Transportation Performance Management Webinar Series

Webinar 27

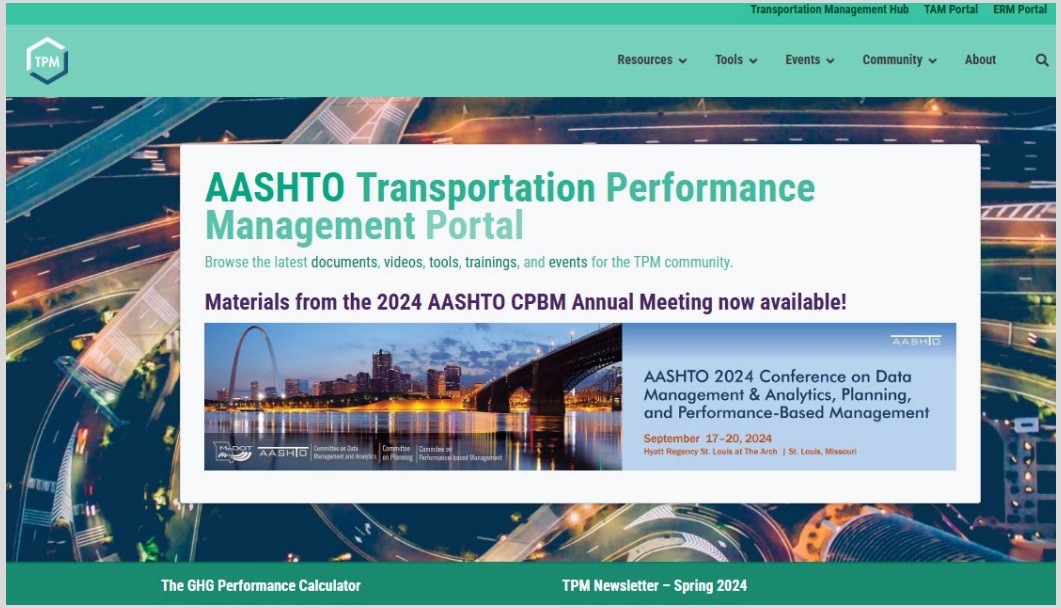
Post-Implementation Project Outcomes

Sponsored by FHWA and AASHTO

July 16, 2025

Transportation Performance Management Webinar Series

- Today is the 27th webinar in our bimonthly series.
- Webinars are held every two months, on topics such as communications, data, and other performance management topics.
- We welcome ideas for future webinar topics and presentations
- Use the webinar chat panel during the webinar
  - Submit questions for today's presenters
  - Submit ideas for future webinar topics



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https://www.tpm-portal.com

Webinar Objectives

- Share information about NCHRP Project 08-170: Closing the Loop: Post-Implementation Evaluation of Transportation Projects
- Share best practices and strategies for post-project implementation review
- Examine lessons learned from agencies' post-implementation experiences

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U.S. Department of Transportation Federal Highway Administration

AASHTO The Voice of Transportation

Webinar Agenda

2:00 **Welcome, Overview, and Agenda**
Christos Xenophontos, CPBM Chair and Rhode Island Department of Transportation

2:10 ***Beyond the Build: Evaluating Transportation Project Outcomes***
Kevin Ford, High Street Consulting

2:25 ***Assessing Performance of Completed Smart Scale Projects***
Beverly Quinlan, Virginia Office of Intermodal Planning and Investment

2:25 ***MnDOT's Experience with Post-Implementation Project Evaluation and Prospects for Future Applications***
Michael Iacono, Minnesota Department of Transportation

2:55 **Panelist Discussion and Wrap Up**
Hyun-A Park, Spy Pond Partners

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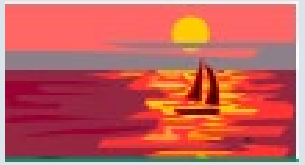
Beyond the Build: Evaluating Transportation Project Outcomes

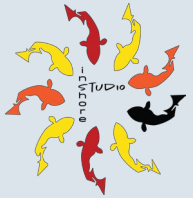
TPM Webinar 27: Evaluating Post-Project Outcomes

Kevin Ford, Ph.D., PE

On behalf of the broader research team:



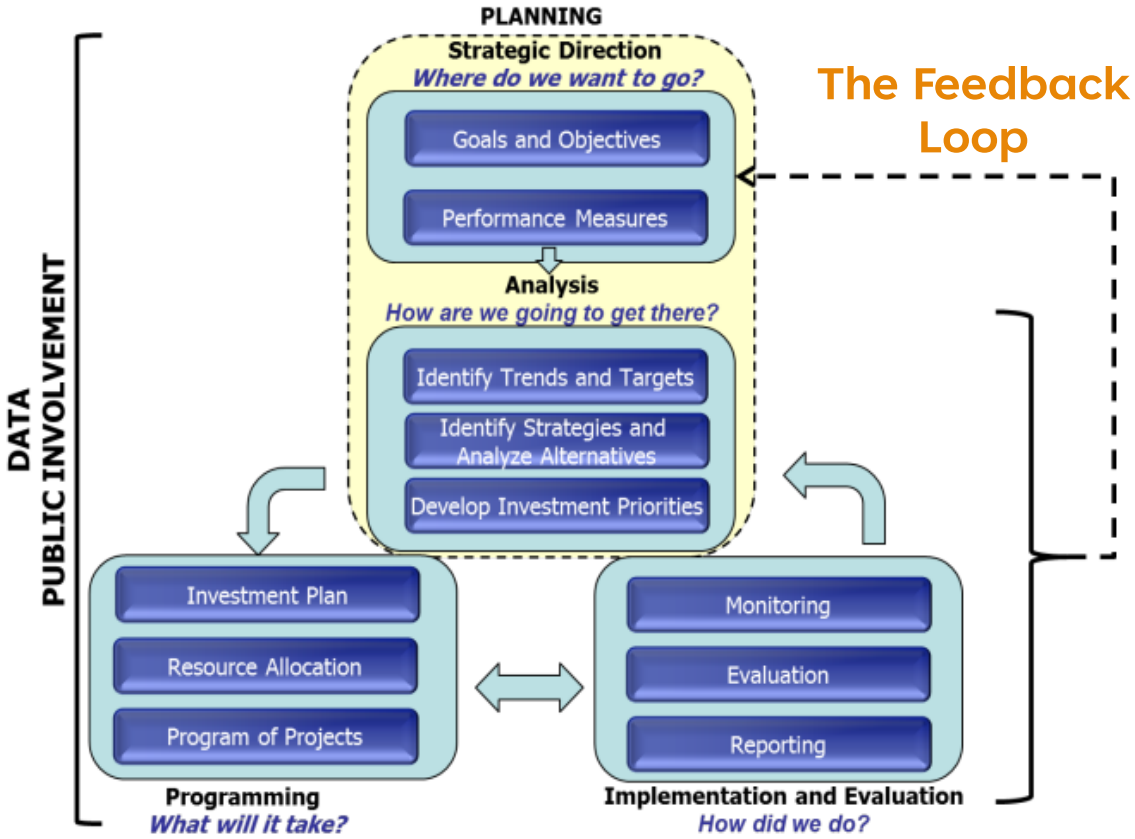
Redd Engineering



Inshore Studio

NCHRP Project 08-170

Closing the Loop: Post-Implementation Evaluation (PIE) of Transportation Projects



The Feedback Loop as depicted in the 2013 FHWA PBPP Guidebook

Research Objective

- Develop a framework to Close the **Loop** and empower agencies to:

✓ make better data-informed decisions throughout the project development cycle

✓ communicate benefits to the public and decision-makers about projects

*PIE Guidebook anticipated Spring 2026

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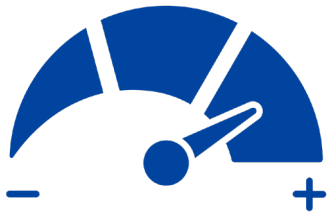
Key Questions PIE Can Help Answer

Externally

What has been our return on investment?

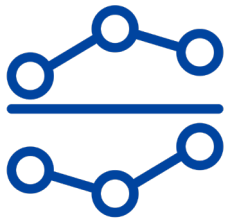
Program Level

Did the investment strategy buy the expected performance outcomes?



Corridor Level

Are improved locations outperforming similar sites without an improvement?



Project Level

Which project types have proven the most effective in addressing performance needs?

Internally

How accurate are our forecasting models?

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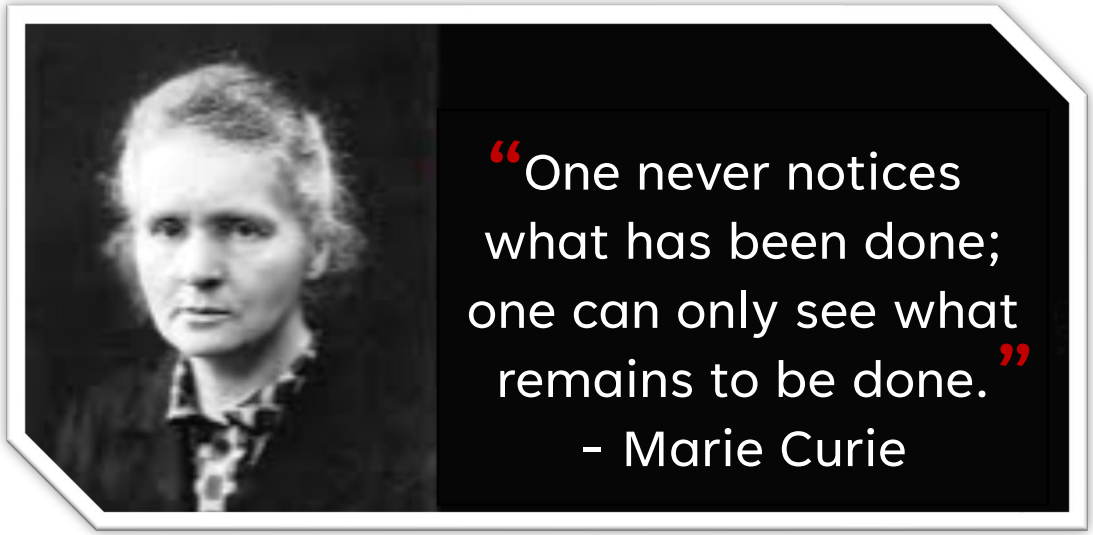
PIE Challenges



Organizational Challenges

- Resource and staffing limitations
- Fear of exposing poor results
- Communicating counterfactuals

It's all challenging but ...

Technical Challenges

- Noise dampening
- Data variability
- Defining broader impacts

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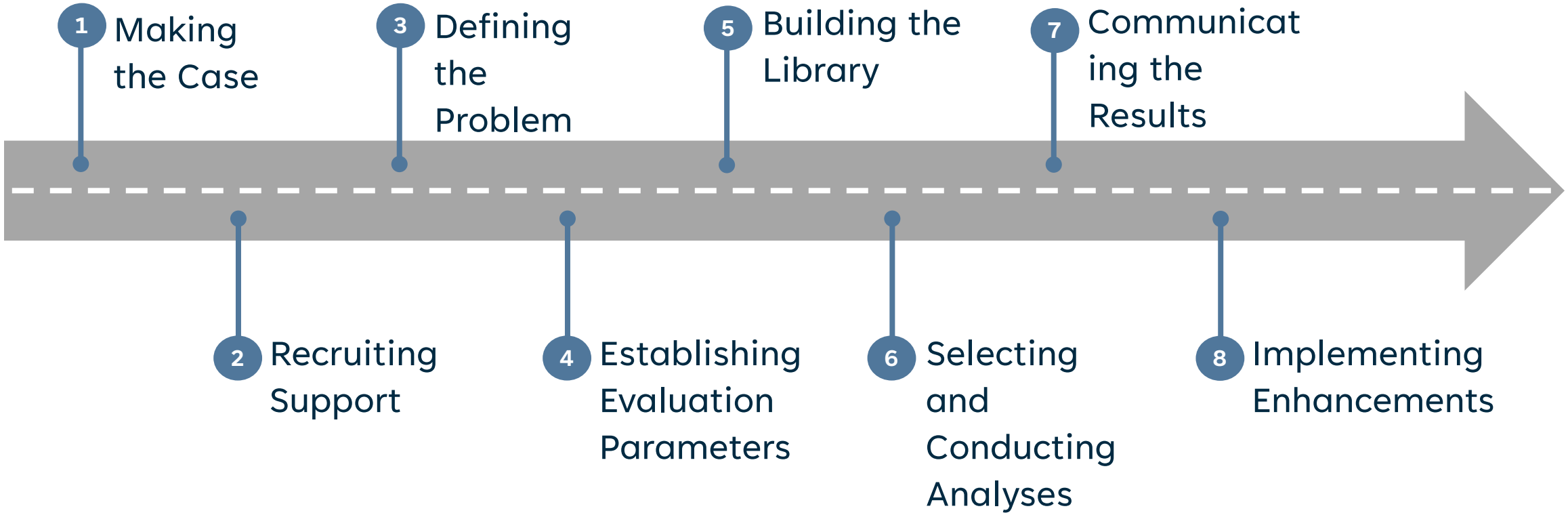
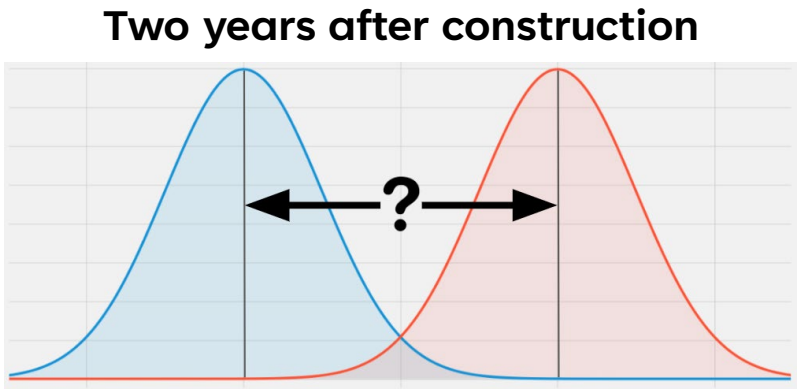
One PIE Framework for Moving Forward



General Approaches

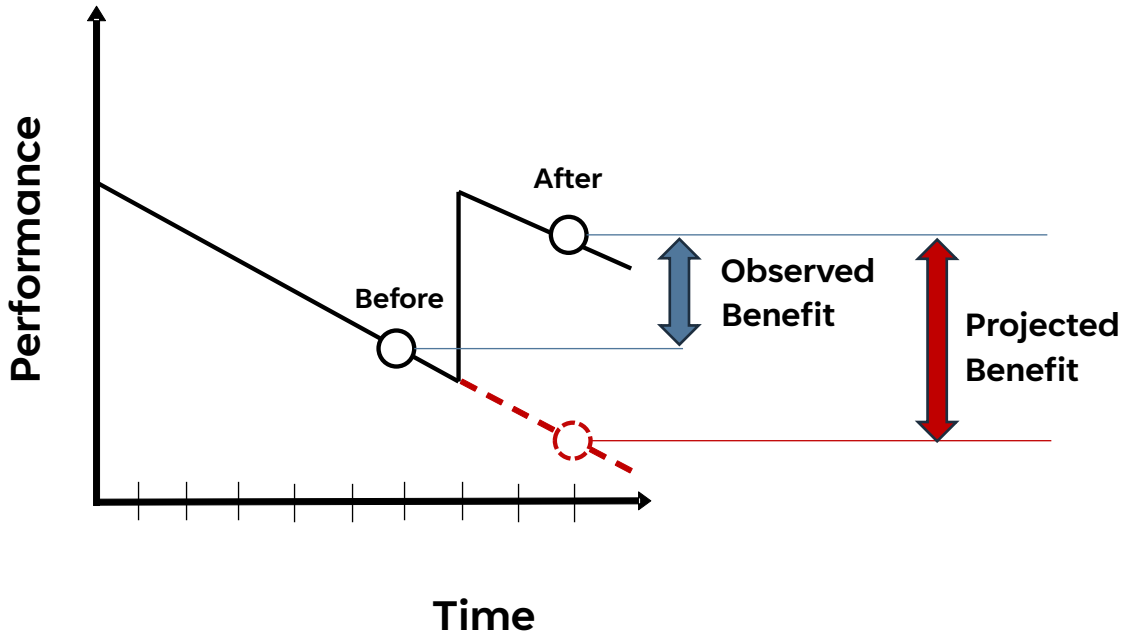
With vs. Without

Cross-Sectional: Same Time, Different Place



Before vs. After

Longitudinal: Different Time, Same Place

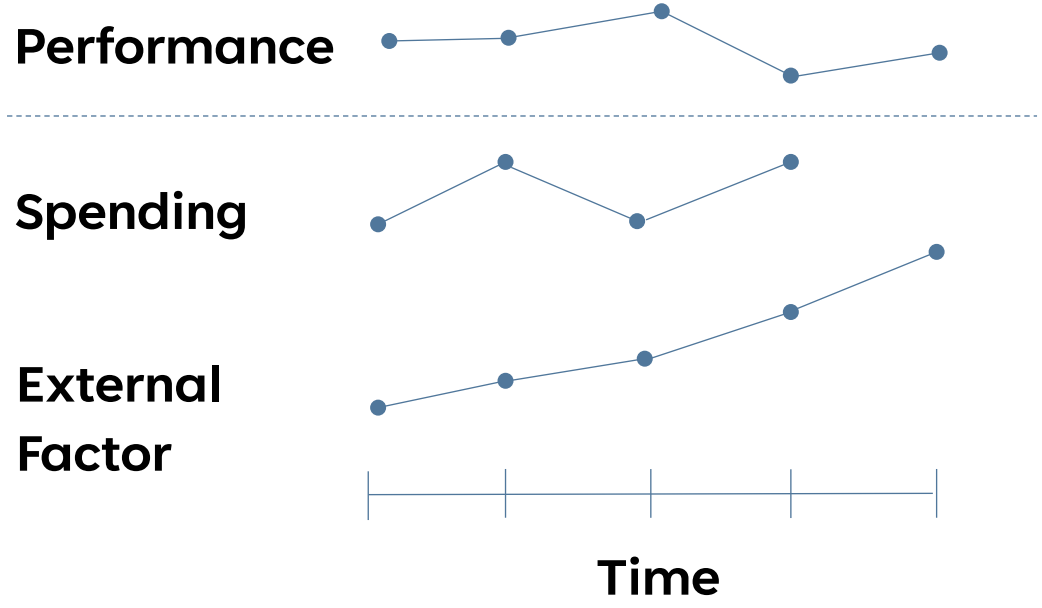


Example Program Level Framework

How it Works

What is it?

Use of regression to explain observed changes in performance relative to historical changes in spending and external factors.

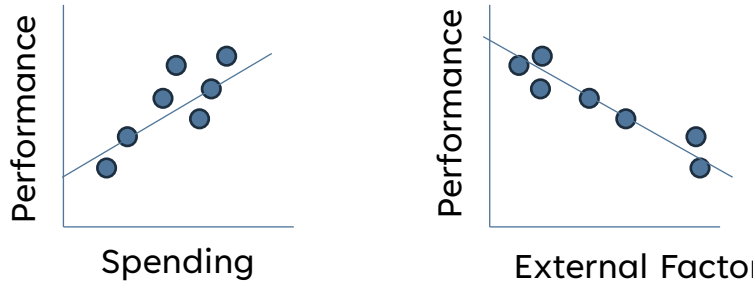


$$Performance_{yr} = c_1 * Spending_{yr-1} + c_2 * External\ Factor_{yr}$$

Change in performance per $

Lag in observed benefits

Regression Can Help Practitioners Understand the Correlation Between Observed Outcomes and Historical Explanatory Factors



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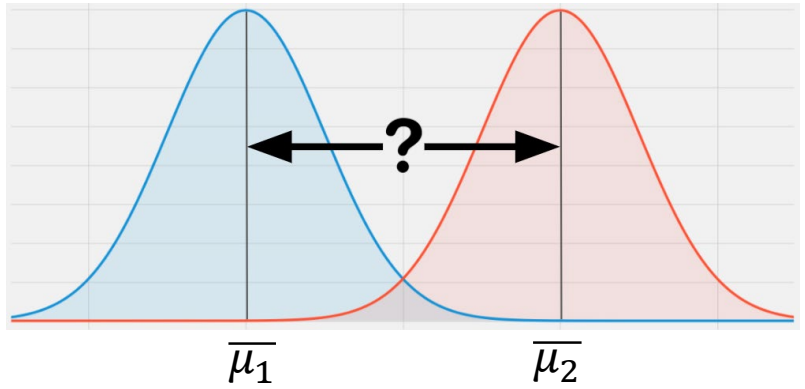
Example Corridor Level Framework

How it Works

What is it?

Comparison of performance outcomes between peer sites with and without a historical intervention using a statistical T-test.

Comparing Performance Differences within a Peer Group



Design Element Not Present | **Design Element Present**

Formula

$$t = \frac{\mu_1 - \mu_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

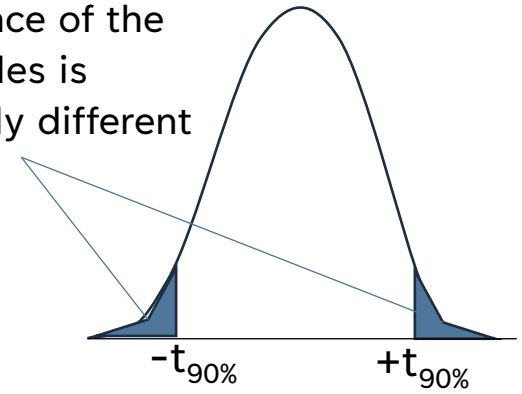
Where,

$\boldsymbol{\mu}$ sample mean

s sample standard deviation

n sample size

If $t > |t_{90\%}|$ then can be 90% confident the performance of the two samples is statistically different



T statistic

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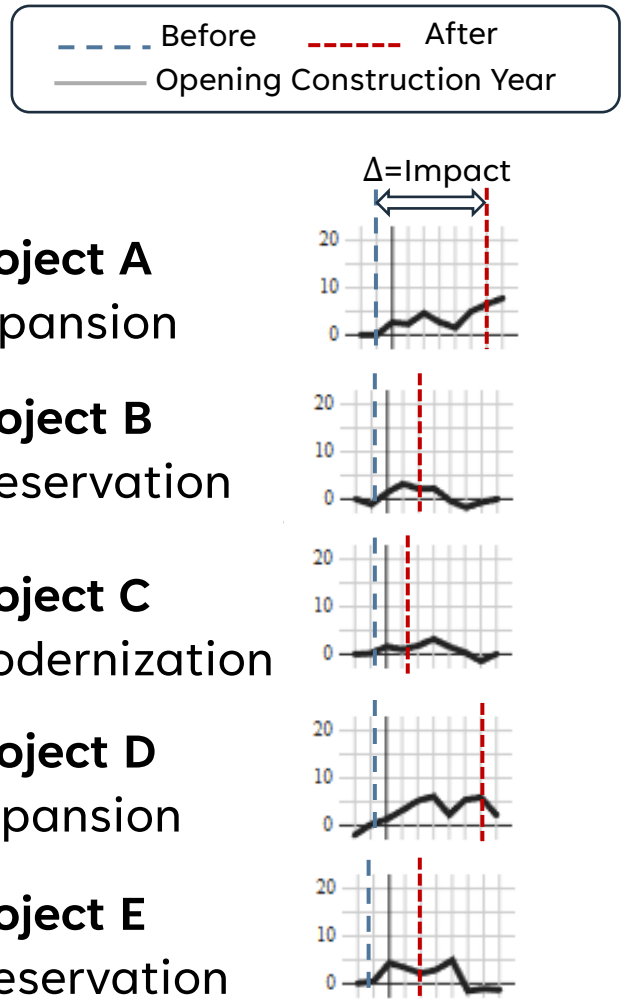
Example Project Level Framework

How it Works



What is it?

Project level analysis of before and after conditions from which practitioners can examine performance trends over time across similar project types, identifying sustained impacts and recurring patterns.

Approach Steps:

Step 1: Screen project types for which a benefit or disbenefit could reasonably be expected for each PIE Metric.

Step 2: Identify project influence areas and spatially join to performance and any other explanatory data layers.

Step 3: Apportion benefits between spatially and/or temporally overlapping projects for before and after years.

Step 4: Calculate change in before and after performance then select a Use Case (e.g., Prioritization and Forecasting).

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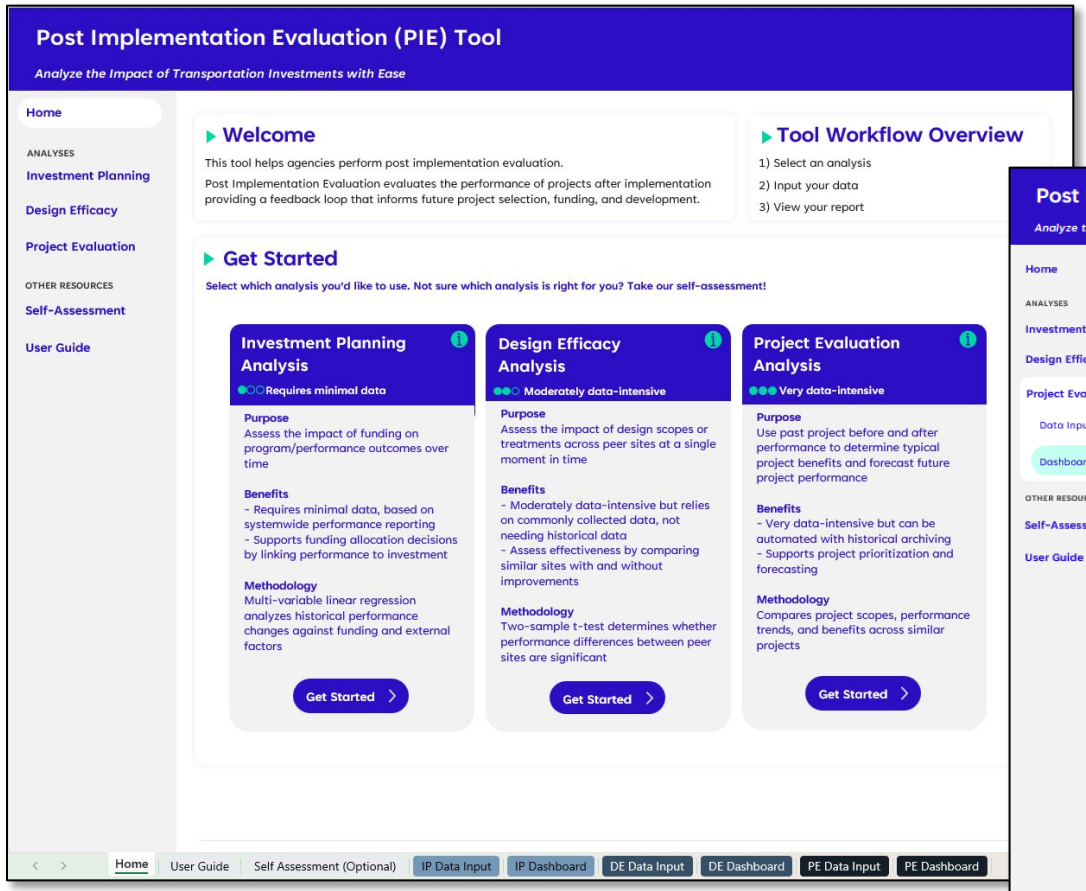
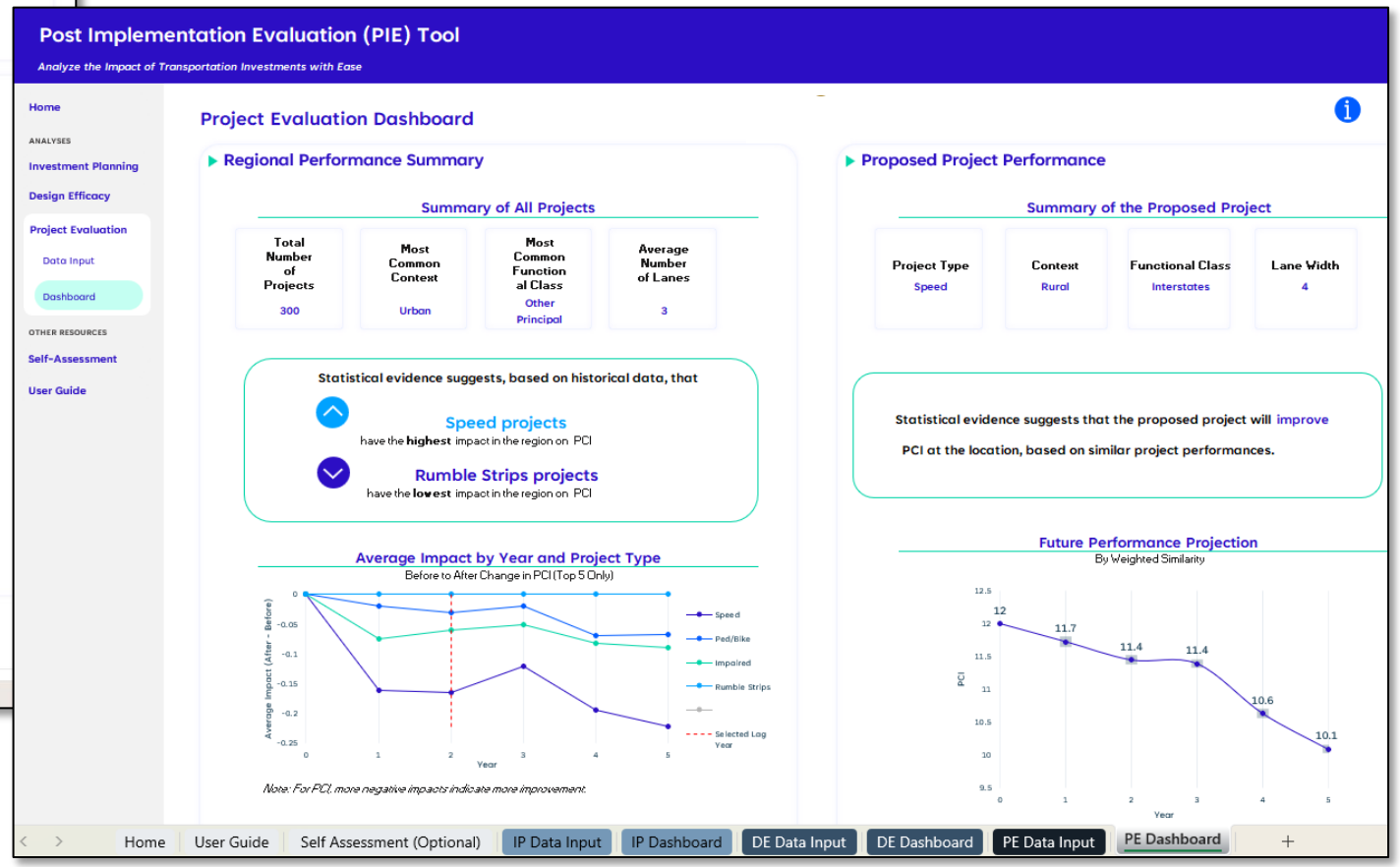
08-170 Research Tool

An accompanying [macro-free] spreadsheet-based tool that demonstrates the three methodologies with editable, sample data will be delivered with the Guidebook

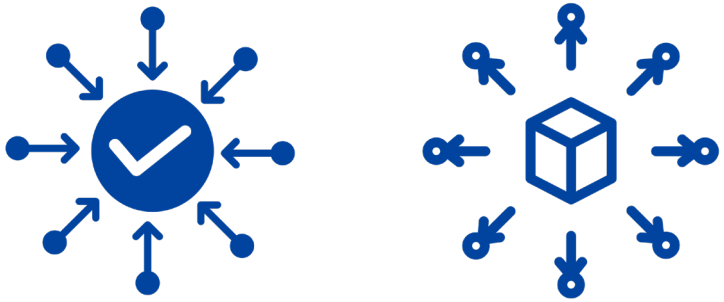




A self-assessment questionnaire is further included to help gauge readiness for PIE

Organizational Strategies

Centralized vs. Decentralized



An Example Centralized Structure

Divisional Representation	Possible Role
Transportation Performance Management (TPM)	**Lead responsible for coordinating** analyses with technical divisions, monitoring outcomes, and disseminating findings across the enterprise
Planning & Programming	**Defines goal-aligned metrics** to evaluate and integrate findings into risk-based investment decisions.
Technical Divisions [e.g., Bridge, Pavement, Safety, Congestion]	**Shares metric data, provide scope details, and helps analyze** outcomes in the proper context.
Finance	**Shares cost details**, as well as any past audit findings.
IT & Data Management	**Maintains historical PIE datasets and dashboards** for communicating results.
Legislative Affairs and Public Involvement	**Crafts strategic messaging** for external stakeholders and the public to take credit for past successes and demonstrate stewardship by communicating what was bought by investments.

Thank you for attending

Any Questions / Comments?

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COMMONWEALTH of VIRGINIA

Office of the

SECRETARY of TRANSPORTATION

ASSESSING PERFORMANCE OF COMPLETED SMART SCALE PROJECTS

Beverly Quinlan
Office of Intermodal Planning and Investment
July 16, 2025

Presentation Overview

TRANSPORTATION PERFORMANCE MANAGEMENT

Background

- SMART SCALE Overview
- Transportation Investment Cycle
- Continuous Process Improvement
- SMART SCALE by Round

Before/After Analysis

- Completed Projects
- Performance Measures
- Analyzing Projects

Results

- Example Project
- Analysis Focus
- Observations

Next Steps

SMART SCALE Overview

TRANSPORTATION PERFORMANCE MANAGEMENT

- Virginia's prioritization process for multimodal transportation needs
- Application program for local governments, regional entities and public transit agencies
- Anticipated benefits are calculated, and projects are scored and ranked
- Commonwealth Transportation Board (CTB) uses results to inform project selection decisions
- Evaluates projects on key factor areas: **safety, congestion, accessibility, economic development, efficient land use** and **environment**

Transportation Investment Cycle – SMART SCALE Focus

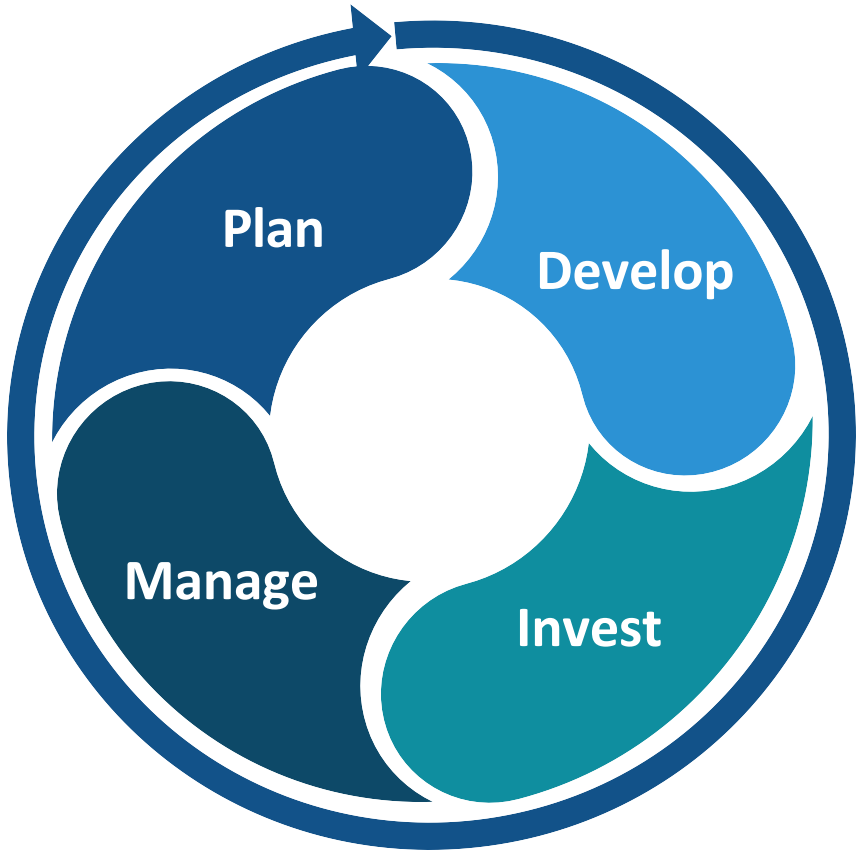
TRANSPORTATION PERFORMANCE MANAGEMENT

Plan: VTrans

- Statewide Multimodal Plan
- Sets Virginia's transportation goals and objectives
- Identifies and prioritizes the transportation needs

Manage

- Evaluate transportation system trends and investment outcomes
- Develop recommendations for program and policy improvements



Develop: Project Pipeline

- Study program focused on the priority needs set by CTB
- Data driven, performance-based
- Designed to support SMART SCALE submissions

Invest: SMART SCALE

- Projects must address VTrans needs to be eligible
- Quantitative analysis to support CTB funding decisions

Manage and Continuous Process Improvement

TRANSPORTATION PERFORMANCE MANAGEMENT

Continuous improvement mindset

- Acknowledge that most processes have potential for improvement
- Analyze past performance to understand where course corrections are needed
- Not critical of past decisions, the past is something we learn from

To understand if the program is working as intended, we must assess if the completed projects are delivering the anticipated benefits

- SMART SCALE predicts/estimates benefits
- Once a project is constructed, we can observe if those benefits are realized with a **before/after analysis**

SMART SCALE Summary by Round

TRANSPORTATION PERFORMANCE MANAGEMENT

- 2,045 applications submitted since 2016 with 1,915 scored and prioritized
- 776 projects selected for funding for total value of $14.5 billion
- More than 150 projects completed through 2022 (19% of funded projects)

PROJECT APPLICATIONS	FY 2017 ROUND 1	FY 2018 ROUND 2	FY 2020 ROUND 3	FY 2022 ROUND 4	FY 2024 ROUND 5	GRAND TOTAL
SCORED	287	404	433	397	394	1,915
FUNDED	163	147	134	167	165	776
VALUE OF PROJECTS SUPPORTED	$2.7B	$2.4B	$5.1B	$1.9B	$2.4B	$14.5B
COMPLETED PROJECTS	101	42	7	0	0	150
ANALYZED PROJECTS 2024*	**101**	**42**	**4**	---	---	147

*Projects had to be completed by September 2022 to ensure at least one year of post-construction data.

Completed SMART SCALE Projects for Before/After Analysis

TRANSPORTATION PERFORMANCE MANAGEMENT

- 147 projects constructed for $782M
- All area types represented
- Most projects are limited in scope and low in cost
  - 91% are less than $10M, compared to 78% of all funded projects (through R5) that are less than $10M

Number of Projects	Cost Range	% of Projects in each Cost Range
5	> $30M	3%
8	< $30m and > $10m	5%
134	< $10m	91%

Principal Improvement Type	Projects	% of Projects by Type
Bike/Ped	12	8%
Bus Transit	6	4%
Highway	121	82%
TDM	8	5%

Area Type	Projects	% Projects by Area Type
Most Urban	19	13%
Urban	31	21%
Rural	33	22%
Most Rural	64	44%

Performance Measures

TRANSPORTATION PERFORMANCE MANAGEMENT

Identified measures within SMART SCALE factor areas where data is available to assess change that may be attributed to the project

Quantitative

Qualitative

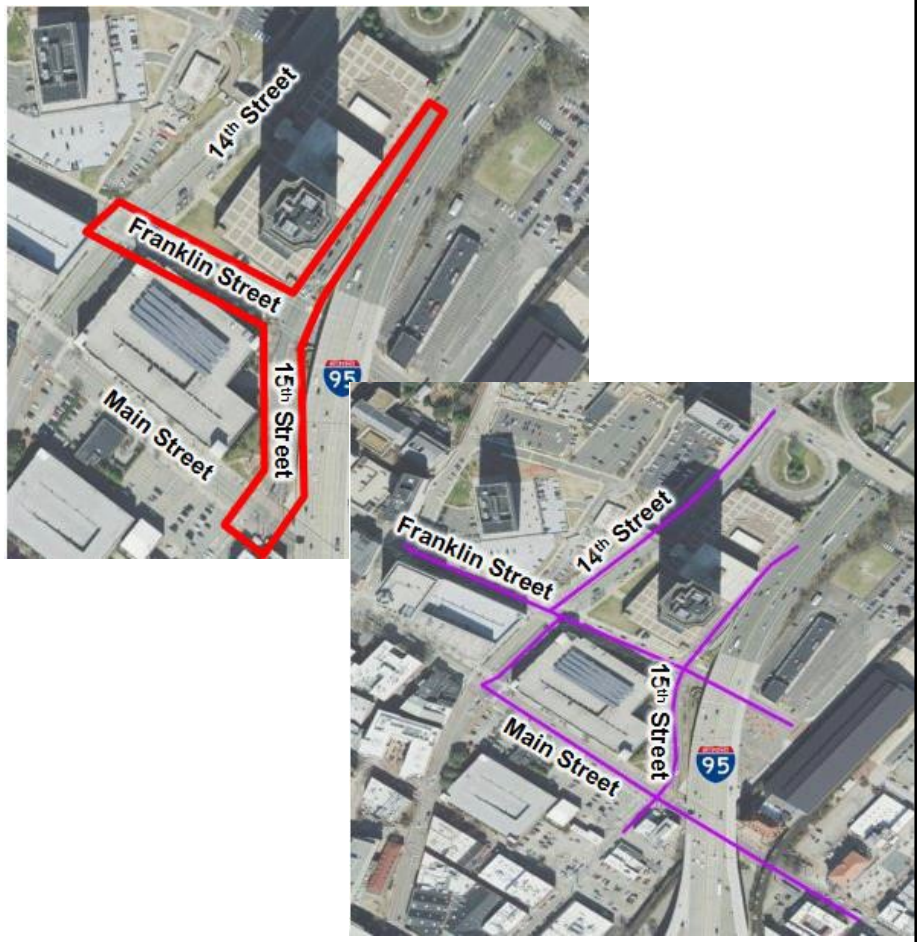
SMART SCALE Factors	Before/After Measures
Improve Safety	Changes in fatality and all injury crashes
Reduce Congestion	Changes in travel speed and changes in travel delay
Increase Accessibility	Changes in auto accessibility to jobs and jobs by disadvantaged populations
Promote Efficient Land Use	None yet, difficult to identify data sources for this policy objective
Affect the Environment	None yet, difficult to identify data sources for this policy objective
Contribute to Economic Development	Changes in travel time index and planning time index For other indicators of economic development, it is difficult to identify data sources

Analyzing Individual Projects: Semi-automation

TRANSPORTATION PERFORMANCE MANAGEMENT

Congestion and Safety analysis steps

- Retrieve project location from application
- Manual process to segment/identify source data (crashes, travel time data, etc.) at project location
  - segmentation guide and training for consistent process
- Automated process to calculate performance measures from source data



Example Project – US 460 & North Main St.

TRANSPORTATION PERFORMANCE MANAGEMENT

Project Purpose: Improve safety at intersection by adding turn lanes and limiting left turning movements (RCUT)

Pre-Construction: Two-way stop-controlled intersection

Total Project Cost: $3,316,565

Safety Factor Area: 87% of score

Before/After Analysis Results

- No fatalities since construction complete with 4 years of post-construction data
- Reduction in EPDO* exceeded projections – actual reduction of 47% compared to projected reduction of 35%

*EPDO: Equivalent Property Damage Only

Analysis Focus

TRANSPORTATION PERFORMANCE MANAGEMENT

- Consistency between observed performance and predicted benefits
- Achievement of project purpose
- Assessment of performance by project type (e.g. new turn lanes)
- Aggregate performance of all projects
- Observations that support improvements to the SMART SCALE prioritization process
- Collection of ancillary data to further project understanding (e.g. bicycle and pedestrian counts, park and ride lot surveys)

Observations – Project Performance

- 95% of projects were found to improve or maintain safety, congestion, or both
- More than 65% of projects were found to be consistent with SMART SCALE estimates of benefits
- Certain project categories perform well across multiple factor areas
  - New Turn Lanes, Interchange Improvements, Widening with Added Capacity (generally improving congestion and safety)

Observations – Process Improvement

Targeted crash reductions

- Overestimating crash reductions for certain improvement types
- This issue was identified and corrected after a post-round lessons learned session

Park & Ride lot usage assumptions

- Overestimating Park & Ride lot usage
- Currently under evaluation for adjustment before the next round of applications

Observations – Policy Improvement

Environmental Factor

- Limited observed benefits were found for many projects having a majority of their score from the Environmental factor area
- This issue was identified and corrected after a post-round lessons learned session by scaling the Environmental score based on impact to environment and benefits in other factor areas and was further refined to be a subtractive measure

Small Projects

- Found an overrepresentation of small projects (< $10M) with limited observed benefits
- After recent comprehensive program review, policy was updated and allocation of funds shifted to ensure projects of statewide and regional significance are better represented

Next Steps

TRANSPORTATION PERFORMANCE MANAGEMENT

Reference Sites

- Implementing a cross-sectional approach to look at performance at similar locations both with and without improvements
- Hope to understand confounding factors which may affect a project's post-implementation performance

Improved Source Data

- Review and testing of new data sources to address data gaps and quality

Desktop review

- In depth data review for projects that didn't perform as expected to glean insights that might feed back into process/policy improvements

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Thank you.

DMV Now
Virginia Department of Motor Vehicles

Virginia Department of Aviation

DRPT
Virginia Department of Rail and Public Transportation

Office of Intermodal Planning and Investment

MVDB
Motor Vehicle Dealer Board
Commonwealth of Virginia

The Port of Virginia

VDOT

Virginia Spaceport Authority

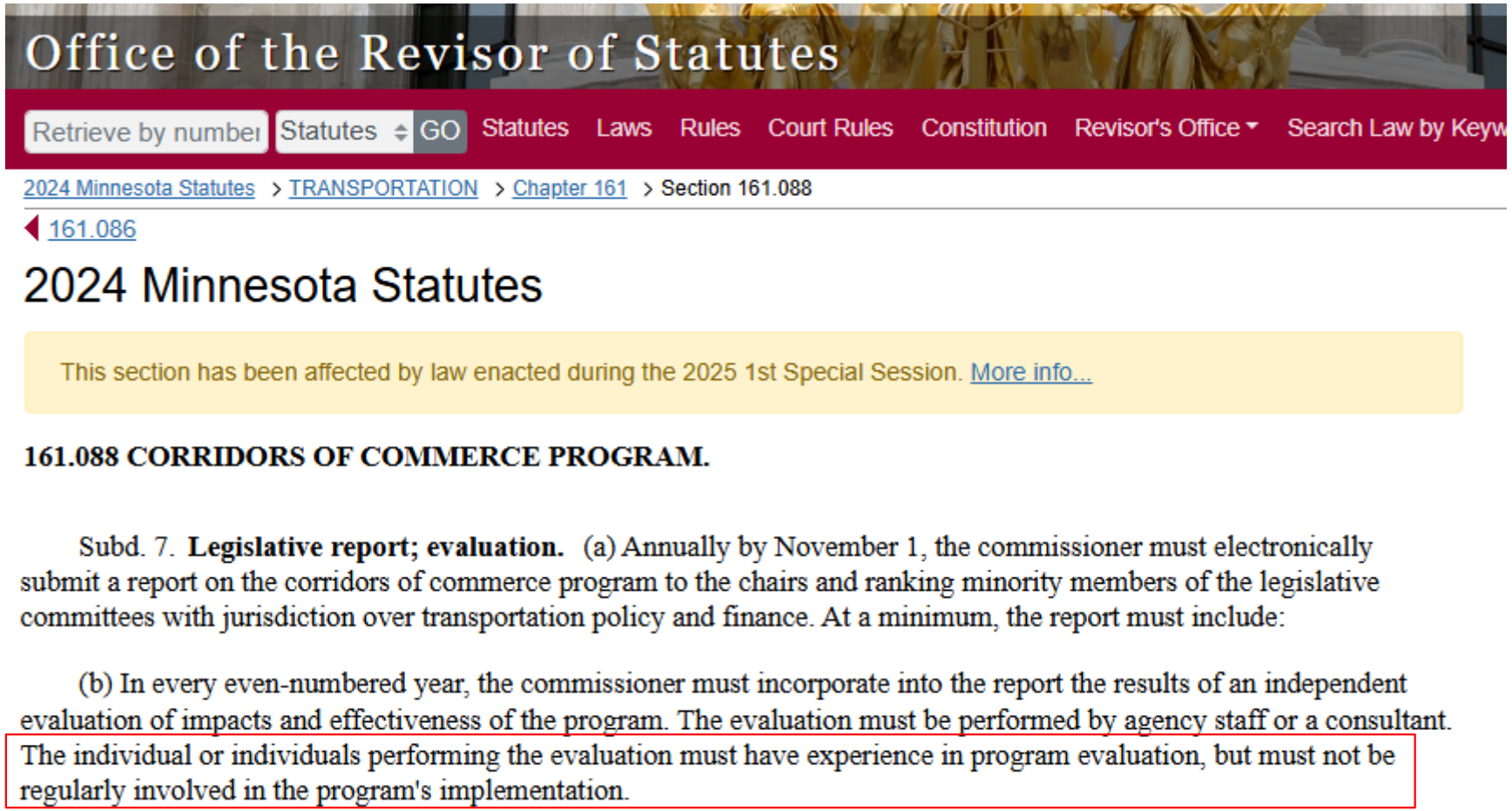
MnDOT's Experience With Post-Implementation Project Evaluation and Prospects for Future Application

Michael Iacono

AASHTO TPM Webinar 27

July 16, 2025

Post-Implementation Evaluation: The Corridors of Commerce Program



Office of the Revisor of Statutes

Retrieve by number | Statutes | GO | Statutes | Laws | Rules | Court Rules | Constitution | Revisor's Office | Search Law by Keyw

2024 Minnesota Statutes > TRANSPORTATION > Chapter 161 > Section 161.088

161.086

2024 Minnesota Statutes

This section has been affected by law enacted during the 2025 1st Special Session. More info...

161.088 CORRIDORS OF COMMERCE PROGRAM.

Subd. 7. **Legislative report; evaluation.** (a) Annually by November 1, the commissioner must electronically submit a report on the corridors of commerce program to the chairs and ranking minority members of the legislative committees with jurisdiction over transportation policy and finance. At a minimum, the report must include:

(b) In every even-numbered year, the commissioner must incorporate into the report the results of an independent evaluation of impacts and effectiveness of the program. The evaluation must be performed by agency staff or a consultant. The individual or individuals performing the evaluation must have experience in program evaluation, but must not be regularly involved in the program's implementation.

Evaluation report requirement

Independence requirement

Criteria for Evaluation

Criteria	Points available
Return on investment	100
Economic impact	100
Freight efficiency	100
Safety improvements	100
Regional connections	100
Policy objectives	100
Community consensus	100
Project readiness	100
Maximum points	800

- 8 Statutory Project Scoring Criteria
- Used to Inform Design of Program Evaluation
- Emphasis on Quantifiable Outcomes

Program Evaluation Areas

- Project Delivery
  - Project Schedule/Timing
  - Project Cost
- Effects on Vehicle Speeds
- Safety Impacts
  - Total Crash Rate
  - Fatal and Serious Injury Crash Rate
- Freight Movement
  - Changes in Commercial Truck Volumes

Project Delivery: Tracking Project Costs

- Comparison at various stages in the project's development

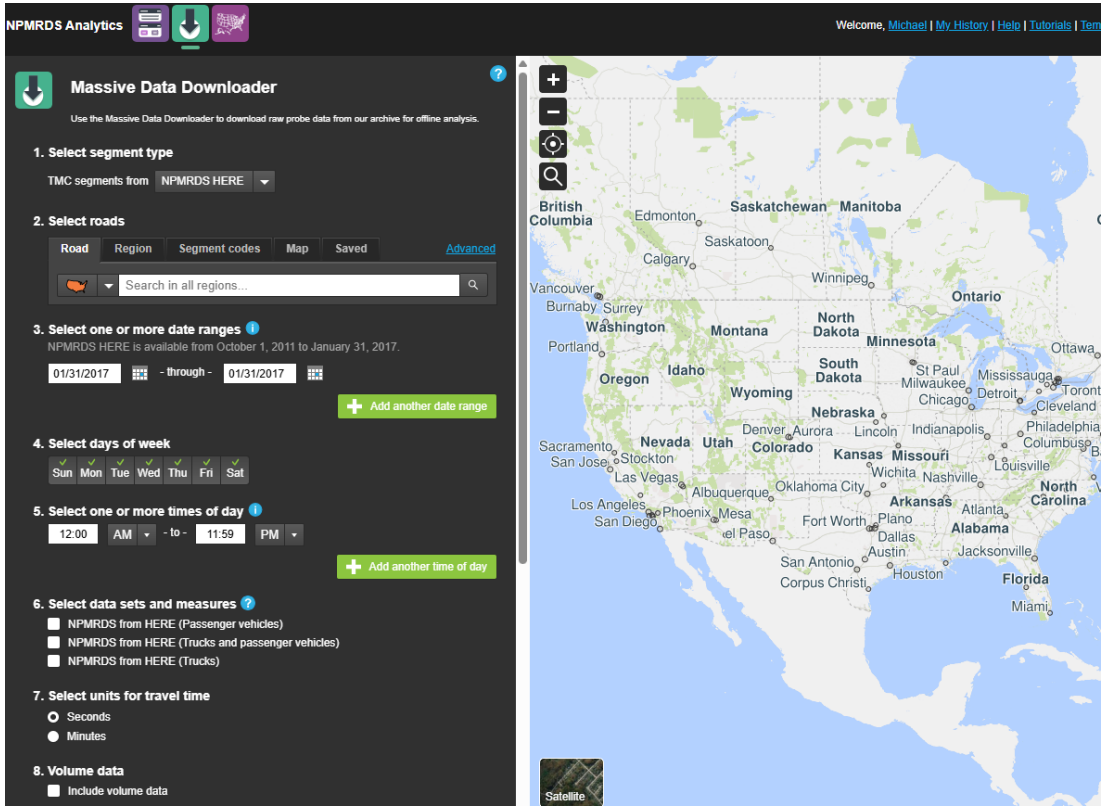
Table C2: Completed Project Construction Cost Comparison (millions)

District	Route	Original Construction	Engineer's Estimate (EE)	Awarded Bid (BID)	Final Amount (FINAL)
6	Hwy 14 (Phase 1)	$15.0	$12.6	$12.0	$11.1
3	I-94 (Rogers to St. Michael)	$32.4	$30.6	$28.3	$28.4
4	Hwy 34 (Passing lanes)	$10.0	$9.0	$7.9	$8.5
2	Hwy 2 (Passing lanes)	$10.5	$10.8	$13.3	$14.1
M	Hwy 610	$100.3	$83.6	$80.7	$80.3
M	Hwy 51	$7.1	$10.5	$12.9	$13.3
7	Hwy 14 (Mankato to Nicollet)	$38.5	$31.2	$31.7	$33.6
3	Hwy 371	$41.9	$56.9	$49.9	$50.2
8	Hwy 23 Passing Lanes (South)	$10.9	$4.3	$4.1	$4.3
M	I-694	$42.3	$35.0	$34.7	$35.0
4	Hwy 34 (turn lanes)	$3.7	$2.7	$2.6	$2.6
8	Hwy 23 Passing Lanes (North)	$10.9	$4.1	$3.9	$3.8
1	Hwy 169	$8.3	$6.7	$5.9	$6.3
2	Hwy 2 (Reconstruct)	$1.5	$1.9	$2.2	$2.5
3	I-94 (St. Michael to Albertville)	$70.6	$68.7	$71.0	$68.9
6	Hwy 14 (Phase 2)	$160.0	$118.9	$108.0	$110.4
3	Hwy 23 (North Gap)	$42.8	$41.4	$41.8	$43.1

All amounts are in millions.

Vehicle Speed Analysis: Data Sources

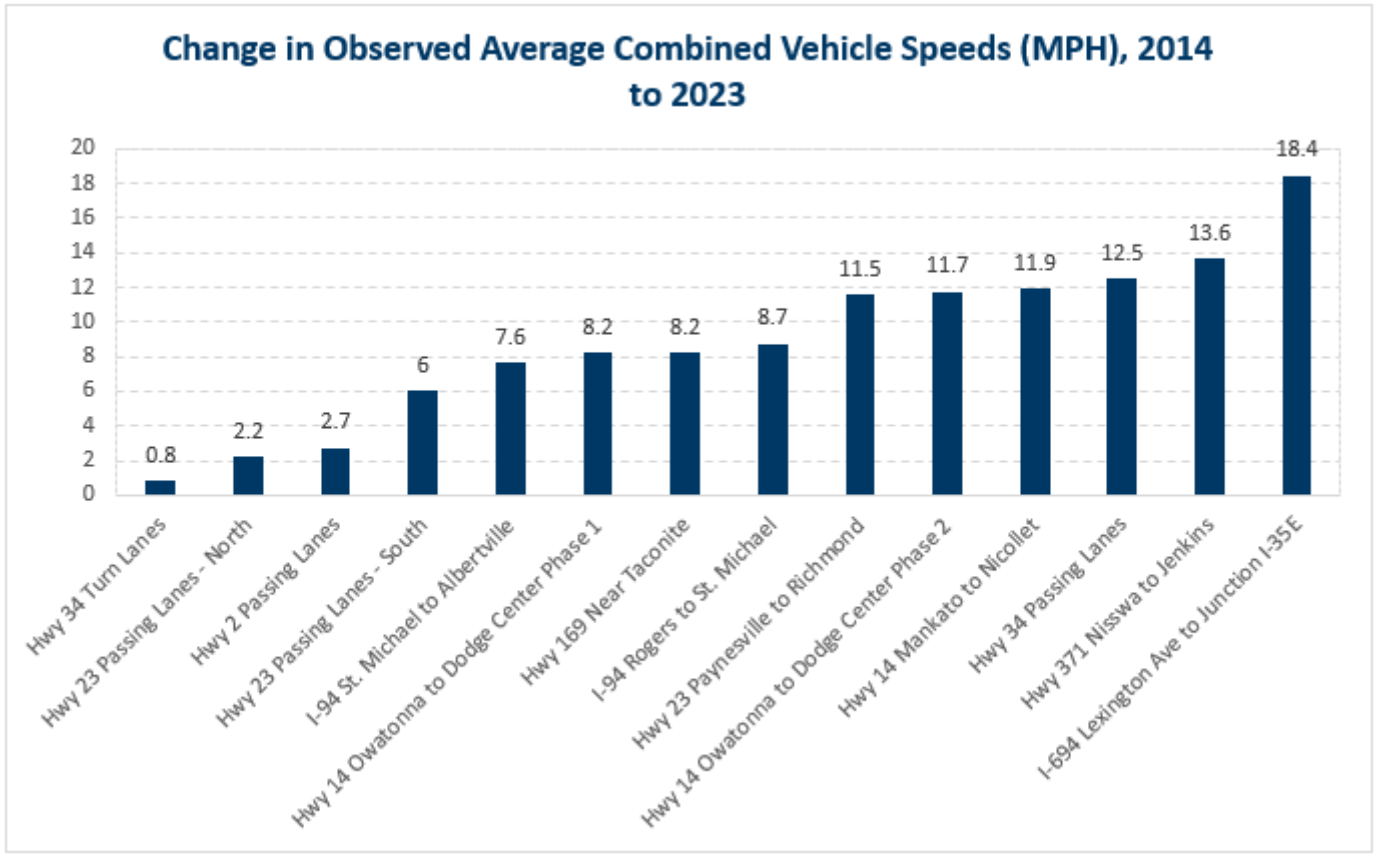
NPMRDS Analytics: Data Downloader



StreetLight: Probe Data Analytics

Vehicle Speed Analysis: Post-Implementation

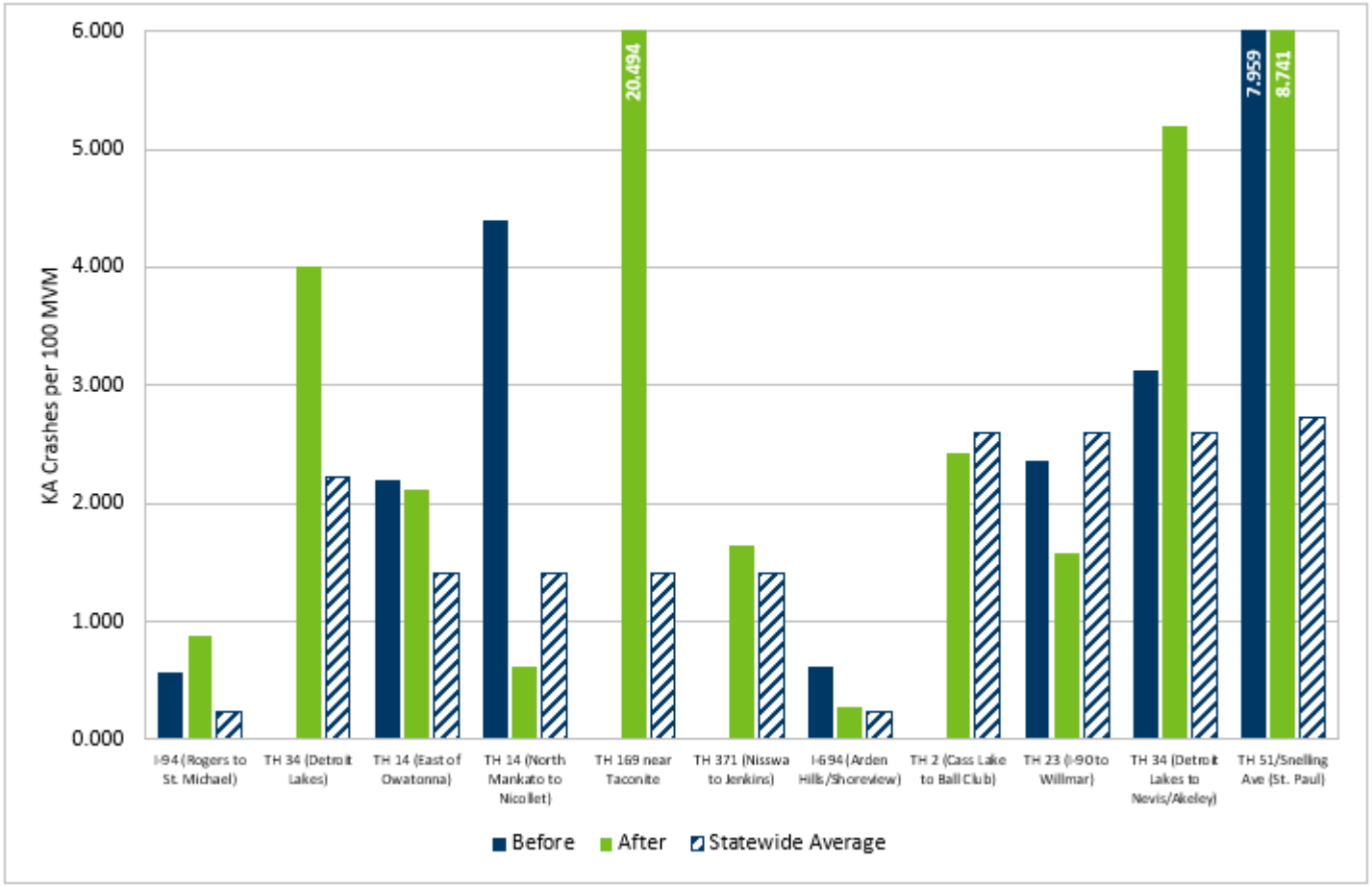
Analysis of Vehicle Speeds: Passenger and Commercial Vehicles Combined



Safety Evaluation: Crash Analysis

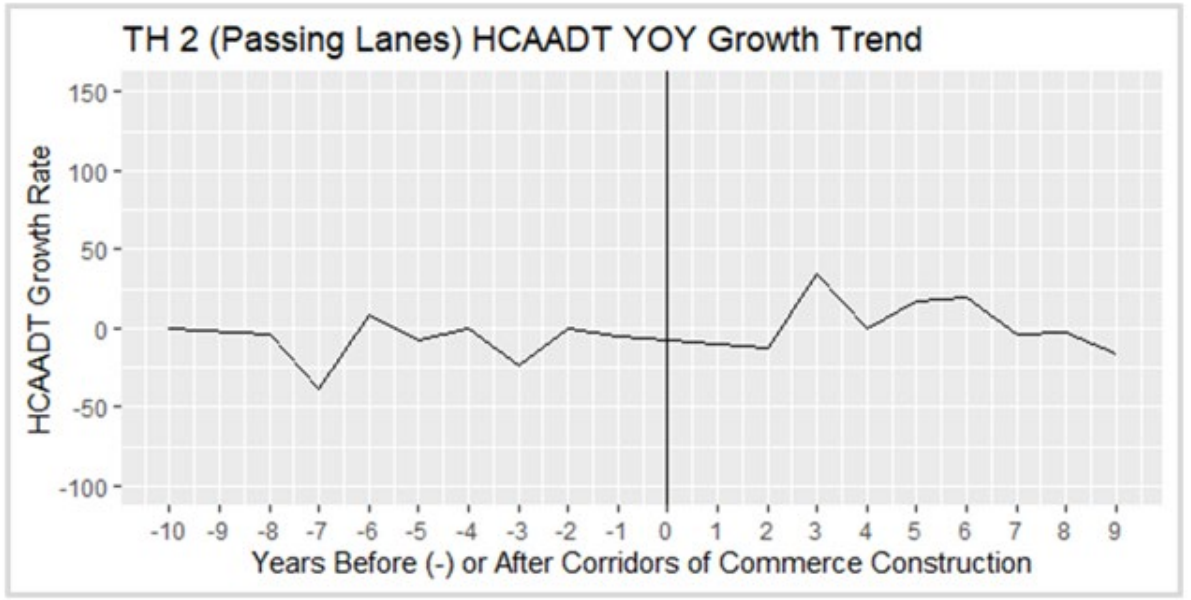
Safety Analysis

Figure 4: Project Fatal and Serious Injury (KA) Crash Rates per 100 Million Vehicle Miles



Commercial Truck Volume Analysis

- Heavy Commercial (HC) volume growth
- Evaluated relative to statewide trend
- Split into years before and after project construction



Traffic Data Collection Methods

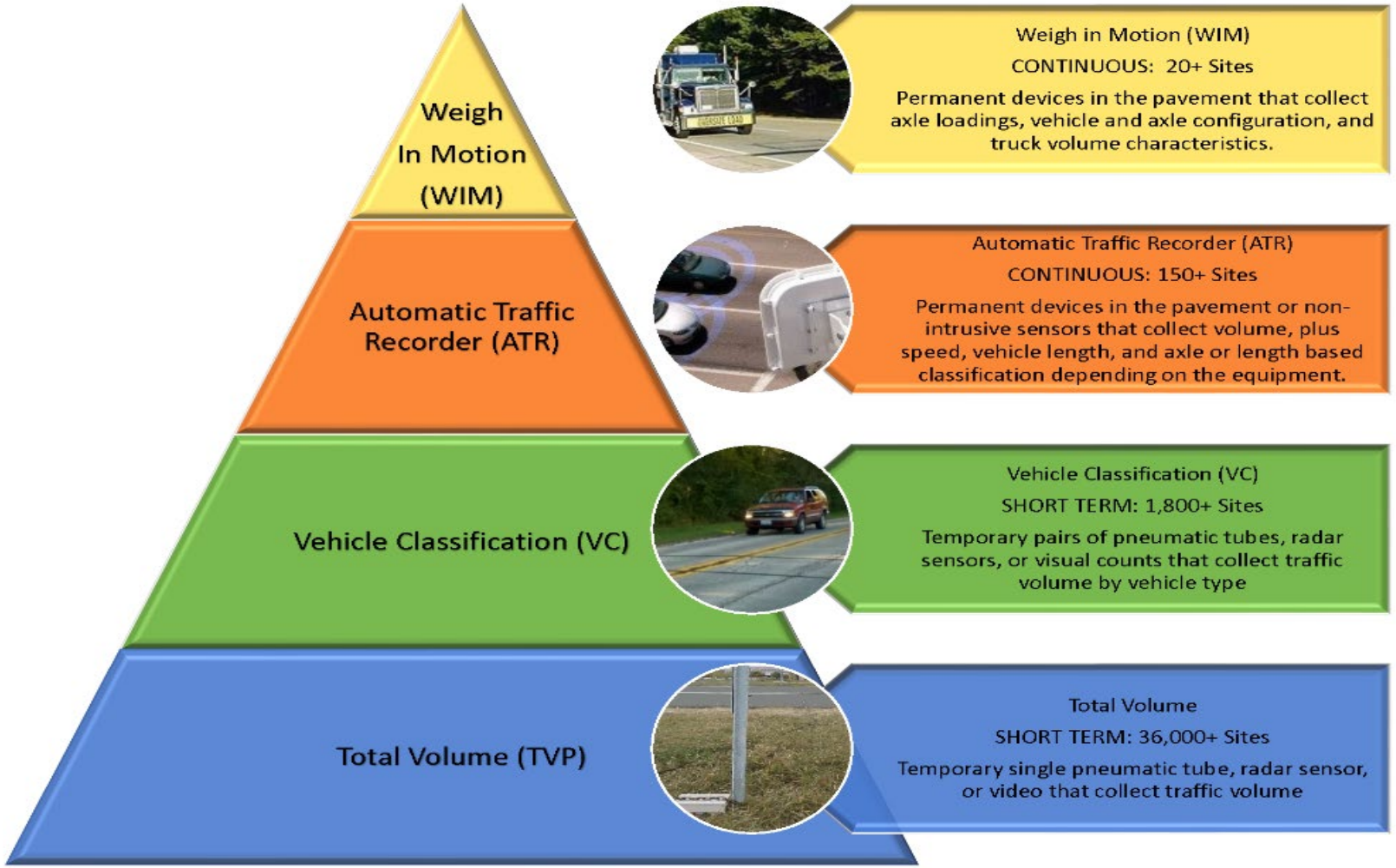
The data collection pyramid:

Higher levels = fewer sites, more types of data

Lower levels = more sites, more coverage, fewer types of data

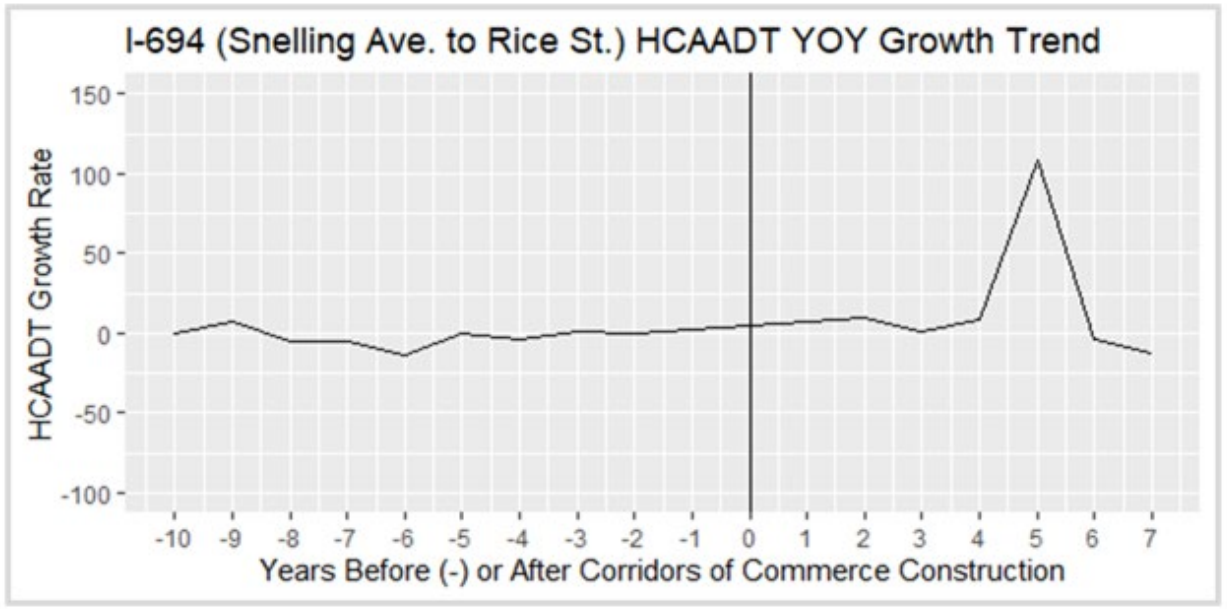
Data types:

Volume, Vehicle class, Weight, Axle Configuration



Estimating Truck Volumes: A New Issue

- Discontinuities in HC volume trends
- Mostly confined to post-COVID period
- Associated with introduction of length-based classification methods



Traffic Volumes: Radar-Based Units

Wavetronix

- Permanent and temporary sites
- Set up trailer for 48 hours
- Counts number of vehicles and measures vehicle length

Technical Improvements

- Commercial Truck Estimation
  - New Data Sources
  - Validation (length vs axle-based)
  - Establishing trends
- Reliability Impacts
  - Used in Project Scoring
  - Evaluation Criterion?
- Statistical Evaluation
  - Significance of Impacts
  - Dependent on data quality (speed, volume)

Prospects for Scaling Up

- Limitations
  - Staffing Levels
  - Skill Requirements
- Who is the Audience?
  - Making the Case
  - Beyond the Status Quo
- Opportunities
  - Pilot Studies?
  - Possible Application: Safety
    - HSIP projects
    - Internal coordination required
    - New software (CRASH)

Questions?

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