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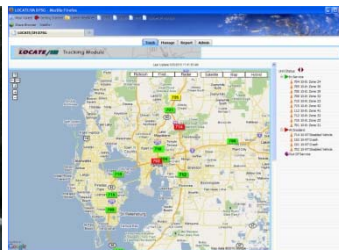
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# Transportation Operations Performance Measurement & Management

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ITS Heartland

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# Introduction

- Overview of TSM&O Performance Management Programs
- Draws on information and experience from:
  - Direct, project-level experience throughout the USA and in England, Mexico, Colombia and Qatar
  - Literature review of best practices and lessons learned from both the private and public sectors
  - Recent interviews with 20 DOTs and MPOs in the USA
- Presentation of:
  - Best practices and recommendations for performance mgmt.
  - Sampling of some programs from DOTs and MPOs
  - Lessons learned and opportunities for improvement



# Recommendations and Best Practices for Performance Management Programs



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# Performance Management in Business & Government

- Setting **goals** and objectives for the company, departments, divisions, business processes, managers and employees.
- Measuring company performance (at all levels) and making changes to correct issues and improve the company's overall performance in achieving the established **goals**.
- "The ongoing monitoring and reporting of program accomplishments, particularly progress toward pre-established **goals**" – US Gov't Accountability Office (GAO)
- FHWA defines Transportation Performance Management as "a strategic approach that uses system information to make investment and policy decisions to achieve national performance **goals**".



# Operations Performance Measures in Public & Private Sector Organizations – FHWA Study

- Start with clear Vision, Mission and high level Goals
- Utilize a balanced set of objectives and performance measures (i.e., “balanced scorecard” approach)
- Develop objectives and measures for all levels/tiers within the organization
  - At employee level, very specific and roll up into higher level organizational objectives and measures
- Communicate performance information to all staff regularly
  - Ensures high level of awareness and engrains performance into the culture
  - Helps to minimize the focus on activity and emphasize results.
  - Fosters collaboration and sharing among regions/districts/units
- Ensure objectives have executive level support and champions

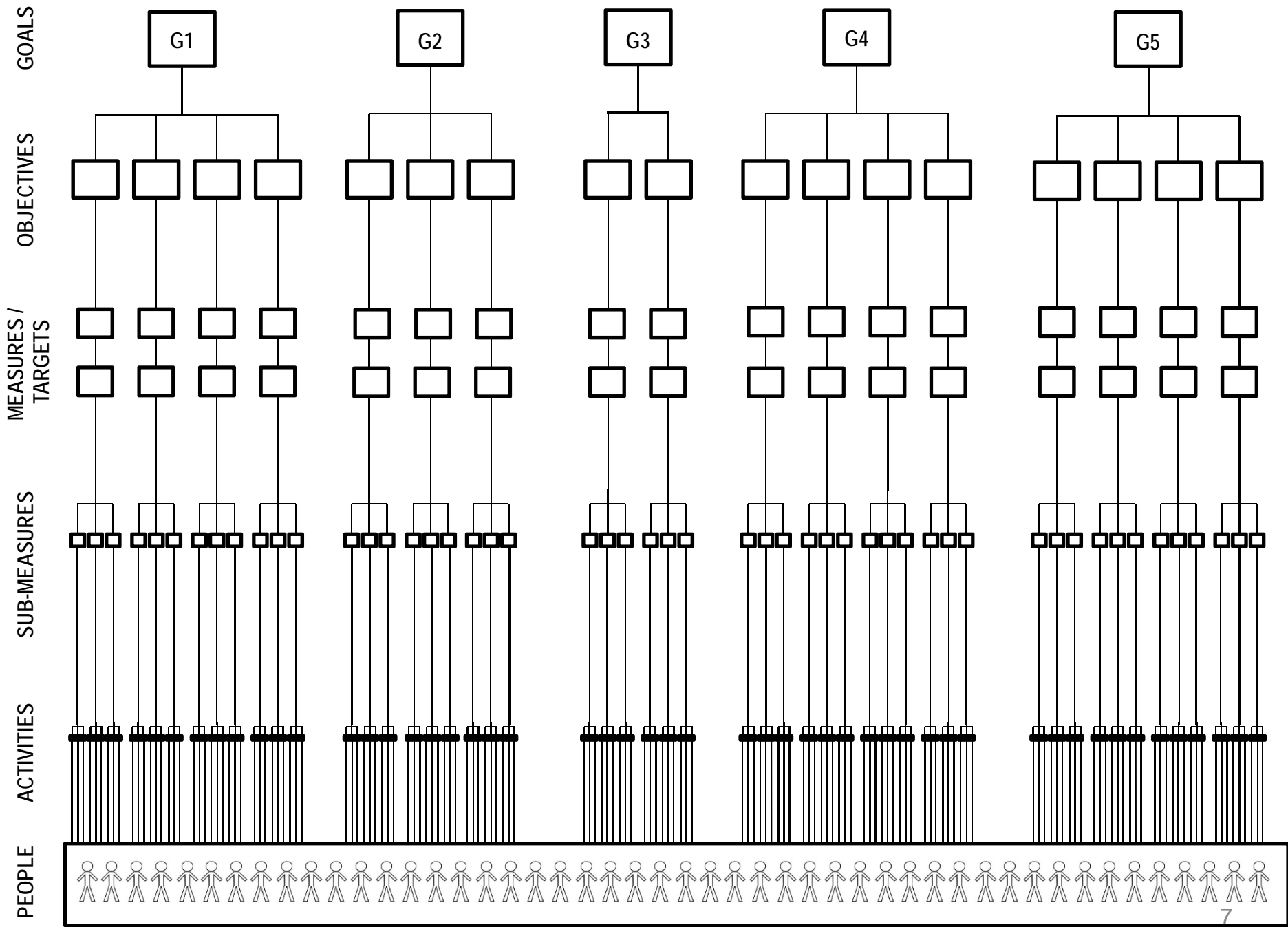


# What are the missions and goals of the transportation community?

## SUMMARY – 5 CATEGORIES

1. Mobility & Fast, Efficient, and Reliable Transportation
2. Safety
3. Economic Prosperity, Competitiveness, Movement of Goods
4. Environmental Stewardship, Sustainability, Air Quality
5. Quality of Life, Convenience, Comfort, Affordable, Informed & Satisfied Customers







*Sample/Hypothetical Situation*

GOAL

Reduce Congestion

OBJECTIVES

Reduce Incident Duration

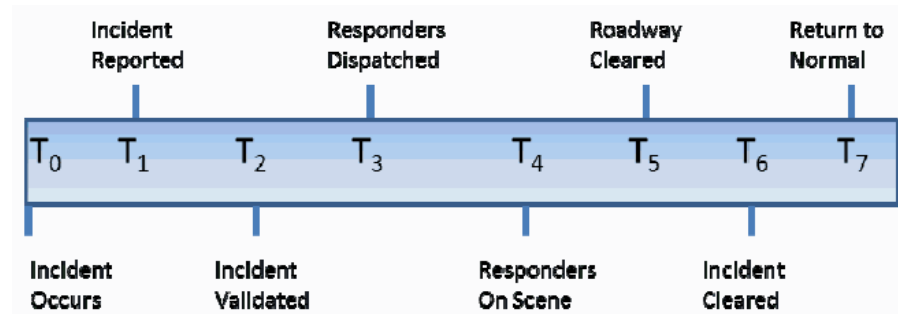
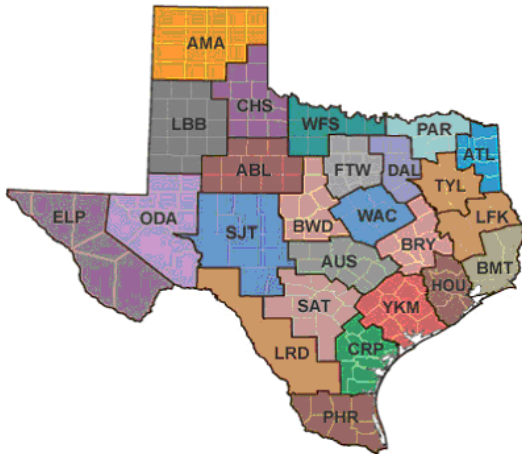
MEASURE

Overall Incident Duration

TARGET

Reduce 5% each year

SUB-MEASURES



PEOPLE ACTIVITIES

- 25 TxDOT Districts x 6 stages of the incident timeline = 150 activities to measure & manage
- Performance goals for hundreds of TxDOT employees directly linked to these sub-measures
- This only covers the highway network. Arterials is another set of activities.





# **Sampling of TSM&O-oriented Performance Measurement and Management Programs at DOTs and MPOs**



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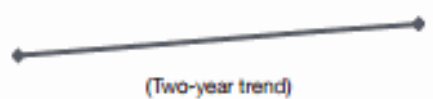

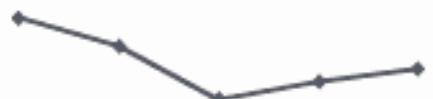



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# Washington State DOT

- “Gray Notebook” – quarterly accountability report
- Started in 2001
- Five Policy Goal areas (with total of 13 key performance measures)
  - Safety
  - Preservation
  - Mobility (Congestion Relief)
  - Environment
  - Stewardship
- Operations-related Performance Measures (all with targets)
  - Safety (fatalities)
  - Delay
  - Incident Clearance Times
  - Train/Ferry On-time Performance



# Washington State DOT ("Gray Notebook")

Policy goal/Performance measure	Previous period	Current period	Goal	Goal met	Five-year trend (unless noted)	Desired trend
<b>Safety</b>						
Rate of <b>traffic fatalities</b> per 100 million vehicle miles traveled (VMT) statewide <i>(Annual measure: calendar years 2011 &amp; 2012)</i>	0.80	0.77	1.00	✓		↓
Rate of <b>recordable incidents</b> for every 100 WSDOT workers <sup>1</sup> <i>(Annual measure: calendar years 2012 &amp; 2013)</i>	5.5	5.7	5.0	—	 (Two-year trend)	↓
<b>Preservation</b>						
Percentage of state <b>highway pavement</b> in fair or better condition by vehicle miles traveled <i>(Annual measure: calendar years 2011 &amp; 2012)</i>	91.9%	91.9%	92.0%	—		↑
Percentage of state <b>bridges</b> in fair or better condition by bridge deck area <i>(Annual measure: fiscal years 2012 &amp; 2013)</i>	91.1%	91.7%	95.0%	—		↑
<b>Mobility (Congestion Relief)</b>						
<b>Highways:</b> Annual (weekday) vehicle <b>hours of delay</b> statewide at <b>maximum throughput speeds</b> <sup>2</sup> <i>(Annual measure: calendar years 2010 &amp; 2012)</i>	31.6 million	30.9 million	N/A	N/A		↓
<b>Highways:</b> Average <b>incident clearance times</b> for all Incident Response program responses <i>(Calendar quarterly measure: Q4 2013 &amp; Q1 2014)</i>	12.8 minutes	12.8 minutes	N/A	N/A		↓
<b>Ferries:</b> Percentage of trips departing on time <sup>3</sup> <i>(Fiscal quarterly measure: year to year Q3 FY2013 &amp; Q3 FY2014)</i>	97.8%	96.9%	95%	✓		↑
<b>Rail:</b> Amtrak Cascades ridership <sup>4</sup> <i>(Calendar quarterly measure: year to year Q1 2013 &amp; Q1 2014)</i>	169,000	163,000	N/A	N/A		↑

# The AZTech™ Regional Partnership (Phoenix)

- Good multi-agency, multi-modal effort focused on the entire metro area's transportation systems
  - FHWA
  - Arizona DOT
  - Maricopa County DOT
  - Arizona Department of Public Safety
  - Maricopa Assoc. of Governments (MPO)
  - Valley Metro
  - METRO Light Rail
  - City of Phoenix
  - 10 other cities in Phoenix metro area



# AZTech™ Performance Dashboard (2013)








Performance trending in favorable direction.



Trend is holding.





Performance is trending in an unfavorable direction.




Policy Goal/ Performance Measure	Previous Reporting Period	Current Reporting Period	Trend	Description
<b>Freeways</b>				
Percent of Miles Congested (out of total of 240 miles measured)	567 miles	612 miles	+7.9%	 Overall the freeways are experiencing more congestion where average vehicle speeds drop below 50 mph
Percent of Time Congested Per Mile (out of total of 240 miles measured)	1.77 minutes	2.03 minutes	+14.8%	 Overall the freeways are experiencing more congestion where average vehicle speeds drop below 50 mph
<b>Arterials</b>				
Bell Road Westbound PM Peak Travel Time	26:05 min	22:23 min	-14.2%	 Bell Road has seen an overall reduction in travel time
McDowell Road Eastbound AM Peak Travel Time	16:59 min	12:44 min	-25.1%	 McDowell Road has seen an overall reduction in travel time
Hayden Road Northbound PM Peak Travel Time	21:34 min	17:48 min	-17.5%	 Hayden Road has seen an overall reduction in travel time

# AZTech™ Performance Dashboard (2013)



## Incident Management—Freeways and Arterials

Number of Vehicular Accidents	103,780	103,637	-0.1%		Slight reduction in the number of crashes per year
Percent of Incidents Cleared in 120 Minutes or Less	10.13%	6.77%	-3.36%		Reduction in the percentage of incidents that are cleared in 120 minutes or less

## Traveler Information

Highway Conditions Reporting System (HCRS) Entries	44,248	36,098	-23%		Reduction in the number of HCRS entries indicates less road restrictions
Phoenix Fire CAD to RADS	30,393	32,199	+6%		Increase in the number of Phoenix Fire CAD data that are being transferred to RADS and 511
Twitter Followers	40,734	68,037	+40.1%		Increase in Twitter followers of agencies providing information to the public through this social media method

## Transit

Transit Schedule Adherence	96.70%	94.87%	-2%		Reduction in schedule adherence for transit vehicles
Number of Transit Boardings	135.38 M	146.82 M	+7.8%		Increase in boarding for Valley Metro transit including light rail and bus

# SANDAG – Annual “State of the Commute”



## HOW is the SYSTEM WORKING?

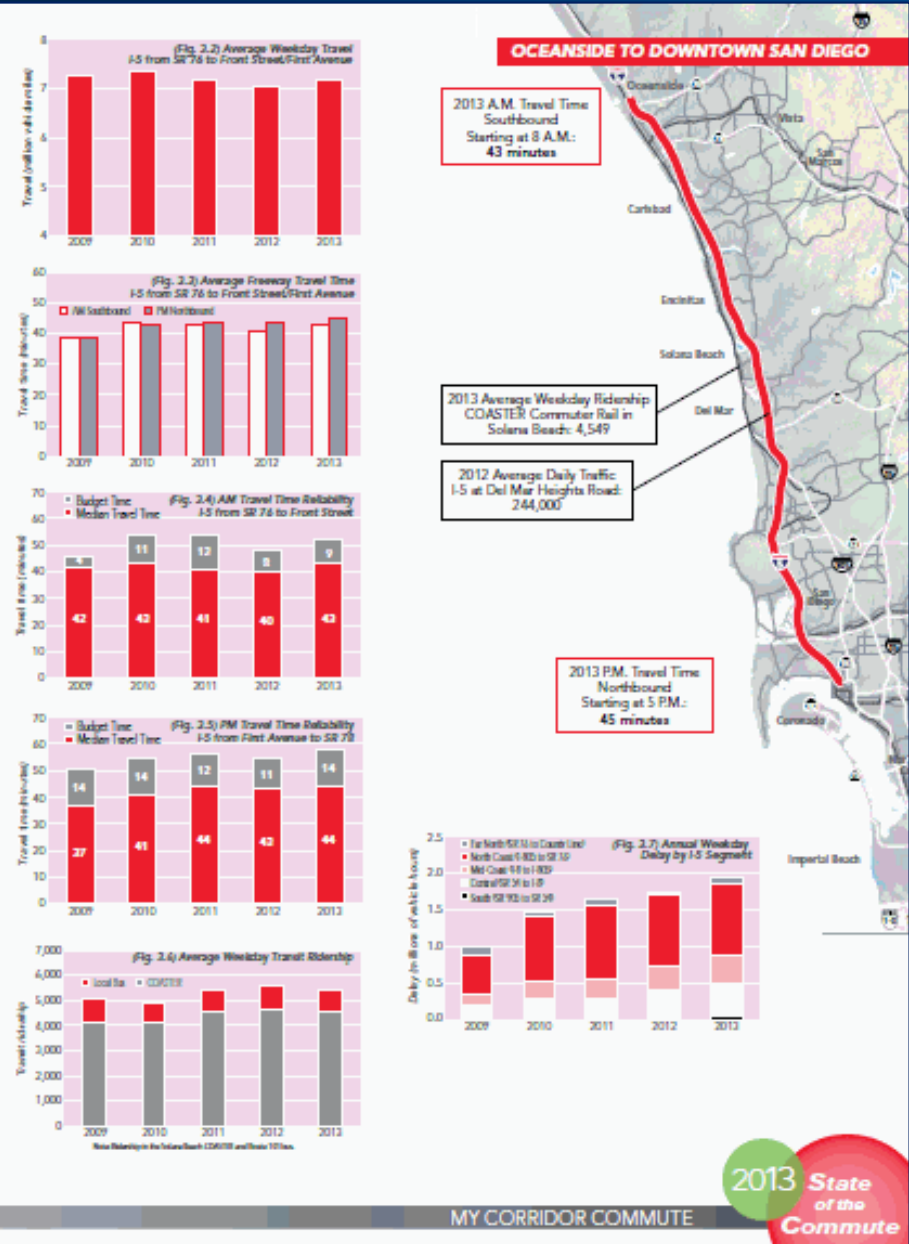
The performance of the surface transportation system is best evaluated by measures such as roadway delay, travel time, and travel time reliability. Transit performance is currently evaluated through measures such as ridership levels and on-time performance. These indicators can be used to assess improvements, identify bottlenecks, and develop strategies and investment plans.



# SANDAG – My Corridor Commute



- 5 year comparison
- Vehicle miles traveled
- Avg Travel times (AM/PM)
- Travel time reliability (AM/PM)
- Annual delay
- ADT



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MY CORRIDOR COMMUTE





# Caltrans

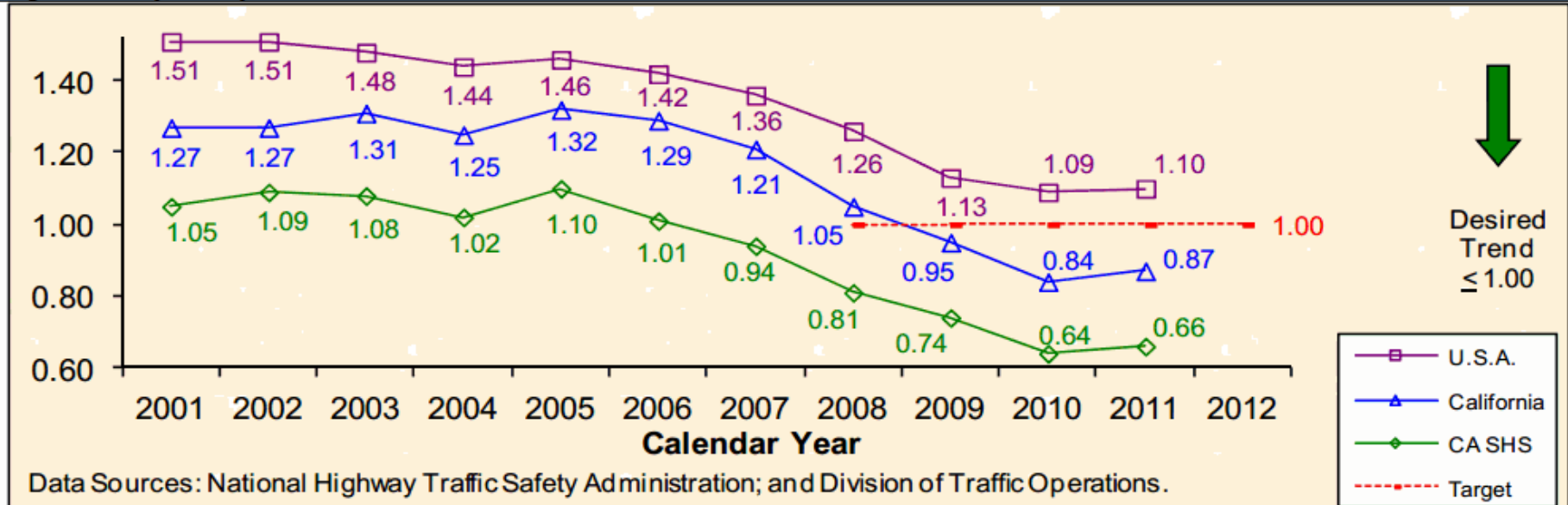
- **Quarterly Performance Reports**
  - 5 Goals (safety, mobility, stewardship, delivery and service)
  - 29 objectives (spread across the 5 goals)
  - Every objective has at least one performance measure
- **Operations-related Objectives**
  1. Fatality rate
  2. Vehicle hours of delay
  3. Transportation system reliability
  4. Intercity rail ridership
  5. Single occupancy vehicle
  6. Satisfaction of external stakeholders



# Caltrans

**Objective 1.1 – By 2008, reduce the fatality rate on the California state highway system (SHS) to 1.00 per 100 million vehicle miles traveled and continuously reduce annually thereafter toward a goal of the lowest rate in the nation.**

## PM 1.1 Traveler Safety – Fatalities per 100 MVMT on the California state highway system (SHS).



# Transport for London



- Multi-modal transportation agency
  - City streets, traffic signals, subway, buses, taxis, light rail, congestion charging program.
- Limited access highways managed by the UK Highways Agency
- A wide range of operations performance measures are used
- The primary performance measure is travel time reliability during the AM peak period
- Multi-modal corridor managers for all major corridors
- Daily performance reviews at 11am after AM peak period
- Goal to improve travel time reliability by 3% per year



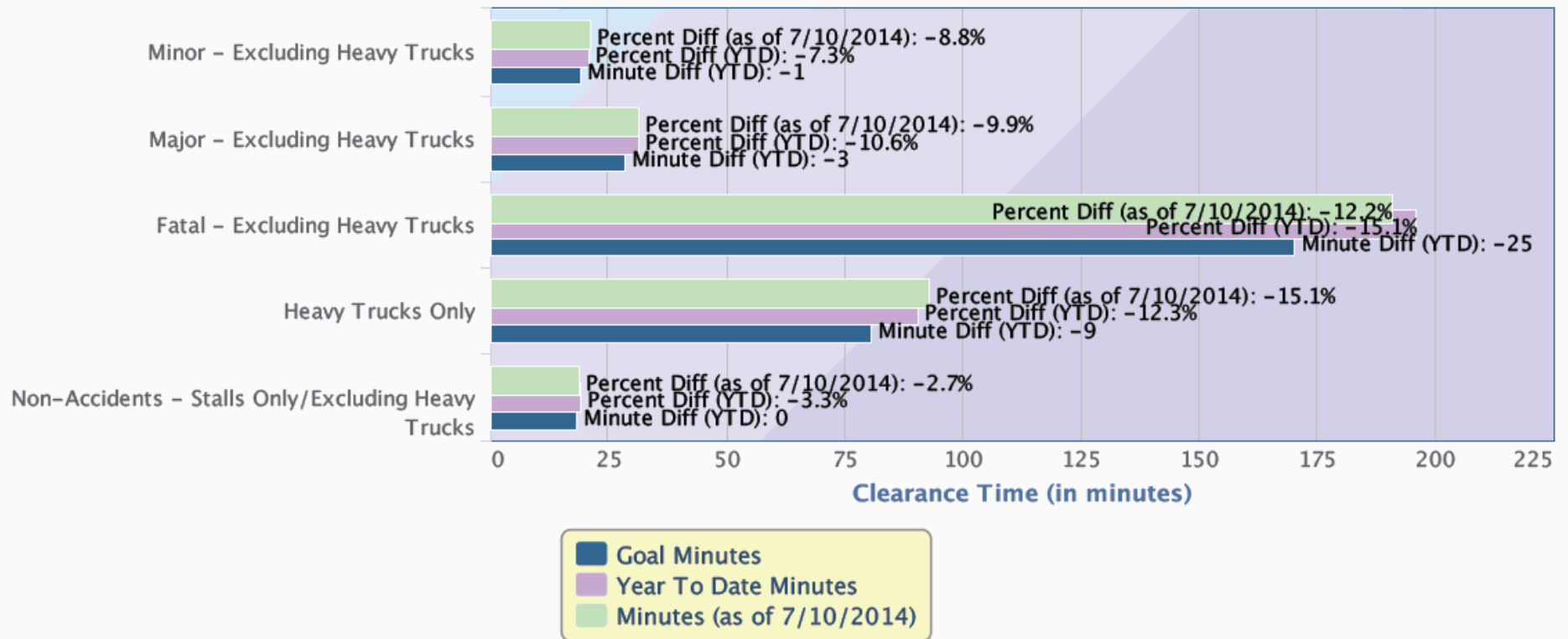
# Houston TranStar

- TIM performance measurement & management
- Incidents on the limited-access roadway network in Houston metro
- Timestamps in the incident database for each step of the incident timeline
- Five incident types/categories
- Goal of reducing overall incident duration by 10% from the previous rolling 3-year average
- Tracked monthly against YTD and the goal
- Monthly TIM meetings / AAR sessions with all members



# Houston TranStar

Incident Clearance Performance Report Card for 2014 (as of 8/7/2014)



Highcharts.com





**Lessons Learned and  
Opportunities for Improvement  
as TSM&O Performance Management Programs  
Continue to Evolve**



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# Lessons Learned, Gaps & Opportunities for Improvement

1. Significantly more output/activity measurement than true outcome/performance measurement
2. Roadway focus is on limited access highways; arterials still get little attention
  - TMC coverage/focus
  - ITS instrumentation
  - Traffic Incident Management teams/focus
  - Performance measures
3. Many agencies utilize no performance measures, particularly cities
4. Agencies with performance measures have very few, and they are often not balanced, or aligned with stated mission/goals
5. Many agencies have poor vertical integration from goals down to specific activities and people



# Lessons Learned, Gaps & Opportunities for Improvement

6. Modally-focused agencies = lack of multimodal measurement and management
7. Need to move from culture of compliance to culture of performance and innovation
8. Benchmarking performance against peer-level agencies/districts/regions fosters collaboration, sharing and improvements
9. Environmental goals are extremely common, but environmental performance measures are rare





## Lessons Learned, Gaps & Opportunities for Improvement

10. Many DOTs have strong, autonomous Districts and very little centralized/statewide guidance or direction (there is a disconnect between statewide direction/reporting and District-level awareness and activity)
11. “We are trained professionals. We are doing our best and we know intuitively that we are making a difference”  
→ *Imagine if FedEx ran their business that way.*
12. Opportunity to utilize performance measures to demonstrate the significant need for resources at transportation agencies if we want to achieve our goals
13. “You don’t need to do more work; you just need to do your work differently” – Captain Jeff King (retired), AZ DPS



## Questions/Collaboration/Follow-up:

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# Characteristics of a Good Performance Measure

1. Align with high level policy and goals
2. Measure both outcomes and outputs, but focus on outcomes (very important distinction)
3. Measurable, with available data and tools
4. Acceptable and meaningful to the stakeholder community
5. Utilize accurate information of known quality & origin
6. Clearly defined owners for collecting the data and calculating the performance measure
7. Clearly defined owners for the performance of the transportation system, not just measuring it



# Characteristics of a Good Performance Measure

8. Affordable, based on readily available data that is available at a reasonable cost
9. Appropriate level of detail and level of aggregation
10. Is a core/global measure or a supporting/sub-measure, with sub-measures rolling up to MPO or statewide level
11. Have a target that is challenging but achievable  
(some measures have desired trends, not targets)
12. Understandable to all stakeholders and the public



# Definitions

- **Buffer Index:** Measure of the reliability of travel service. Calculated as the ratio between the difference of the 95th percentile travel time and the average travel time divided by the average travel time.
- **Planning Time Index:** The ratio of the 95<sup>th</sup> percentile travel time compared to the time required to make the same trip at free-flow speeds. A value of 1.8, for example, indicates a 20-minute free-flow trip requires 36 minutes during the worst peak period.
- **Travel Time Index:** The ratio of the travel time during the peak period to the time required to make the same trip at free-flow speeds. A value of 1.3, for example, indicates a 20-minute free-flow trip requires 26 minutes during the peak period.

Source: TTI



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