TRANSPORTATION LEADERSHIP ACADEMY

Transportation for America

U.S. Department of Transportation Federal Highway Administration

SAN FRANCISCO BAY AREA: COST-BENEFIT ANALYSIS CASE STUDY

HON. STEVE KINSEY

Performance Measures

Transportation's Bridge to a Sustainable Future

Steve Kinsey – Metropolitan Transportation Commission

Transportation Leadership Academy, Boston – October 2016

Source: https://www.flickr.com/photos/frank_schulenburg/9518366702

The Bay Area drives the 21st century.

7.6 million residents
Becoming **majority-minority**
Rapidly-growing **senior** population

Highest median income in U.S.
2nd-highest cost of living

25 transit agencies
$2.5 billion annual operating budget
Twice that of roads

40% of Bay Area greenhouse gas emissions come from transportation

#1 market for electric vehicles

Focus of Today's Presentation

MTC's trailblazing journey down the performance measures pathway

MTC's use of performance measures – then and now

Lessons learned along the way

Performance measures are the building blocks of sustainable transportation.

Advancing economic, equity, and environmental objectives

Opportunity to reinforce community values in transportation investments

Accountability for decisions / continuous improvement

Performance measures are the building blocks of sustainable transportation.

Visioning – quantify values and goals

Evaluation – structured comparison of options

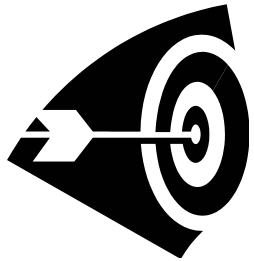
Decision – grounded selection

Monitoring – track expectations / continuous improvement in evaluation tools

Year	2001	2005	2009	2013	2017
	2001 Regional Transportation Plan	Transportation 2030	Transportation 2035 Change in Motion	Plan Bay Area	Plan Bay Area 2040
Scenario Planning	Transportation investment packages	Transportation investment packages	Transportation investment packages	Integrated transportation & land use scenarios	***Integrated transportation & land use scenarios***
Performance Targets	Transportation targets	Transportation targets	Transportation targets	Integrated targets	***Integrated targets***
Qualitative Project Assessment	None	Goals-based	Goals-based	Targets-based	***Targets-based***
Quantitative Project Assessment	None	None	Limited benefit-cost analysis	Rigorous benefit-cost analysis	***Rigorous benefit-cost analysis***
Committed Policy In Place	n/a	Expansive definition of "committed"	Expansive definition of "committed"	Narrow definition of "committed"	***Narrow definition of "committed"***
Compelling Case Process in Place	No	No	No	Yes	***Yes***
Project Types Evaluated	None	Expansion Efficiency	Expansion Efficiency	Expansion Efficiency	***Expansion Efficiency State of Good Repair***

General Framework:

- Evaluate ~70 major transportation projects (>$100M)
- Includes expansion, efficiency, and state of good repair investments
- Two components:
  - **Benefit-cost assessment**
    - Relies on travel demand model
    - Incorporates economic best practices
  - **Targets assessment**
    - Relies on qualitative criteria
    - Reflects regional values



Time and Effort:

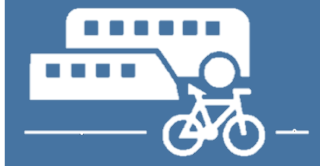
- 3 months – update methodologies & engage stakeholders
- 2 months – collect project definitions
- 4 months – run travel demand model & calculate scores

Image Source: https://www.flickr.com/photos/68751915@N05/6869768383

ECONOMY

Economic Vitality

- Increase access to jobs by all modes
- Preserve the share of jobs in middle-wage industries
- Reduce per-capita delay on freight network



Transportation System Effectiveness

- Increase non-auto mode share
- Reduce auto maintenance costs
- Reduce transit delay associated with aged infrastructure

ENVIRONMENT

Climate Protection

- Reduce per-capita greenhouse gas emissions from cars and light-duty trucks

Healthy and Safe Communities

- Reduce adverse health impacts

Open Space and Agricultural Preservation

- Direct all non-agricultural development within the urban footprint

EQUITY

Adequate Housing

- House all of the region's projected housing growth

Equitable Access

- Decrease housing + transport costs for lower-income households
- Increase share of affordable housing
- Do not increase the risk of displacement

Goals and Targets

Plan BayArea 2040

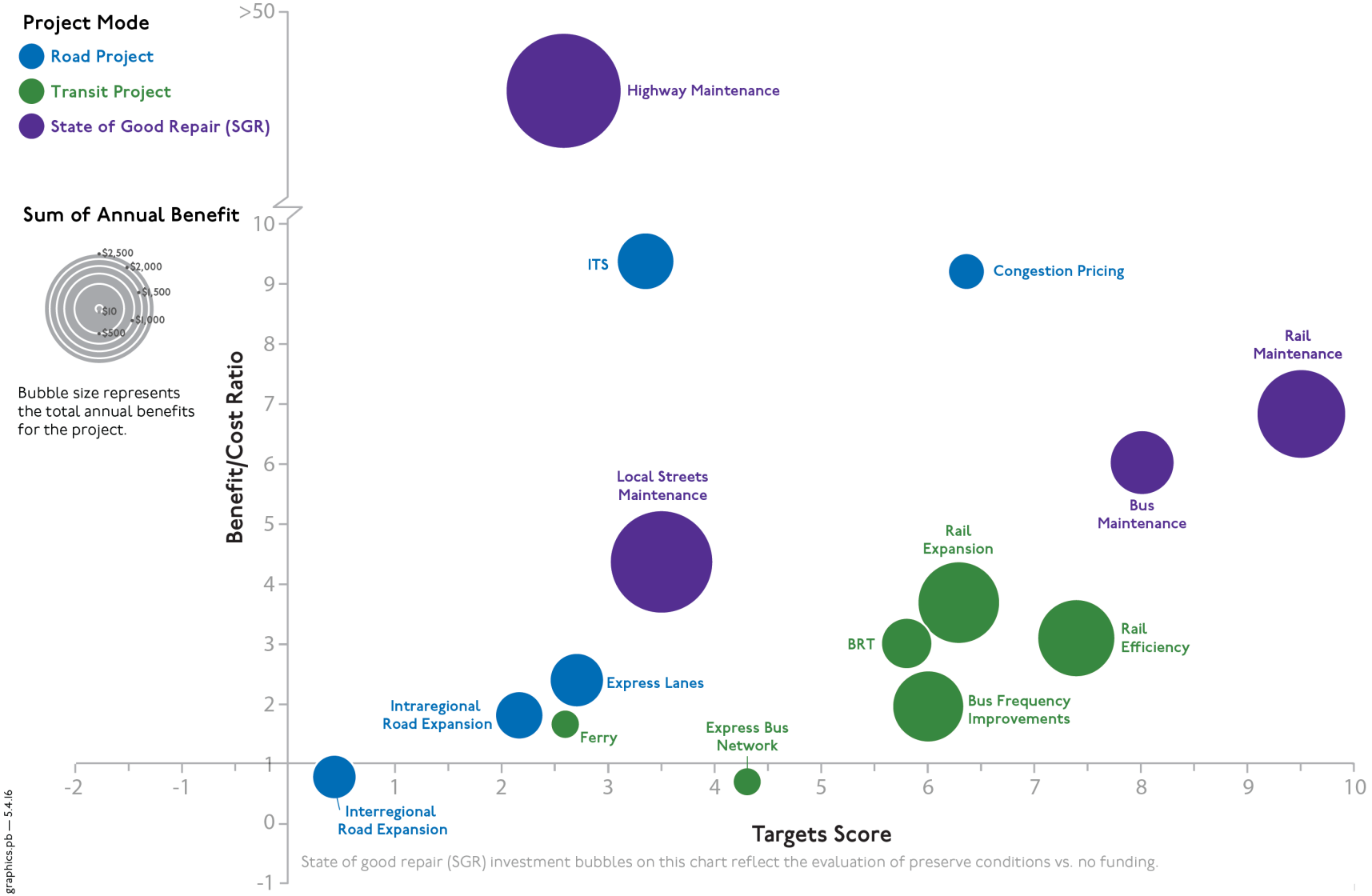
Plan BayArea 2040

What We Heard

JOBS
PRESERVATION
DEVELOPMENT
GOOD
WAGE
JOBS-HOUSING BALANCE
OPEN SPACE
REALISTIC
NEIGHBORHOOD
COMMUTE
ACCESS
FOOD
PEDESTRIAN
SEA-LEVEL RISE
RESIDENTIAL
WILDLIFE
WALKING
HOUSING
WATER
TRAILS
SEGREGATION
ACCOUNTABILITY
AFFORDABLE
LOCAL
LOW-INCOME
EQUITY
SAFETY
EXPANSION
MORE NOTICE
PRIVATE-PROPERTY RIGHTS
INTERCONNECTEDNESS
AGRICULTURAL
TECH
BAY
ADEQUATE
GROWTH
REGIONAL
DROUGHT
TRANSIT
CORPORATE
ECONOMIC
SLOWER
EDUCATION
CLIMATE CHANGE
BIKING
PARKING
TRANSPORTATION
FREE
CARS
PLAN
SMART
COMMUNICATION
BALANCE
SYSTEM
SEISMIC
POPULATION
HOMELESSNESS
PUBLIC

Plan Bay Area 2040

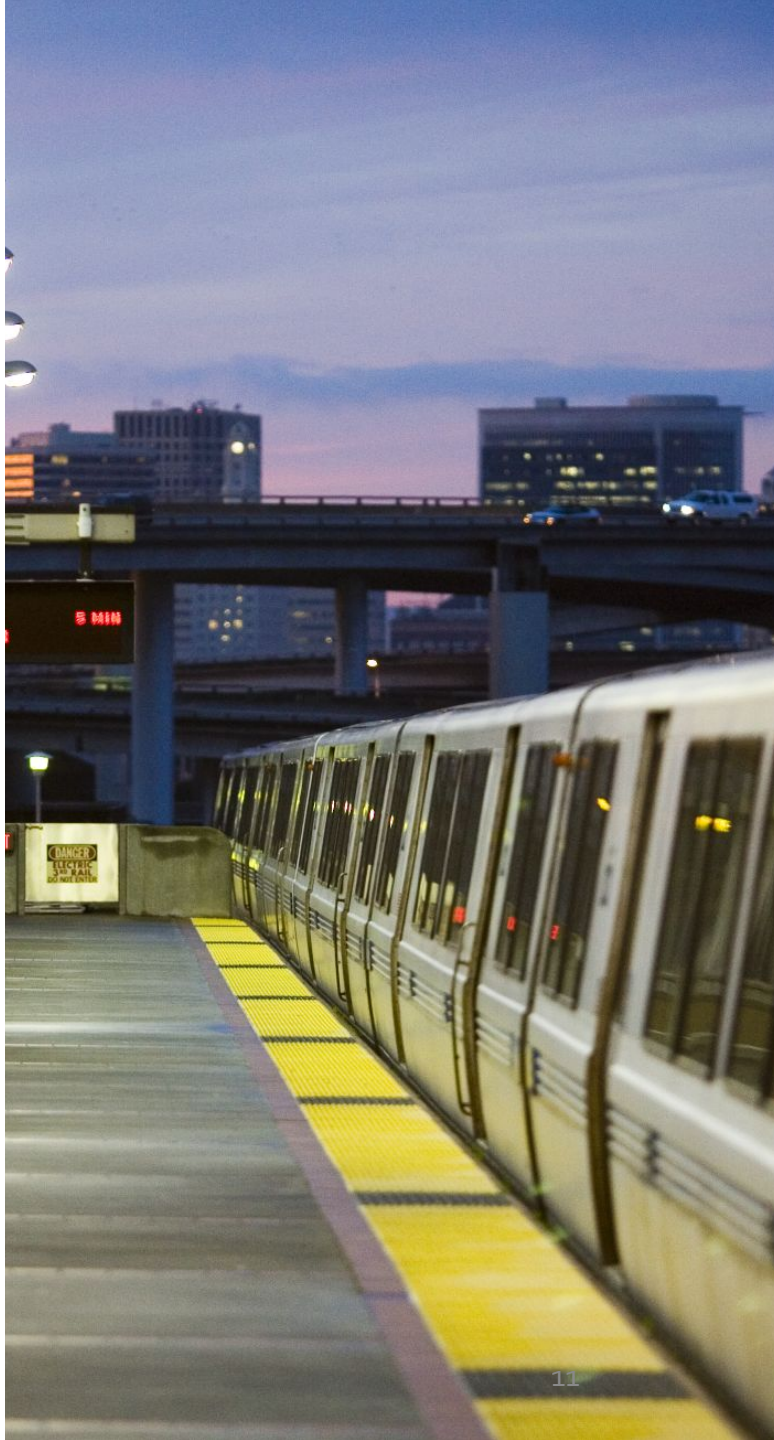
Project Performance Assessment: Overall Results by Project Type



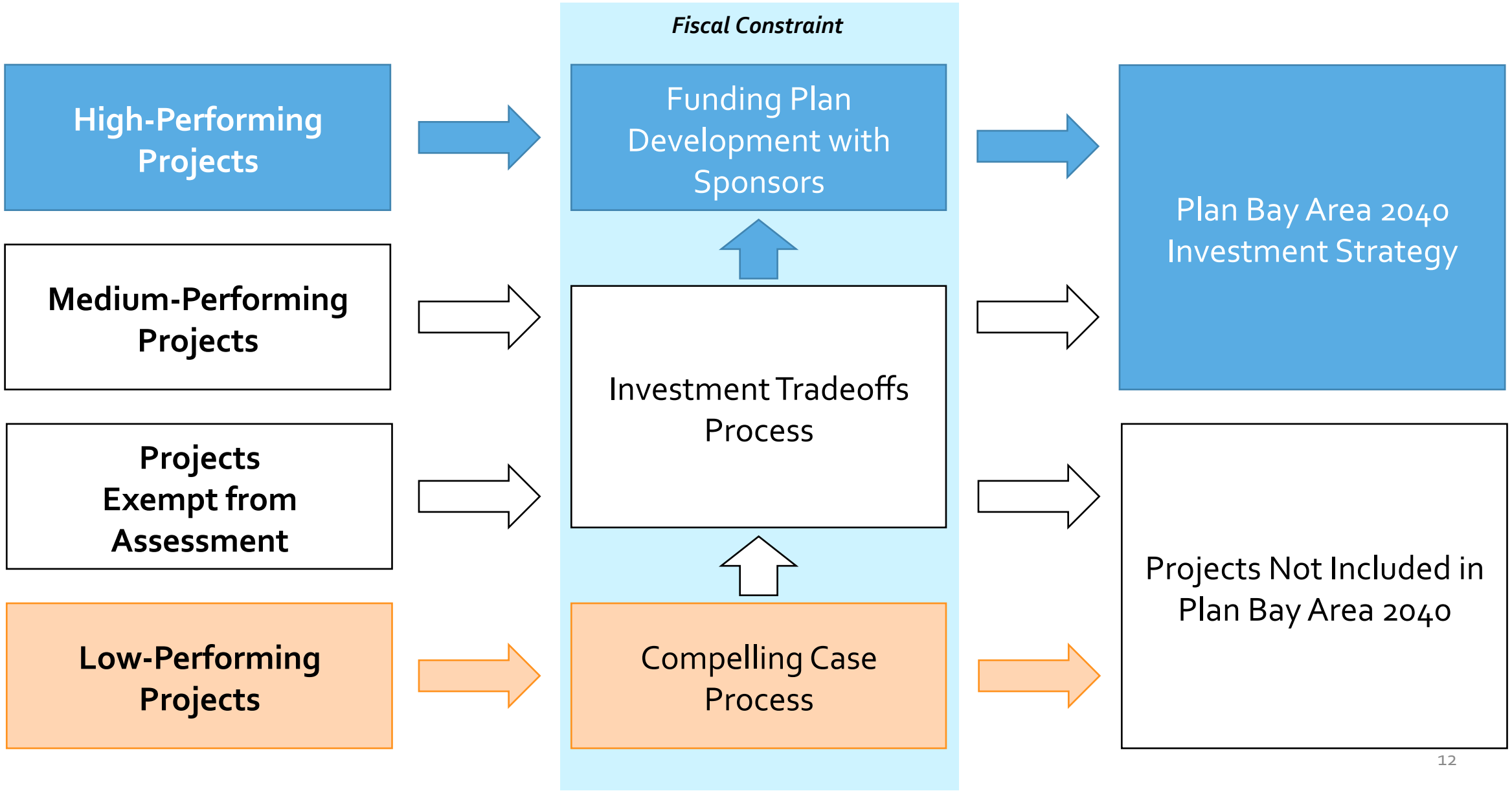
State of good repair (SGR) investment bubbles on this chart reflect the evaluation of preserve conditions vs. no funding.

mtc graphics.pb — 5.4.16

For detailed data and methodologies: http://data.mtc.ca.gov/performance/dashboard/



Prioritizing (and De-Prioritizing) Projects



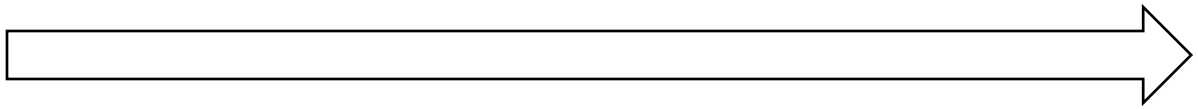
Prioritizing (and De-Prioritizing) Projects

High benefit-cost ratio (B/C) and **medium** targets score (TS)
- Plan Bay Area: B/C ≥ 10 and TS ≥ 2
- **Plan Bay Area 2040: B/C ≥ 7 and TS ≥ 3**

Medium benefit-cost ratio and **high** targets score
- Plan Bay Area: B/C ≥ 5 and TS ≥ 6
- **Plan Bay Area 2040: B/C ≥ 3 and TS ≥ 7**

High-Performing Project

All other projects



Medium-Performing Project

Low benefit-cost ratio or **low** targets score
- Plan Bay Area: B/C < 1 or TS ≤ -1
- **Plan Bay Area 2040: B/C < 1 or TS < 0**

Low-Performing Project

PLAN BAY AREA 2040 PROJECTS BREAKDOWN

11 high-performers

40 medium-performers

18 low-performers

Plan BayArea 2040

Example Scorecard

Project sponsors and Plan stakeholders can delve into the detailed performance results for a specific project using the online Project Dashboard tool.

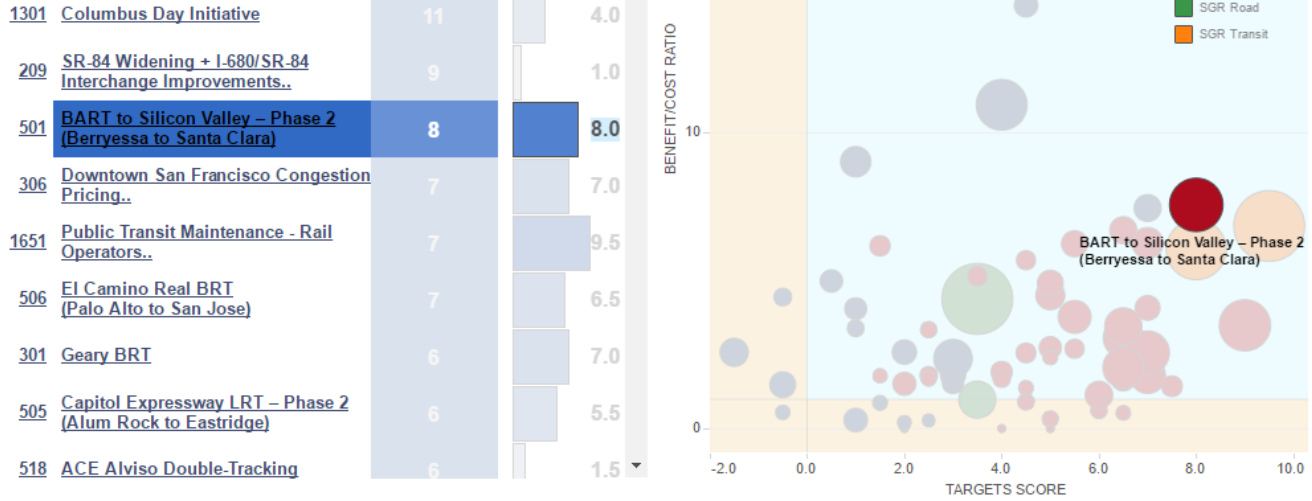
http://data.mtc.ca.gov/performance/dashboard

Project Overview
High-Level Results + Geographic Location

Benefit-Cost Breakdown
Benefits and Disbenefits by Category

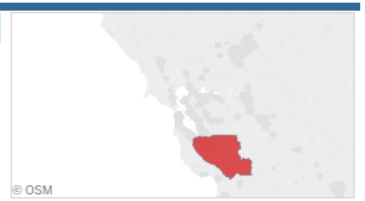
Targets Breakdown
Scores for All 13 Targets

Supplemental Results
Confidence Evaluation + Equity Analysis



SELECT PROJECT FROM LIST ABOVE TO DISPLAY PERFORMANCE DETAILS BELOW

501
BART to Silicon Valley – Phase 2 (Berryessa to Santa Clara)
B/C: **8** Targets Score: **8.0**



BENEFIT - COST ASSESSMENT

[monetary benefits and costs are in millions of 2017 dollars]

ANNUAL BENEFIT	ANNUAL COST	CAPITAL COST	NET O+M COST
$472M	$62M	$3,900M	$206M

	TRAVEL TIME + COST SAVINGS		AIR POLLUTION			HEALTH + SAFETY		
Annual Benefit	Travel Time + Cost	Vehicle Ownership	GHG	PM	Other	Collisions	Physical Activity	Noise
$472.0M	$390.7M	$2.9M	$2.0M	$1.9M	$0.0M	$18.2M	$55.9M	$0.3M

TARGETS ASSESSMENT

	Climate Protection	Adequate Housing	Healthy + Safe Communities	Open Space + Agricultural Preservation	Equitable Access			Economic Vitality			Transportation System Effectiveness		
TOTAL TARGETS SCORE	1 Climate Protection	2 Adequate Housing	3 Healthy + Safe Communities	4 Open Space + Agricultural Preservation	5 Housing + Transportation Costs	6 Affordable Housing	7 Displacement Risk	8 Access to Jobs	9 Jobs Creation	10 Goods Movement	11 Non-Auto Mode Share	12 Road Maintenance	13 Transit Maintenance
8.0	STRONG SUPPORT	MODERATE SUPPORT	STRONG SUPPORT	STRONG SUPPORT	STRONG SUPPORT	MODERATE SUPPORT	MODERATE ADVERSE	STRONG SUPPORT	STRONG SUPPORT	MODERATE SUPPORT	STRONG SUPPORT	MINIMAL IMPACT	MINIMAL IMPACT

CONFIDENCE ASSESSMENT

Travel Model Accuracy	Framework Completeness	Timeframe Inclusiveness
✓	✓	▲

The project is likely to be complete toward the end of the Plan, reducing the total benefits potentially accrued during the Plan period.

EQUITY ASSESSMENT

Equity Targets Score	Serves Community of Concern
4.0	Yes

For a map of all projects and their relationship to Communities of Concern, please refer to the Equity Map

Plan BayArea 2040

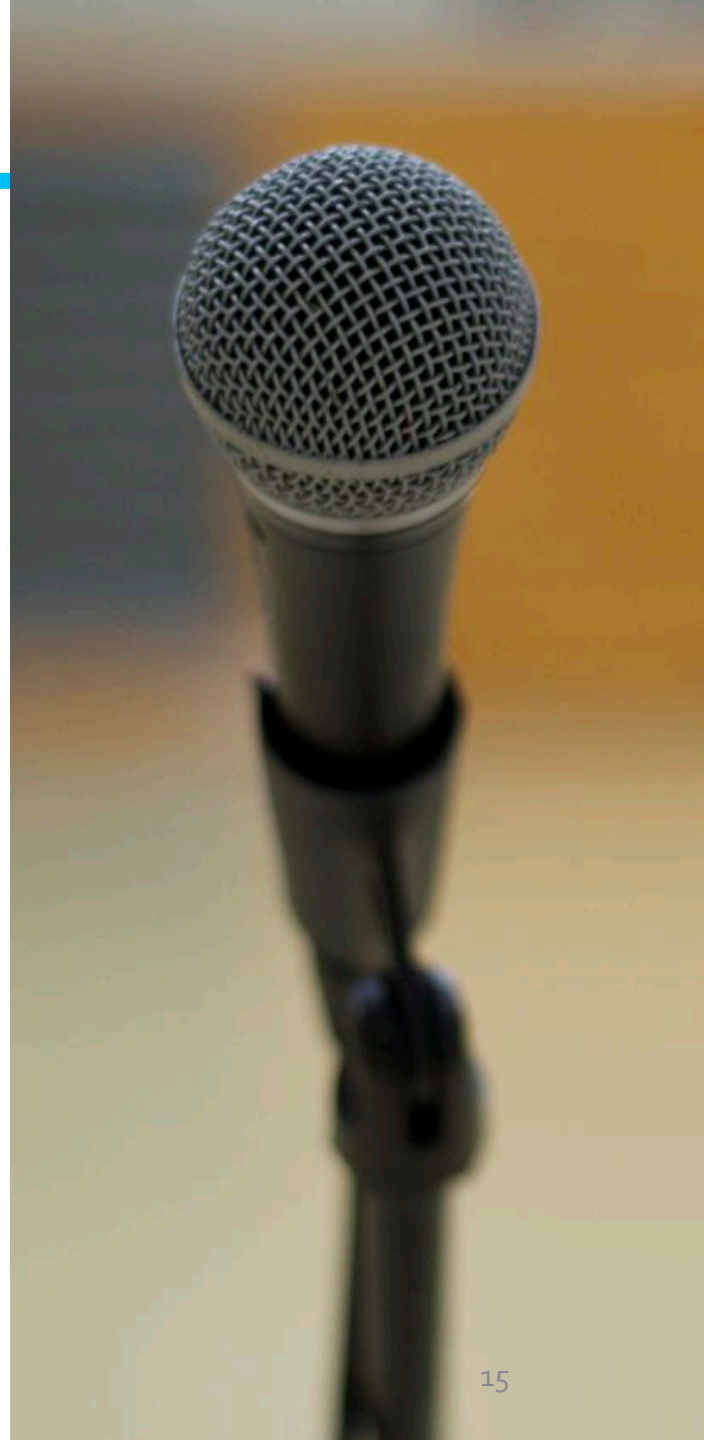
Making a Compelling Case

Process:

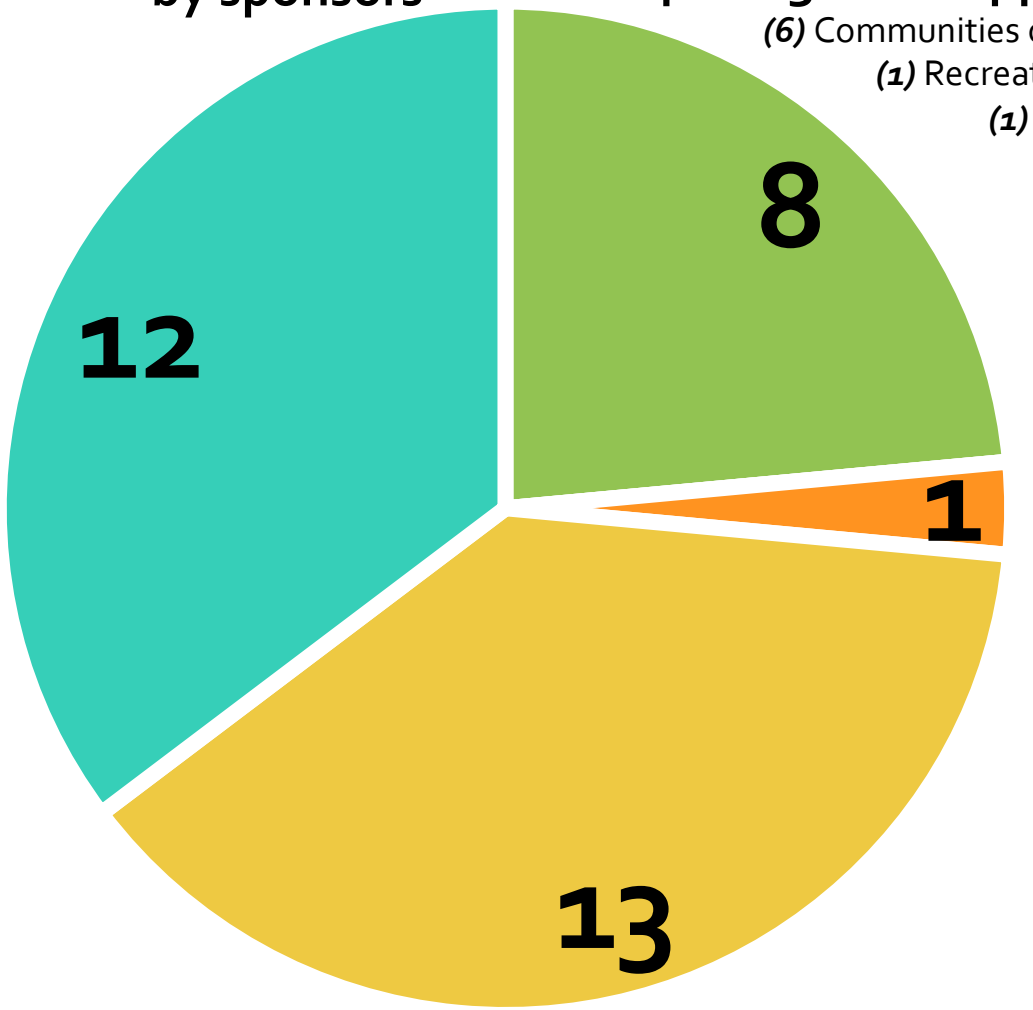
- Commission **approves thresholds** for high- and low-performers, as well as **eligible criteria** for a case
- Project sponsor must **submit compelling case letter** under adopted criteria
- Staff reviews cases and **makes recommendations**
- Commission reviews staff recommendations and **makes ultimate decision** on how to proceed

Eligible Cases:

- **Based on travel model limitations** (low B/C projects only):
  Must demonstrate that project would exceed B/C ratio of one without limitation(s) in place
- **Based on federal requirements** (all projects):
  Air quality conformity and Title VI



Plan Bay Area (34 low-performing projects)



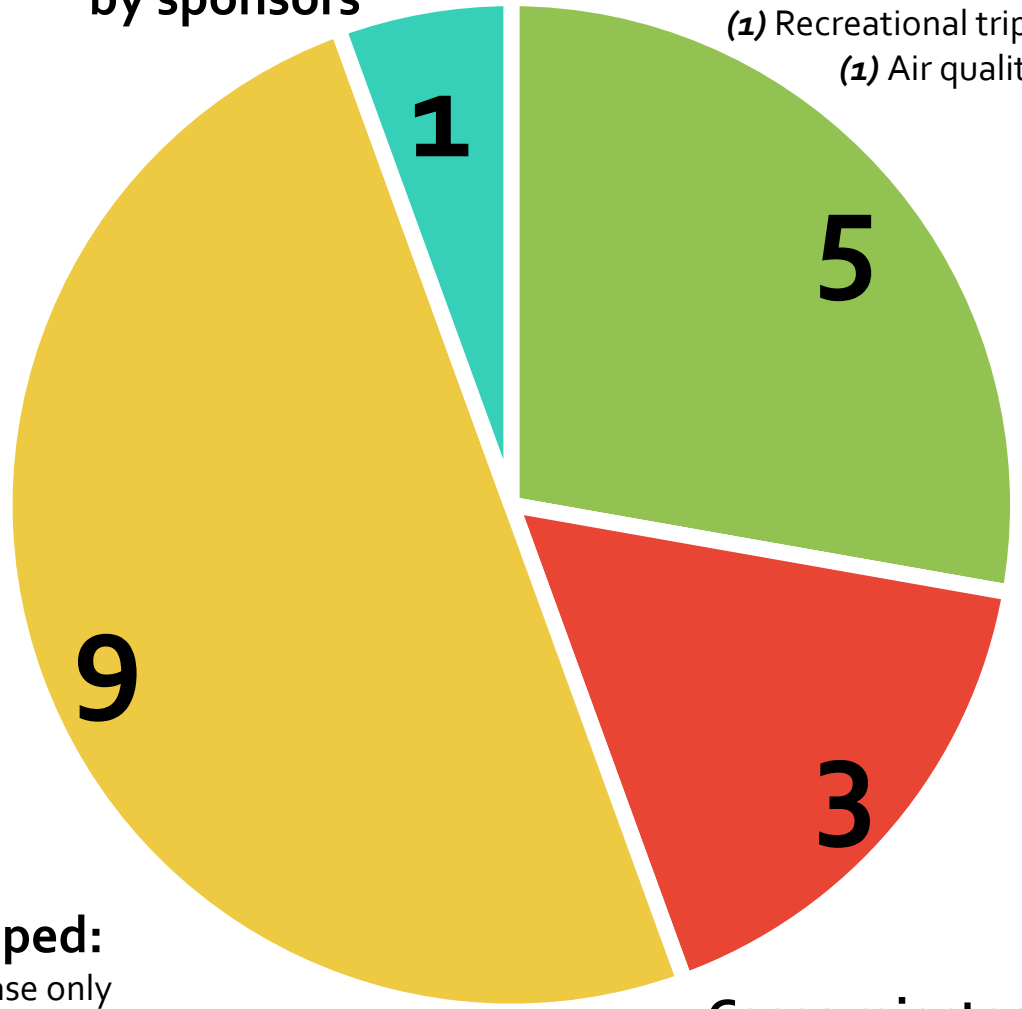
Projects withdrawn by sponsors

Compelling cases approved:
(6) Communities of Concern
(1) Recreational trips
(1) Air quality

Case slated for rejection; "settled out of court"

Projects re-scoped:
(7) Environmental phase only
(5) Sponsor agreed to fully fund project locally
(1) Down-scoped to achieve B/C ratio greater than 1

Plan Bay Area 2040 (18 low-performing projects)



Project withdrawn by sponsors

Compelling cases approved:
(3) Communities of Concern
(1) Recreational trips
(1) Air quality

Projects re-scoped:
(5) Environmental phase only
(2) Sponsor agreed to fully fund downscoped project locally
(2) Reduced project costs to achieve B/C ratio greater than 1

Cases rejected by Commission

Adding state of good repair to the mix for the first time required significant research and development – integrating asset condition into a travel demand model. But it's critical in a region with only 9% of funding going to expansion.

For links to peer-reviewed methodologies: http://data.mtc.ca.gov/performance/reference/; published papers in TRR and Journal of Public Transportation

Image Source: https://www.flickr.com/photos/sling_flickr/2902727677

In addition to calculating benefit-cost ratios and target scores for state of good repair, we were also able to quantify benefits from maintenance for system users for the first time.

- Achieving state of good repair on state highways will save motorists **$3.5 billion** per year in vehicle maintenance costs, while maintaining local streets will save **$2.3 billion** per year.
- Between **270,000** and **320,000** transit boardings would be lost if we don't invest in transit maintenance – primarily choice riders.
- All expansion projects proposed for the region combined generate just **$5.5 billion** in annual benefits – while state of good repair across all modes generates at least **$6.8 billion** in annual benefits at a substantially lower annualized cost.

Image Source: https://www.flickr.com/photos/albategnius/8669103583

Plan BayArea 2040

Mores, not S'mores

More inclusive

More challenging

More expensive and time-consuming

More integrated with regional goals

Image Source: https://www.flickr.com/photos/e-jays/14689226510/

Numeric targets associated with these measures are extremely ambitious.

The targets aim to mitigate all growth in displacement risk, prevent any development outside existing growth boundaries, bring all infrastructure into good condition, double the share of affordable housing, etc.

Image Source: https://www.flickr.com/photos/wcouch/8558312997

Building a bigger tent takes a team.

- Broader stakeholder participation
- Incorporate other regional agencies' work
- Specialized engagement for disadvantaged communities and local transportation agencies
- Working groups to sharpen target definitions

What have we learned from two cycles of extensive project prioritization?

1. **It's worth it in the end, despite a significant time commitment.** Project sponsors have generally accepted the approach and have begun to proactively identify projects with potential performance issues. We feel that project performance is one of the most valuable aspects of the long-range planning process.

2. **Adding state of good repair to the mix was essential in a maturing region**. "Fix It First" shouldn't be taken on faith. This effort also highlighted the need for additional innovative methodologies to simulate benefits for other types of non-capacity increasing projects.

Image Source: https://www.flickr.com/photos/thomashawk/7610019164

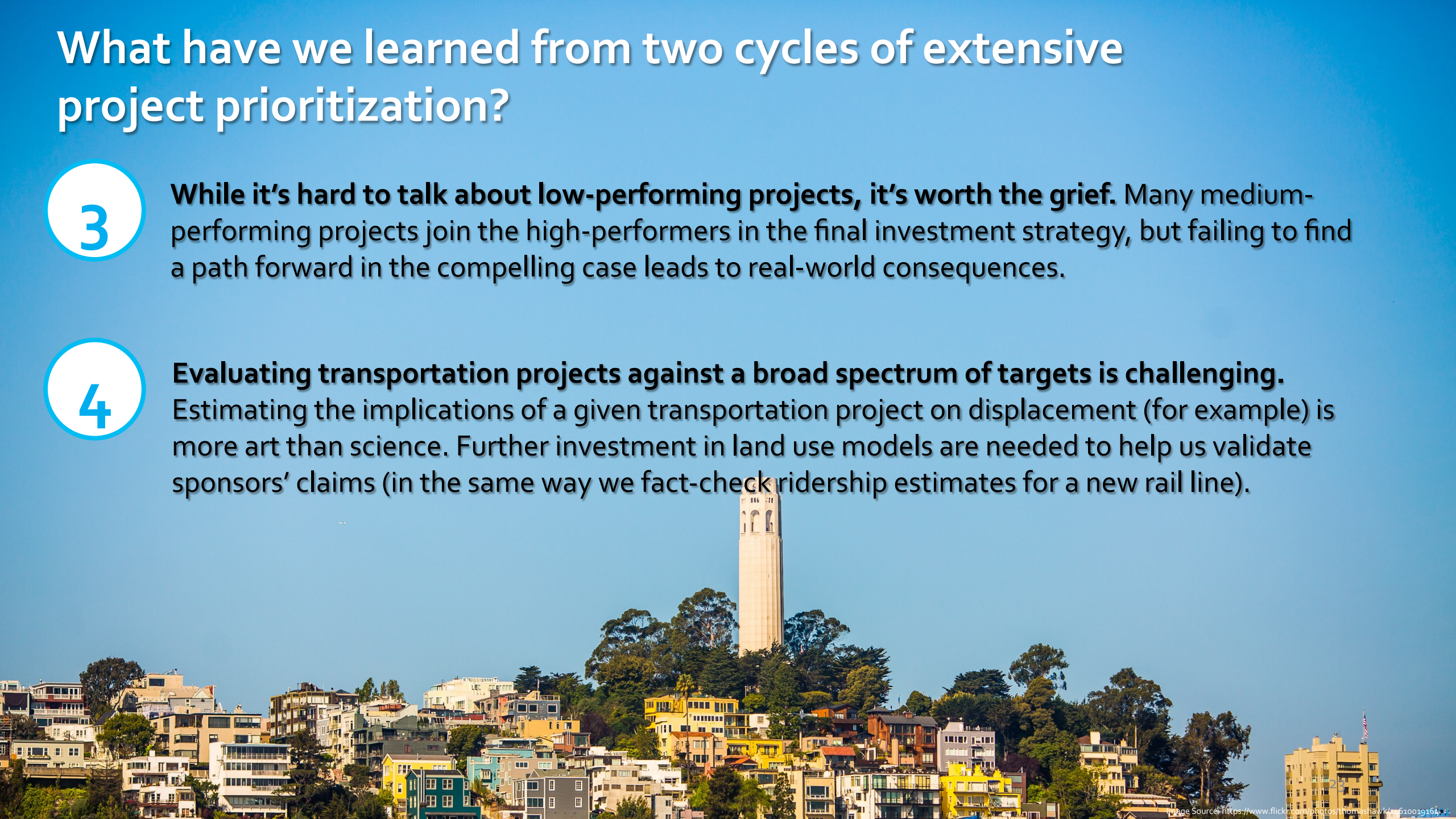
What have we learned from two cycles of extensive project prioritization?

3

While it's hard to talk about low-performing projects, it's worth the grief. Many medium-performing projects join the high-performers in the final investment strategy, but failing to find a path forward in the compelling case leads to real-world consequences.

4

Evaluating transportation projects against a broad spectrum of targets is challenging. Estimating the implications of a given transportation project on displacement (for example) is more art than science. Further investment in land use models are needed to help us validate sponsors' claims (in the same way we fact-check ridership estimates for a new rail line).



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Discussion

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Image Source: https://www.flickr.com/photos/e-jays/14689226510/

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QUESTIONS & COMMENTS
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