

JTA Trip Based Model Enhancement & the 3 F'sForecasting.....FSUTMS....Fun

presented to
MTF Transit and Rail Committee

presented by
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date
March 25, 2014



Parts of the presentation

- Forecasting-
 - Why a forecast?
- FSUTMS-
 - Why JTA needed an upgrade?
 - How the new Standards are used
- Fun
 - Data, Peer Review and Next Steps

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The Purpose of Travel Forecasting



- Suspected

- To create schedule delays?
- To annoy the engineers?
- To entertain the “travel demand modelers?”
 - Job Security(SMS)
- To satisfy those FTA people?



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The Purpose of Travel Forecasting



- Actual

- To understand the motivating problems
- To compare the performance of alternatives
- To explain the benefits of the resulting proposal

Information for decision-making

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Why a Forecast for Jacksonville?



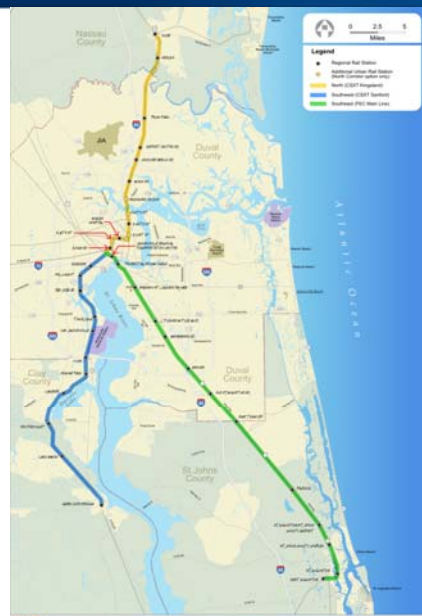
- **Jacksonville Transportation Authority** operates the local transit service. JTA is a unique agency in that it provides both transit service and has responsibility for the majority of the highway projects in Jacksonville
 - Operates local and express bus service (174 buses, 31 local and express routes, 11.5 million annual ridership)
 - Operates a downtown people mover system (the Skyway) (2.5 miles of track and 8 stations, annual ridership 480,000).
 - Developing a 4 corridor BRT system, actively in design and implementation operations scheduled to begin in 2016(?)

- **Looking at commuter rail options in the region**

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Why a Forecast for Jacksonville?



- **Multiple Corridors**
 - Need Ridership as Input to Finalize Preferred corridor
 - Need to explain differences
 - Seeking Federal Funding
 - Scrutiny?

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Why JTA Needed an Upgrade?



- No Auto Ownership Model
- Purposes
 - Home-based work (HBW)
 - Home-based shop (HBSH)
 - Home-based social and recreational (HBSR)
 - Home-based other (HBO)
 - Non-home-based (NHB)
- Gravity Model for Distribution
- Uses PT
 - Autocon(Fortran version)
 - Modes:
 - Auto, Fringe Parking
 - Bus/BRT
 - Project/Premium(Rail)

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Why JTA Needed an Upgrade?




- Calibrated on older HH data
 - Travel Patterns Different
 - Transit and Hwy
- ABM had updated SE data
 - Why not use it
- Skyway might go through extension
 - Was in local bus


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Fun: Data and Such




- Using NHTS
 - ~900 samples
- Have new on-board survey
- Using ABM SE data inputs



- 6,640 records (5,491 after cleaning)/re-expand)
- Self Enumerated Survey
- FTA Expansion by Route, Direction, TOD, (Bus Stop-On, Bus stop-Off)




Fun: Data and Such



Trips by Mode and Access

	Walk	PNR	KNR	CBD	FRINGE	Total
Local	26,566	277	892	455		28,189
Express	129	24	35			187
Skyway	999	5	18	47	157	1,226
Trolley	1,053	169	27	16	24	1,289
Community	1,584		35			1,619
Total	30,330	475	1,007	518	182	32,511



Fun: Data and Such



OBS Market Analysis

Income Stratification

		Frequency	%
No Answer		8,286	20%
Below <15,000		10,708	26%
\$15,000to	\$24,999	8,699	21%
\$25,000to	\$39,999	8,342	20%
\$40,000to	\$54,999	2,973	7%
\$55,000to	\$74,999	1,361	3%
\$75,000+		1,004	2%

Auto Ownership

No Answer	1,781	4%
None	26,746	65%
1	8,553	21%
2	3,037	7%
3	829	2%
4	244	1%



Using the New FSUTMS Standards




- Trip Generation
 - More Markets
 - Auto Ownership Model
- Trip Distribution
 - Destination Choice
 - Auto Sufficiency
- Mode Choice
 - Stratification by Sufficiency and Income
 - Change to Nesting Structure to allow for better mode analysis
- Calibration
 - Use of on-board survey

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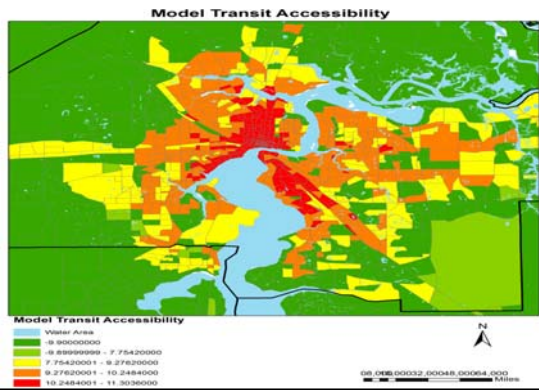
Using the New FSUTMS Standards




- Auto Ownership using:

$$Mixed\ Density = \ln \left[\frac{Intersections \times (a \times Employment) \times (b \times Households)}{Intersections + a \times Employment + b \times Households} \right]$$

- Logsum




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Using the New FSUTMS Standards

Trip Generation




Trip Purpose	
Current	Proposed
Home-Based Work	Home-Based Work
Home-Based Shop	Home-Based Shop
Home-Based Social/Recreation	Home-Based Social/Recreation
Home-Based Other	Home-Based Other
	Home-Based College/University
	Home-Based School
Non-Home-Based	Non-Home-Based Work
	Non-Home Based Other

GREEN-income/autos/workers


BLUE-income/autos/HH Size

RED-HH size

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**Using the New FSUTMS Standards
Trip Distribution**




- Split into market segments as required by the mode choice model:
 - Trip purpose
 - Time period (peak & off-peak)
 - Household income & Car sufficiency


HBW example:

	Zero Cars	Cars < Workers	Cars ≥ Workers
Low Income	x	x	x
High Income		x	x

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**Using the New FSUTMS Standards
Trip Distribution**




Size Term Estimation

Estimated using NHTS for all but Work

- # of HHs, # of students, # of employees by NAICS

Work Uses PUMS for Estimation



HBW Final Size Term

Industry	All income 0 car	Low Income		High Income	
		Autos < Workers	Autos >= Workers	Autos < Workers	Autos >= Workers
Accommodation and Food Services	3.89	2.60	0.88	1.06	0.83
Administrative and Support and Waste Management	1.17	2.51	0.98	1.08	0.89
Agriculture, Forestry, Fishing and Hunting	5.63	1.33	1.08	0.03	0.90
Arts, Entertainment, and Recreation	1.03	0.97	0.73	1.01	1.13
Construction	1.57	0.42	0.97	0.56	1.10
Educational Services	0.37	0.64	0.68	0.62	1.27
Finance and Insurance	0.52	0.85	0.54	0.45	1.34
Food Manufacturing	2.05	0.29	0.64	0.70	1.23
Health Care and Social Assistance	0.85	1.24	0.79	0.77	1.13
Information	0.57	0.18	0.65	1.16	1.22
Management of Companies and Enterprises	0.00	0.00	0.00	0.00	1.77
Mining, Quarrying, and Oil and Gas Extraction	0.00	0.00	2.56	0.38	0.43
Other Services (except Public Administration) Religious	0.61	1.96	1.05	0.72	0.97
Postal Service	0.00	0.00	0.50	0.99	1.36
Primary Metal Manufacturing	0.50	0.61	0.68	0.21	1.33
Professional, Scientific, and Technical Services	0.68	0.35	0.55	0.55	1.35
Public Administration	0.47	0.42	0.54	1.09	1.27
Real Estate and Rental and Leasing	0.10	0.52	0.84	0.56	1.22
Retail Trade	1.00	1.00	1.00	1.00	1.00
Sporting Goods, Hobby, Musical Instruments and Book stores	2.67	0.91	1.26	1.03	0.80
Transportation	0.71	1.68	1.46	0.51	0.81
Utilities	1.93	1.07	0.49	0.32	1.32
Wholesale Trade	0.57	0.71	0.73	1.33	1.12
Wood Product Manufacturing	2.46	1.37	0.60	0.16	1.25



Destination Choice Calibration



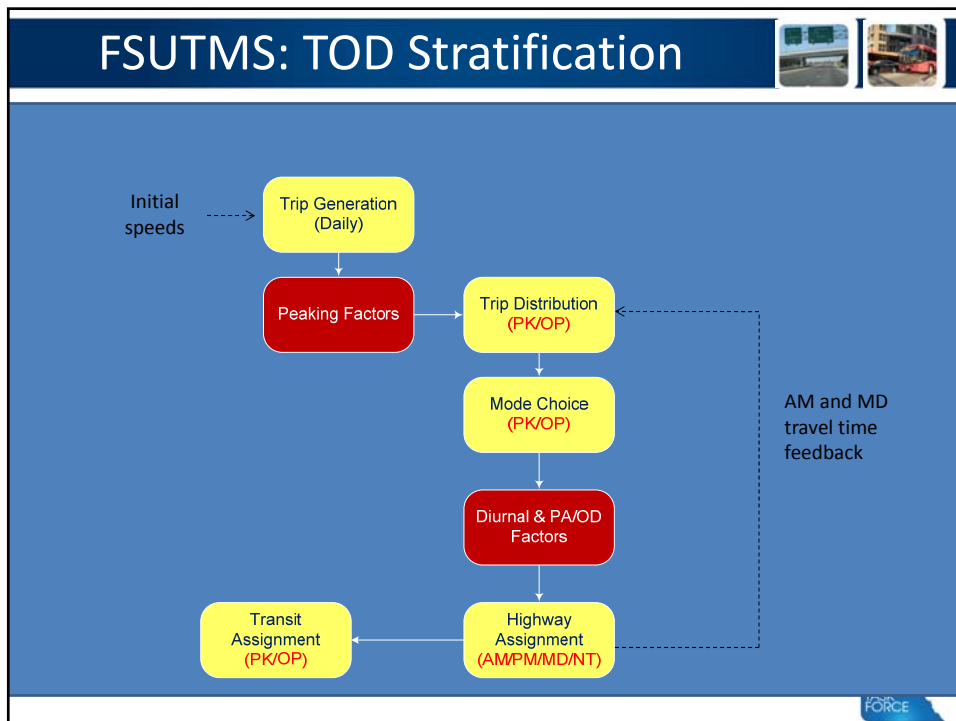
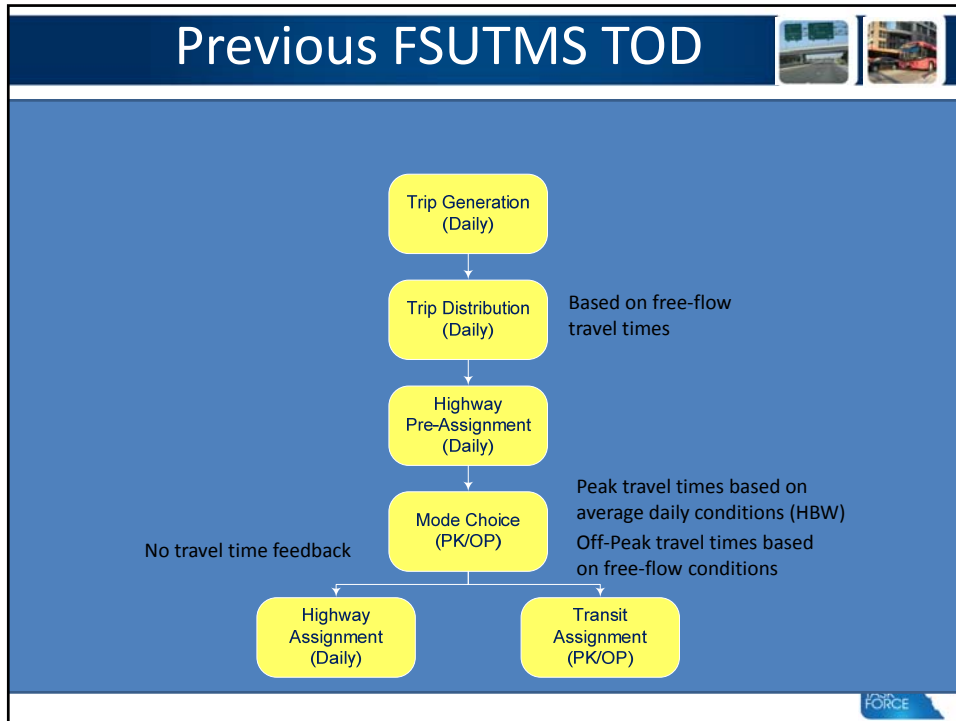
HBSch and HBUniv

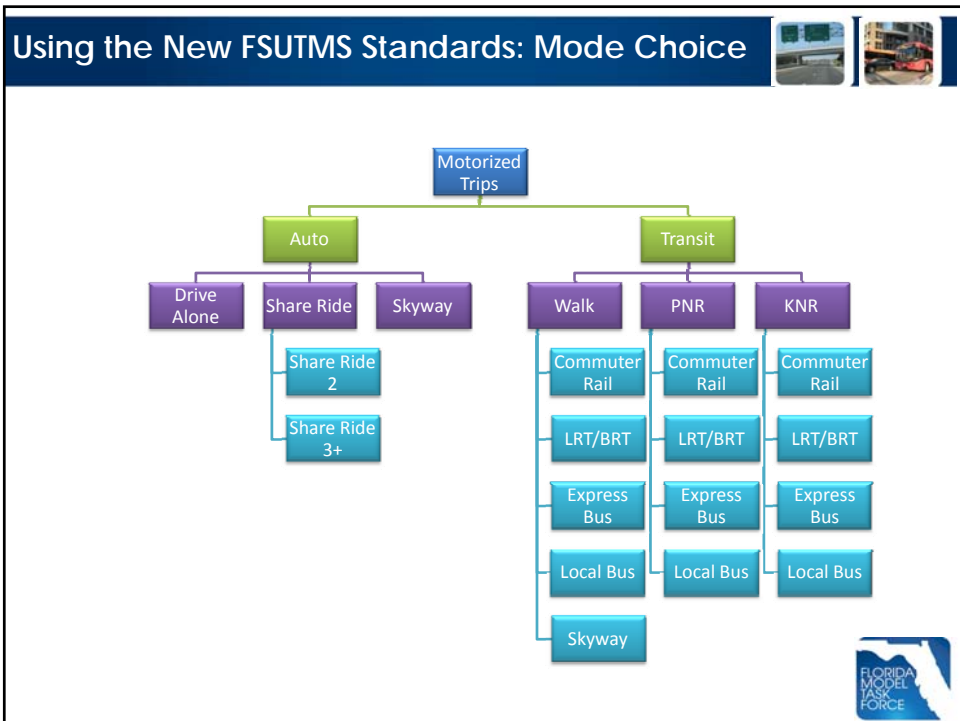
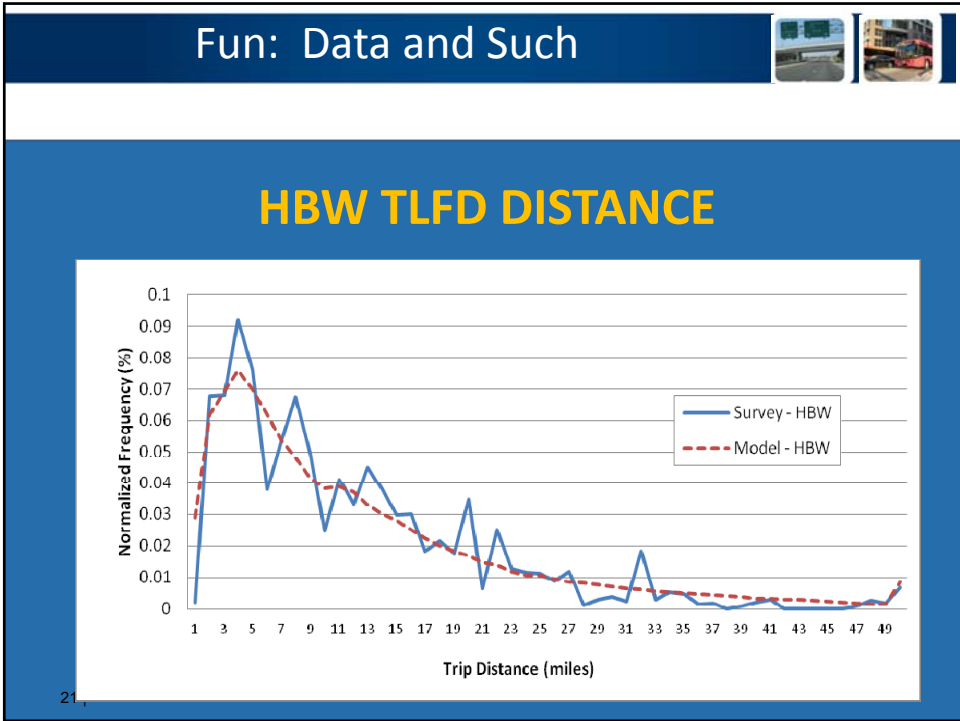
- Standard gravity model

All Other Purposes Destination Choice


- Initial Logsums from old NERPM4.2 model
- Peak and Off-Peak Trip Tables Generated
 - Peak 6-9am & 3-7pm








Using the New FSUTMS Standards: Mode Choice




Mode Hierarchy – Path Builder

- Commuter Rail (CRT)
- Light Rail (LRT)
- Bus Rapid (BRT)
- Express Bus (EBUS)
- Local Bus (LBUS)
- Skyway (SKY)




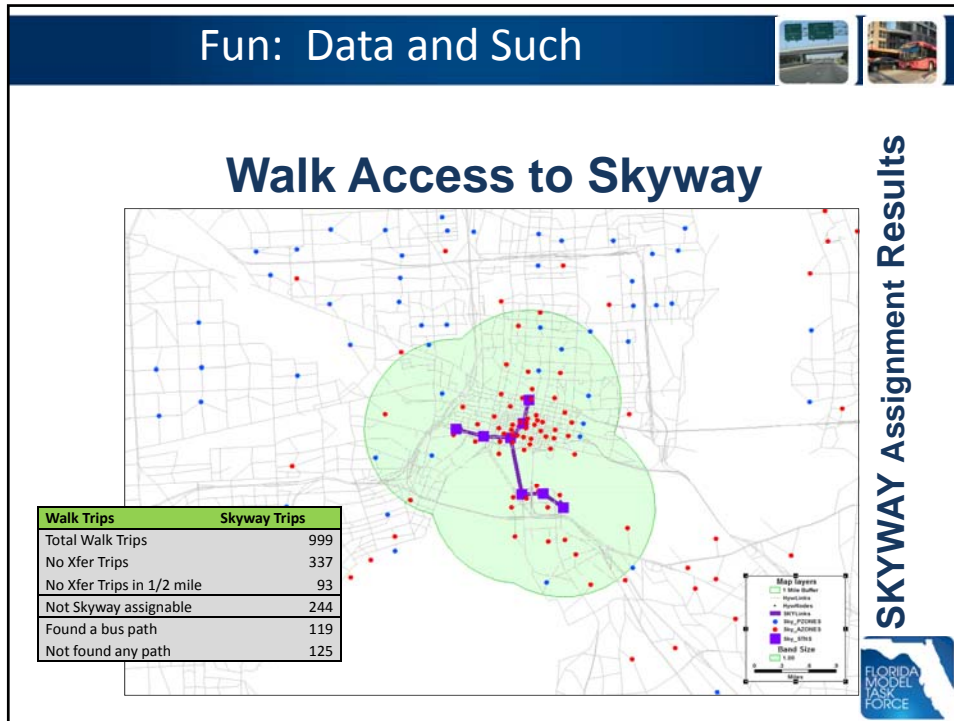
Fun: Data and Such





SKYWAY Assignment Results

Survey Name	Network Name	System Name	2011 Obs. Linked Trips	2011 Obs. Boardings (unlinked)	2011 Asgn. Observed	2010 Estimated Boardings
Local	Local	Local Bus Routes (with Survey)			994	
Local	Local	Local Bus Routes (no Survey)	-	-	1	
Skyway	Skyway	Skyway	1,226	2,049	310	2,072
Trolley	Trolley	Trolley Routes			24	
Express	Express	Express Bus Routes			28	
CS	CS	Community Shuttles			59	
Grand Total (with Survey)			1,226	2,049	1,414	2,072






Using the New FSUTMS Standards: Mode Choice

TRANSIT ROUTE BOARDING SUMMARY						
Observed vs Estimated						
NERPM4.3 2010 Model vs 2011 JTA Onboard Survey						
Summary						
Survey Name	System Name	2011 Obs. Boardings (unlinked)	2011 Asgn. Observed	Model Estimated Boardings	Change Estimated vs Observed	Ratio Estimated / Observed
Local	Local Bus Routes (with Survey)	38,307	36,120	39,273	966	1.03
Skyway	Skyway	2,049	498	2,215	166	1.08
Trolley	Trolley Routes	1,609	664	2,615	1,006	1.62
Express	Express Bus Routes	153	330	149	(3)	0.98
CS	Community Shuttles	2,096	2,808	3,912	1,816	1.87
Grand Total (All)		44,214	40,431	48,164	3,950	1.09



Fun: Peer Review



- Feb 18/19th
 - Details about every portion of model
- Panelists with Wide Background
 - Rick Curry-SANDAG
 - Chaushie Chu- LA Metro
 - Wilson Fernandez- Miami-Dade
- They liked the approach and new standards
 - Impressed with effort to understand markets/region
 - Lots more tasks they added ☺




Fun: Next Steps




- Look at under-reporting of Trips
- Compare D2D flows with other data
 - LEHD, CTPP
- Low Income Variable-
 - zero car still needs additional low income breakdown
- Understand profile of high income
 - Routes, where from
 - Skyway-high or low income
- High level traffic validation
- FORECASTING!!!!
 - Summarize few other systems
 - PNR/KNR pseudo validation




Fun: What Will it Do for JTA?




- State of the Practice Trip Based Transit Model
 - Helps forecasting
 - First major area in Fla to implement standards
- Allows testing of competing alternatives
 - In the past not really
- Skyway can now be tested for improvements
- Can see effects on markets




Questions??



Following FTA Guidance?



AND THE LORD GAVE ADAMS A BASEBALL. SAYING, "THOU SHALT HIT THEM ON A 3-0 PITCH."



"No, I don't want to step on your dream, Walter, but if they haven't called after thirty years, perhaps it's time to go on to something else."

Bad Forecast

Understanding Model Limitations

