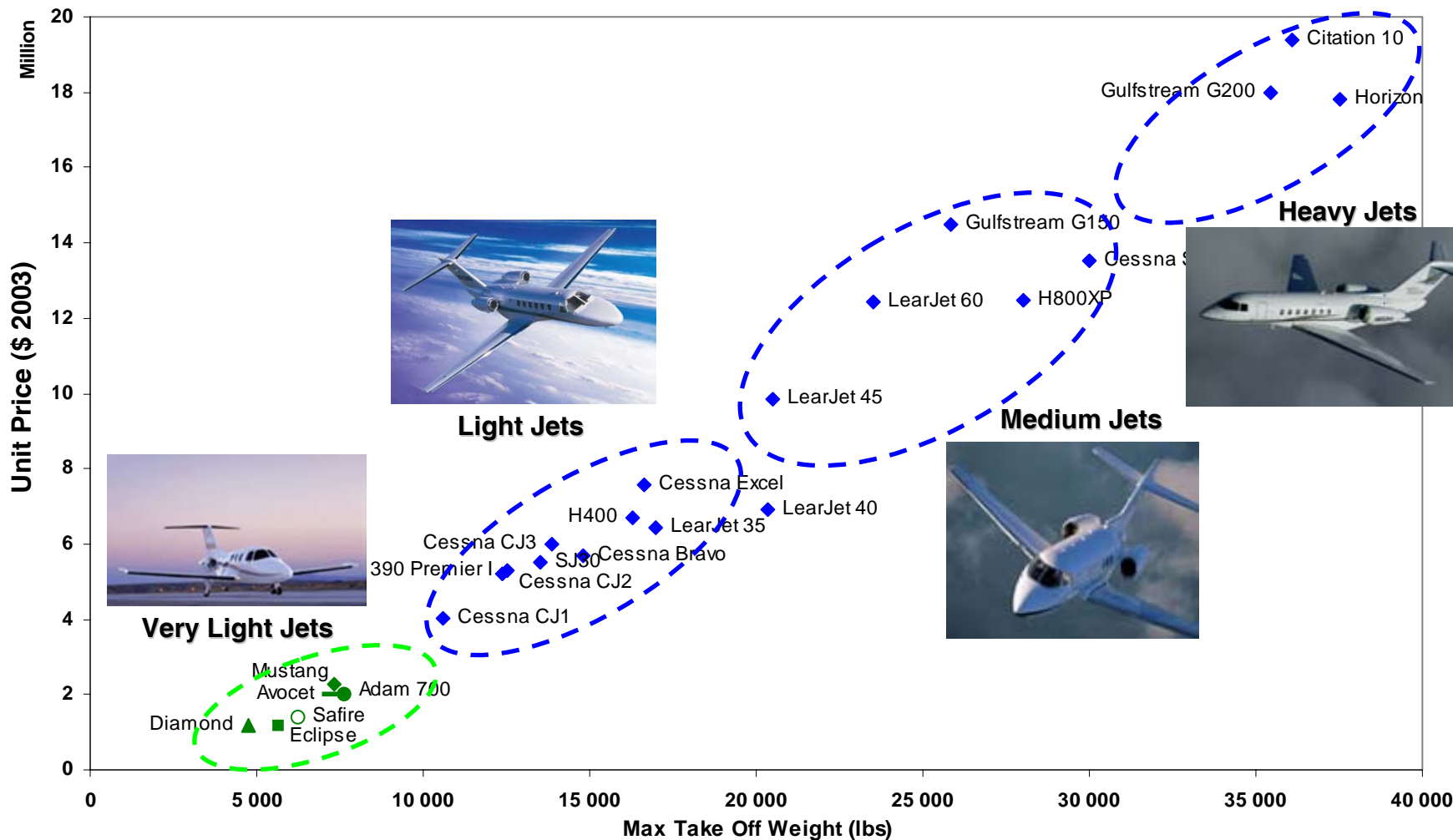
Future entry of Very Light Jets

- New opportunities:
 - Large scale on-demand air networks
- Need to **understand the dynamics of entry of VLJs** at the N.A.S. level and **anticipate the potential impacts** in order to allow a **successful integration** of these new models



Data source: NBAA, Fact Book 2004.

Very Light Jets (VLJs): A New Class of Aircraft



NBAA classification	Light Jets		Medium Jets	Heavy Jets
New class	Very Light Jets			

Very Light Jets in Development



Eclipse500
Eclipse Aviation
 Twin Jet
 U.S.
2300-
August 2005
 Q2 2006



Mustang
Cessna
 Twin Jet
 U.S.
240
July 2005
 Q3 2006



Adam700
Adam Aircraft
 Twin jet
 U.S.
75
July 2004
 2006+



EMB-VLJ
Embraer
 Twin Jet
 Brazil
 2008



ProJet
Avocet Aircraft
 Twin Jet
 Israel / U.S.
 not disclosed

A/C name:
 Company:
 A/C type:
 Country:
 Orders:
as of:
 First Delivery*:
 *expected



Epic LT
Epic
 Twin Jet
 U.S.
 Not disclosed



HondaJet
Honda
 Twin Jet
 Japan
 No
 commercialization
 commitment



Safire26
Safire Aircraft
 Twin Jet
 U.S.



D-Jet
Diamond Aircraft
 Single Jet
 Austria/Canada
 Not disclosed

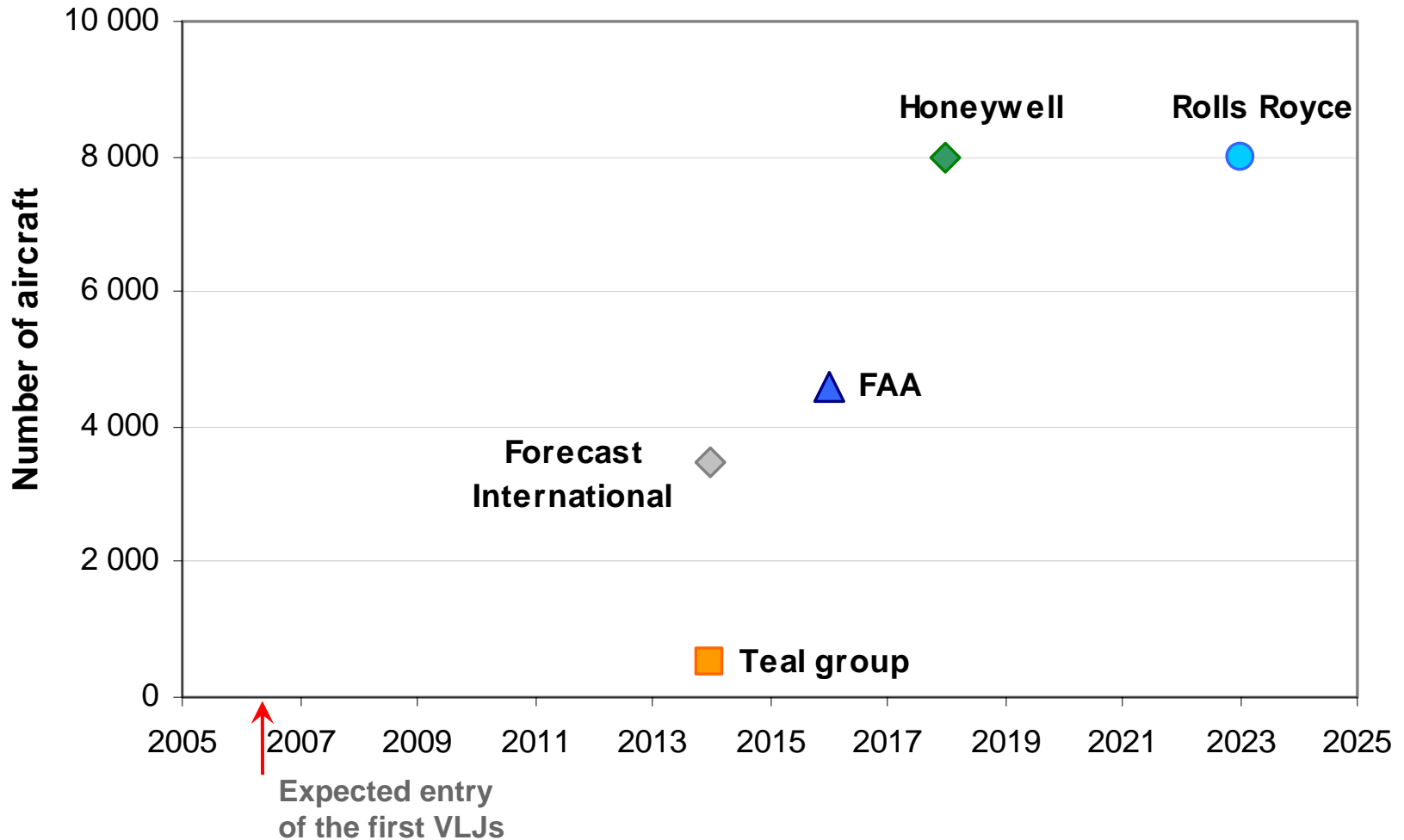


Eviation EV-20
 2006
Excel Sport Jet

A/C name:
 Company:
 A/C type:
 Country:
 Orders:
as of:
 First Delivery*:
 *expected

... and others entering the race: Spectrum 33

Potential Size of this Segment of the Industry



Data Source:

-FAA Forecast 2005-2016: http://www.faa.gov/data_statistics/aviation/aerospace_forecasts/2005-2016/

-Rolls-Royce outlook: http://www.rolls-royce.com/civil_aerospace/overview/market/outlook/default.jsp

-Aviation International News, Forecasts predict growth for business aviation, http://www.ainonline.com/issues/11_04/11_04_forecastp10.html,

Potential Modes of Operations

- **Owner flown** (≈ 900 aircraft)

 - Owned and operated by individuals or companies

- **Fractional Ownership Programs** (≈ 20 aircraft)

 - e.g. Our Plane (Canada & U.S.)

- **Clubs** (≈ 110 aircraft)

 - e.g. Aviace (Switzerland)

- **Large Scale On-Demand Air Networks** (≈ 1700 aircraft)

 - Charter: e.g. Pogo (U.S.)
 - Per Seat: e.g. DayJet (U.S.)
 - Mix Charter/Per Seat: e.g. LinearAir (U.S.)



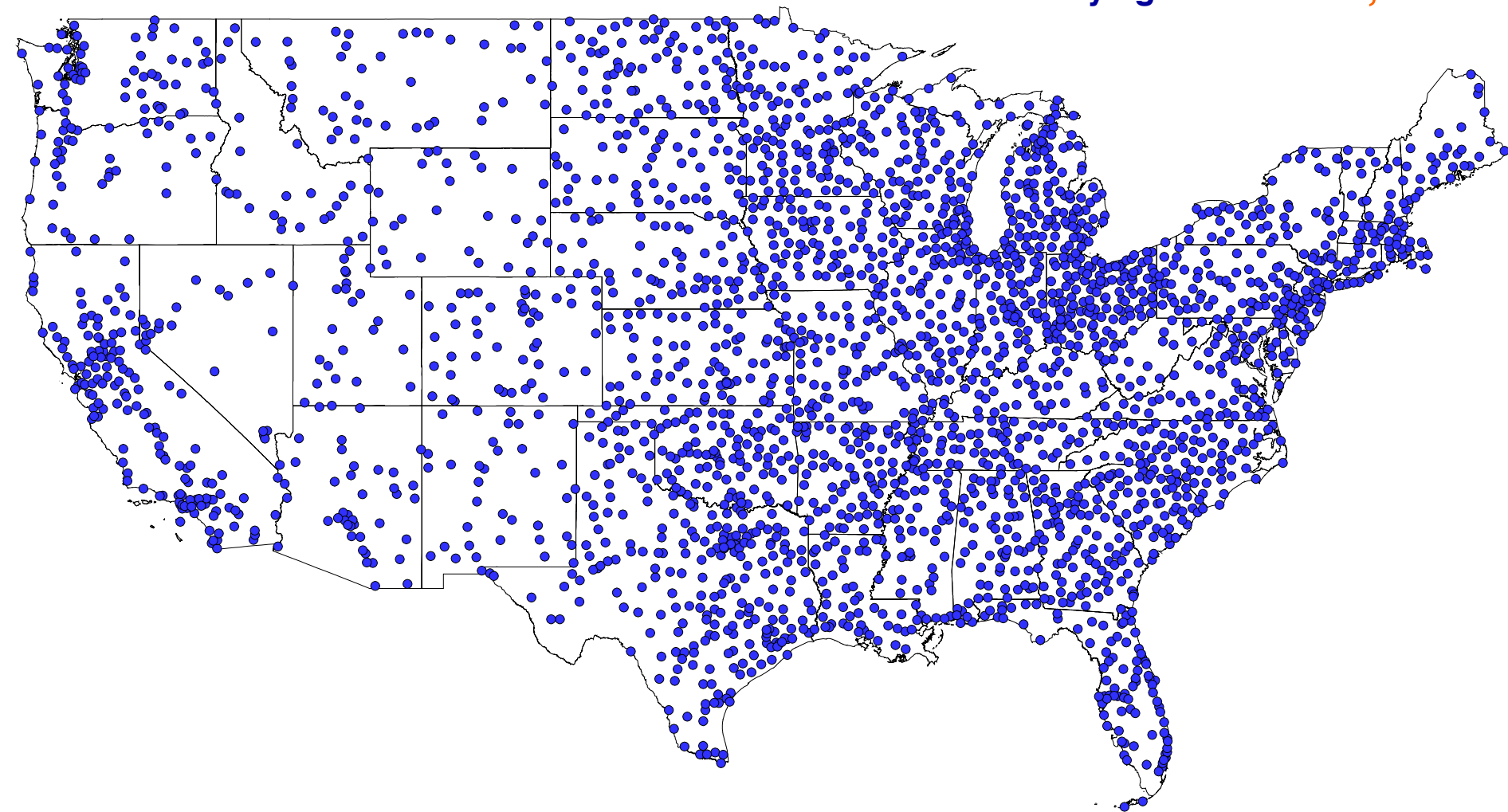
- **Freight** (≈ ? aircraft)

 - Logistic Networks
(e.g. Supply Chain Back Up Networks, Package delivery, etc)



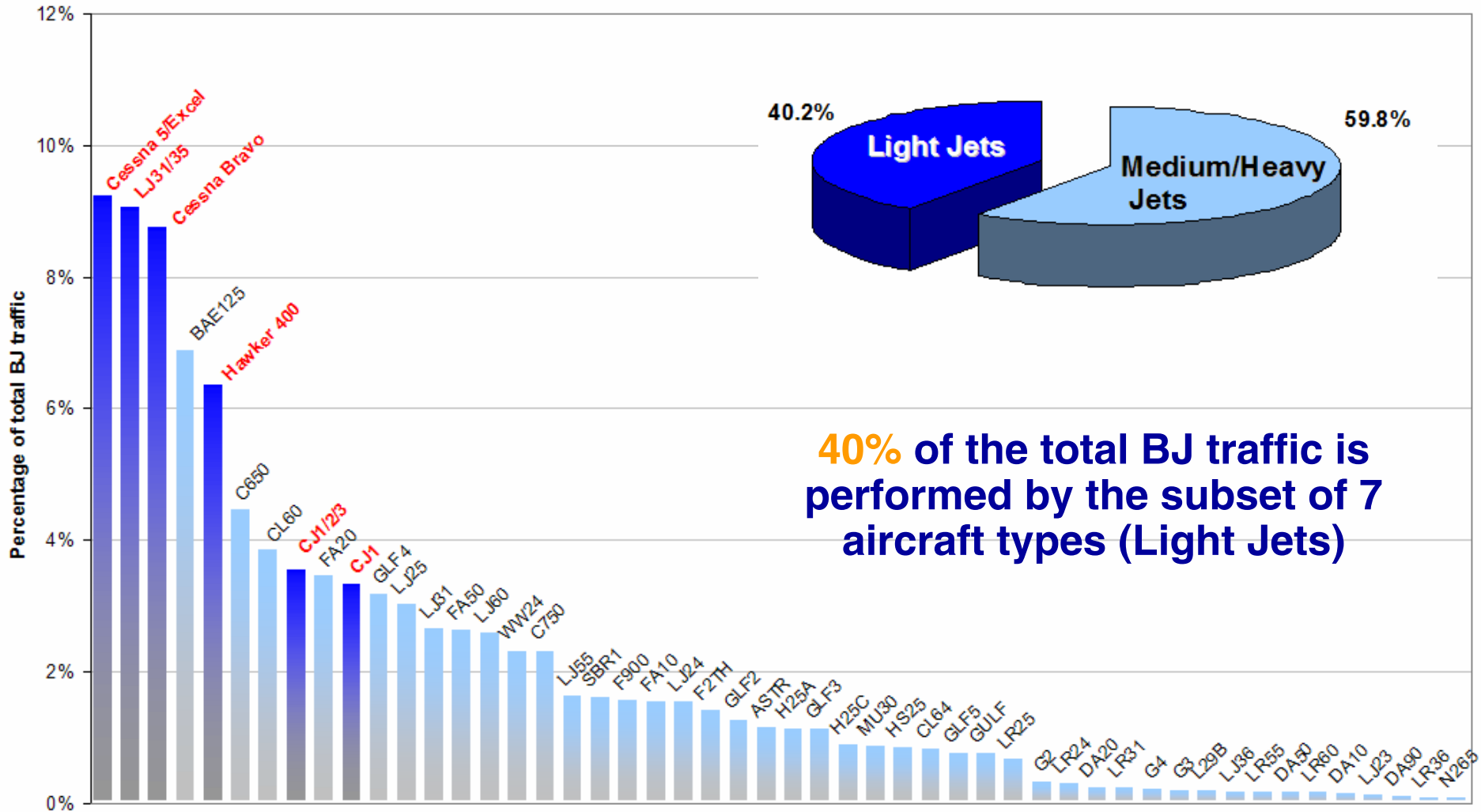
With runway length requirements of 3000 ft VLJs will be able to have access to a larger set of airports

Runways greater than **3,000 ft**





Analysis of Traffic by Existing Business Jets: Traffic Share by Aircraft Type

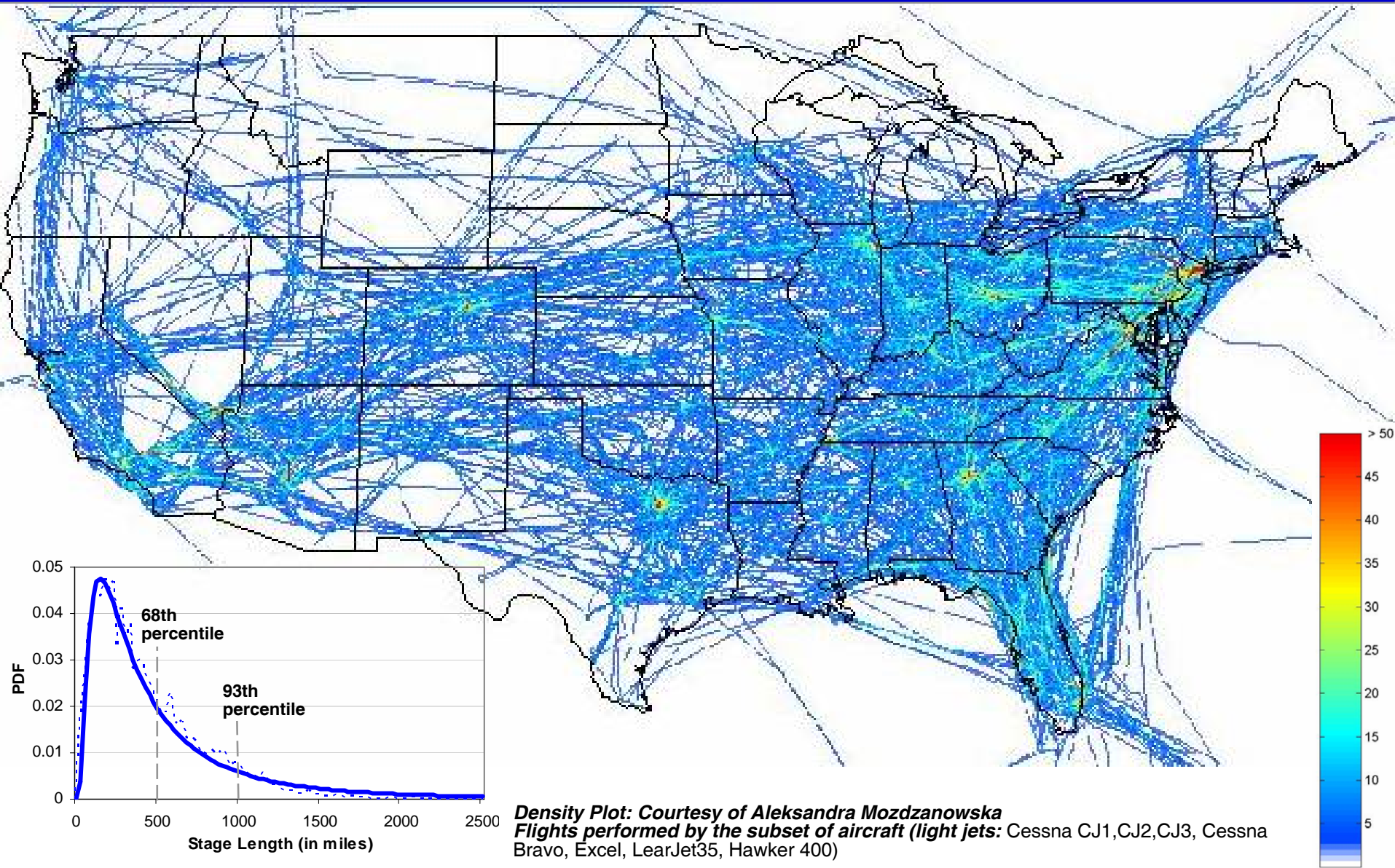


40% of the total BJ traffic is performed by the subset of 7 aircraft types (Light Jets)



Horizontal Pattern Analysis

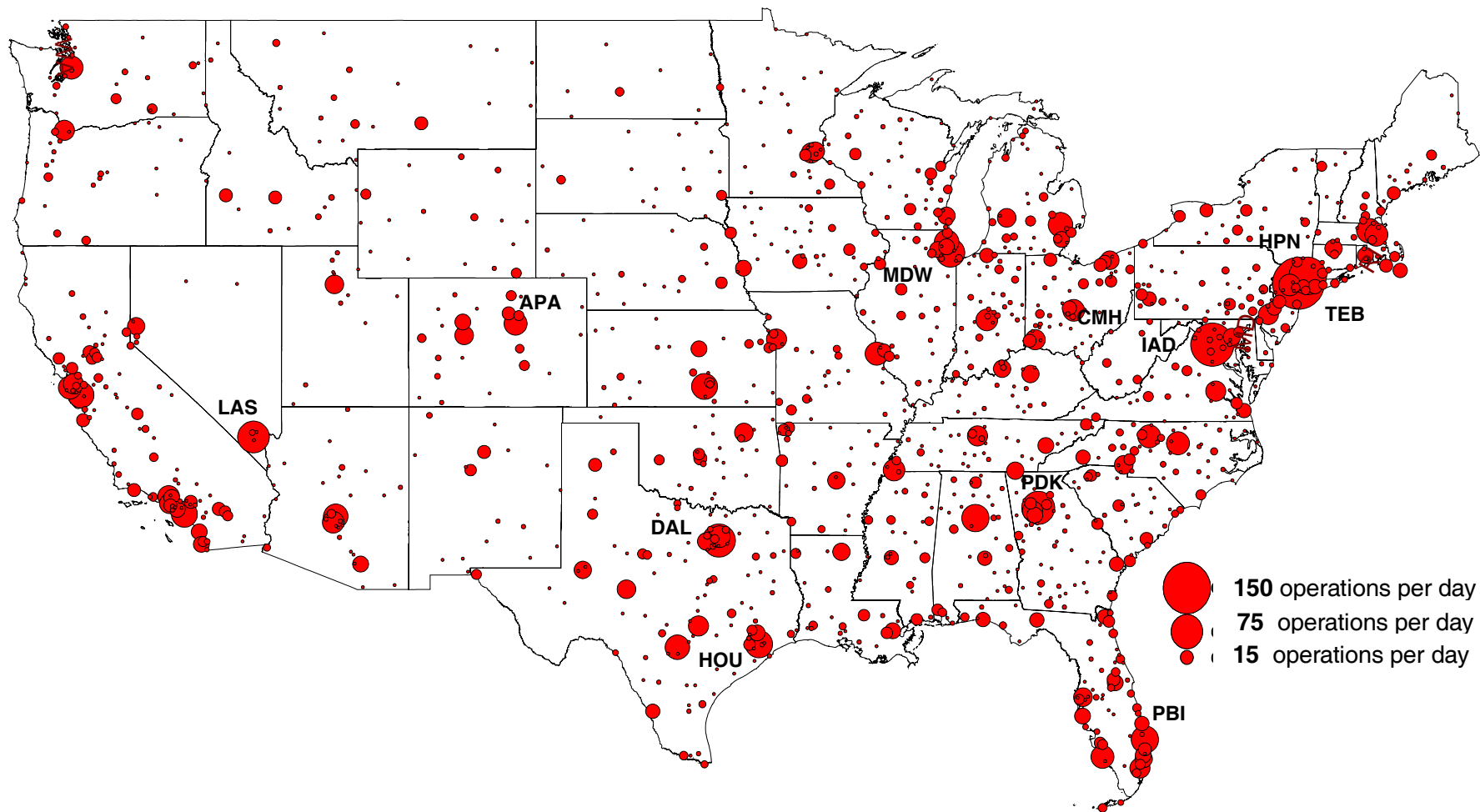
One day of traffic in the NAS by Light Jets



Density Plot: Courtesy of Aleksandra Mozdzanowska
Flights performed by the subset of aircraft (light jets: Cessna CJ1,CJ2,CJ3, Cessna Bravo, Excel, LearJet35, Hawker 400)



Light Business Jet Traffic* in 2003

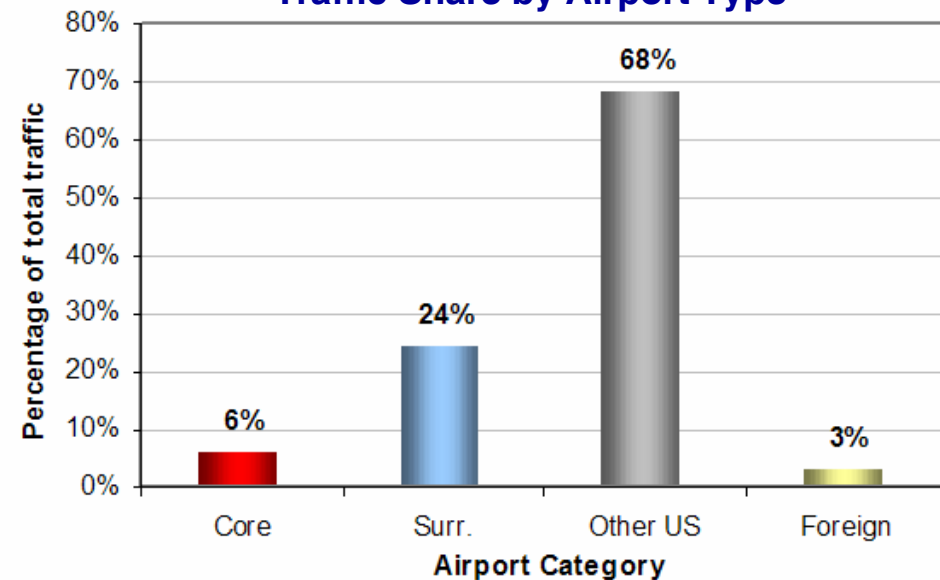


•Traffic at 3400 public airports
Light Jets include: Cessna CJ1, CJ2, CJ3, Bravo, Excel, LearJet35, Hawker400

Data source: ETMS data (traffic) and FAA Form 5010 (airports)

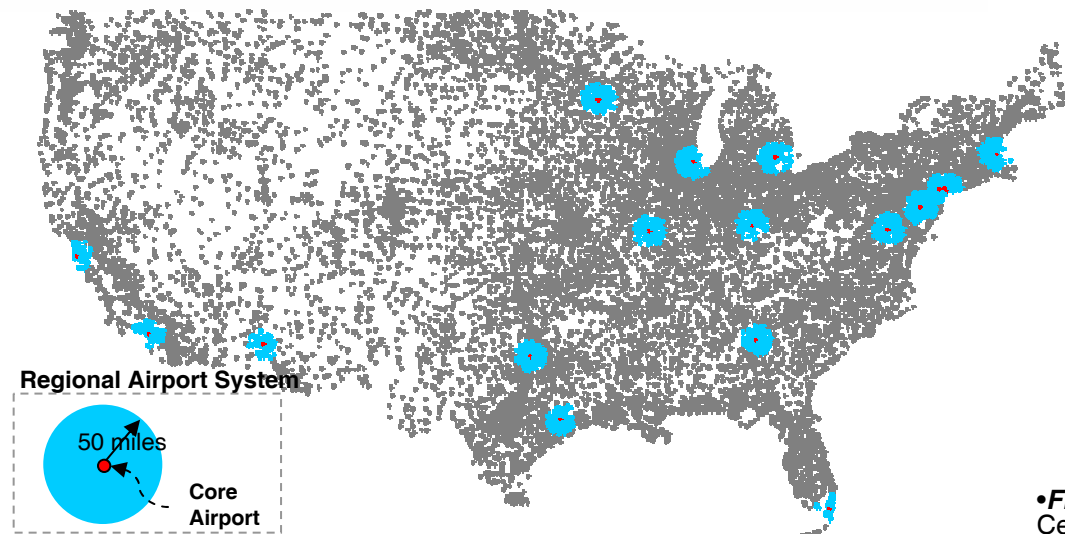
Airport Utilization (by airport type)

Traffic Share by Airport Type



30 % of the total activity (departures and arrivals) is performed at airports part of the 16 metropolitan regions

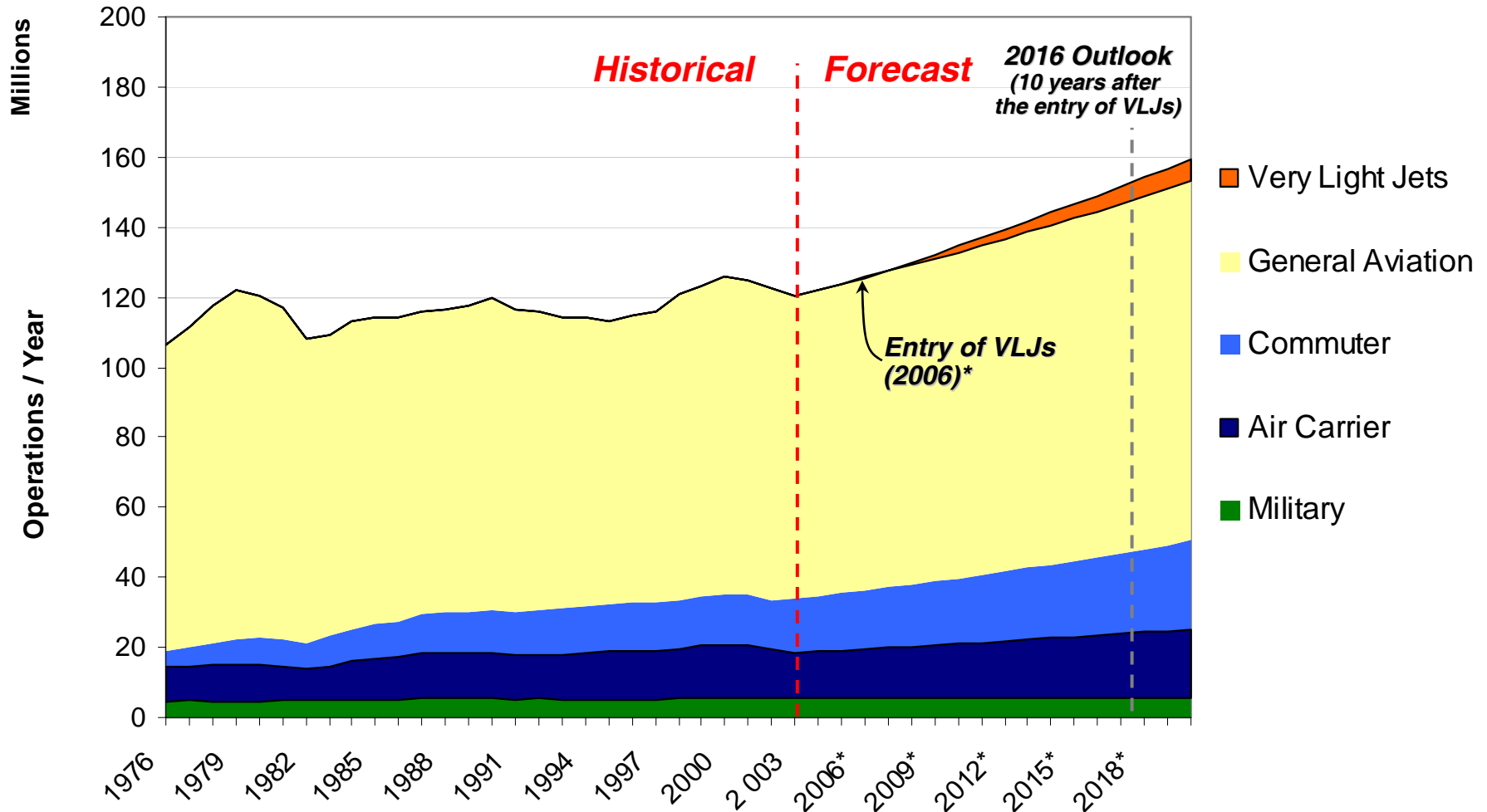
50 % of all flights* have at least one end airport in one of 16 metropolitan regions



•Flights performed by the subset of aircraft (Light Jets: Cessna CJ1,CJ2,CJ3, Cessna Bravo, Excel, LearJet35, Hawker 400) 11

Volume of Operations in the U.S.

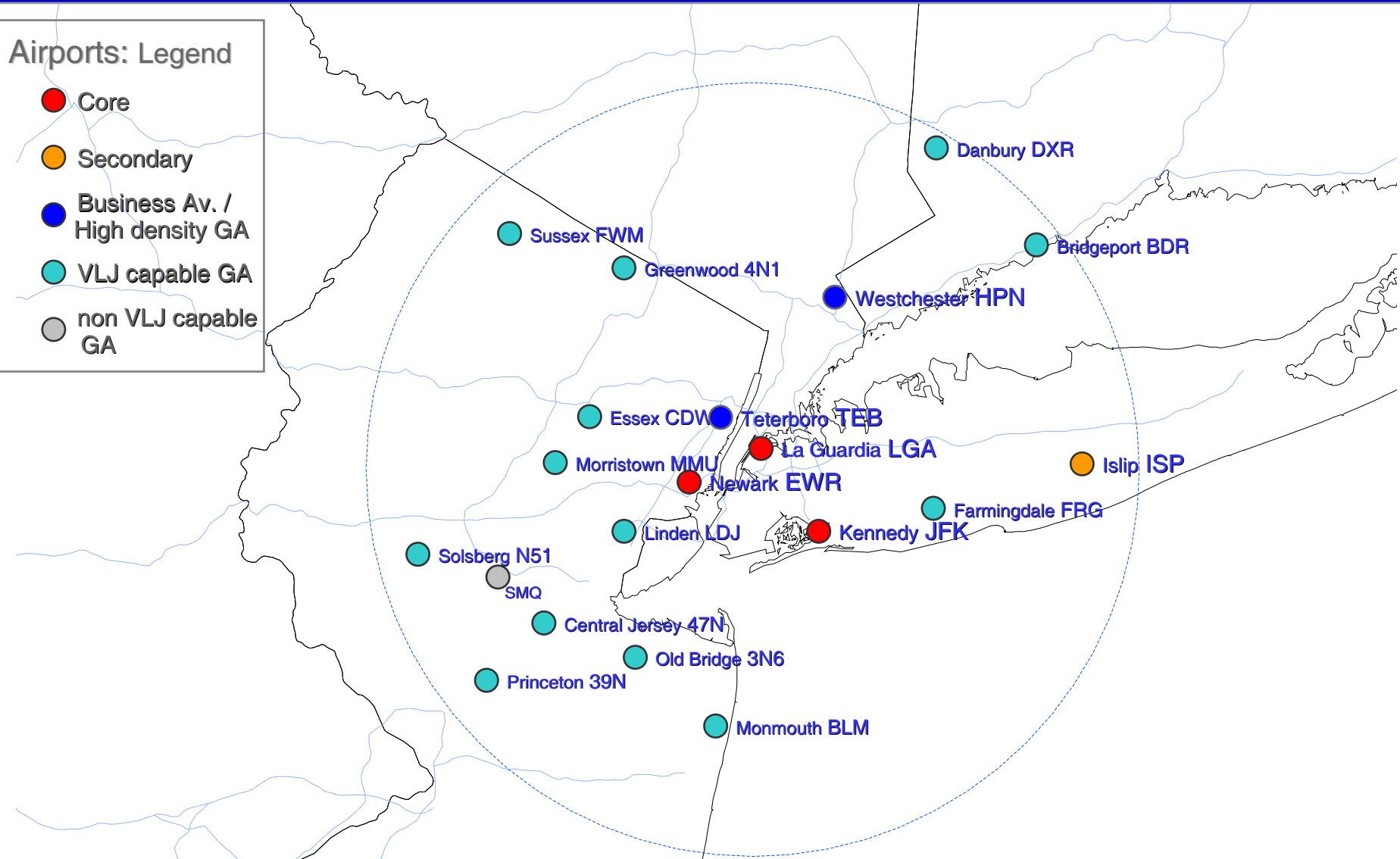
Historical data and forecast



* This scenario assumes a delivery rate of 500 very light jets per year starting in 2006.

Analysis of Traffic Distribution at the Regional Airport System Level

example of the **New York Region***

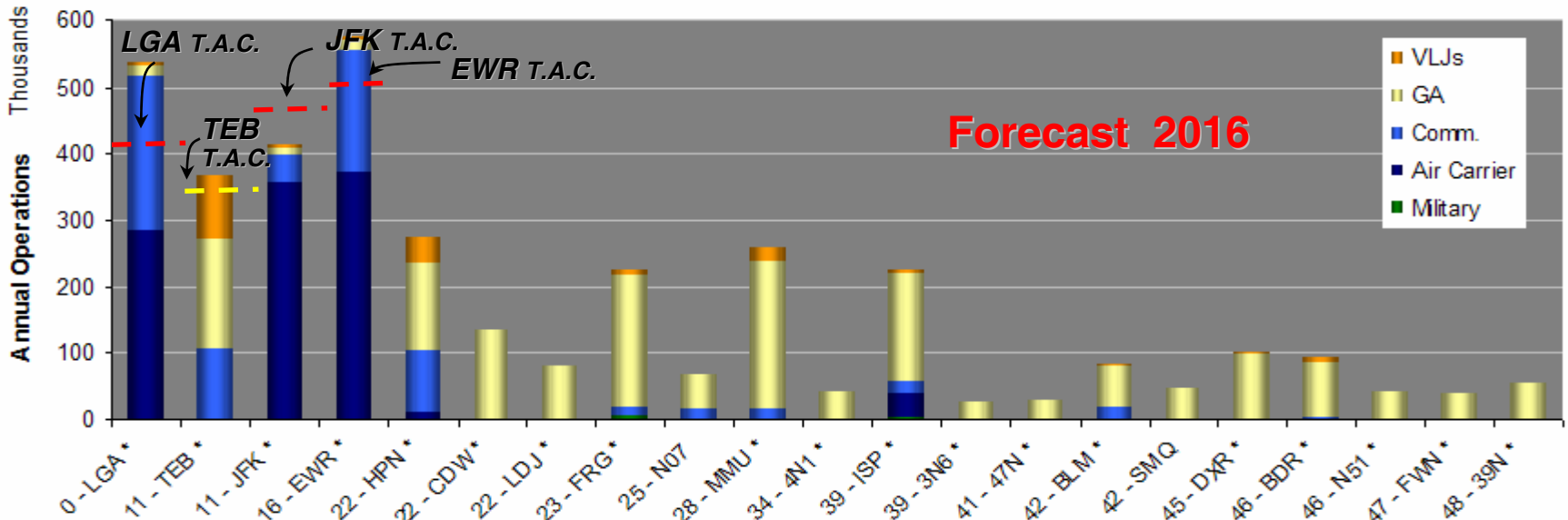
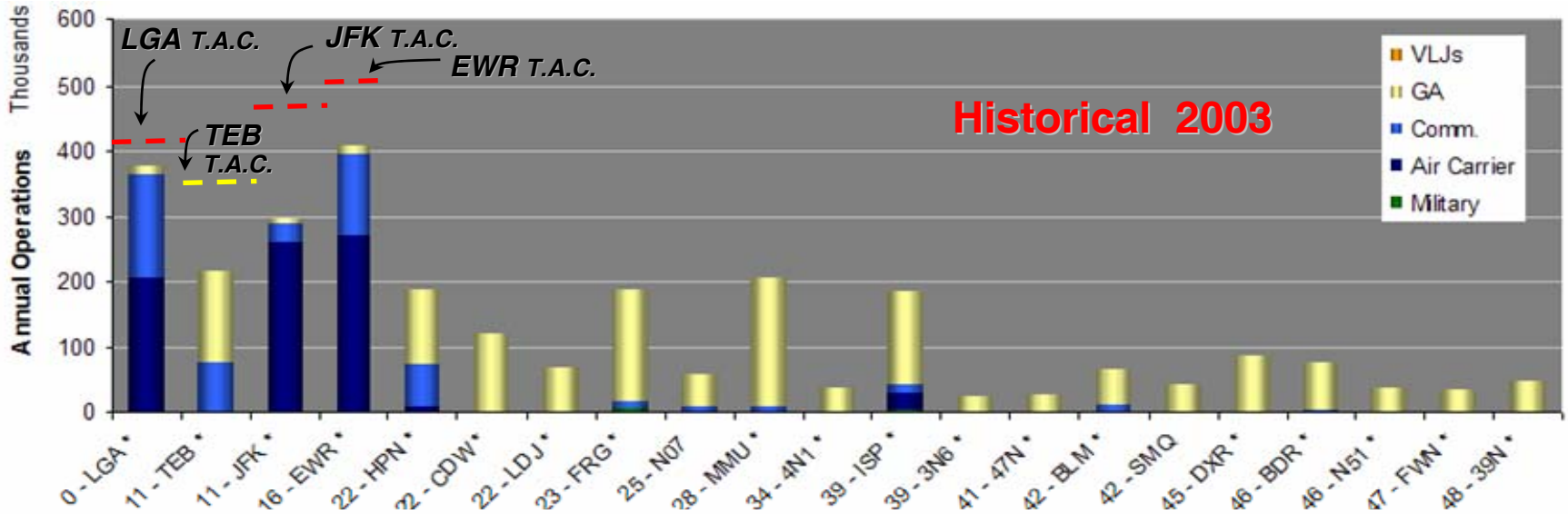


* The analysis was performed for several regional airport systems in the U.S. (New York, Boston, Washington, Chicago, Miami, Los Angeles)



Historical and Forecasted Volumes of Traffic at Airports within the Regional Airport System

example of the **New York Region***



* The analysis was performed for several regional airport systems in the U.S. (New York, Boston, Washington, Chicago, Miami, Los Angeles)



Conclusions & Future Directions of Research

Conclusion

- In the short and medium term, VLJ traffic is unlikely to differ from existing LJ traffic.
- Concentration of traffic implies:
 - **Outside high density metro areas: Not an issue, capacity exists**
 - **Inside high density metro areas**
 - *Some key airports will become even more congested*
 - *Capacity crisis at key airports will occur even without VLJs*
 - **Traffic redistribution mechanisms will take place**
 - *Core airports*
 - *Secondary airports; emergence of new secondary airports*
 - *Core GA reliever airports; strengthening of existing and emergence of new reliever airports*
 - *Surrounding GA airports; growth of business jet (and Very Light Jet) traffic*
- Strengthened role of small regional airports within key metropolitan areas
- Need to promote the development of airport systems on a region wide basis

Future Directions of Research

- Investigating the feasibility and the implications of the integration of air carrier and on-demand air networks



Questions & Comments