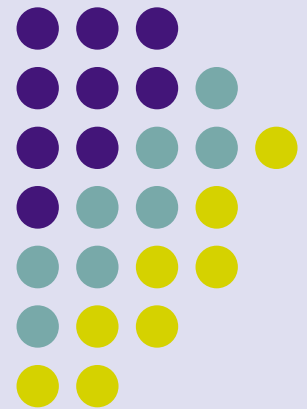


# Travel Forecasting for New Starts

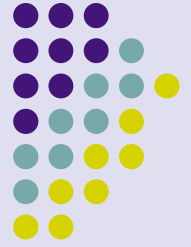
A Workshop Sponsored by  
The Federal Transit Administration

March 23-25, 2009

Tampa



# Agenda for Today

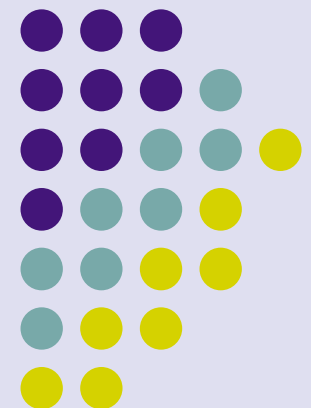


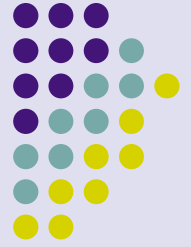
- Session 11: Before-and-After Studies - Methods
- Session 12: Before-and-After Studies - Examples
- Break
- Session 13: Simplified Methods for Small Starts
- Session 14: Current Research
- Session 15: Wrap-up

# Before-and-After Studies – Methods

## Session 11

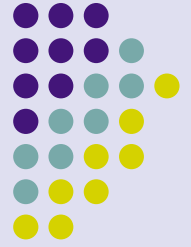
- FTA requirements
- Preservation of forecasts
- Analysis: before versus after
- Analysis: predicted versus actual
- Completed studies
- Lessons learned





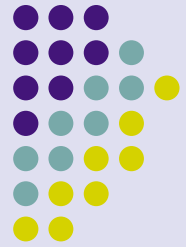
# FTA Requirements

- Before-and-after studies by project sponsors
  - Before-versus-after
    - Conditions prior to project implementation
    - Conditions two years after project opening
    - Understanding of project impacts
  - Predicted-versus-actual (after)
    - Accuracy of forecasts
    - Causes of differences
    - Implications for methods, QC, management



# FTA Requirements

- Annual reports to Congress by FTA
  - Results of before-and-after studies
  - Contractor performance assessment
    - Accuracy of forecasts
    - Causes/sources of errors
    - Possible award of additional funding to sponsors

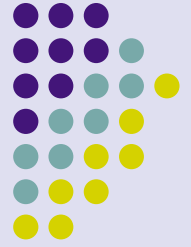


# FTA Requirements

- Five characteristics for New and Small Starts

	Forecasts	Data	
		Before	After
Project scope	X		X
Capital cost	X		X
Service levels	X	X	X
O&M cost	X	X	X
Ridership	X	X	X

- Others added on a case-specific basis, e.g.:
  - Land use and economic development
  - Equity of service changes for transit dependents

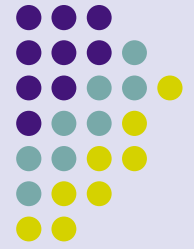


# FTA Requirements

- Four characteristics for Very Small Starts

	Forecasts	Data	
		Before	After
<b>Project scope</b>	<b>X</b>		<b>X</b>
<b>Capital cost</b>	<b>X</b>		<b>X</b>
<b>Service levels</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Ridership</b>		<b>X</b>	<b>X</b>

- Others added on a case-specific basis



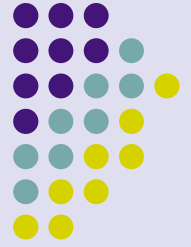
# FTA Requirements

- Forecasts prepared at different time points
  - Request to enter preliminary engineering or project development
  - Request to enter final design
  - Request for Full Funding Grant Agreement (FFGA) or Project Construction Grant Agreement (PCGA)

## Notes:

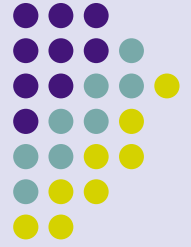
- New Starts projects request separate FTA approvals of entry into preliminary engineering and final design.
- Small Starts projects request FTA approval into a consolidated project development step.
- New Starts projects receive FFGAs while Small Starts projects receive PCGAs.





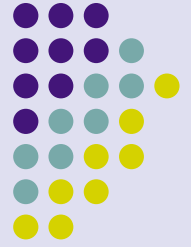
# FTA Requirements

- Plan for the Before-and-After Study
  - FTA approval prior to grant agreement
  - Plan for rider data collection, before and after
    - On-board surveys, or other adequate approach
    - Regional or corridor
    - Even a full-region survey is eligible for federal funding
  - Analytical approaches
  - Other elements



# FTA Requirements

- Preservation of forecasts
  - FTA policy guidance (May 16, 2006)
  - Required as part of milestone approvals
    - Archived materials
    - Analysis/documentation of changes since previous forecast
    - Preservation of the ability to replicate the forecasts
  - Verification by FTA oversight contractor



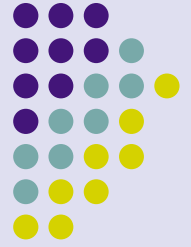
# Preservation of Forecasts

- Challenges
  - Predictions from different time points
    - Many years may have passed since the AA
    - Project scope may have substantially changed
    - Individuals preparing forecasts may have changed
    - Forecaster memories no longer fresh
  - Insufficient information being preserved
    - Forecast documentation too aggregate
    - Critical electronic files missing
    - Model application documentation incomplete



# Preservation of Forecasts

- Necessary actions by project sponsors
  - Preservation tasks in the schedule and budget
    - Sponsor's work plan
    - Consultants' scopes of work
  - Early coordination with FTA



# Preservation of Forecasts

- Transit service levels
  - Transit service plan for the project
  - Summary of the transit system
    - All routes: today, opening, and horizon year
    - Headways, vehicle-miles, vehicle-hours by time period
    - Fare policies and fare levels
    - Map(s) of transit services in the project corridor



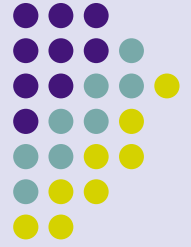
# Preservation of Forecasts

- Ridership
  - Validation year and opening year
  - Horizon year: no build, baseline, and build
  - Electronic files for replication of above forecasts
    - Full travel model on DVDs
      - Input demographics/networks and outputs
      - Scripts and application documentation
    - DVDs to FTA do not include proprietary software



# Preservation of Forecasts

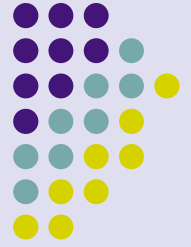
- Reasons for replication capability
  - An FTA requirement
  - Available for revised forecasts
    - Isolation of impacts in input errors
    - Understanding the causes of errors, as required for FTA's contractor performance assessment
  - Special analyses focused on errors in rider travel patterns, characteristics, and volumes
  - Identification of improvements to travel forecasting methods for major transit improvements



# Preservation of Forecasts

- Issue: out-of-date software versions
  - Preservation of computers and forecasting capability
  - or --
  - Migration of forecasting capability as necessary
    - To new computers, operating systems, and software
    - “Close-enough” replication with documentation of differences





# Preservation of Forecasts

- Interim analyses of forecasts
  - Sufficient insights to inform the analysts preparing the before-and-after study
    - Same format for earlier and revised forecasts
    - Explanation of changes
      - Demonstration that the highlighted changes account for all (or nearly all) of the forecast revision

# Analysis

## Before versus After



- Conceptual approach
  - Big picture description of what happened
    - Compared to conditions before project opening
    - Key things the project accomplished
  - Insights gained from digging into the details
    - Reasons for big picture differences
    - Disaggregate differences in big picture similarities

# Analysis

## Before versus After



- Changes in the transportation network
  - Transit service levels
  - Roadway system
    - If differences help explain ridership changes
- Changes in demographics/land use
  - Households, population, employment
    - By district or near stations
  - New construction – completed or under way
    - Realization of transit-oriented development

# Analysis

## Before versus After



- Transit rider travel patterns
  - Tabulation of who is riding transit
    - For all data items collected from the rider surveys
    - Who gains and who loses
  - District-to-district flows
  - Modes of access and egress
  - Transfer rates
  - Insights on possible reasons for differences

# Analysis

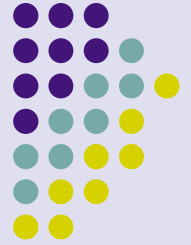
## Before versus After



- Transit boardings
  - Within and outside corridor
  - By line or line segment
    - By time period
    - Weekday, Saturday, Sunday
    - Special focus on services replaced or dramatically impacted by project
- Park-and-ride counts
- Activities at major transfer centers

# Analysis

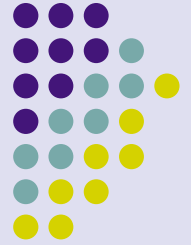
## Predicted versus Actual



- Conceptual approach
  - Insights from the before-versus-after analysis
  - Big picture comparison
    - What we thought would happen
      - Summary in the case for the project (presumably)
      - Details in presentations of previous forecasts
    - What actually happened
  - Insights gained from digging into the details
    - Reasons for big picture misses
    - Confirmation of big picture successes

# Analysis

## Predicted versus Actual



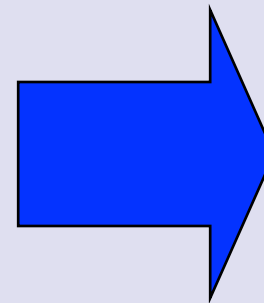
- Assessment of the accuracy of forecast inputs
  - District-level demographics
  - Transit service levels
  - Roadway system
  - Auto-related costs, etc.
  - New forecasts with corrected inputs for quantification of impacts
- Special model runs to find the sources for other errors in the forecasts

# Analysis

## Predicted versus Actual



- Transit rider travel patterns
  - For all markets represented in mode choice
    - Trip purpose
    - Socio-economic class
  - District-to-district flows
  - Station-to-station flows
  - Modes of access and egress
  - Transfer rates

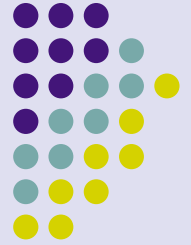


Big-picture  
differences



# Analysis

## Predicted versus Actual



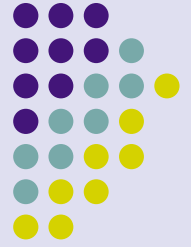
- Supporting details
  - Total riders (linked trips) and boardings (unlinked trips) by mode
  - Boardings by line
  - Guideway station activity
    - Production-attraction format
    - ONs and OFFs by direction
    - Rider load volumes between stations
  - Park-and-ride usage

NOT the big picture!  
Useful only in support of  
the big-picture findings



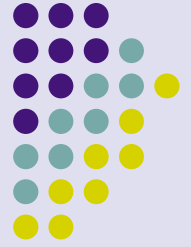
# Completed Studies

- Medical Center Extension of TRAX LRT
  - Utah Transit Authority in Salt Lake City
  - September 2003 open for revenue operation
  - Systemwide perspective telling a broader story
- Interstate MAX LRT
  - TriMet in Portland, Oregon
  - May 2004 open for revenue operations
- Tren Urbano Heavy Rail
  - Puerto Rico Highway and Transportation Authority
  - June 2005 open for full revenue operations



# Lessons Learned

- A compelling case for clear explanations
  - More than just totals and hand-waving
  - Useful for Congress
  - Useful information for the profession
- Greater attention to opening-year forecasts
  - More than calculation of an aggregate total
  - Better understanding of the case for the project



# Lessons Learned (continued)

- Ongoing preparations
  - Early and frequent sponsor/FTA coordination
  - Inclusion in budget and schedule
  - Clearly defined responsibilities
  - Timely FTA reviews and approvals
    - Verification of preserved forecasts
    - Adequacy of the analysis/documentation of changes
    - Development of the Before-and-After Plan
    - Conduct of the data collection