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CENTER for URBAN TRANSPORTATION RESEARCH

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The Evolution of Transit Ridership Forecasting Capabilities in Response to Changing Client Needs, Computing Capabilities and Data Availability

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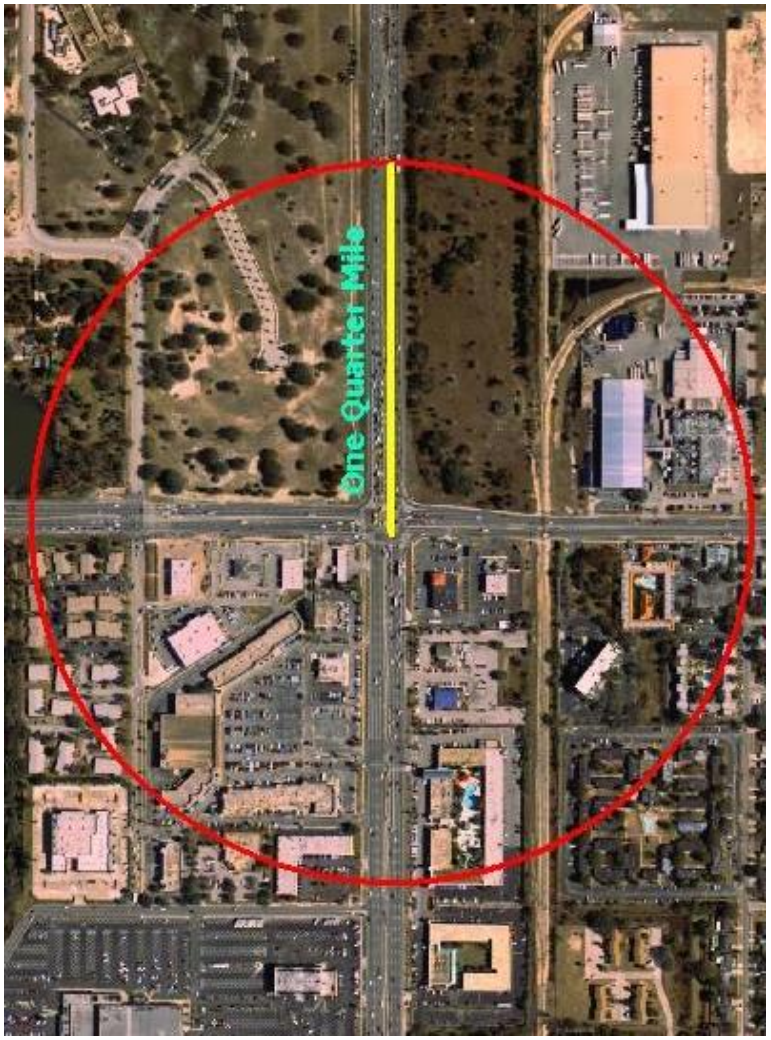
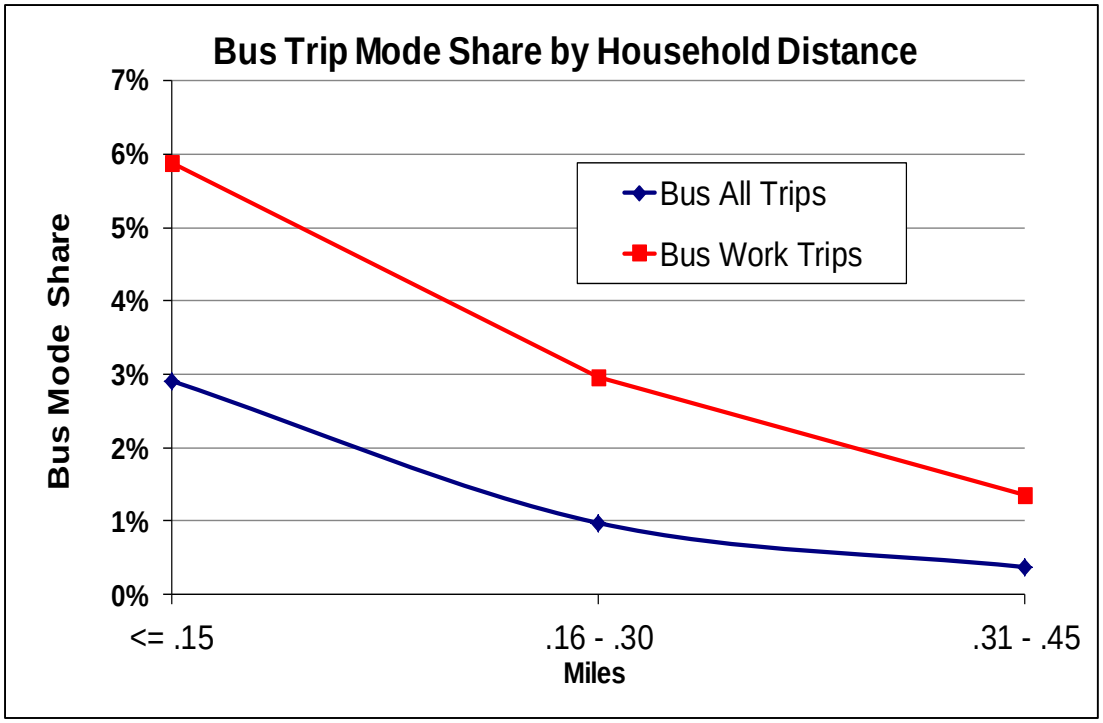
Once upon a time, over a decade ago …

- FDOT/planners wanted a software tool for short-term transit service planning – designed specifically for transit.
  - Aspire to be FAST, ACCURATE, and INEXPENSIVE
  - Be uniquely sensitive to transit "not a retrofitted highway model"
- Serve as FDOT provided ridership estimation technique for State mandated Transit Development Plans (TDPs)
- And Transit Boardings Estimation and Simulation Tool (TBEST) was born in early 2000's.

We Understand that a Quarter Mile is a Big Deal in Transit



Geographic precision at a scale more refined than traditional traffic analysis zones was critical and enabled by better data quality and greater computing capacity.



2001 NHTS Analysis

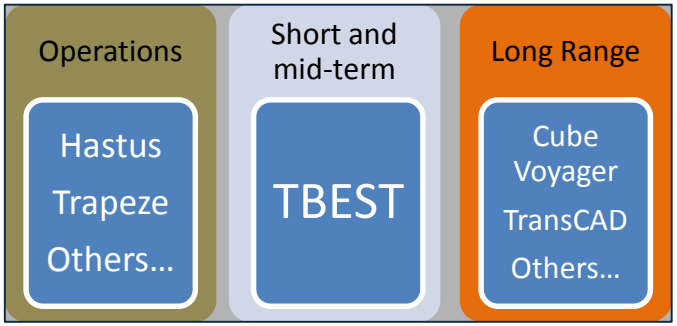
TBEST GIS Specifications

- Desktop application requiring ArcGIS 10.1 Basic license
- Utilizes ArcGIS Engine for map display, spatial analysis and network editing
- SQL Server 2008 R2 (Express or Enterprise editions)
- No Network Analyst or ArcSDE required
- Utilizes ESRI Map Services, Bing Maps or preformatted .mxd for base map
- No fee for TBEST except ArcGIS license

Utilization

- Strategic Planning (TDP)
- Service Planning
- Comprehensive Operational Analysis
- Grant Applications
- FTA Title VI Analysis
- Mobility Studies
- NTD Route Miles
- Market Analysis
- Network Accessibility

Transit Planning and Management Software



Win-Win-Win Situation

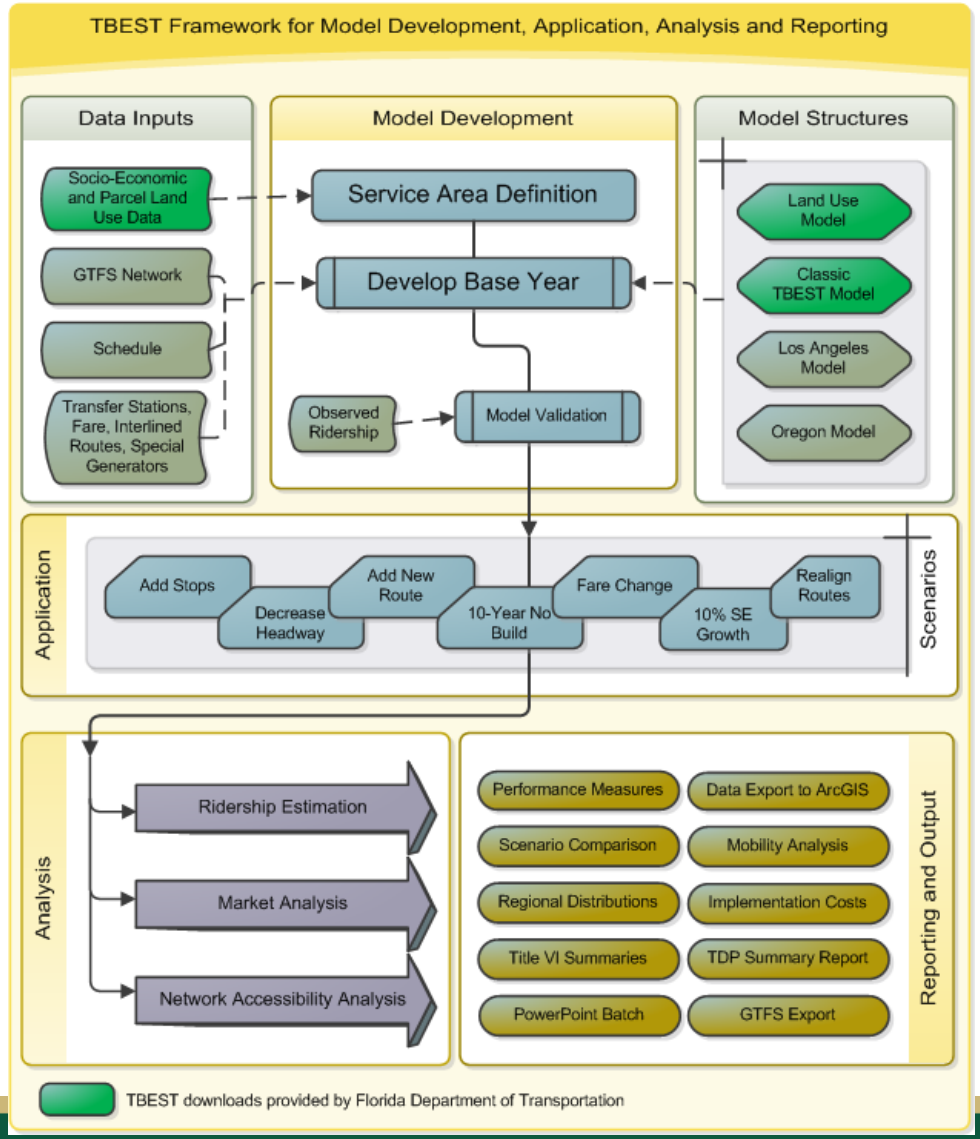
FDOT standardized model platform for consistent TDP ridership reporting across agencies

Agencies have a pre-built methodology for estimating ridership + many other applications

Consultants using TBEST for TDP's have an easy-to-implement ridership estimation solution with available data, tools and modeling capabilities

Framework Components

- Model Development
- Application
- Analysis
- Reporting and Output



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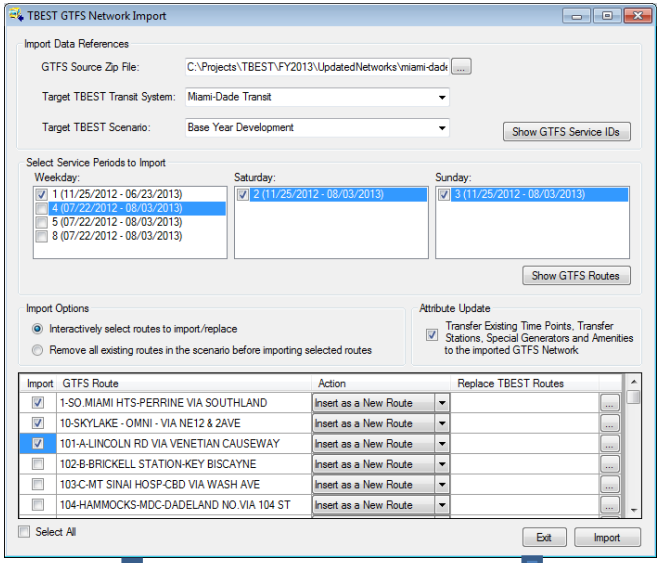
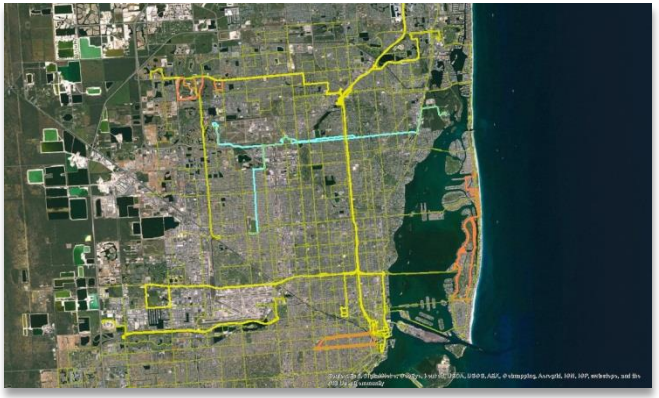
Travel Demand Forecasting in a World of Change

Changing Client Priorities and Interests	Changing Computing Capabilities	Changing Data Availability	Changing Behaviors and Technologies
Ridership and stop level forecasting	Faster	Discontinuation of Census Long Form	BRT
Equity analyses	Cheaper	Emergence of ACS	Flex Routes
Accessibility Analysis	More seamless data interface	GTFS	Real time information and trip planning
TOD/land use analysis	Improved visualization	Parcel data, Trip generation data, NHTS data	Emerging complimentary modes: Bikeshare, Carshare, TNC,
Evolving modes		LEHD, CTPP data	

Data Interface

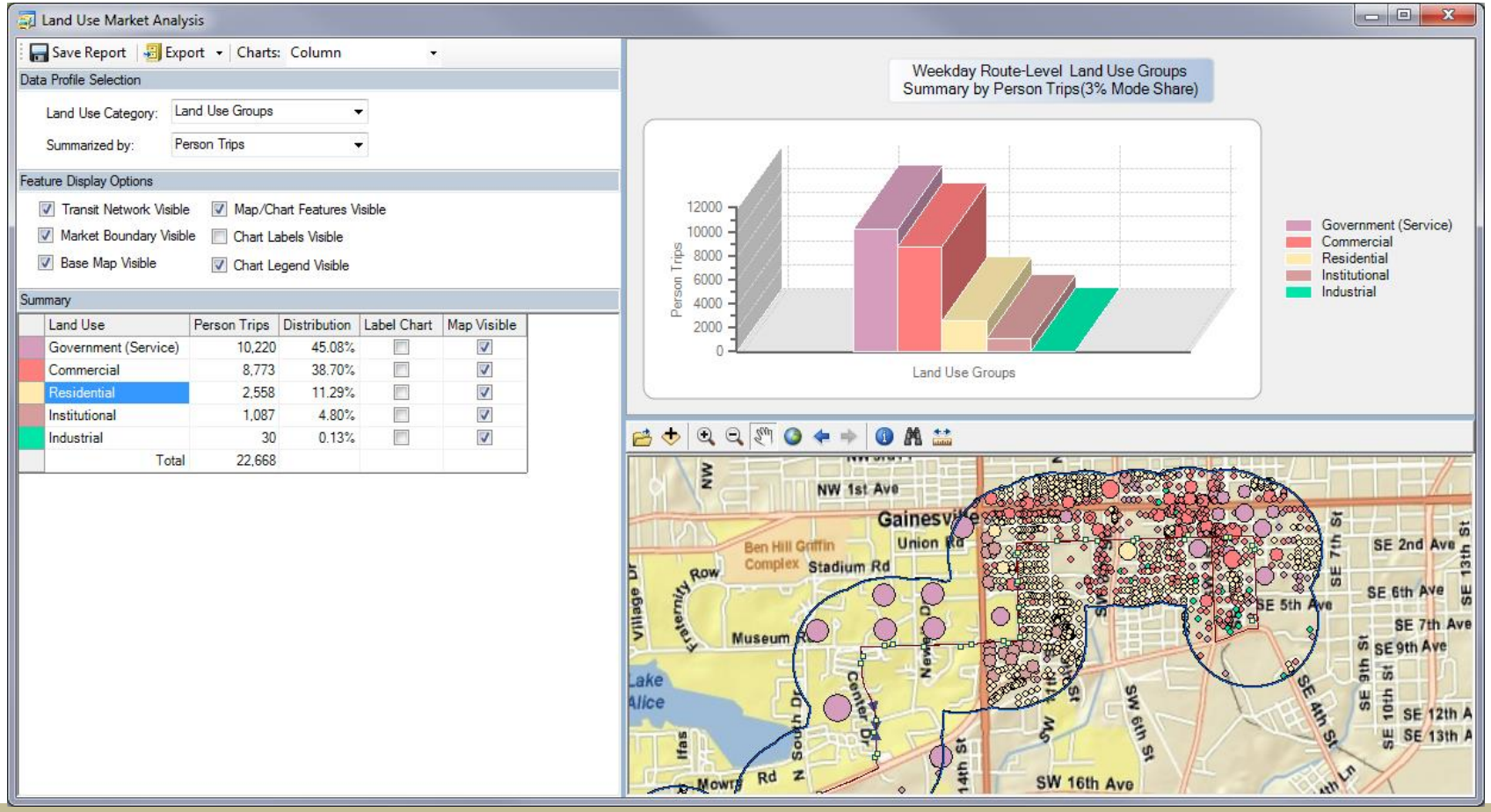
- GTFS Import
  - Imported networks for all FL agencies with GTFS feeds
  - Also used nationally in Ft. Worth, Portland, Los Angeles, Savannah
- GTFS Export
  - Export TBEST network into GTFS
  - Added TBEST attributes to exported data including ridership and stop amenities
- ArcGIS
  - Export TBEST maps and data into ArcGIS
  - Import route alignments into TBEST from outside data sources
  - Export “loaded networks” into geodatabases



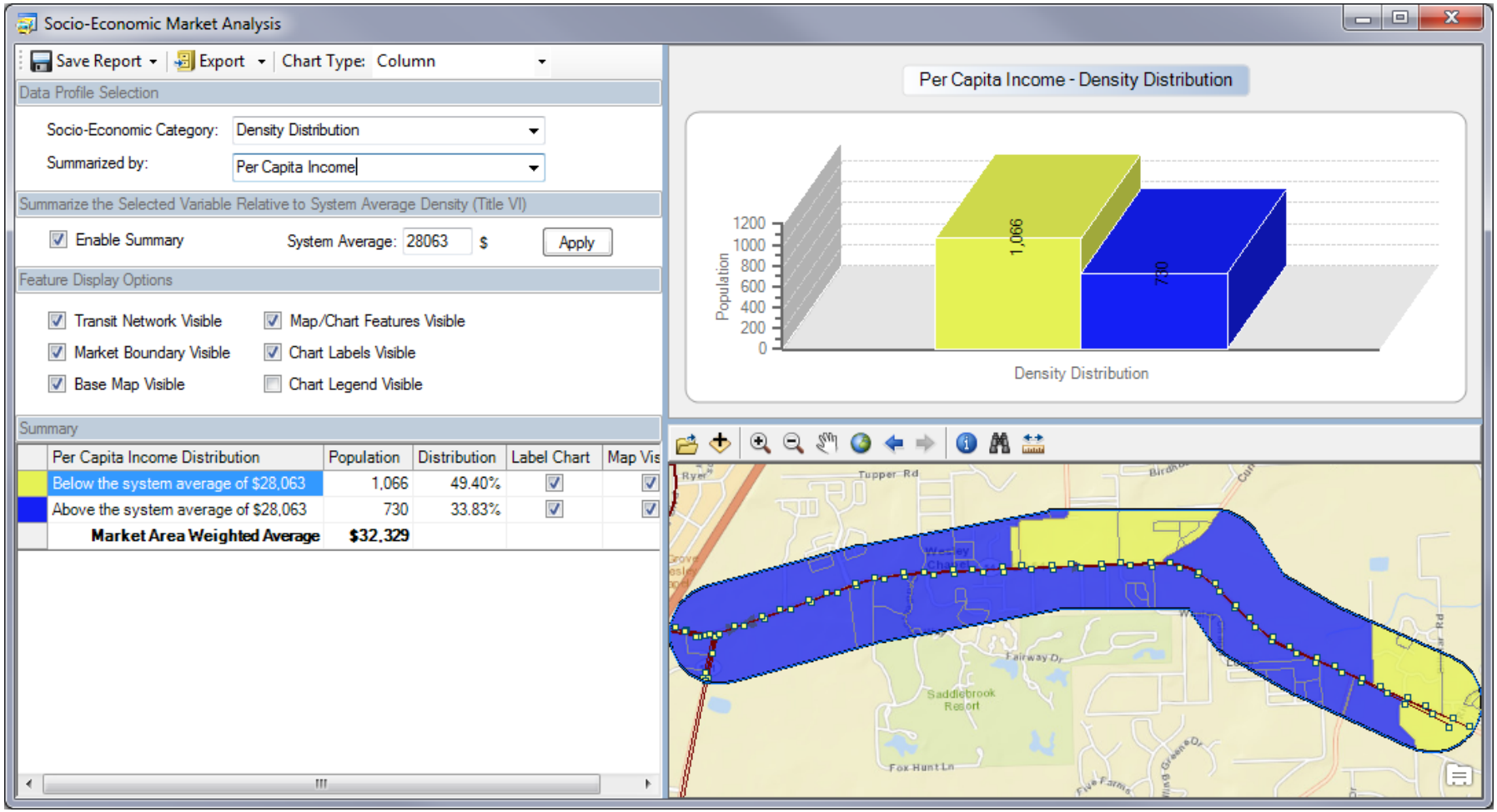


Parcel Data Market Analysis

Land Use Market Analysis



Title VI Analysis



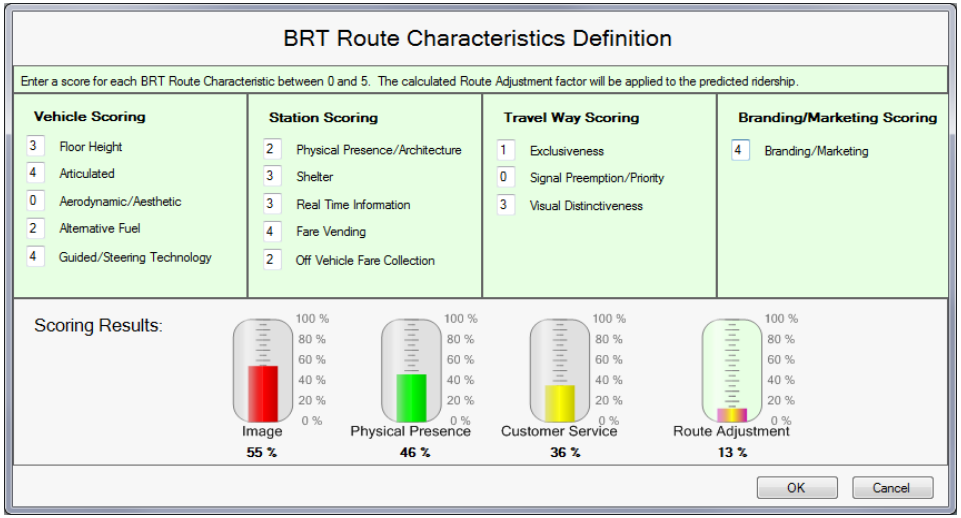
BRT Sensitivity

TBEST supports BRT route definition and model sensitivity

How it works

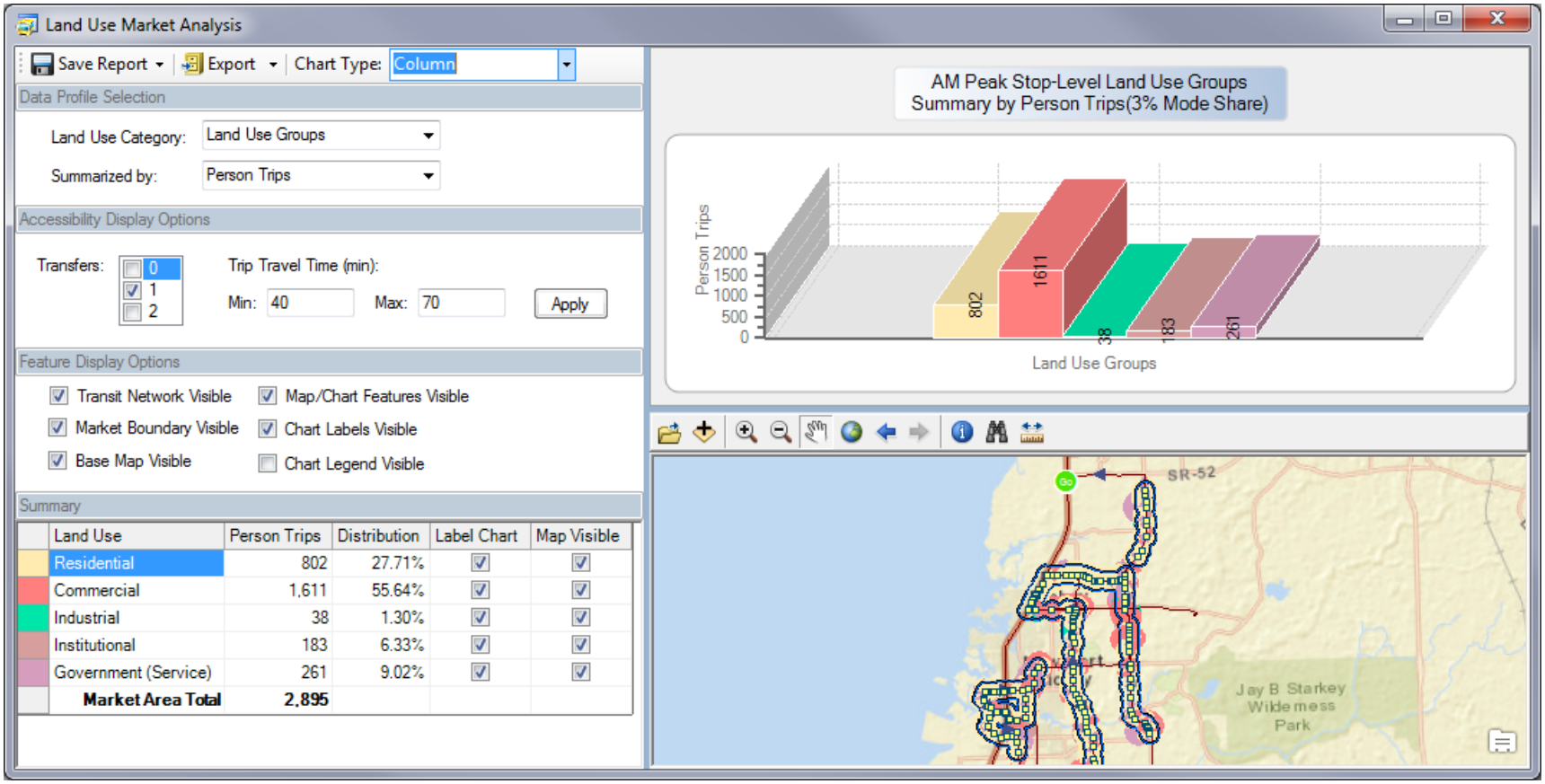
Users specify the implementation level of specific route-level BRT characteristics and

TBEST will adjust base ridership forecasts with an empirically derived adjustment factor



Network Accessibility Analysis

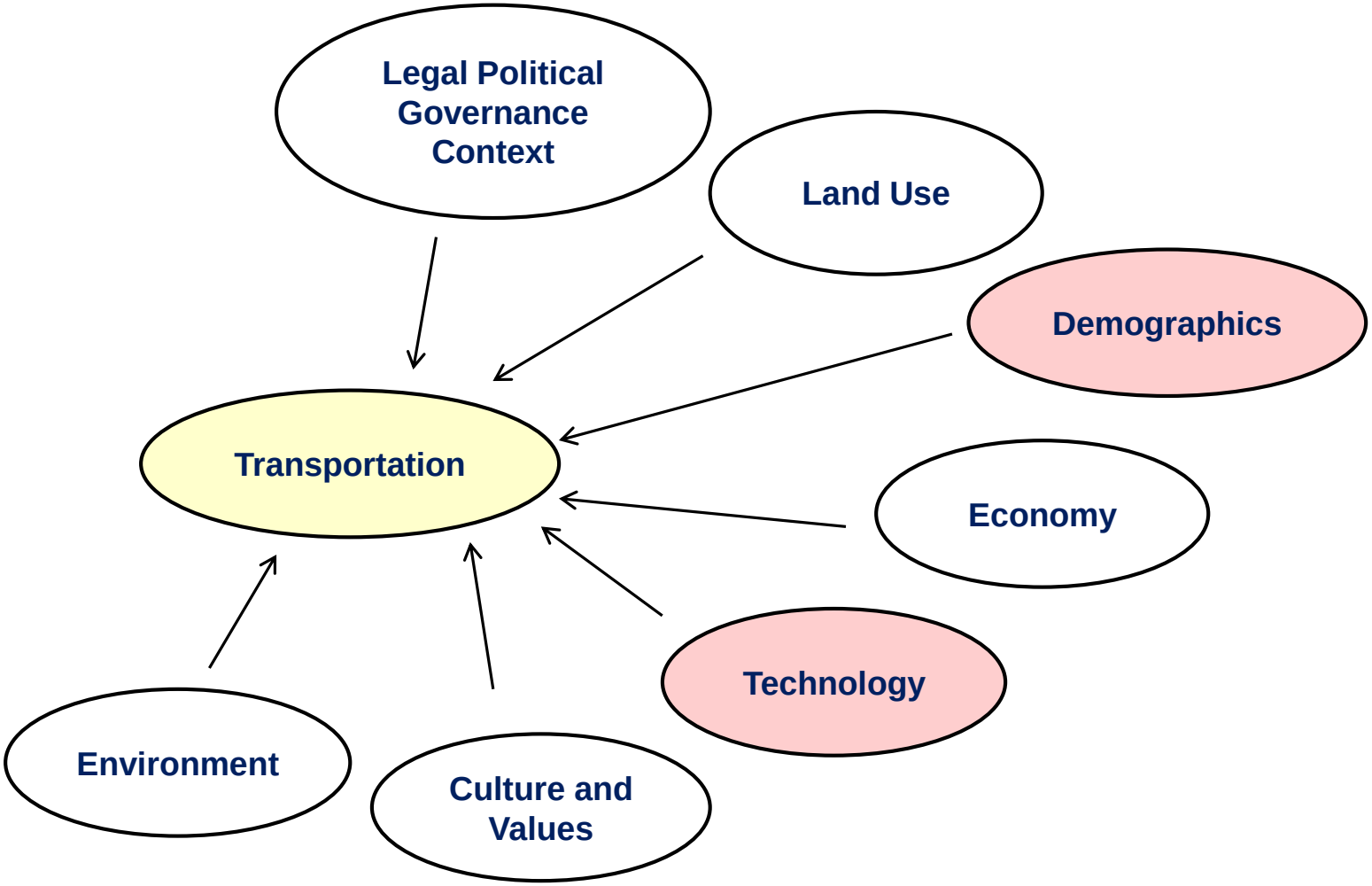
Network Accessible Market Analysis



Transit Accessibility

- Access to transit (stop buffer analysis)
- Access via transit (leverage parcel data)
- Access from Parcel (distribution of land use relative to stop or stops)

Everything Affects Transportation and Transportation Affects Everything



Fundamental Economic and Demographic Changes

Student Loans Could Cripple the U.S. Economy…
…student debt reaching almost $1.2 trillion last year, its highest level ever.
- Bloomberg Business, May 2015

Hispanics to reach 23% of the U.S. population by 2035
- Washington Examiner, May 2015

U.S. Birth Rate Hovers at All-Time Low
- Health Day, May 2015

Millennials make up the largest share of the U.S. workforce…
- Wall Street Journal May 2015

Women now hold the majority (52%) of management and professional related positions…
- BMO Wealth Institute March 2015

Homeownership Rate Drops to Quarter-Century Low
- Market Watch, April 2015

Census: Immigrant Population to Explode 85 Percent by 2060…
- Breitbart.com, March 2015

Keeping Up

- Model logic updates
- Model recalibration
- Model revalidation

Institutional Issues

Agency Perspective	
Mandated Tool (with opt out process) ❑ Standardized modeling method to ensure consistency and equity among agencies ❑ TBEST reduces burden on FDOT for evaluating a variety of ridership estimation methodologies ❑ TBEST reduces burden on agencies to prepare and conduct more expensive and complex modeling efforts	☺
Low cost software	☺
Data provided by FDOT	☺
Learning curve versus application value (5 year TDP cycle)	☹
Staff capacity	☺☹
Consultant adaption	☺☹

Institutional Issues

Sponsor/Developer
Sustaining support from FDOT (staff changes)
Developing a critical mass of users (in state and other) RVTD (Oregon) Calibration and Implementation Los Angeles Metro Calibration TheT (Ft. Worth) Model Development PennDOT Pilot Project CAT (Savannah) Strategic Plan PeopleMover (Anchorage, AK)
Sustaining competencies/project team (affiliation changes)
No established mechanism for pooled funding of development
Dealing with open source public domain software
Economy of scale versus innovation

Pending Capabilities

- Integrating Park and Ride model that leverages TBEST accessibility features
- Understanding “user fare burden” – how much comes out of pocket for a given trip

Emerging Challenges to the Ability to Forecast Transit Ridership

- Socio-demographic and economic factors are changing more rapidly – I.E. millennial behaviors
- Transit services are increasingly focusing on less-easy-to-predict non-work travel as transit targets activity centers, intermodal facilities, education, healthcare, tourism and other trips
- Communication substitution for travel (e-commerce, telecommuting, distance learning, e-books, e-music, electronic document transmittal, etc.)
- New technologies such as OneBusAway and Google trip planning, change customer awareness of transit service availability and wait times
- Innovative services such as Uber and Lyft, rideshare, bridj, flex services, and others blur the definitions of transit, sometimes complement and sometimes compete with transit
- Prospects of app-based trip aggregating, autonomous vehicles and changes in the models of offering mobility services
- Transit modal concepts are continuing to emerge/evolve (i.e. BRT variants, urban streetcar, peoplemovers)

Questions?

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http://tbest.org/

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