

An Introduction to NCHRP Project 03-122: Performance-Based Management of Traffic Signals

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Session 2C: Big Data Performance Measures for Smarter Traffic Signals
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Project Background

OBJECTIVE

Develop guidance for agencies across a spectrum of resource levels to implement a performance measurement approach to traffic signal management.



Poor signal timing is a contributor to congestion



Signal retiming projects are often deferred or placed on an arbitrary schedule



Public service requests often drive problem identification

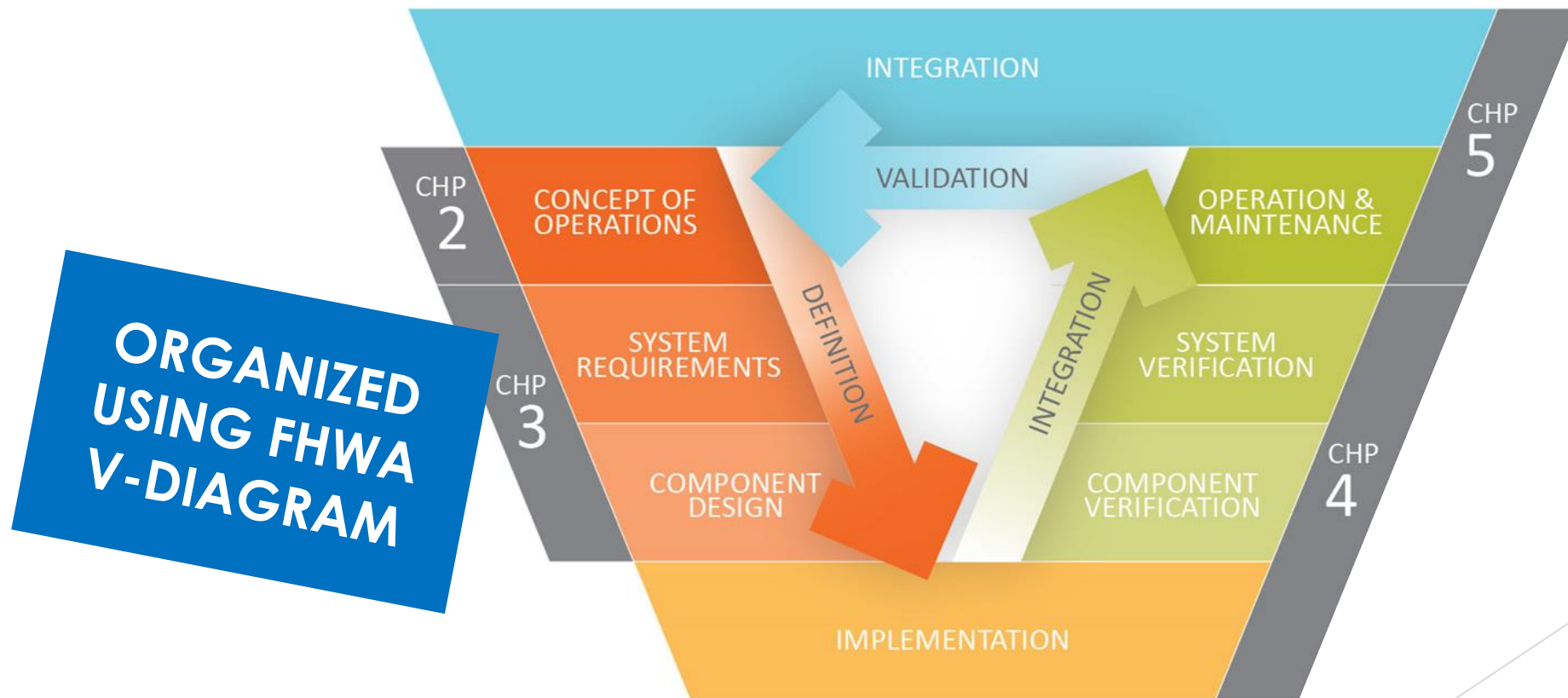


Crowd-sourced data is being used more frequently to assess performance



Guidance needed to help agencies overcome financial and organizational barriers

Applying a Systems Engineering Approach to the Guidebook



Guidebook Outline

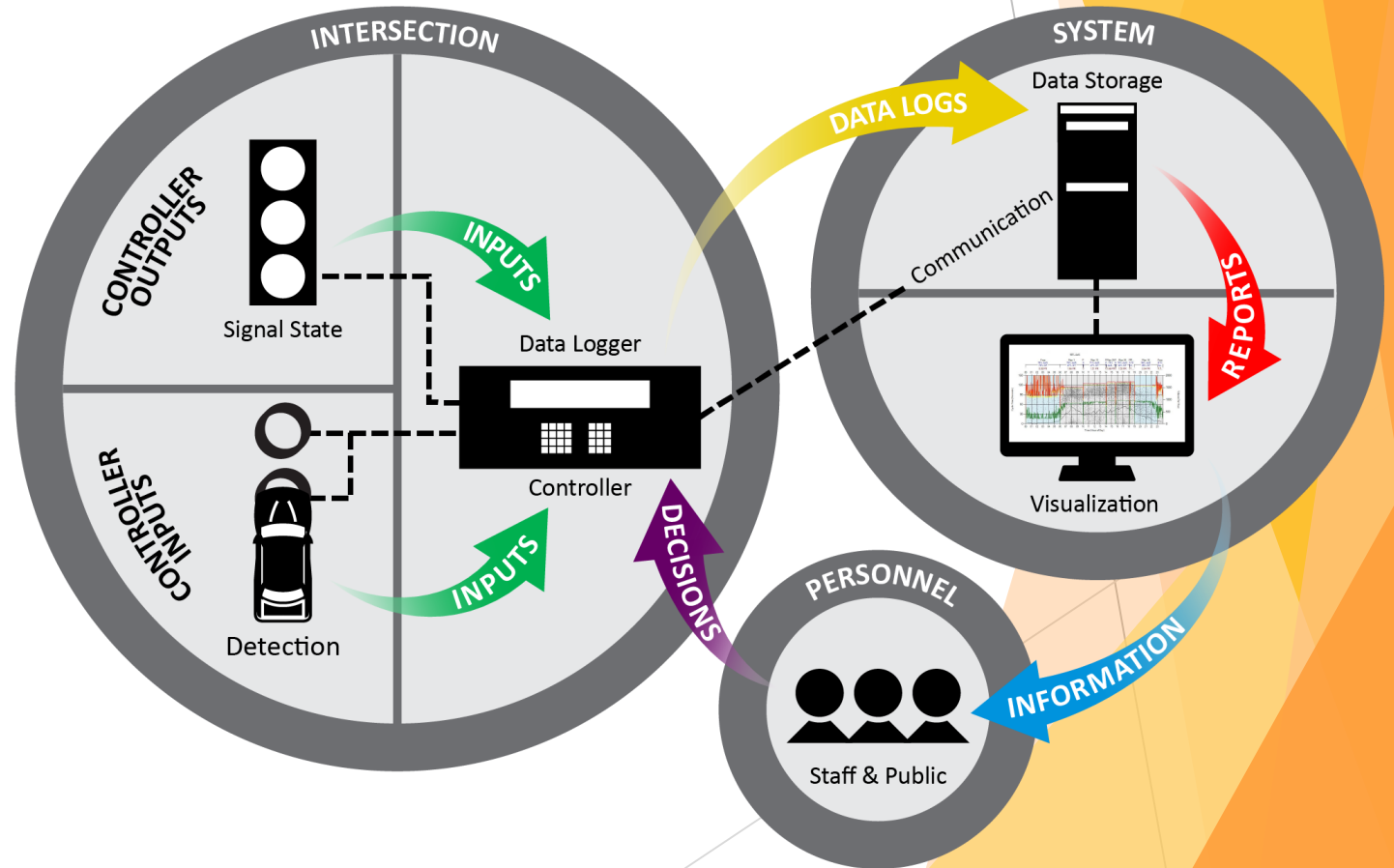
CHAPTERS

- 1 Roadmap to Performance Measures
- 2 Performance Measure Selection
- 3 Performance Measure Details
- 4 System Needs for Performance Measures
- 5 Implementation of Performance Measures
- 6 Integration into Agency Practice

Chapter 1

Roadmap to Performance Measures

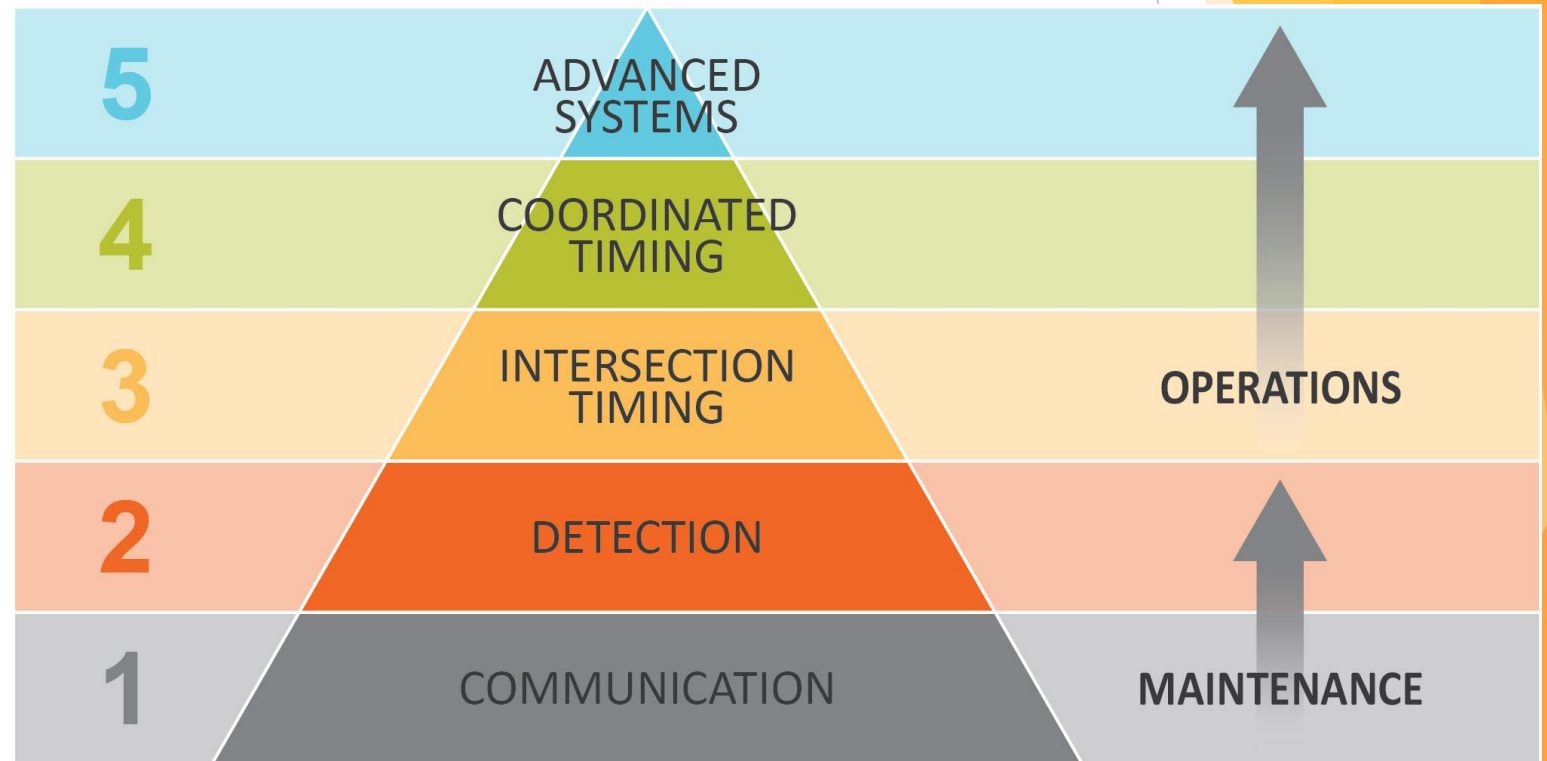
- ▶ ATSPM introduction
- ▶ Implementation roadmap
- ▶ Benefits
- ▶ Required investments



Chapter 2

Performance Measure Selection

- ▶ STM2 outcome-based process
- ▶ Matching signal performance measures to objectives
- ▶ Implementation scale options
- ▶ Additional resources



Chapter 3

Performance Measure Details

TWO-PAGE PRIMERS

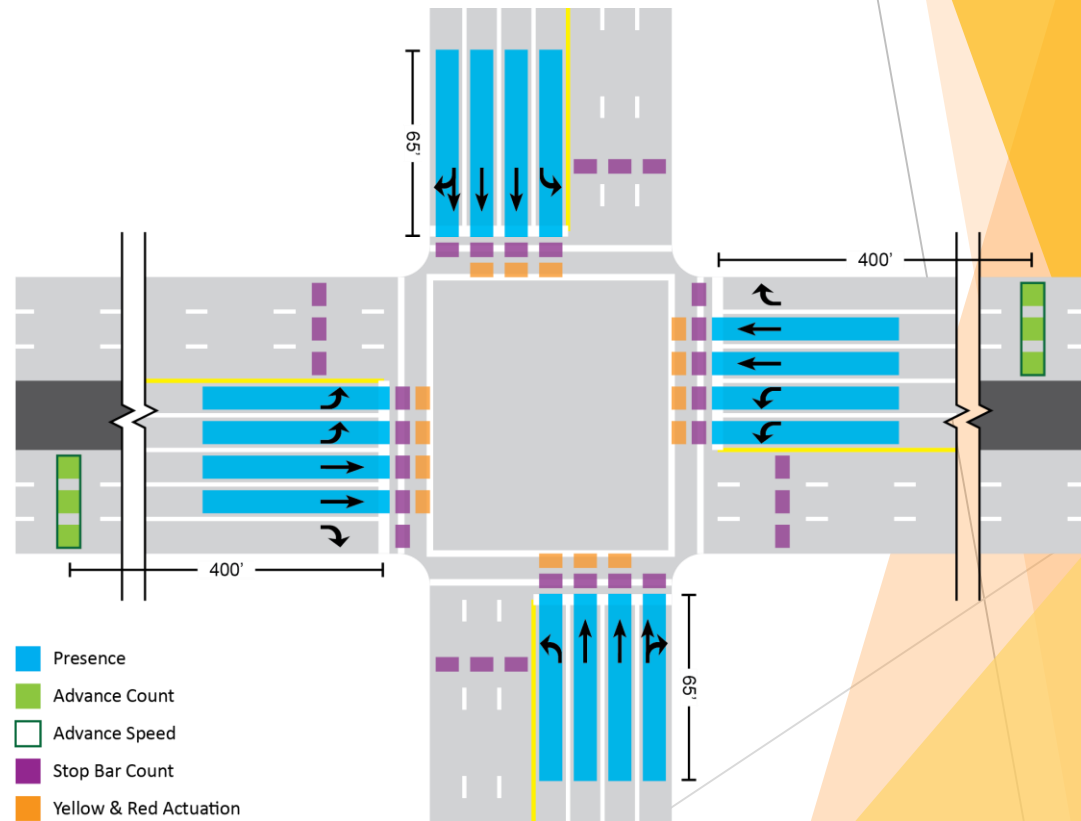
1. Communication Status
2. Flash Status
3. Power Failures
4. Detection System Status
5. Phase Termination
6. Vehicle Volumes
7. Pedestrian Volumes
8. Split Monitor
9. Split Failures
10. Estimated Delay
11. Estimated Queue Length
12. Oversaturation Severity Index
13. Pedestrian Phase Actuation and Service
14. Pedestrian Delay
15. Yellow/Red Actuations
16. Red-Light-Running (RLR) Occurrences
17. Pedestrian Conflicts
18. Effective Cycle Length
19. Progression Quality
20. Purdue Coordination Diagram
21. Cyclic Flow Profile
22. Offset Adjustment Diagram
23. Travel Time and Average Speed
24. Time-Space Diagram
25. Preemption Details
26. Priority Details

- ▶ **Description**
- ▶ **Uses**
- ▶ **Related Objectives**
- ▶ **Agency Applications**
- ▶ **Data Sources**
- ▶ **Detection Needs**
- ▶ **Calibration**
- ▶ **References**
- ▶ **Examples**

Chapter 4

System Needs for Performance Measures

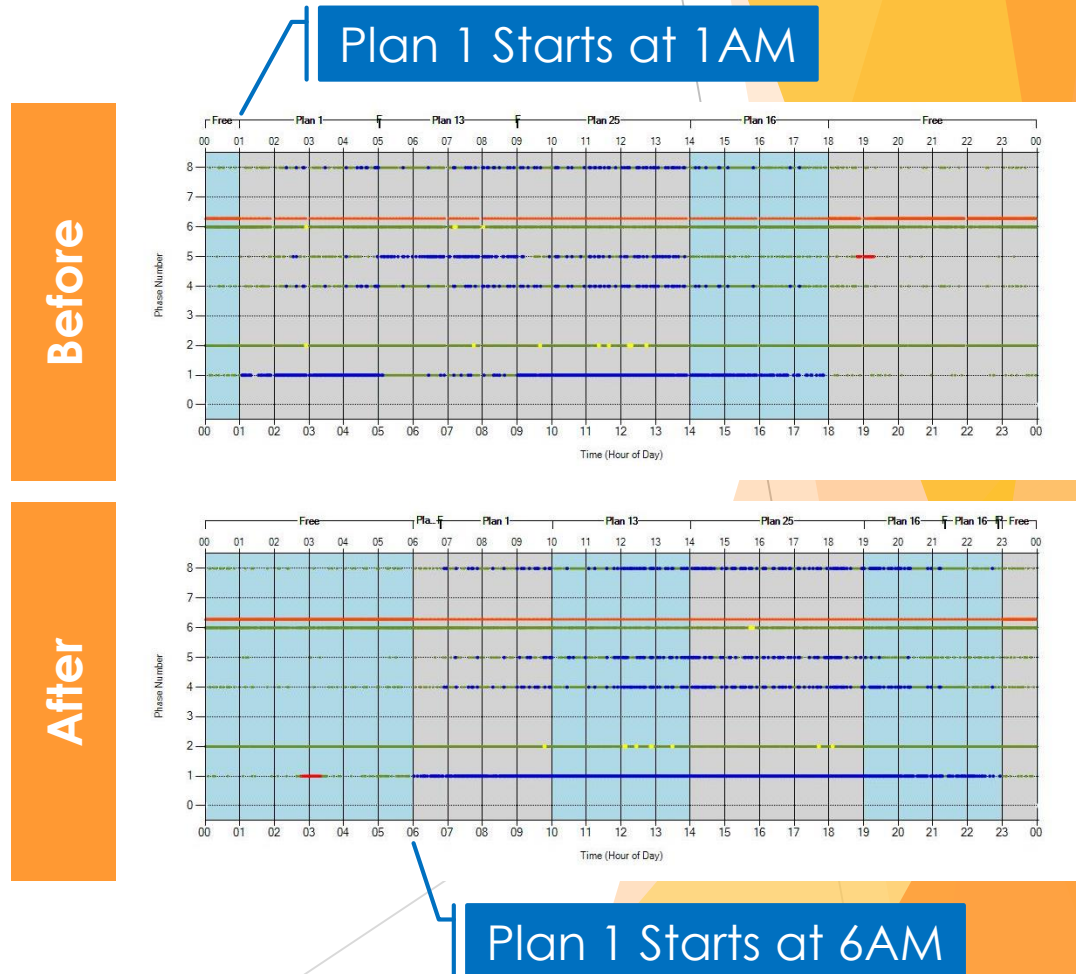
- ▶ Gap assessment
- ▶ Technical requirements
- ▶ Data sources
 - ▶ Description
 - ▶ Data collection requirements
 - ▶ Availability
 - ▶ Capabilities
 - ▶ Challenges



Chapter 5

Implementation of Performance Measures

- ▶ Hardware configuration
- ▶ Software configuration
- ▶ Verification
- ▶ Potential signal adjustments
- ▶ Monitoring through automated alerts



Chapter 6

Integration into Agency Practice

- ▶ Day-to-day impacts
 - ▶ Organizational
 - ▶ Planning
 - ▶ Design and construction
 - ▶ Operations
 - ▶ Maintenance
 - ▶ External partners
- ▶ Communicating benefits
- ▶ Policy changes

PLANNERS

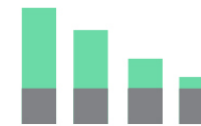
Is traffic changing?



Volume Profiles

DESIGNERS

Which equipment works best in different scenarios?



Alarm Ticker

SIGNAL TIMERS

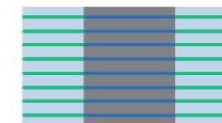
Are vehicles arriving when the signal is green?



Arrivals on Green

SIGNAL TECHNICIANS

Is equipment functioning properly?



Phase Termination

DECISION-MAKERS

Are investments improving conditions over time?



Travel Time Distributions

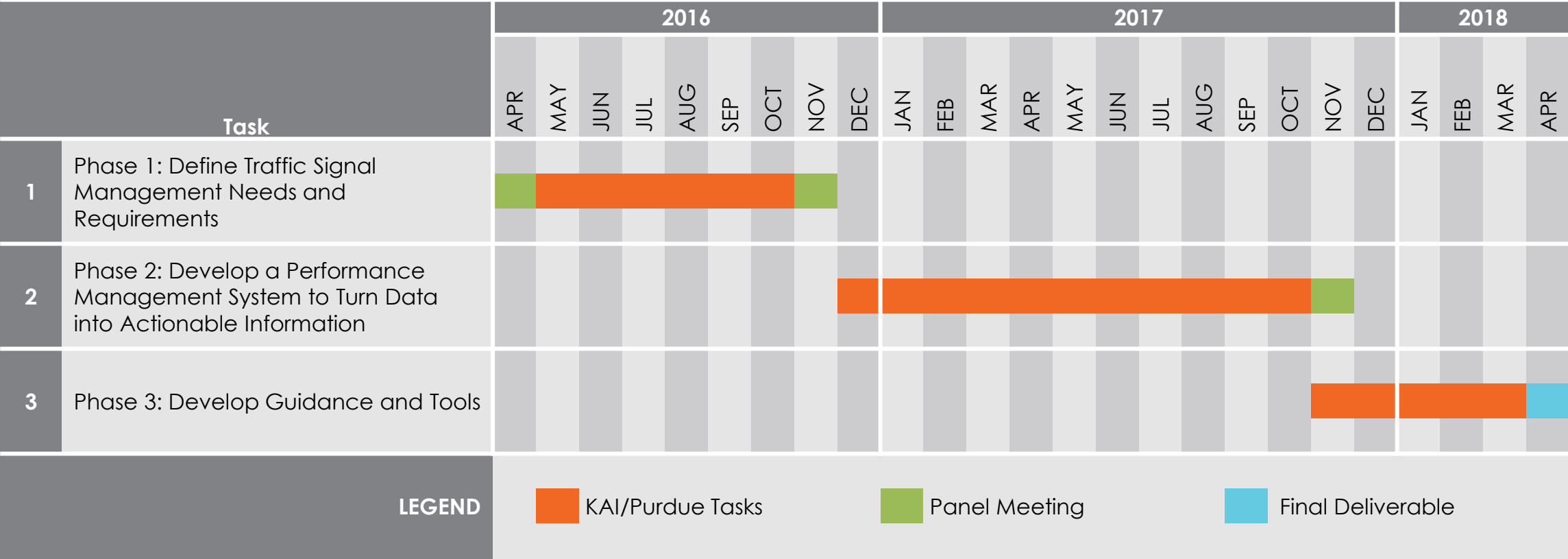
THE PUBLIC

Is my agency making trips safer and more reliable?



Report Card

Project Schedule



Questions?

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