CALIFORNIA
High-Speed Rail Authority

Update to Peer Review Group of work in progress on Ridership and Revenue Modeling and Forecasts

Model Enhancements and 2014 Business Plan Forecast Approach

San Francisco
July 9th, 2013

FINAL

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- *Model Enhancement Overview & Schedule*

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Note: A list of abbreviations used in this document is in the appendix

This report covers ridership & revenue model improvements and 2014 Business Plan approach

▶ We listened to comments from the Peer Review Group (PRG), the Ridership and Revenue Peer Review Panel (PRP) and others in developing an approach to enhancing the forecast model

▶ The enhanced model being developed for the 2014 Business Plan incorporates new and re-analyzed data, and will reflect the most current thinking about California's future

▶ As the 2014 Business Plan forecasting gets underway, work will continue to develop a model to support commercial planning, that addresses issues such as station choice and time-of-day choice

▶ The 2014 Business Plan forecasts will better represent the timing of project phasing than prior forecasts

▶ The 2014 Business Plan forecasts will be expressed in probabilistic terms, using a Monte Carlo simulation technique

▶ Working with the PRP, models enhancements will be made to align level of detail to stage of the program

▶ Steps taken to avoid "Flyvbjerg effect" seen in other programs

The Legislature's PRG had some remaining concerns from the 2012 Business Plan

PRG Conclusion

- The Legislative PRG issued two Draft Reports on the Draft 2012 Business Plan prior to issuing their final conclusions and recommendations

- We addressed the PRG's concerns, but a few remained:

  - There is no U.S. experience with high-speed rail (HSR) and California HSR will be a "greenfield" project, meaning that the forecast models are based, in part, on stated preference survey results, which carry a high degree of uncertainty

  - Researchers have found optimism bias especially related to market estimating issues (e.g., Flyvbjerg).

PRG Recommendations

- The Authority should take the PRP into account in future demand modeling

- "The Authority be required in its 2014 Business Plan to: a) substantially upgrade its demand modeling through better input data on sources of demand, updated socioeconomic data, and wider sensitivity analysis with particular attention to the issues associated with extension to the San Fernando Valley […]"

- The PRG recommendations were incorporated into SB-1029:

  - The High-Speed Rail Authority shall, as part of its January 1, 2014, Business Plan, include: a proposed approach for improving (a) demand projections, (b) operations and maintenance cost models, and (c) benefit-cost analysis as applied to future project decisions

The GAO found that the Authority's ridership and revenue estimates were reasonable

Background	GAO Conclusion
▪ The Government Accountability Office (GAO) was asked by the Congressional Requestors to look at the following: – The reliability of project cost estimates – The reasonableness of passenger rail ridership and revenue forecasts – The risks attendant with the project funding plan – The comprehensiveness with which the economic impacts were identified ▪ The focus of the GAO analysis was primarily on the cost estimates but also covered revenue & ridership, funding and economic impact	▪ "The Authority's ridership and revenue forecasts to date are reasonable" ▪ "Based on our review, we found that the Authority's methods and model used to produced its ridership and revenue forecasts adhere to generally accepted travel-demand best practices" ▪ "The Authority will need to complete several additional updates to improve the model and the resulting forecasts for the 2014 Business Plan […] including completing a new travel preference survey and developing a second generation travel demand model"

Recommendations	▪ The GAO did not provide any direct recommendations to the Authority but addressed some to FRA and USDOT ▪ The Authority is taking steps to incorporate GAO's comments in the continued improvement of its estimates

Many PRG concerns were addressed for the 2012 Business Plan; remaining are being addressed now

PRG Concerns	Authority Response and Plan
"Greenfield" HSR System in CA	▪ The 2012 Business Plan forecasts were shown as a range, with a 5-year market ramp-up assumption for each new phase ▪ The range will be upgraded to a probabilistic approach using Monte Carlo simulation techniques ▪ Market ramp-up assumptions will be reviewed

Stated Preference Survey	▪ The enhanced model for the 2014 Business Plan will feature new mode choice, destination choice, and trip frequency models based on recently collected data:
	  – Revealed Preference data from the recent long distance travel component of the California Household Transportation Survey (CHTS)
	  – Additional data analysis from the 2005 Revealed Preference/Stated Preference (RP/SP) survey
	  – A new 2013 RP/SP survey to validate the HSR constant

Optimism Bias	▪ The 2012 Business Plan forecasts used conservative assumptions at the low end of the range resulting in forecasts 40% lower than previous forecasts ▪ GAO indicated in their review that the forecasts were reasonable and followed best practices ▪ The 2014 Business Plan will revisit all assumptions and include potential outside review, with particular attention to the potential for optimism bias
PRP Recommendations	▪ The PRP provided extensive recommendations that are being incorporated ▪ The next model version will be re-estimated and re-calibrated with the new data sets to 2010, and then validated to 2000 ▪ As with the 2012 Business Plan, we will test the sensitivity of the enhanced model through NEC-like service comparison

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Model Version 2 is for the 2014 Business Plan; Model Version 3 is for ongoing commercial planning

Model Versions

Version 1 "Existing" model	Version 2 "Enhanced" model *Ready Sept. 9, 2013*	Version 3 "New" model *For use in 2014 and beyond*

Description

Version 1
- Used for the 2012 Business Plan, and subsequent analysis until V2 is complete
- Used for all prior environmental and planning work

Version 2
- Being developed now for the 2014 Business Plan
- Significant enhancements incorporating new data, new analysis of old data, and new baseline forecasts that reflect the best available information
- Re-estimates all sub models and streamlines executable programs
- Calibration to 2010 and sensitivity testing with NEC-like scenario

Version 3
- Fully integrates new revealed preference/stated preference survey data
- Addresses issues such as station choice and time of day for commercial planning
- Design still being discussed with the PRP

We are focused on Version 2 model enhancement, which has four main tasks

| Main Tasks	Description
1 — Collect and analyze data	- New California Statewide Travel Demand Model (CSTDM) data - Population forecasts from the Caltrans Population Synthesizer - Updated highway and transit networks - California Household Transportation Survey (2012) - New 2013 stated preference and revealed preference survey (underway now)
2 — Re-estimate Inter and intra-regional models	- Replace "short" and "long" interregional models with "long distance" (≥50 miles) - Re-estimate all model components with new or refined data: 2012 California Household Travel Survey 2005 stated preference plus revealed preference - Updated network descriptions - Made SCAG and MTC intraregional model structures consistent; recalibrated
3 — Calibrate and validate	- Calibrate to 2010 conditions - Validate by backcasting to 2000 - Sensitivity testing using NEC-like alternative - Validation of the high-speed rail constant using the 2012/2013 RP/SP survey - Determine elasticities through multiple model runs
4 — Streamline executable programs	- Consistent intraregional model implementation code for MTC & SCAG regions - Updated source code for long distance model implementation - Revised network processing scripts

# Model version 2 represents a significant enhancement over the previous model

Model	Improvement	Data Source
Overall	• Replace short & long interregional with long distance (≥ 50 miles) • Improved network specification • Improved consistency through removal of "threshold" variables in network processing	
Trip Frequency	• Combined estimation of trip frequency and travel alone-group travel • Less reliance on district constants	• 2012 CHTS long distance data
Destination Choice	• Fewer constrained variables • Less reliance on district-district constants • Refined "size" variables (employment categories) • Impact of Disneyland and Yosemite on recreation travel	• 2012 CHTS long distance data • 2005 RP data
Main Mode Choice & Access / Egress Mode Choice	• Joint estimation of the access/egress and main mode choice models – Consistent perceptions of time and cost for access/egress & main mode choice • Added mode availability specification (e.g. rental car not available for egress if no rental car facilities at station) • More consistent specification of reliability variable	• 2005 RP and SP survey data • 2012 CHTS long distance data
SCAG & MTC Intraregional Models	• Consistent, underlying model forms • Networks and socioeconomic data from MTC & SCAG • Model constants calibrated according to FTA guidelines	• 2008 & 2010 model data • 2010 validation data used for regional models
Calibration, Validation, & Sensitivity Testing	• Calibration to 2010 conditions • Validation by backcasting to 2000 • Sensitivity testing via NEC-like regional HSR system alternative • Validation of the high-speed rail constant using a new RP/SP survey • Multiple model runs to determine elasticities	• Expanded 2012 CHTS data • Caltrans traffic counts • Operator boarding data

We have a detailed schedule to have the enhanced model ready to use by September 9, 2013

	Jun				Jul					Aug				Sep				Oct			
Model Estimation	06/03	06/10	06/17	06/24	07/01	07/08	07/15	07/22	07/29	08/05	08/12	08/19	08/26	09/02	09/09	09/16	09/23	09/30	10/07	10/14	10/21	10/28

Model Estimation

- A/E and Main Mode Choice
- Destination Choice Estimation
- Trip Frequency Estimation
- Update Model Codes

Calibration / Validation

- Intra-SCAG Calib. & Validation
- Intra-MTC Calib. & Validation
- Calibration to 2010
- Validation & Sensitivities

Risk Analysis

- Risk Analysis Plan
- Identify Risk Factors
- Develop Range of Risk Factor Values and Distributions
- Develop and Run BP Scenarios And Risk Analysis Model

2013 Survey Work

- Collection & Analysis
- HSR Constant Validation

Note: Detailed Schedule in Appendix   End of Model Estimation   Ready for 2014 BP Forecasts

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Update to Peer Review Group of work in progress   7/9/2013   11

The Peer Review Panel will review and validate the key milestones along the enhancement process
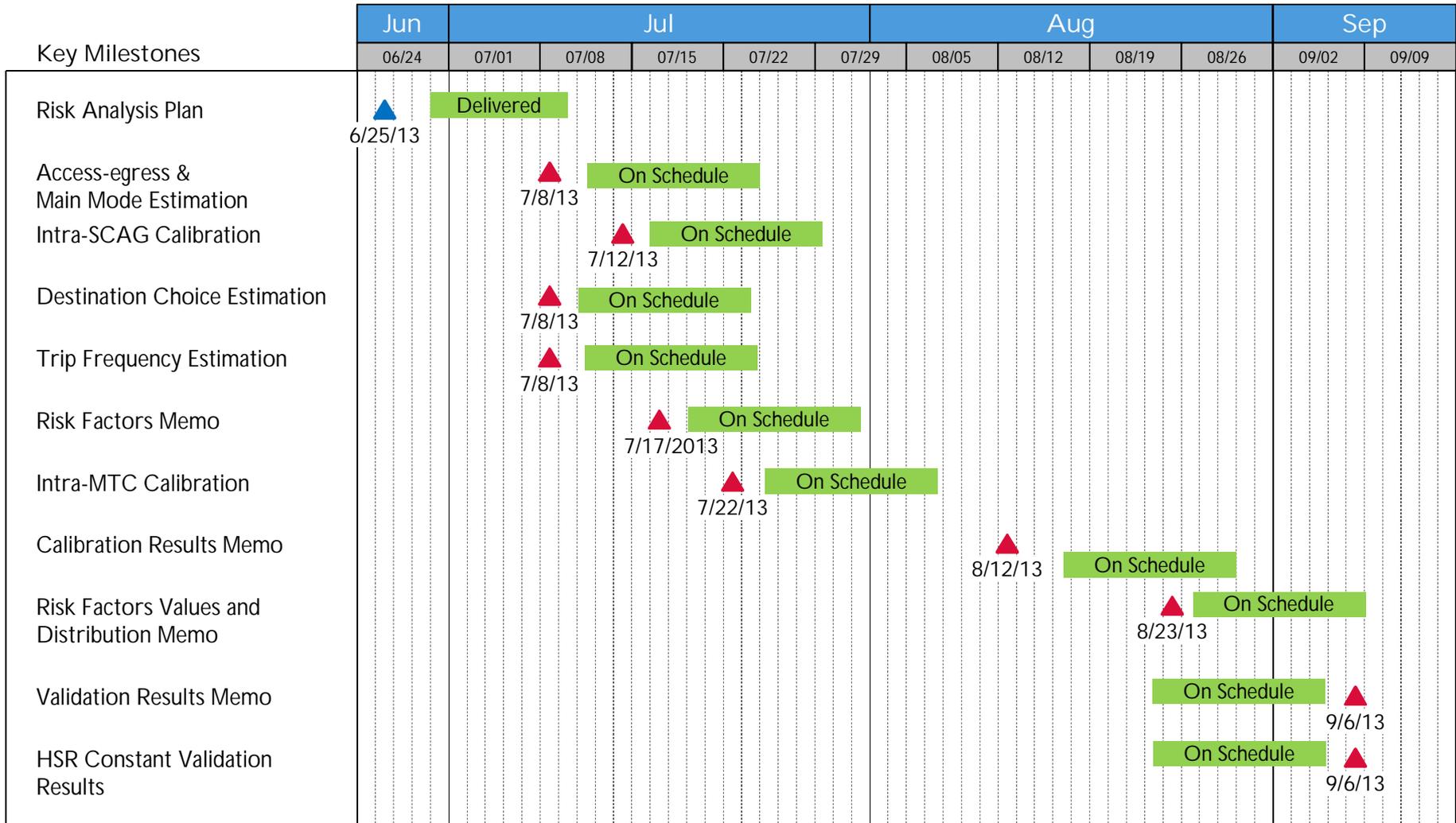
Key Milestones	Jun	Jul	Aug	Sep

Risk Analysis Plan — 6/25/13 — Delivered

Access-egress & Main Mode Estimation — 7/8/13 — On Schedule

Intra-SCAG Calibration — 7/12/13 — On Schedule

Destination Choice Estimation — 7/8/13 — On Schedule

Trip Frequency Estimation — 7/8/13 — On Schedule

Risk Factors Memo — 7/17/2013 — On Schedule

Intra-MTC Calibration — 7/22/13 — On Schedule

Calibration Results Memo — 8/12/13 — On Schedule

Risk Factors Values and Distribution Memo — 8/23/13 — On Schedule

Validation Results Memo — On Schedule — 9/6/13

HSR Constant Validation Results — On Schedule — 9/6/13

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The model enhancement is progressing well

Main Activities	Examples of Work in Progress	Progress To Date

1 — Data Collection & Evaluation
- Analysis of existing and new data sources
- New 2013 RP/SP survey data evaluation
- Updated highway and transit networks
- Develop new baseline socioeconomic datasets

Progress To Date:
- Work almost complete
- Air passenger surveys in the field
- Work completed
- Work almost complete

2 — Model Re-estimation (Inter and intra-regional)
- Re-estimate all model components with new data
- Replace "short" and "long" distance model
- Intraregional model structure

Progress To Date:
- Initial estimation review by PRP on 6/20
- Initial estimation results confirm process
- Work complete
- Work complete

3 — Model Calibration & Validation
- Calibration to 2010 conditions
- Validation:
  - Backcasting to 2000
  - NEC-like regional HSR system alternative
  - HSR constant using 2013 RP/SP survey
  - Model elasticities

Progress To Date:
- Intraregional calibration almost complete
- Model validation not initiated – on schedule

4 — Model Executable File
- Consistent intraregional model structure
- Updated source code for long distance model implementation
- Revised network processing model scripts

Progress To Date:
- Scripts developed and tested
- Work to be complete by 7/8
- Work complete

We re-analyzed data used for the V1 model and found new data sources to mine

Data Source	Data Identified	Data Processing/Uses
2005 RP/SP Survey	• SP Data from 2005 RP/SP survey	• Combined with other data for main mode choice model estimation
	• RP Data from 2005 RP/SP survey	• Combined with other data for access/egress and main mode choice model estimation • Updated/corrected network travel time information on RP data that precluded its use in V1 model
2012/2013 California Household Travel Survey: Daily Diary Data	• Trip records for trips 50 or more miles from home	• Trips "filtered" to use only those 50 or more miles from home based on straight line distances • Use for overall long distance trip rates (insufficient information for trip rates by purpose)

2012/2013 California Household Travel Survey: Long Distance Data	• 8 week recall of trips 50 or more miles from home	• Trips "filtered" to use only those 50 or more miles from home based on straight line distances
		• "Cleaned" to adjust for non-response and other issues (with PRP review and advice regarding procedures)
		• Unexpanded data used for estimation of:
		  • Main mode choice
		  • Destination choice
		  • Trip frequency
		• Data being expanded to 2010 California population and will be used for calibration of final constants for:
		  • Main mode choice
		  • Destination choice
		  • Trip frequency

One of the re-analyzed sources was the CHTS Long Distance Survey

Unweighted CHTS Long Distance Data

	Business	Commute	Recreation	Other	Total
Annual RT/Capita	0.85	1.17	2.33	2.94	7.29
Share of Total	12%	16%	32%	40%	100%
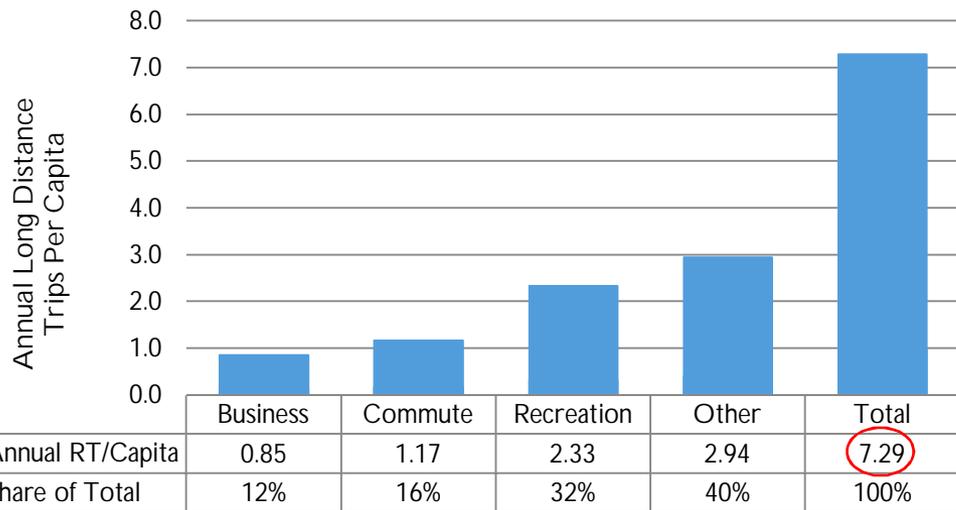
Comparison of Shares of Long Distance Trips (50+ Miles) by Purpose

Survey / Source	Business	Commute	Business / Commute	Recreation / Other
2000 CA HSR Model Calibration	12%	43%	55%	45%
2011/2008 Harris Survey	11%	8%	20%	80%
2001 NHTS (National Data)	16%	13%	29%	71%
2009 NHTS (National Data)	9%	9%	18%	82%
2012-2013 CHTS LD*	12%	16%	28%	72%

* Unweighted data

Comments

- One person reported for all household members based on eight-week recall; also reported number of household members and total people accompanying traveler
- Analysis showed many households did not report repeated trips
- We corrected this (with PRP review) by imputing repeat trips based on the 2011 Harris Long Distance Survey (for CHSRA), and adjusting for non-response
- All trips 50 or more miles from home based on straight line distance for consistency with model design
- We found that unweighted results:
  - look reasonable in terms of annual round trips per capita
  - more closely match national data and the Harris long distance survey than the targets set for the Version 1 model calibration
- The PRP noted the similarities with the previous results

A new Revealed Preference/Stated preference survey will give us data for V2 and V3

▶ A new 2013 RP/SP Survey is underway right now, capturing:

  – Airline passengers (SFO & LAX for certain; possibly several smaller airports)

  – Conventional rail (Amtrak, Caltrain, and Metrolink)

  – Long distance auto users (recruited from respondents to CHTS survey)

▶ In Version 2, we will use the new data to verify the high-speed rail constant

▶ In version 3, we will use the new survey more extensively:

  – We will combine it with the CHTS long distance data and the 2006 RP/SP data and use it for re-estimation of mode choice models and possible new model components such as station choice

Updated networks ensure the most recent available data and consistency with other statewide modeling efforts

▸ We obtained and checked highway and transit networks that were developed for use with the California Statewide Travel Demand Model

- The CSTDM, recently developed by UC Davis and HBA Specto, forecasts all personal travel made by every California resident, plus all commercial vehicle travel

- The Authority team adapted the master highway network developed by UC Davis to the CHSR model and can create networks for any base or forecast year specified

- We developed new CSTDM base year auto and transit skims from the new networks.

We performed extensive quality control on the network and zonal data that we converted from the CSTDM

Verified information for model estimation with same rigor we used for V1 forecasts for HSR alternatives –

Connectivity Checks

☑ Review and verify dangling nodes to identify possible miscodings (links could be so close that they appear connected but are not)

☑ Verify non-intersecting link overlaps as over/underpasses

☑ Generate list of nodes/links that are very close to each other but not connected (could identify two roadways that were supposed to intersect but were close enough to appear connected even though they were not)

Skim-based Checks

☑ Compare skimmed distances to straight-line distances

☑ Calculate average skim-based speeds to identify any unrealistic paths or congested speeds

☑ Spot check individual paths and routings for key zone pairs

☑ Plotted travel times to key stations to check for logical spatial distribution of travel times

TAZ Review

☑ Ensure total coverage/no slivers

Link-based Checks

☑ Sort attributes to looks for missing or unreasonable values

☑ Compare values against observed data, where available

☑ Sort attributes to looks for missing or unreasonable values

An example of network checks is the skimmed travel times to regional airports

Total Auto Travel Time to LAX

HSR_TAZs_Dec2012
AUTO_TIME

	5 - 45
	46 - 90
	91 - 120
	121 - 180
	181 - 763
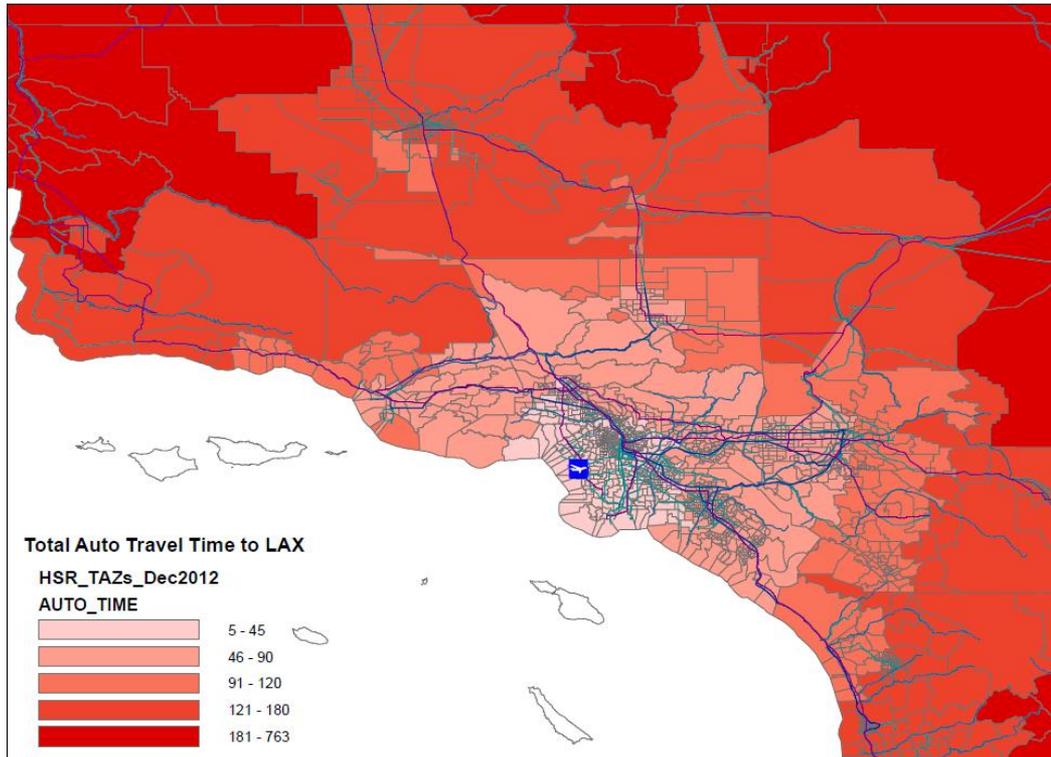
Comments

▸ With this kind of analysis, we can quickly see if the model views travel times to Los Angeles International Airport (LAX) is reasonable—and consistent

▸ We do similar analysis for transit access to LAX as well

Our forecasts will incorporate the latest current opinions regarding socioeconomic growth

▸ Forecasts developed for the CSTDM will be our starting point

– The Caltrans population synthesizer allocates population to individual traffic analysis zones based on county-wide control totals provided by regional planning agencies

– Forecasts are available for 2010, 2015, 2020, 2035, 2040, and 2050

▸ We will review several additional data sources:

– Department of Finance (new)

– Moody's Analytics (new data purchase, updating data from 2011)

– Others, such as recent work by USC Price School of Public Policy

▸ We will develop a range of forecasts for population and employment and a probability distribution to be used in the risk analysis based on the available data

▸ Data sources vary in details and timing of updates

California Department of Finance (DoF) 2013 projection shows long-term slowing in population growth

▸ After decades of fast growth, California's anticipated growth rate is now much more closely aligned with the nation's.
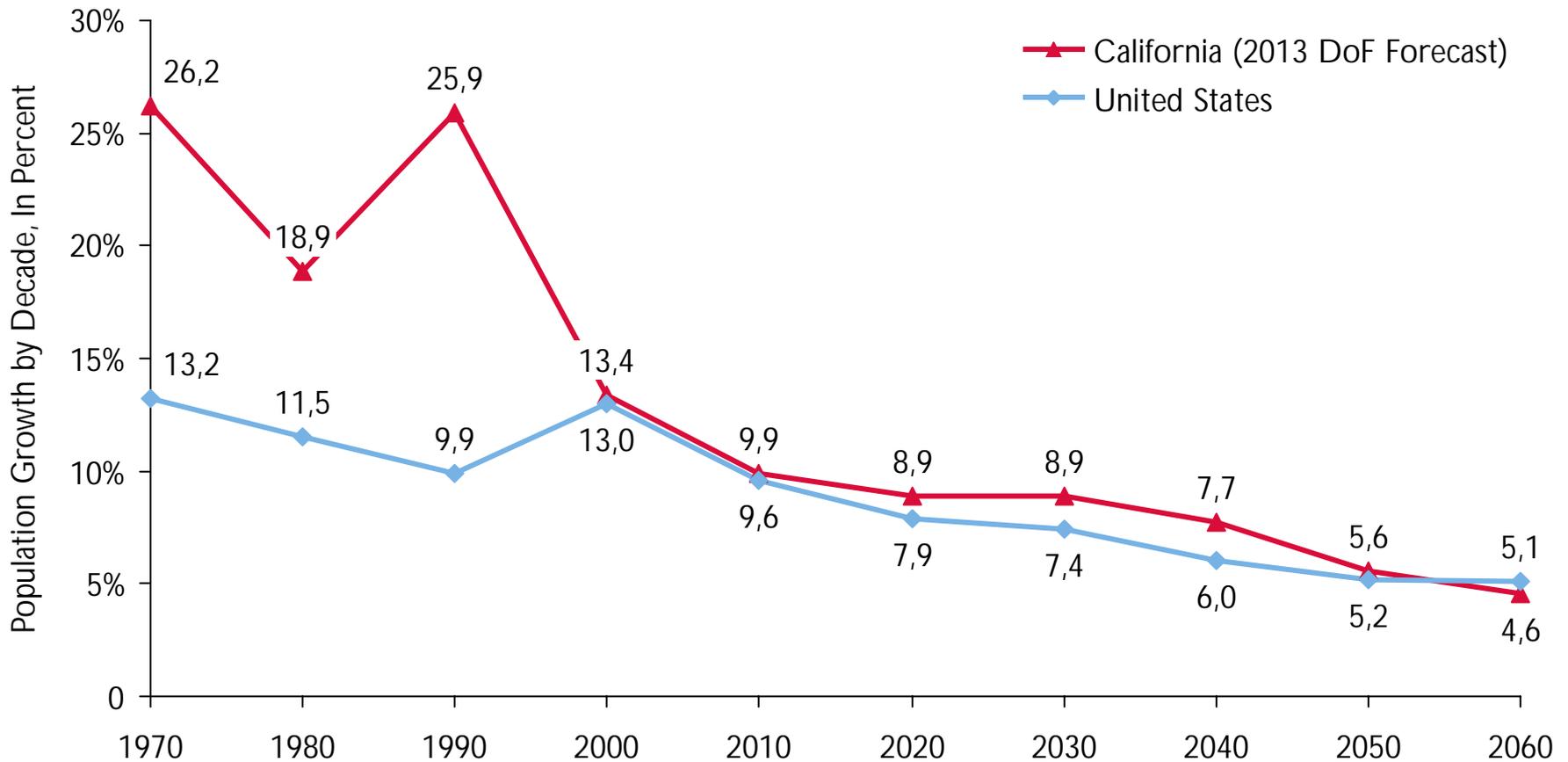
We will develop a range of socioeconomic forecasts from the most recent available published and private sources

Population Projection 2010-2040 (millions)
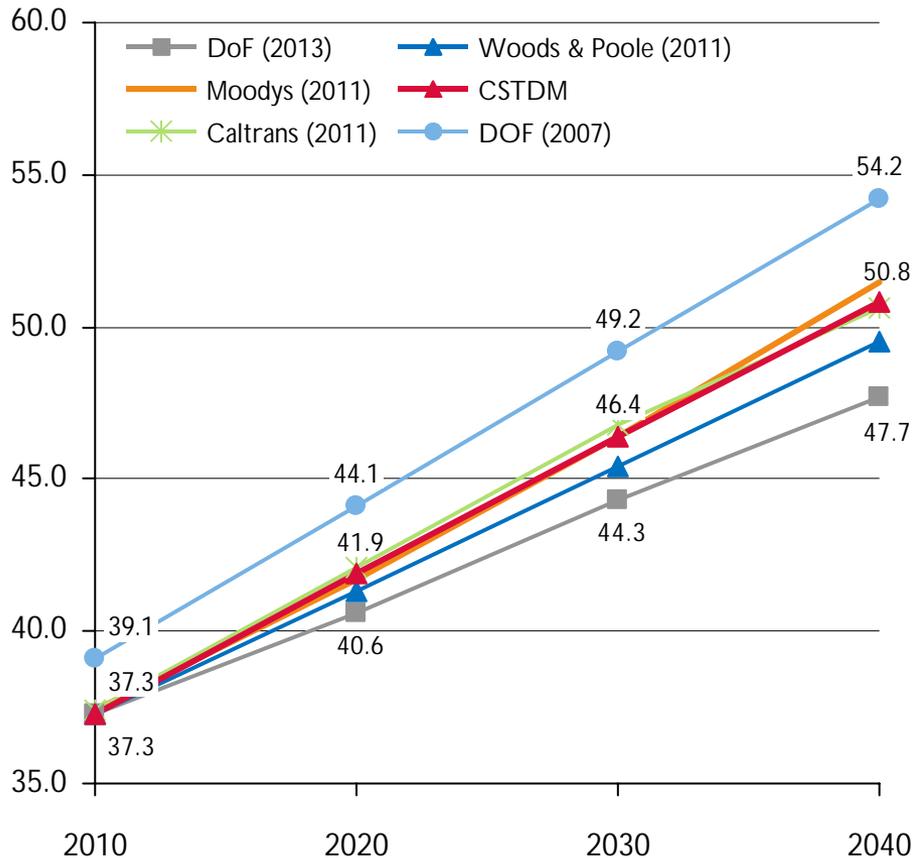
Population Projections in 2040 (millions)

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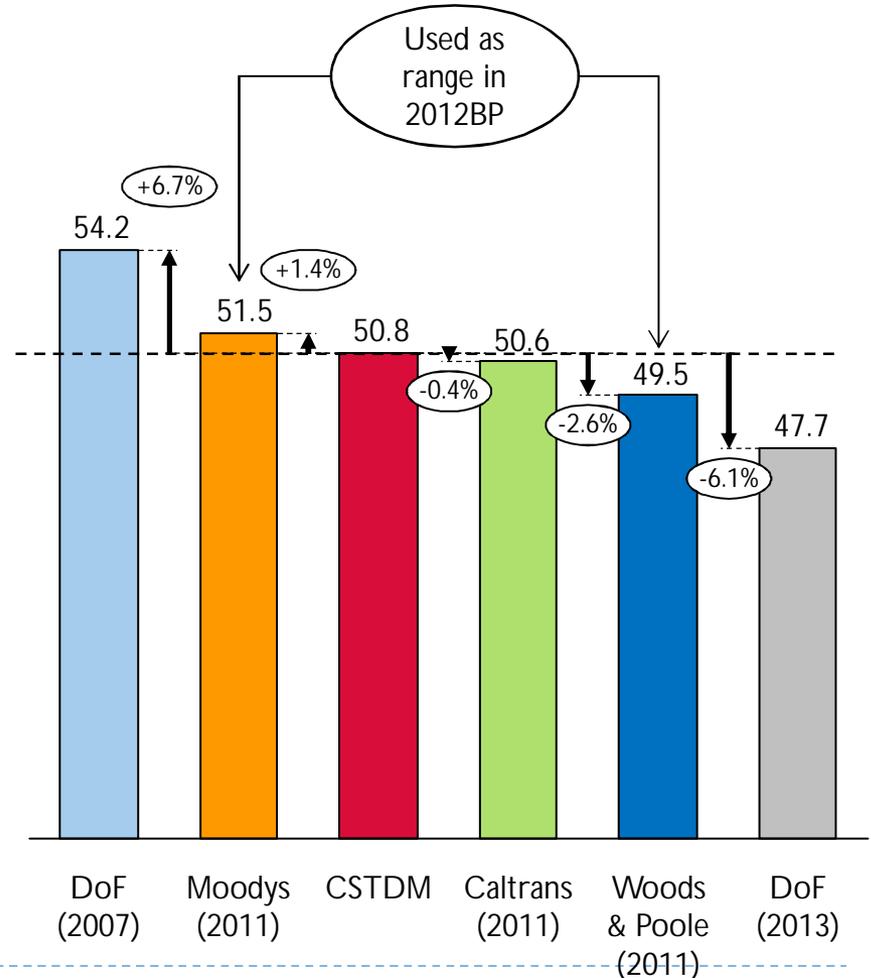
As was the case with the 2012 Business Plan, we are not planning to rely solely on DoF forecasts in the model

▸ When the version 1 model was developed, the latest DoF forecasts (2007) did not reflect the 2008 recession so the PRP recommended to use alternative (private) sources for the model

▸ Moving ahead the PRP continues to see limitations with the use of DoF demographics forecasts:

 – New DoF forecasts are available (2013) but the update frequency (>5 yrs) causes a concern for future model enhancements

 – DoF provides forecasts by age group but not at the detailed needed for the model (households, employment, income, etc…)

▸ Caltran's Economic Analysis Branch prepared long term detailed socioeconomic forecasts used for the CSTDM but also by all other models in the state ensuring consistency

▸ The PRP approved the use of the CSTDM socioeconomic forecasts in the version 2 model

▸ We will however consider all those opinions in developing a reasonable range of forecasts to use in our risk analysis

We updated the SCAG and MTC components of the model system

▸ The existing model had two different approaches in the two major urban regions. We created a consistent model structure between the two regions

▸ We updated the models with extensive changes to create consistency with existing regional models maintained by MTC & SCAG

– Skim factors were adjusted to ensure consistency between mode choice coefficients and skim weights

– Home-based work market segmentations were revised to include income <u>and</u> vehicle ownership

– Cost coefficients in the home-based work models were adjusted to account for new market segmentations

– Constants are being calibrated using "Federal Transit Administration guidelines" to 2010 regional models

– Validation is being done to 2010 observed transit ridership data

The entire model system will be recalibrated and validated

Calibration

- Calibrate model constants to match expanded data from 2012-2013 CHTS Long Distance Survey

Validation

- Comparisons to observed 2010 conditions:
  - Traffic counts on major screenlines and gateways
  - Intrastate airline passengers estimated from 10 percent ticket sample
  - Rail boardings

Backcasting to 2000 conditions

- Traffic counts on major screenlines and gateways
- Intrastate airline passengers estimated from 10 percent ticket sample
- Rail boardings
- Estimates of long distance travel from 2000/2001 CHTS data

Sensitivity Testing

- Re-doing our analysis of an NEC-like system
- Estimating model elasticities

We are updating the model executable files

	Version 1	Version 2	Version 3
Programming Language	▪ Originally written in Pascal	▪ Updated in Pascal, so as not to have to re-write the code from scratch	▪ Re-write completely in updated programming language
Compatibility Issues	▪ Incompatible with Windows 7; Must be run on Windows XP.	▪ Compatible with Windows 7	▪ N/A
Run Time	▪ Approximately 8 hours	▪ Expect run time to decrease due to fewer computations in Version 2	▪ Decrease run-time substantially. Goal of less than 2 hours.
Input/Output File Formats	▪ Cube Matrices; Source of incompatibility issues.	▪ CSV Files	▪ To be determined
Models	▪ Version 1 estimated models and input files	▪ Version 2 estimated models and input files	▪ Version 3 estimated models and input files
Useability	▪ Code is not well documented ▪ No built-in checks on unreasonable input data ▪ Code errors	▪ Code is well documented ▪ Built-in checks to catch unreasonable input data ▪ Known code errors are corrected	▪ To be determined

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Our approach to the 2014 Business Plan analysis seeks to maximize the value from model runs

Project Phasing	Identify and Quantify Risk Factors	Run Model Scenarios	Monte Carlo Simulations

Project Phasing
- Project to open in phases
- Match project phases to analysis years
- Avoids extensive factoring from 2030

Identify and Quantify Risk Factors
- Some risk factors will have more influence over ridership and revenue than others
- We will design the model run regime based on the type and variation in key risks

Run Model Scenarios
- Individual model runs will be analyzed to build regression models to create relationships among the different risk factors
- These form the basis for the Monte Carlo simulations

Monte Carlo Simulations
- Monte Carlo simulations expand our ability to test a limited number of model runs (in the tens) to thousands of potential outcomes
- Results are expressed as the probability of achieving different outcomes

2014 Business Plan forecasts will recognize the project phasing plan

Proposed Forecast Year by Phase		
System Phase	Planned 1st Year of Revenue Service	Proposed Model Forecast Year
Initial Operating Segment (IOS)	2022	2022
Bay-to-Basin	2027	2027
Phase 1 Blended	2029	2029
Phase 1	2034	2034

Comments

- The program is phased and includes four distinct steps: Initial Operating Segment (IOS), Bay to Basin (B2B), Phase 1 Blended and Phase 1 Full Build

- In the 2012 Business Plan CS prepared forecasts for all project phases for forecast year 2030. The Authority applied growth factors to estimate annual ridership and revenue between 2022 and 2060

- For the 2014 Business Plan, we will forecast revenue and ridership at different forecast years, eliminating the factoring process

- Networks and socioeconomic datasets are being developed to be able to incorporate this model feature

- Datasets for 2040 and 2050 will also be developed to enable forecasts for a longer period

CSTDM data will be a starting point, but the ridership and revenue forecasts will be expressed in probabilistic terms

Stepped Approach	Description
1 Start with consistency	▪ Our <u>first</u> forecasts will use CSTDM data to provide consistency to other planning work going on in California, such as for the State Rail Plan ▪ But, our forecasts will recognize risk, and will not be constrained by the accepted forecasts
2 Scenarios to address uncertainty	▪ The Authority will develop a set of scenarios that demonstrate how ridership and revenue varies as important inputs change: – Socioeconomic data – Airline competitive response – Auto operating costs – Trip frequency and modal constants
3 Probability distributions for inputs	▪ The Authority will develop distributions of these key inputs for review by the Peer Review Panel and/or other outsiders
4 Monte Carlo Simulation	▪ The variation of potential ridership and revenue outcomes will emerge from a Monte Carlo simulation method of risk analysis (presented on page 32)

The Risk Analysis Model will account for four risk factors

| Risk Factors	Description
Socioeconomic dataset	▪ A range of county-level forecasts will be allocated to individual Traffic Analysis Zones ▪ Data sources include forecast from the California Department of Finance, Moody's Analytics, and USC Price School of Public Policy
Airline Competitive Response	▪ The 2030 aviation forecast used in the 2012 Business Plan will be updated and expanded to include 2022, 2027, 2029, 2034, and 2050 forecasts, if possible
Auto Operating Costs	▪ The latest U.S. Energy Information Administration gasoline price forecasts out to year 2040 (low, reference, high) and the latest fuel efficiency projections in California will be combined to develop a range of auto operating costs.

Model Assumptions	▪ The most important will be:
	  – High-speed rail constant
	  – Changes in trip frequency over time

We will develop a model run plan to efficiently create a "model of the model" for use in Monte Carlo simulations

Illustrative Example from Another Project
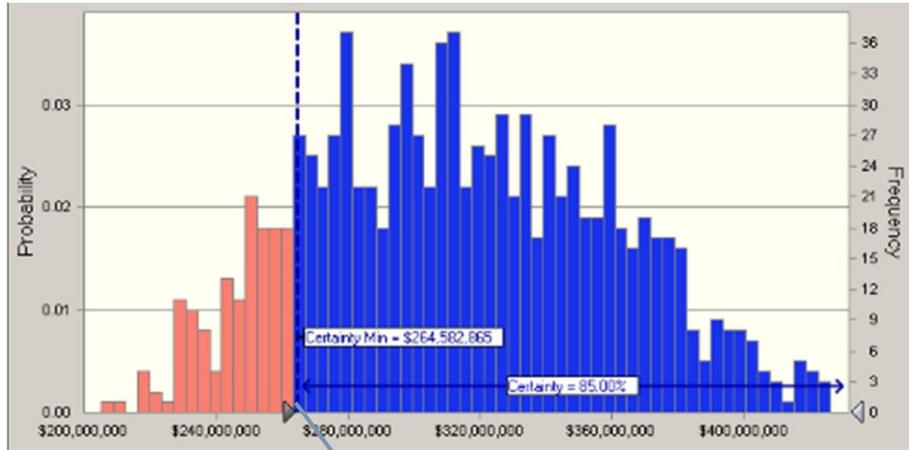
Represents 85% probability of exceeding this amount.

Approach Description

- For each risk factor, we will develop a distribution of probable outcomes using a middle value (e.g., greatest likelihood of occurring) and by estimating a "high" value (e.g. ,value projected near the 85th percentile) and a "low" value (e.g., value projected near the 15th percentile)

- 20 or 30 model runs testing the elasticity of ridership and revenue to changes in different risk factors will be used to develop regression models

- Randomized series of 5,000+ scenarios will be run across the risk factors to obtain the revenue distribution suggested by each risk factor's sensitivity to revenue, and likely range and probability distribution.

- The result will be a ridership and revenue forecasts with confidence intervals

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Abbreviations used in this report

CHSRA   California High Speed Rail Authority

CHTS   California Household Transportation Survey

CS   Cambridge Systematics

CSTDM   California Statewide Travel Demand Model

CSV   Comma-separated value (a type of data file)

DoF   California Department of Finance

HSR   High-Speed Rail

IOS   Initial Operating Segment of the California High Speed Rail system

LAX   Los Angeles International Airport

MTC   Metropolitan Transportation Commission

NEC   Amtrak's Northeast Corridor

PRG   Legislature's Peer Review Group

PRP   High Speed Rail Authority's Ridership and Revenue Peer Review Panel

RP/SP   Revealed Preference/Stated Preference

SCAG   Southern California Association of Governments

USC   University of Southern California