



Homeland Security

- Airline Passenger Risk Assessment -

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- Program Objectives and Approach -



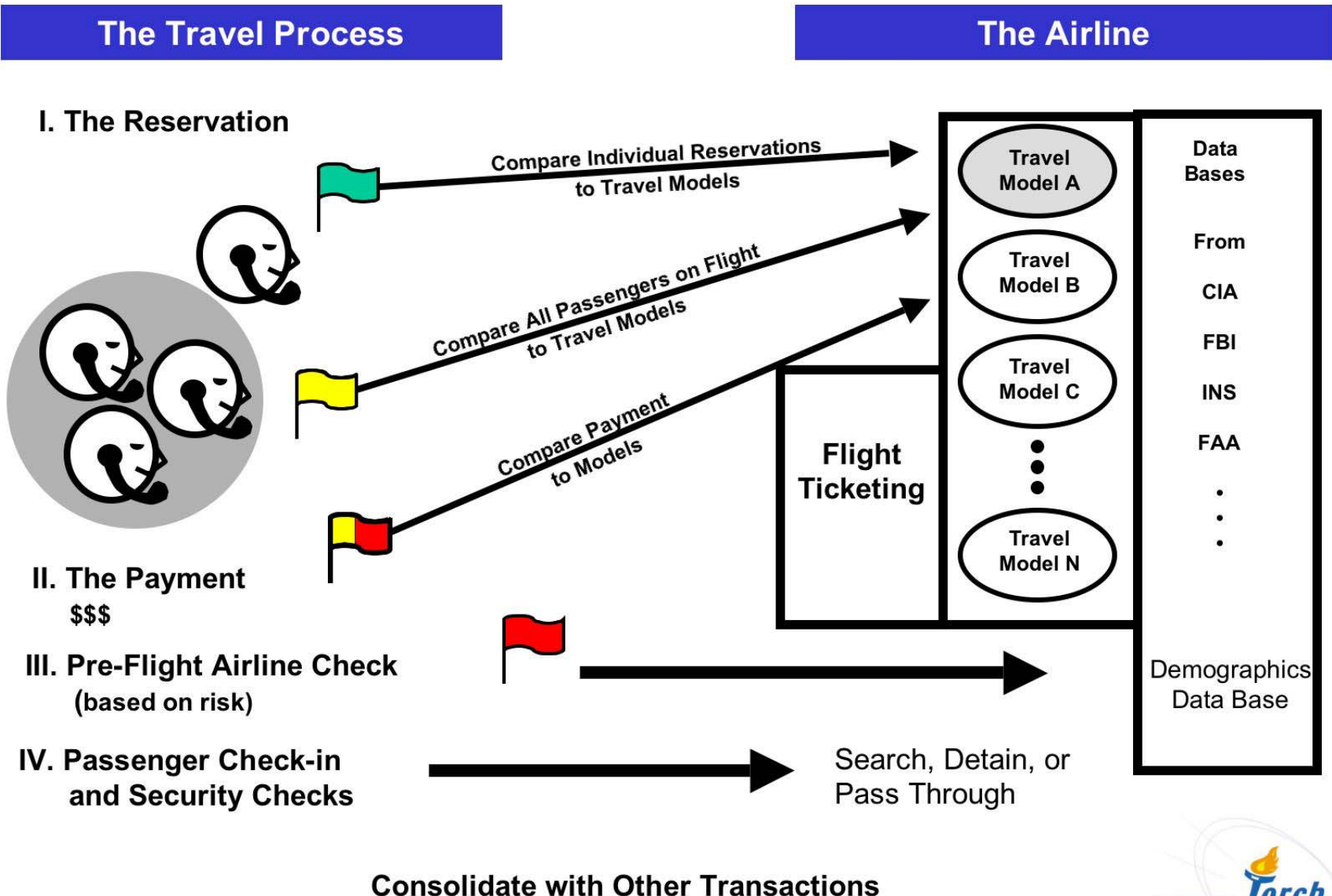
Objectives

- **Demonstrate that Airline Passenger and Reservation Data Can Be Clustered to Form Groups of Conventional Travelers.**
- **Characterize Each Group of Travelers.**
- **Show How This Type of Characterization, When Extended to a More Complete and Representative Data Base, Can Be Used to Identify High Risk Passengers.**



Concept for Airline Ticketing Transactions

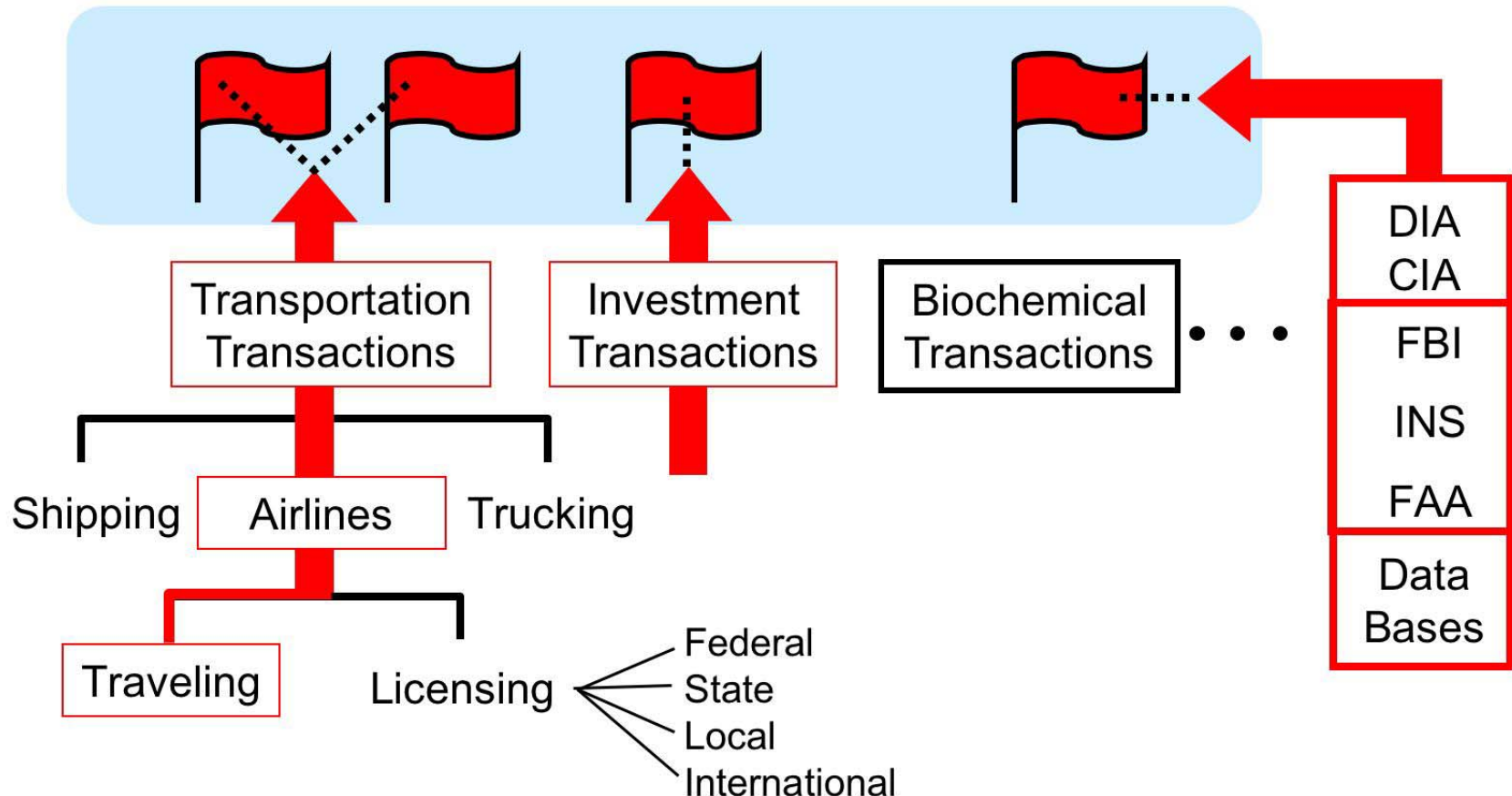
- The Risk Assessment Process -



Employ Transactions Across Broad Spectrum

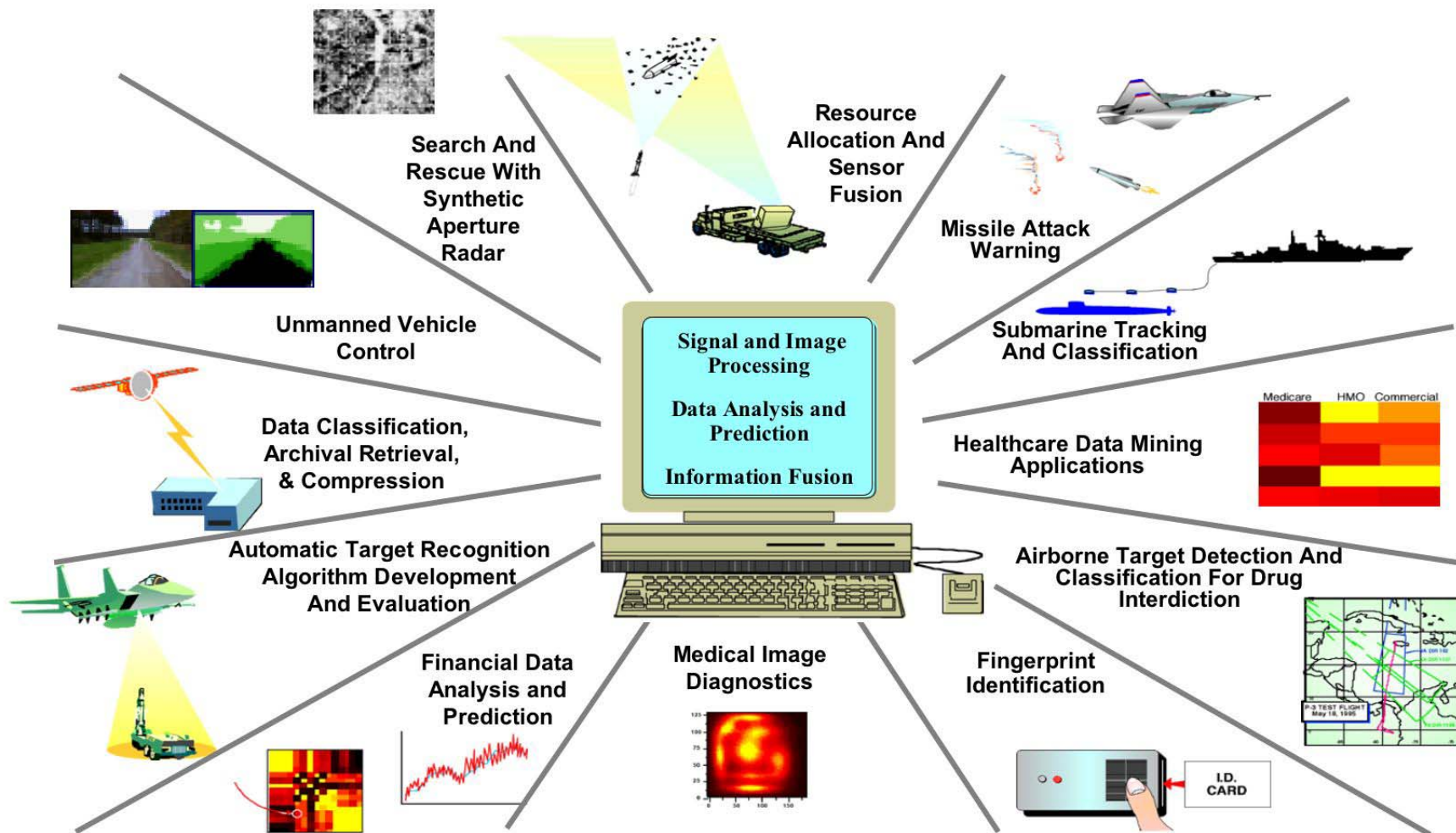
- Deviations From Normal Behavior Point To Terrorists -

Deviations Represent Suspect Actions or Flags!



**Find a “Needle in a haystack”
without knowing what the needle looks like!**

Previous Applications of ACUMEN Technology



ACUMEN technology is mature and has been successfully demonstrated applied to many problems

- Data Base Delays Forced Modified Approach -

It Took a Long Time to Get Data!

- Dec '01 – Jan '02: Initial Overtures Made to Airlines to Obtain Data (Delta, American, . . .)

March – Contract Funded

- April 11: First Meeting with DOT, Mr. Jim Yeager
- April – May: Congressional Liaison Arranged Meeting with TSA
- June: First DOT-TSA Meeting Addressed Proposed Project.
- July: Given Assurance That We Would Receive the Necessary Data Base Being Used By CAPPS II Contractors in Weeks.
- August: Informed We Would Receive the jetBlue Data Base. We Indicated That This Would Probably Be Very Limited.
- September: Received the jetBlue Data Base. Confirmed Limitations.
- October: Purchased Acxiom Data Base on Passenger Demographics.

Airline Passenger Data Base

- jetBlue P&R and Demographics -

Complexity of Data Base

- Fifty-Three Dimensional Data Base
- Five Million P&R Records

P&R Data

- Airline Serves Only Eighteen Airports
- Principal Hub at JFK
- Trips Primarily
 - (1) Within New York
 - (2) New York to Florida
 - (3) New York to West Coast

Demographic Data

- Demographic Data Available for 40% of Passengers
- Not Security Quality

**Data Base Limited: “Tourist-Like” Passengers; Limited Origins and Destinations;
Lack Passenger Travel History; . . .**

jetBlue Routes



The Passenger Demographics Data Base

- Acquired from Acxiom -

For Approximately 40% of the Passengers, the Following Demographic Information Could Be Extracted:

Name

1. Gender
2. Home Specifics – Owner/Renter, . . .
3. Years at Residence
4. Economic Status – Income, . . .
5. Number of Children
6. Social Security Number
7. Number of Adults
8. Occupation
9. Vehicles

- Results of ACUMEN Analysis -

Travel Patterns Are Unremarkable

Travel Patterns:

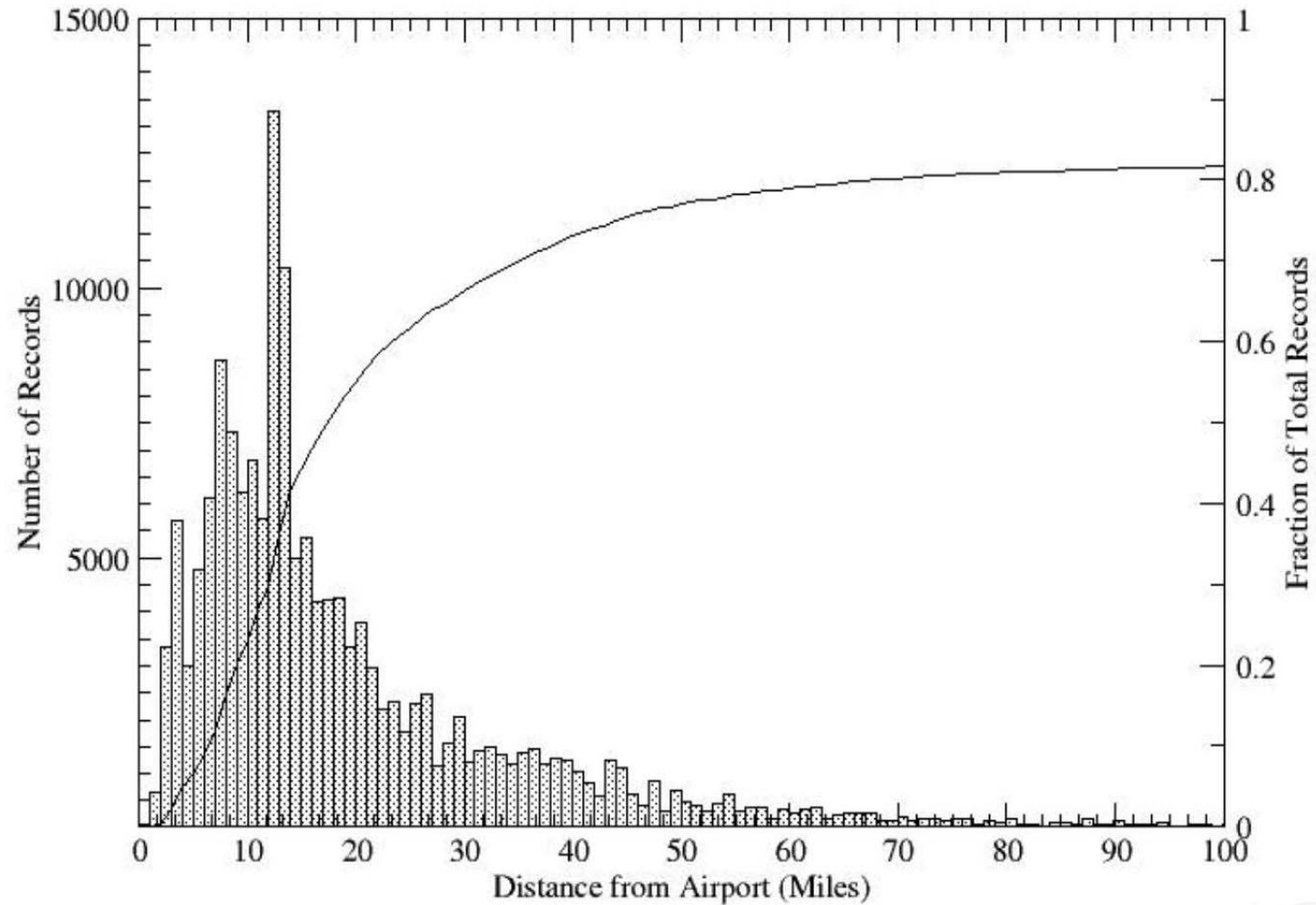
- Long and Short Commutes
- Long and Short Trips
- Round Trips and One-Ways



jetBlue Passengers Appear to Be Largely Upper Middle Class Tourists

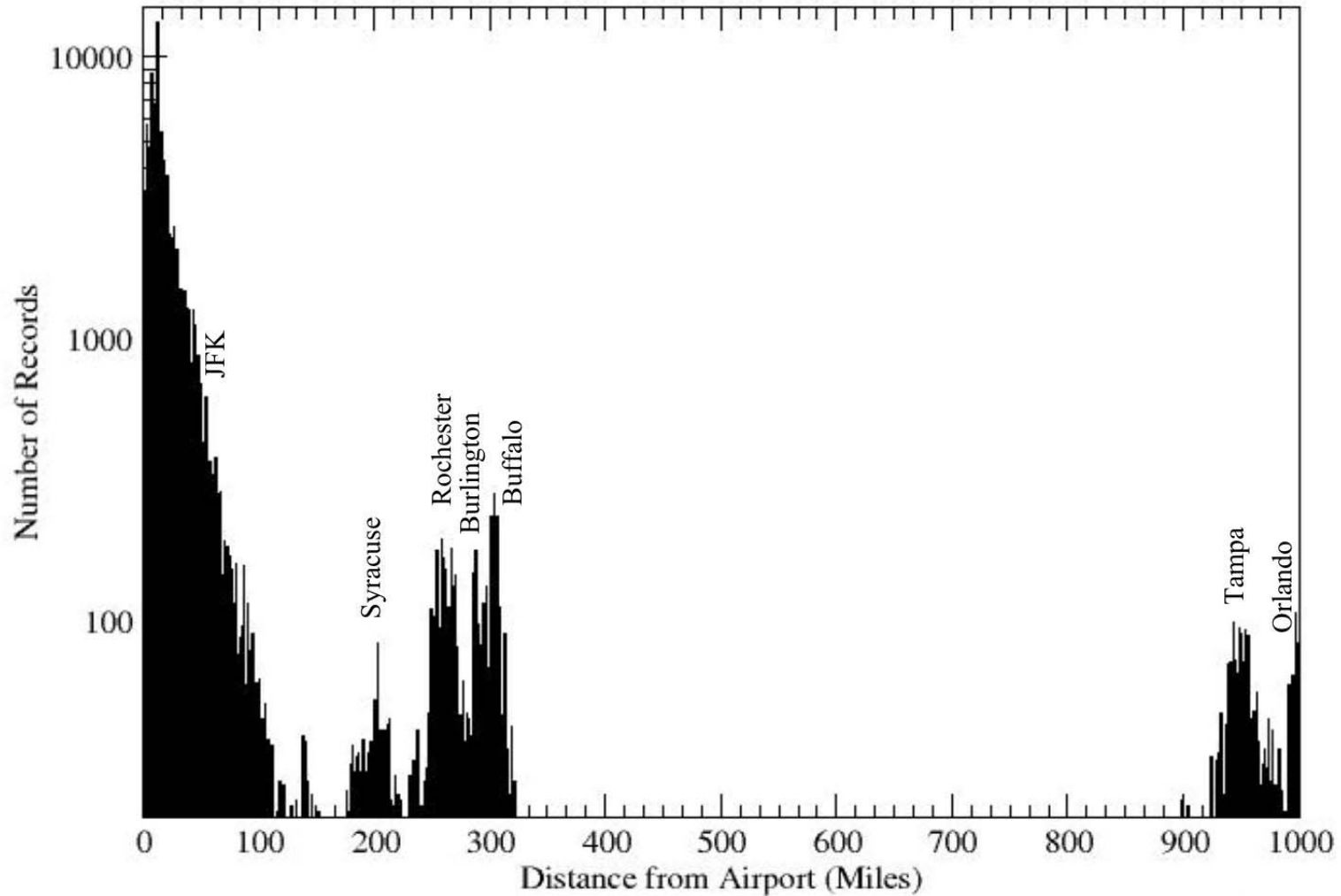
Distance from Airport

- Approximately 80% of Travelers Have Less Than 50 Mile Commute to Airport -

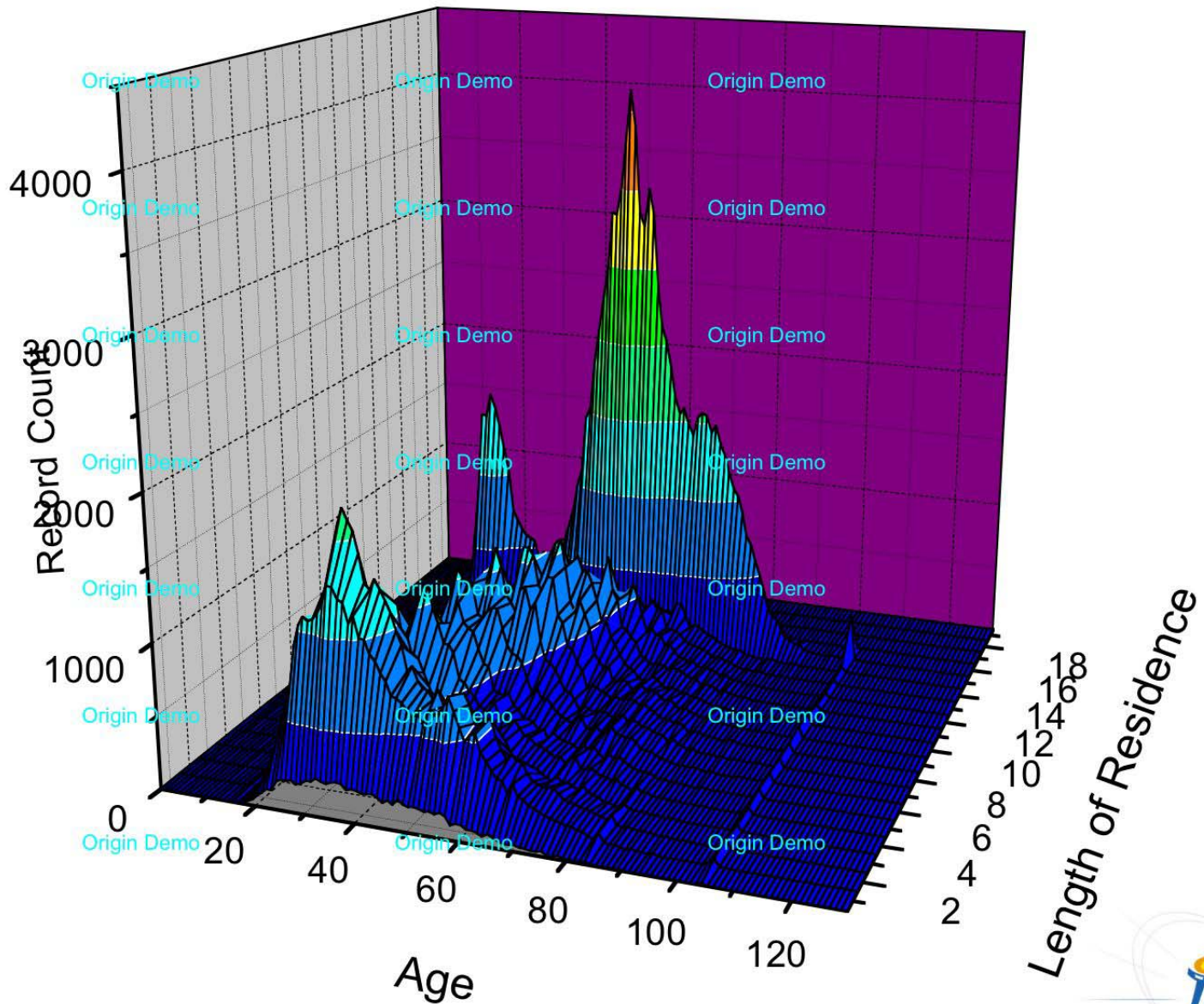


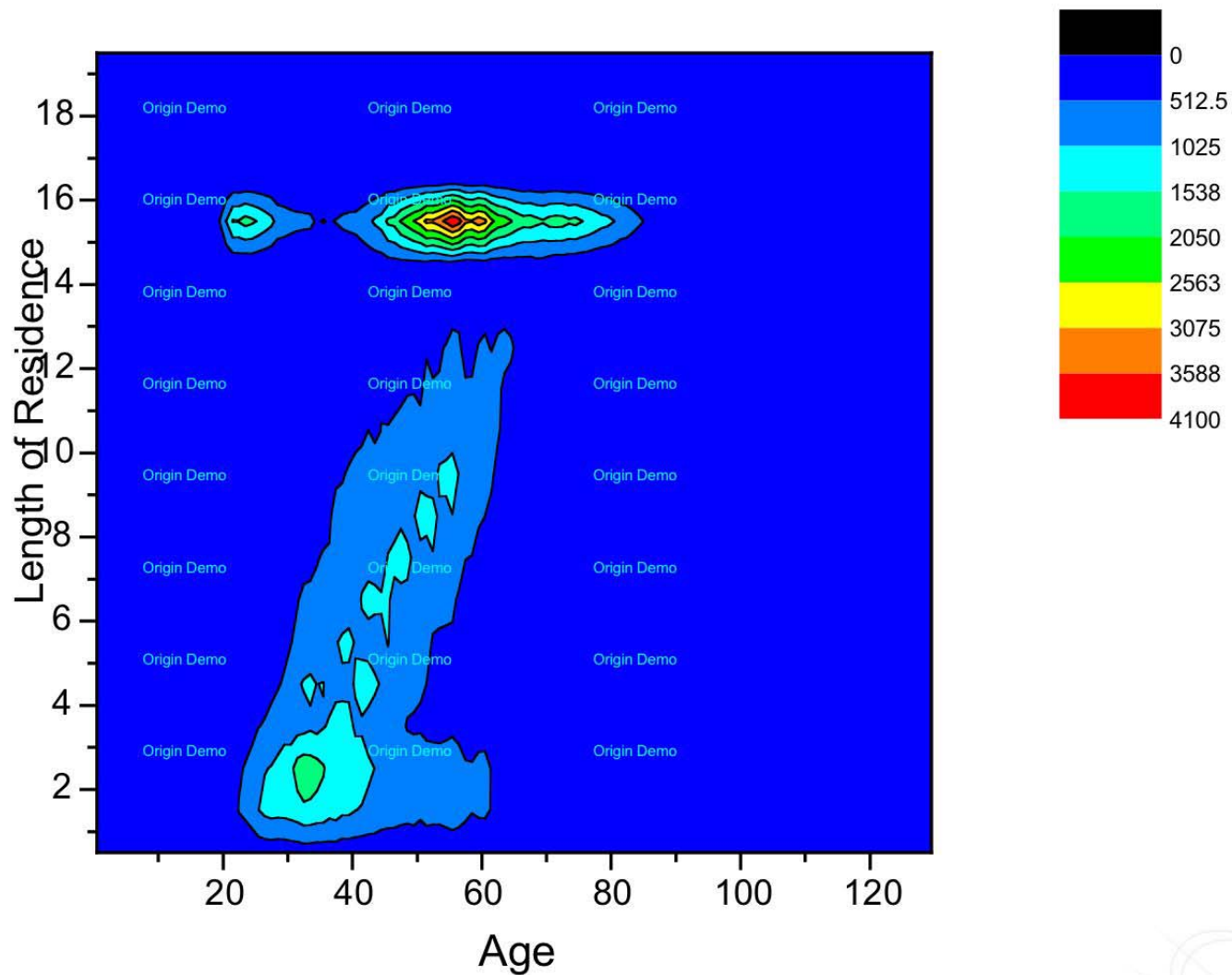
Distance from Airport

- Outliers Fly Out of Nearby Airport or Fly One-Way Home -



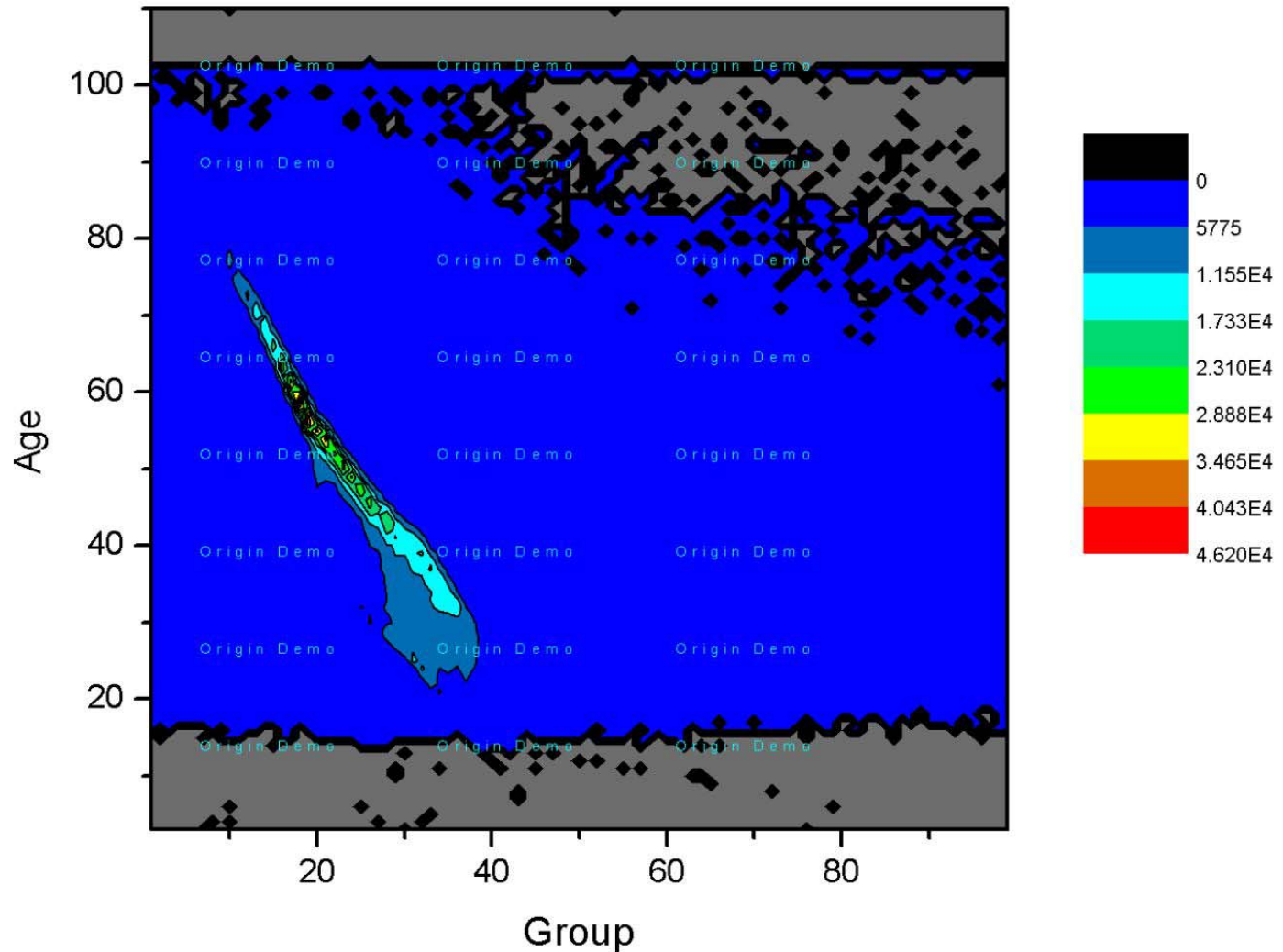
Passenger Demographic Groupings





Correlation of SSN Group and Age

- jetBlue Travelers -



A Strong SSN Group-Age Correlation Exists Within a Given Geographic Locale

Passenger Demographics

Distribution Mode	# Records	Age	Income	Length of Residence	Home: Owners/Renters	Gender: Male/Female	Adults	Children	SSN Group
Mode #1 "Younger Affluent"	88,000	43 yrs. $\sigma = 16$	\$41K $\sigma = 13$	2.7 yrs. 60% > 1 year	54% Own 2% Rent	$\frac{25\%}{22\%}$	2.8 $\sigma = 0.52$	0.58 $\sigma = 0.27$	49 $\sigma = 29$
Mode #2 "Older Affluent"	112,000	51 yrs. $\sigma = 16$	\$50K $\sigma = 18$	3.8 yrs. 74% > 1 year	72% Own 1% Rent	$\frac{34\%}{32\%}$	3.4 $\sigma = 0.54$	0.53 $\sigma = 0.26$	48 $\sigma = 29$

Anomalous Demographic Information for One Passenger

Address	City	State	Zip	SSN	DOB	LOR
526 14 MILE	CLAWSON	MI	48017	57603840	1964-05-27	3
526 14 MILE	CLAWSON	MI	48017	1195672881	1964-05-27	3
231 HECHT	MADISON HEIGHTS	MI	48071	57603840	1964-05-27	0
804 EDGEWORTH	ROYAL OAK	MI	48067	1195672881	1964-05-27	0
2595 OXFORD	TROY	MI	48084	1195672881	1964-05-27	0
13395 106TH	OCKLAWAHA	FL	32179	594270207	1964-05-27	2
49 VICTOR	LEESBURG	FL	34748	57603840	1964-05-27	0
PO BOX 547	BETHPAGE	NY	11714	1192692651	1964-05-27	0
PO BOX 547	BETHPAGE	NY	11714	1192692651	1964-05-27	0
31 OAKDALE	CENTRAL ISLIP	NY	11722	57603840	1964-05-27	10
31 OAKDALE	CENTRAL ISLIP	NY	11722	1195672881	1964-05-27	10
2476 QUAIL	COTTONWOOD	AZ	86326	576034801	1964-05-27	0
1350 PIUTE	PHOENIX	AZ	85024	576034801	1964-05-27	0
2215 PEACH TREE	FAIRFIELD	CA	94533	576038401	1964-05-27	0
914 FRANCISCO	SUISUN CITY	CA	94585	576038401	1964-05-27	0
13265 US HIGHWAY 441	SUMMERFIELD	FL	34491	57604830	1964-05-27	0
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13265 US HIGHWAY 441	SUMMERFIELD	FL	34491	594270207	1964-05-27	0
8 TANGERINE	YALAHA	FL	34797	1192692651	1964-05-27	0
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13450 105TH	OCKLAWAHA	FL	32179	594270207	1964-05-27	0
13450 105TH	OCKLAWAHA	FL	32179	594270702	1964-05-27	0
13450 105TH	OCKLAWAHA	FL	32179	594270207	1964-05-27	0
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13450 105TH	OCKLAWAHA	FL	32179	594270207	1964-05-27	0
13450 105TH	OCKLAWAHA	FL	32179	594270702	1964-05-27	0
13255 US HIGHWAY 441	SUMMERFIELD	FL	34491	594270207	1964-05-27	0
PO BOX 492154	LEESBURG	FL	34749	57603480	1964-05-27	7
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PO BOX 492154	LEESBURG	FL	34749	57603840	1964-05-27	7
PO BOX 492154	LEESBURG	FL	34749	57603840	1964-05-27	7
PO BOX 492154	LEESBURG	FL	34749	1192692651	1964-05-27	7
PO BOX 492154	LEESBURG	FL	34749	1192692651	1964-05-27	7
469 14 MILE	CLAWSON	MI	48017	57603840	1964-05-27	0
469 14 MILE	CLAWSON	MI	48017	1195672881	1964-05-27	0
PO BOX 1391	CHINO VALLEY	AZ	86323	57603840	1964-05-27	0
36830 RIDGE	FRUITLAND PARK	FL	34731	57603840	1964-05-27	0
36830 RIDGE	FRUITLAND PARK	FL	34731	57608430	1964-05-27	0
3579 FIDDLER	BETHPAGE	NY	11714	1192692651	1964-05-27	0
8 TANGERINE	LEESBURG	FL	34748	1192692651	1964-05-27	0

LOR = Length of Residence



- Conclusions -

Conclusions

- **The jetBlue Airline Passenger and Reservation (P&R) Data Base Provided Is Very Limited**
- **To Develop An Acceptable Data Base, the jetBlue P&R Data Was Augmented with Passenger Demographics**
- **Passenger Demographics - Analysis Indicates Largely Homogeneous Distribution With Two Groupings:**
 - (1) Young Middle Income Home Owners with Short Length-of-Residence
 - (2) Older Upper Income Home Owners with Longer Length-of-Residence
 - (3) A Grouping of Passengers Also Exists with Anomalous Records, Whether Through Erroneous Entry, Fraud, or Mischief
- **Passenger Travel - Several Distinctive Travel Patterns Were Identified. Demographic Groupings Appear Common to Each**
- **Known Airline Terrorists Appear Readily Distinguishable from the Normal jetBlue Passenger Patterns**
- **If a More Comprehensive P&R Data Base Were Available, It Is Expected that Analysis Could Identify and Characterize All Normal Travel Patterns**

Risk Assessment Potential

- **Several Data Elements Have Been Identified Which Best Distinguish Normal jetBlue Passengers from Past Terrorists.**
- **These “Passenger Stability Indicators” Include Social Security Number, Length-of-Residence, Income, and Home Ownership. Two Additional Elements If Available Would Likely Be Good Indicators: Namely, Miles Flown Annually and Lifetime.**