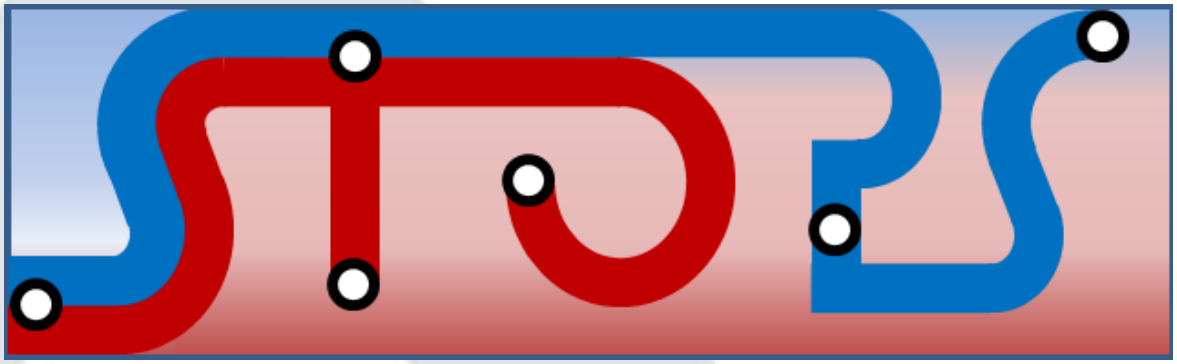


RSG
the science of insight

Role of Census Data in FTA's Simplified Trips-on-Project Software (STOPS)

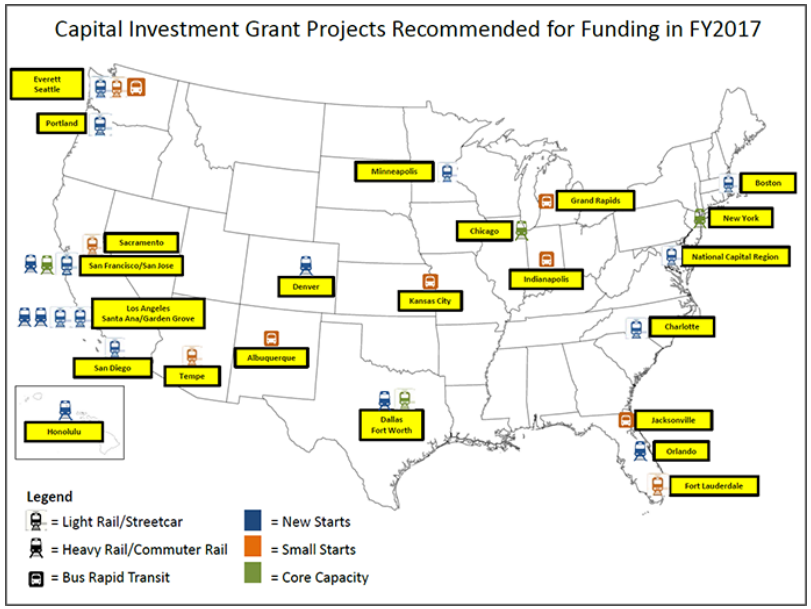
Bill Woodford, RSG
Jim Ryan, FTA
Jeff Roux, FTA

Applying Census Data for Transportation, 50 Years of Transportation Planning Data Progress
Kansas City, MO

November 15, 2017

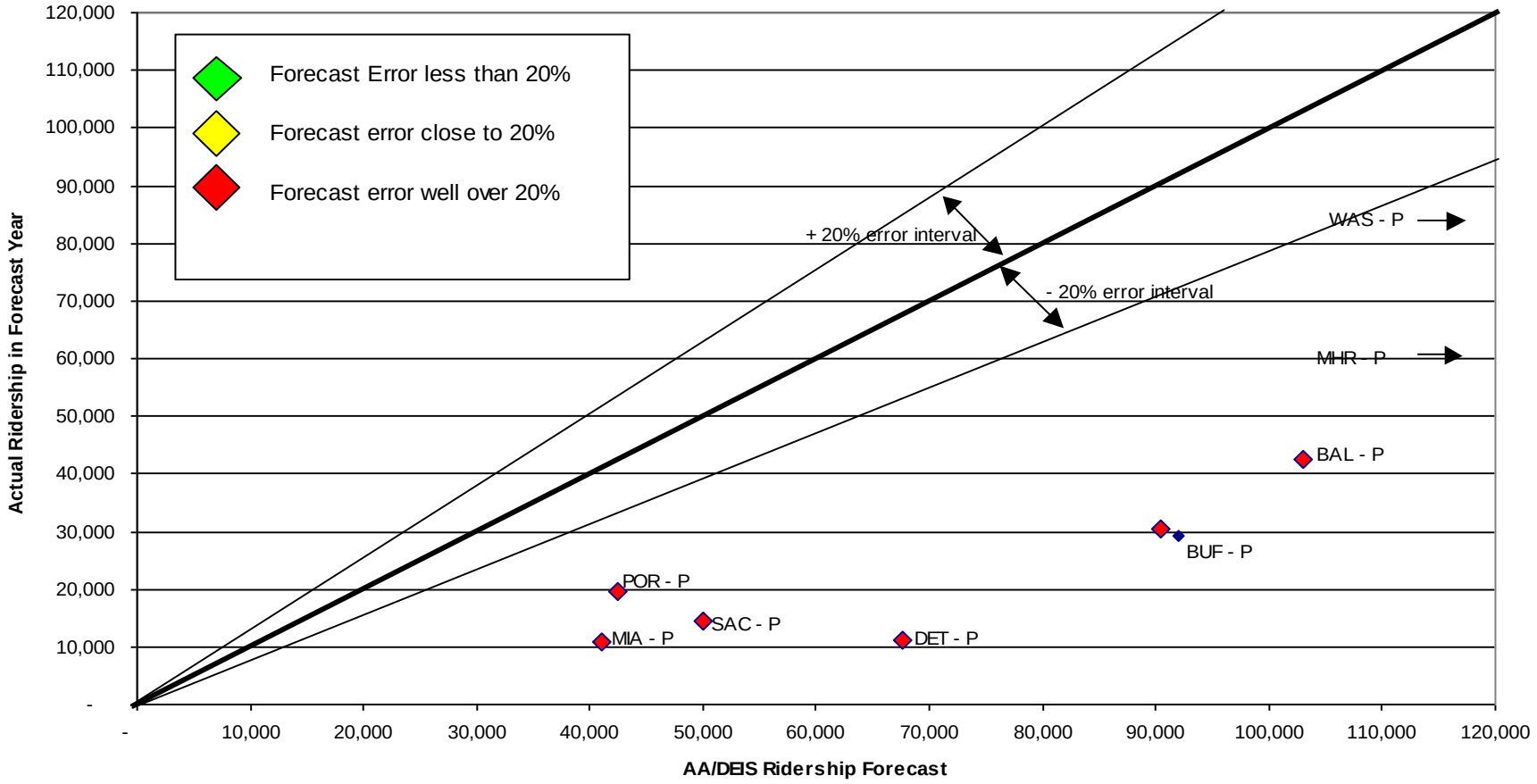
FTA Capital Investment Grant Program

- Funds new fixed-guideway transit projects
- Congressional mandate to consider mobility benefits in project evaluation process
- FTA uses ridership-related measures to quantify mobility benefits



In FY2017, 31 projects in 18 states. $3.5 billion in administration's recommended budget

Poor forecast accuracy for projects before 1990



Poor forecast accuracy for projects before 1990

- Unreliability has been a target for:
  - Critics of the program
  - Anyone opposing individual local projects

How many people will ride?

Panel finds flaws in rail forecasts

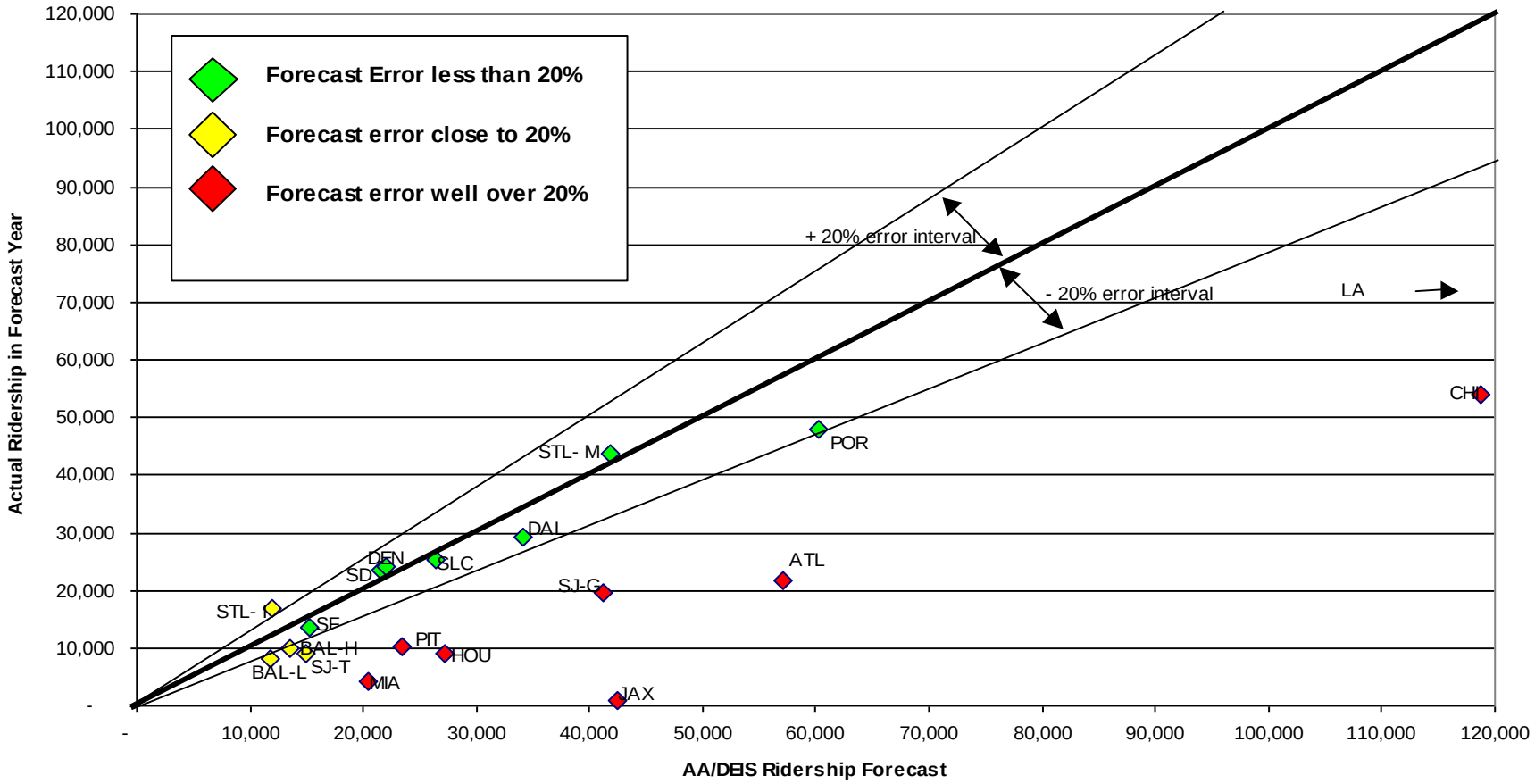
Critics confront rail leaders on ‘unrealistic’ ridership

Report casts doubt on rail ridership

FTA actions to improve forecast reliability

- Required that project sponsors:
  - Collect additional detailed data on current ridership
  - Develop models that represent transit-related choices within prescribed set of model structures and parameter ranges
  - Demonstrate model's grasp of existing transit markets described in the detailed data

Actions improved forecast accuracy



The downside

- Enhanced ridership forecasts were time-consuming and expensive to prepare… and still not completely reliable.
- Even worse, forecasts were on the critical path for new projects. Delays led to increased project costs.
- These difficulties were perceived by the industry and by FTA as being a barrier to project development.

Streamlined project evaluation process

- FTA leadership sought a simplified method to forecast ridership-related benefits of fixed guideway transit projects:
  - Simpler representation of mobility benefits – trips on the project rather than time savings
  - Based on existing, widely-available data
  - Uses fully-calibrated model that is ready-to-go
- Led to project to develop:

  Simplified Trips-on-Project Software (STOPS)

Opportunities to be more than just “simple”

- While we were at it, we aspired to make the forecasts better:
  - Inform the simplified method about actual ridership outcomes on recently-opened projects
  - Rely more on data and less on models
  - Accurately represent both supply and demand for travel between trip origins and trip destinations

The challenge

- To generate realistic projections of transit ridership, we need reliable information on
  - The number of trips between different origin and destination locations
  - The time and other impedances required to use each mode for each combination of origin and destination

Starting with data on transit supply…

- Start with each agency's computerized representation of its schedule (GTFS)… the same data used by on-line apps to suggest transit routings and travel times
- Build origin-to-destination paths to identify the individual routes and stations involved – just like those on-line apps

… and then with data on travel demand

- CTPP is crucial to understanding travel demand
  - Exists throughout United States with no new local data collection required
  - Large sample data on real origin-to-destination travel patterns for automobile, non-motorized and transit travel
  - Usable as a direct data input rather than a basis for model calibration:

    Preserves the complexity of real travel patterns rather than creating an idealized/simplified model

Translating CTPP flows to travel demand

- Start with home-to-work travel
  - Represents ~50% of transit market
  - CTPP Part 3 represents solid foundation of total (all mode) trip-making and transit travel
  - Simple trips per worker conversion factors
- Other home-based travel
  - Represents ~40% of transit market
  - Scaled from home-to-work travel
  - Similar economic factors affect other travel (except “special markets”)

Translating CTPP flows to travel demand

- Non-home-based travel
  - Represents ~10% of transit market
  - Scaled from home-to-work travel and from the number of workers arriving at each location
  - Non-home-based trip patterns by arriving workers similar to trip patterns of residents

CTPP versions

- STOPS originally developed with CTPP 2000
- Later extended to 2006-2010 5-Year ACS
- ACS results as good or better than CTPP 2000
  - More recent
  - More detailed TAZ definition

Educating the model about travel choices

- Implemented initial model with parameters from:
  - NCHRP and NHS trip rates
  - Transit routing parameters that generate realistic paths
  - Conventional forecasting practice
- Tuned model to match transit usage information from surveys in six cities
- Confirmed model performance in 12 other cities
- Resulted in STOPS understanding of observed traveler reactions to new fixed guideways

Making it work in a given locale

- Automatic adjustment of STOPS prediction of current ridership patterns to match actual transit usage in any particular city
- Based on rider count data for individual routes, rail stations, and bus stops
- Crucial for establishing model credibility for local decision-making

Systems with transit rider survey data

Metro area	Comm. rail	Heavy rail	Light rail	Streetcar	BRT	Total
Atlanta		1				1
Charlotte *			1			1
Denver *			1			1
Phoenix			1			1
San Diego	1		2			3
Salt Lake City*	1		1		1	3
Subtotal	2	1	6	0	1	10

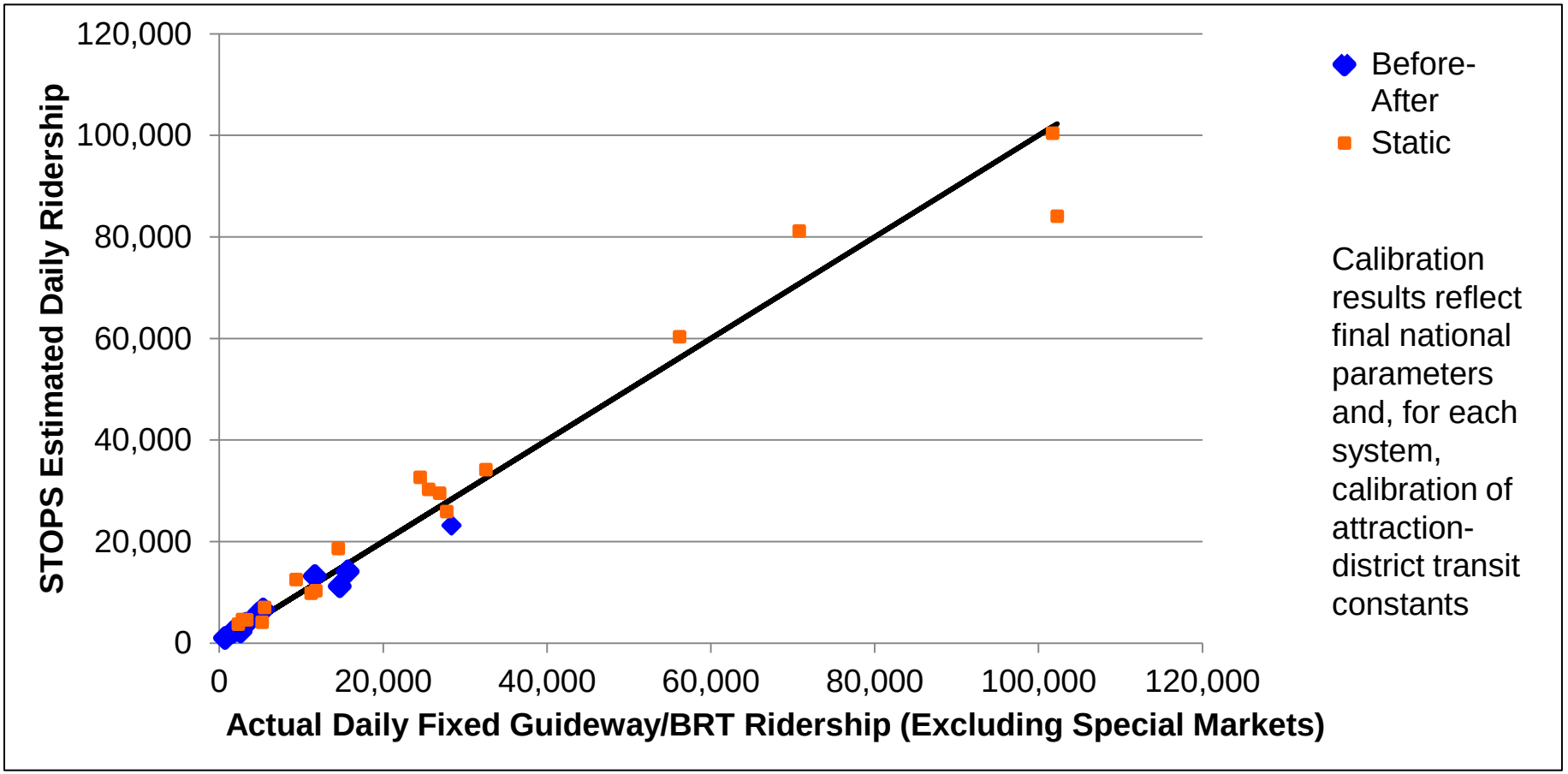
* Indicates survey data on ridership both before and after recent project openings

Systems with count data

Metro area	Comm. rail	Heavy rail	Light rail	Streetcar	BRT	Total
Chicago	1	1				2
Houston			1			1
Kansas City					1	1
Minneapolis*	1		1			2
Nashville *	1					1
Norfolk *			1			1
Portland *	1		1	1		3
San Jose			1			1
SE Florida	1	1				2
Seattle	1		1	1		3
St. Louis			1			1
Tacoma				1		1
Subtotal	6	2	7	3	1	19
Total	8	3	13	3	2	29

* Indicates count data on ridership both before and after recent project openings

National calibration results



Outcomes

STOPS has been a big success

- A new model can often be implemented in less than 2 weeks (used to be six months-year+)
- Results are almost always plausible
- STOPS forecasts for projects that have already been built are well within FTA expectations for an indicator of project mobility benefit

Outcomes

- FTA is now using these forecasts to make project-funding recommendations
- Market has responded!
  - Over 100 projects have adopted STOPS for forecasts
- FTA continues aggressive technical support and training of the STOPS user community

Conclusions

- These results are only possible with the CTPP
  - Large sample size
  - Geographic location of worker residence and employment sites
  - Indication of transit reliance from auto ownership data
  - Indication of transit usage from mode usage data
- With STOPS, FTA is relying on the CTPP to evaluate project mobility benefits for its capital investment program