5. Calibration/Validation

- FTA requirements for New Starts
- Implications
- Thoughts on good practice
- Three examples
FTA Requirements

- New Starts forecasts must be prepared with models tested against data on current transit ridership patterns.
- New Starts forecasts must be a useful basis for quantifying and understanding the benefits of proposed projects.
Implications

- More (and better) ridership data
- Need for clearer focus on transit markets
- Need for better tests and standards
Implications: Data

- Absence of data – a problem fixed
- Need to seize the opportunities
  - Data for testing prior to PE request
  - Data collected in Before-After studies
- Design of data collection activities
  - Scope, sampling plan, and expansion
  - Survey methods and data items/questions
Implications: Focus

- Matching target totals is **insufficient!!**
- Key markets, defined by:
  - Trip purpose
  - Socio-economic class
  - Production and attraction locations
  - Transit access mode
- More effective transit calibration:
  
  “Do our models grasp adequately the characteristics of our key transit ridership markets?”
Implications: Tests

- Model calibration – a revised definition
  - Adjustments to match current patterns
    - Models in standard application context
    - Emphasis on important transit markets
    - Adjustments based on behavior, not arithmetic
  - Documentation
    - Key transit markets – fully characterized
    - Current transit modes – precisely defined
    - Calibration forecast – carefully examined
Implications: Tests

- Model validation – a revised definition
  - Valid (plausible) description of behavior
  - Valid (plausible) basis for discussion of current conditions
  - Valid (plausible) forecasts of deltas
Thoughts on Good Practice

- Allocation of resources
- Useful model-estimation topics
- Some specific tests
Allocation of Resources

- **Tradition**
  - Model development = parameter estimation
  - Calibration = K estimation
  - Validation = first/only real application

- **Traditional outcome**
  - Most resources go to estimation
  - Left-over resources go to testing
  - Little real testing before roll-out
Allocation of Resources

- “Better” allocation
  - Estimate models only where necessary
  - Fully fund (and protect) model testing
  - Recognize benefits of real model testing
    - More transparent behavioral focus
    - Models ready for application
    - Models already supportive of real-world insights
Useful Estimation Topics

- Workplace/destination choice
  - Recognition of long-term choices/timing
  - Choice-set formation
  - Performance of multimodal impedances
  - Reason for distance correction term
Useful Estimation Topics

- Mode choice
  - Choice-set formation
  - Parking supply characteristics
  - Additional transit attributes
  - Non-linearity in variables
  - Tour-based framework rather than trip-based framework (verification of this??)
  - Not: version #79 of the same specification!
Some Specific Tests

- **Calibration**
  - Assignment of on-board survey trips
  - Identification of calibration markets
  - P&A locations of transit riders, by market
  - Access modes to stations for P’s; for A’s

- **Validation**
  - Full 2030 forecast $\rightarrow$ deltas vs. today
  - Full “build” forecast $\rightarrow$ deltas vs. 2030 base
Three Examples of Careful Calibration Work

- Network design/testing with APC data
  - Dick Walker, Portland Metro

- Pathbuilder calibration with rider data
  - Bill Woodford, AECOM Consult

- Mode choice calibration with rider data
  - Bill Davidson, PB
Network Design/Testing with APC Data

Dick Walker
Scott Higgins
Aaron Breakstone

Portland Metro
Automatic Passenger Counters

- Registers boardings and alightings when infrared beam is interrupted
- Provides transit boardings and alightings by direction, by line, by stop, by time of day
- Program started with selected lines – now whole system
APC Applications

- Useful for count information
- Provides clues for demand model refinement and network design
How Does Metro Use APC?

- Cutlines
- Line flow analysis
- Zonal analysis
- Walk accessibility to transit
Cutline Analysis

- Measure corridor flow
- Model vs. APC – macroscopic and mesoscopic indicator

Example follows →
Line Flow Analysis

- Flow levels by line segment
- Model vs. APC – microscopic indicator

Example follows ➔
Zonal Analysis

- Patronage by zones
- Model vs. APC – microscopic indicator

Example follows ➔
Model 7% High (Illustrative)
Walk Accessibility

- Percentage of households and percent of employment in a zone that are walk accessible to transit

- Model vs. APC - microscopic indicator

Example follows ➔
Other Considerations

- APC can point to other areas where the analyst may want to investigate
  - Land use allocation to zones
  - Transit vehicle speeds
Closing

- APC data useful at macro, meso, and microscopic levels.
- APC can help in model validation and network design
- But .......... counts are not the whole story. Origin-destination patterns and trip purposes are not addressed.