SHRP2 SOLUTIONS
TOOLS FOR THE ROAD AHEAD

innovation ingenuity imagination invention Every Day Counts

WISE: Work Zone Impacts and Strategies Estimator Software

Demonstration and Peer Exchange

September 20, 2017

U.S. Department of Transportation
Federal Highway Administration

American Association of State Highway and Transportation Officials
AASHTO
The Voice of Transportation

Transportation Research Board
of the National Academies
TRB

This Session

- Welcome
  - Today's Agenda
- Overview and Background of WISE
  - Origins of WISE
  - WISE Product Description
  - Context in Work Zone Management

Today's Workshop

- Demonstration and peer exchange on WISE and work zone project coordination
- Joint effort of SHRP2 and EDC
- Want this to be interactive - please speak up, ask questions, share your experiences
- Goals
  - Discuss best practices for work zone project coordination
  - Learn about new tools for analyzing multiple work zones in a corridor/region
  - Share knowledge on how to apply the new tools

Workshop Agenda – Morning Session

9:00 – 9:30	Participant Introductions
9:30 – 10:00	WISE Software Proof-of-Concept in Maryland
10:00 – 10:15	Break
10:15 – 10:45	Maryland Software Demo
10:45 – 11:15	Integrating WISE into Agency Business Processes ***– Group Discussion***
11:15 – 11:45	Tennessee Project Coordination Using WISE
11:45 – 12:15	Tennessee Software Demo
12:15	Lunch

Workshop Agenda – Afternoon Session

1:15 – 1:45	Data Needed for WZ Project Coordination and WISE ***– Group Discussion***
1:45 – 2:15	MetroPlan Orlando: WISE Implementation
2:15 – 2:45	AMBAG Monterey Region WISE Implementation
2:45 – 3:00	Break
3:00 – 3:45	AMBAG/MetroPlan Software Demo
3:45 – 4:15	Getting Started with WISE ***– Group Discussion***
4:15 – 4:30	Open Q&A Roundtable

EDC3: Smarter Work Zones

- Innovative strategies designed to optimize work zone safety and mobility → Project Coordination and Technology Applications

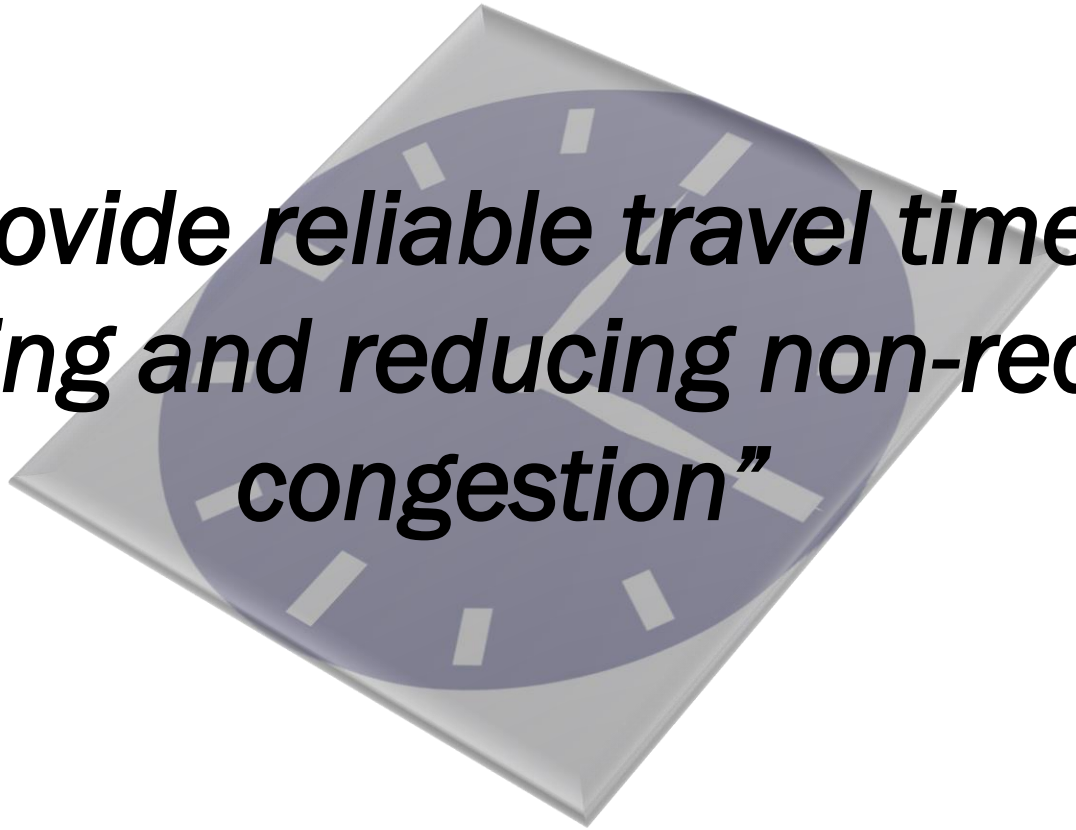
> **Project Coordination:** Coordination within a single project and/or among multiple projects within a corridor, network, or region, and possibly across agency jurisdictions to minimize WZ traffic impacts.

- EDC3 Smarter Work Zones Nationwide

  As of January 2017

  - **34 state DOTs implementing** WZ project coordination strategies into agency documentation and business processes for improving safety and reducing work zone delays.
  - **4 state DOTs** volunteering to pilot the WISE software application.

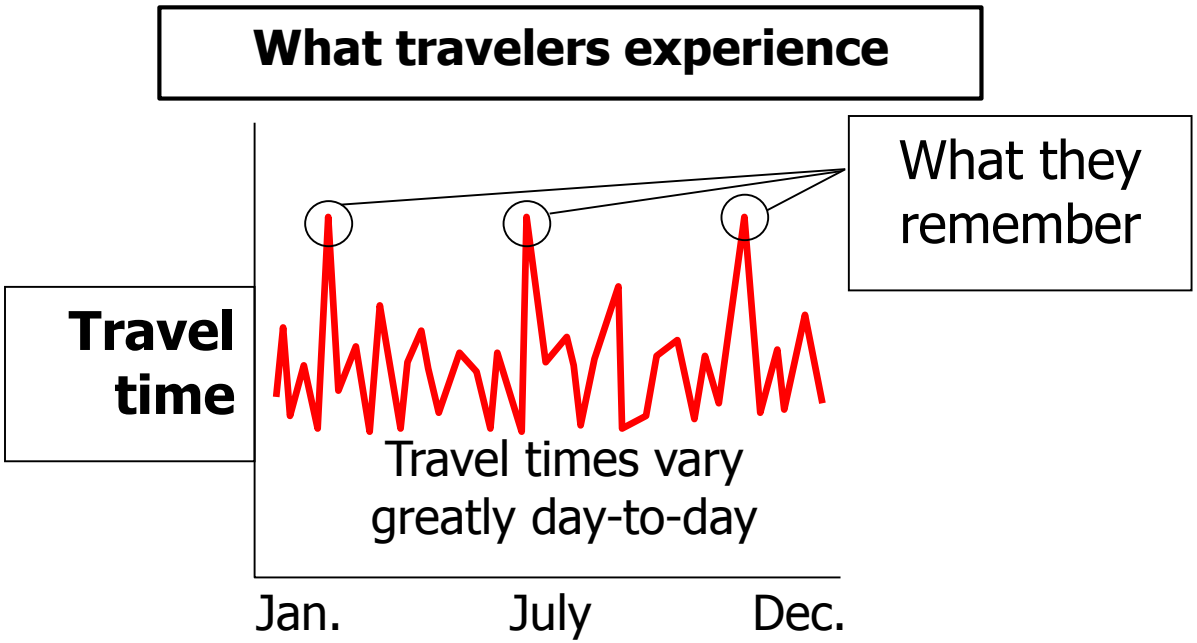
SHRP2 Reliability Focus Area Objective



"To provide reliable travel times by preventing and reducing non-recurring congestion"

Travel-Time Reliability

Travel-time reliability describes the quality, consistency, timeliness, predictability, and dependability of travel times, from day-to-day or across different times of day.



Travel-Time Reliability

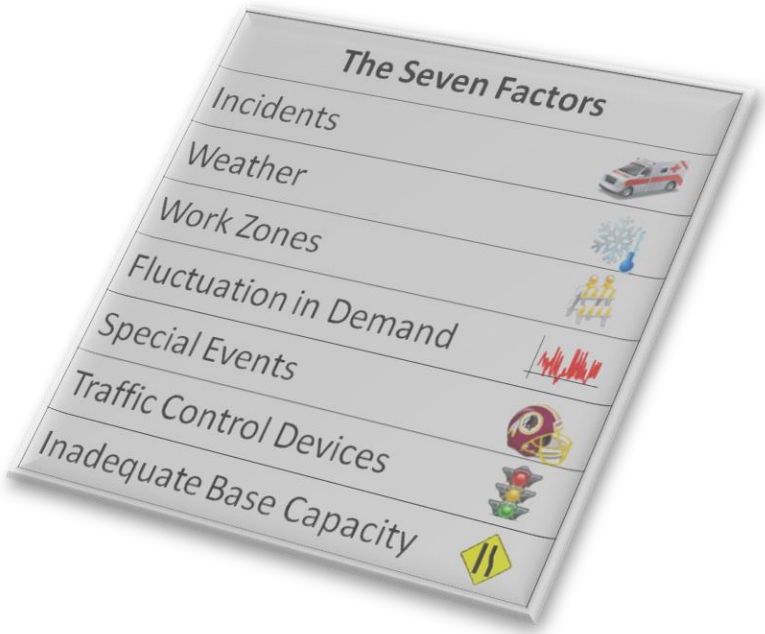
Challenge

- Increasing levels of congestion.
- More than half of congestion is due to non-recurring delays.
- Customers care about predictability of travel.
- Agencies need to be able to better understand and identify the issues and strategies to improve travel-time reliability.

The Seven Causes of Unreliability

The Reliability Focus Area research attributed variability in travel time to seven primary causes:

1. Incidents
2. Weather
3. Work zones
4. Fluctuations in demand
5. Special events
6. Traffic control devices
7. Inadequate base capacity



Work Zones and Reliability

Challenge

- A primary cause of unexpected delays is work zones.
- Drivers believe that transportation agencies can better plan and schedule work zones.
- The accountability of agencies and the frustration of travelers are generally more intense in response to work zones.
- Work zones involving temporary lane closures can increase your probability of being involved in certain types of crashes.

SHRP2 Reliability Focus Area

Approach

Develop processes and tools that help transportation agencies enhance

- Organizational capabilities
- Decision making
- Practices
- Knowledge

to reduce the variability of travel time and the underlying causes.

R11: Strategic Approaches at the Corridor and Network Levels to Minimize Disruption from the Renewal Process

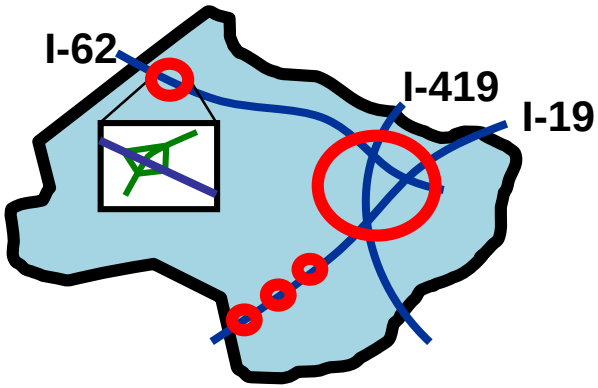
- Multiple roadwork projects.
- How can they be coordinated to reduce the combined traffic impacts?
- What strategies can help?

Project Coordination

Seemed like there was a need for a tool that:

- Looks at a program of projects rather than individual conflicts
- Can be applied earlier to affect the process before many decisions are made
- Can be carried through from program planning to project level
- Recommends what to do (not just what to avoid)
- Supports better and more complex decision making

Upcoming work zones – What sequencing is best for managing impacts?



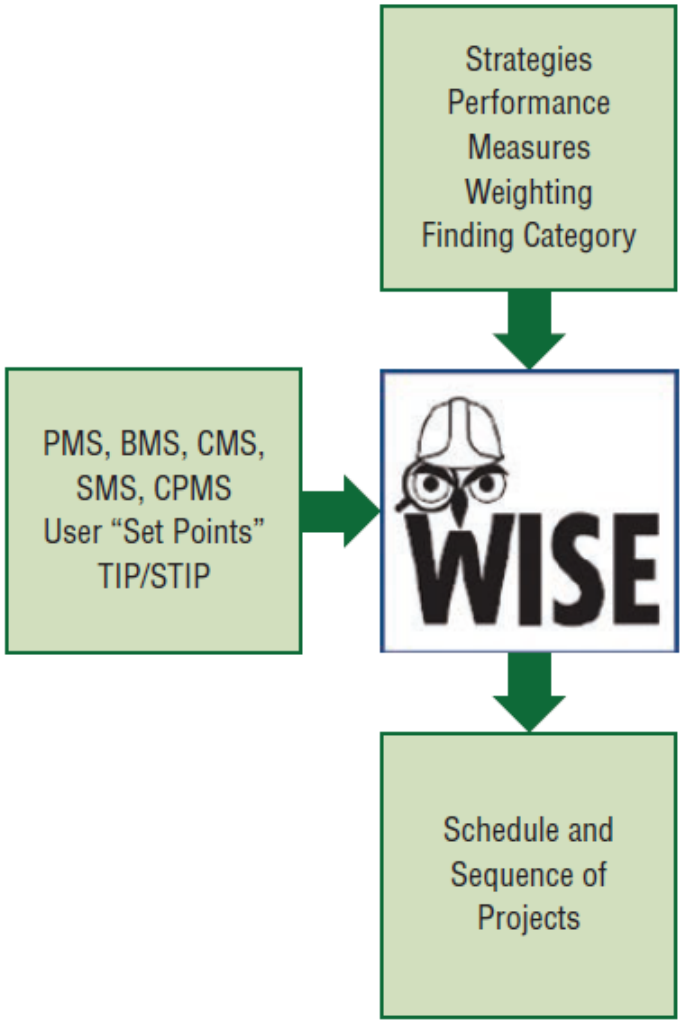
WISE: Work Zone Impacts and Strategies Estimator Software

Solution

- A decision support system for use by planners and engineers.
- Helps them:
  - Evaluate traffic impacts of combinations of work zones
  - Identify best sequencing to manage impacts

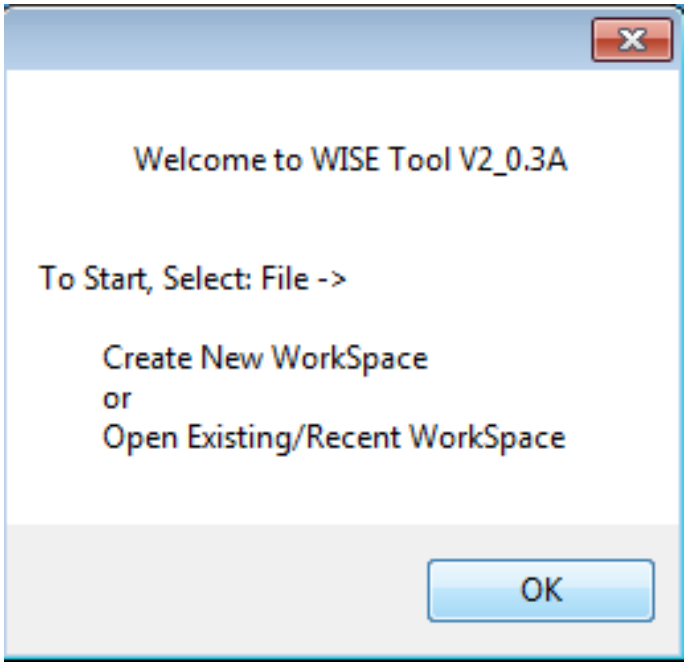
Benefits

- Better coordinated and planned work zones.
- Reduced mobility, safety, and economic impacts of highway renewal activities.
- Increased public satisfaction.



WISE: An Engine in Two Parts

1. Planning Module – (Project Sequencing Optimization Engine)
2. Operations Module – (Microsimulation)



- A converted network and data sets are the only pre-requisites.

* Microsimulation software can be used to create diversion estimates to feed back into the Planning Module.

Planning Module: Data Requirements

- Link – node network with basic geometry
- Basic traffic flow numbers
- Project characteristics and constraints
- Mitigation strategies
  - Demand-based
  - Duration-based

Operations Module: More Refined Diversion Analysis

- Microsimulation provides a more refined estimate of traffic diversion based upon:
  - Additional project information
  - What-if scenarios
  - Interactions with nearby links

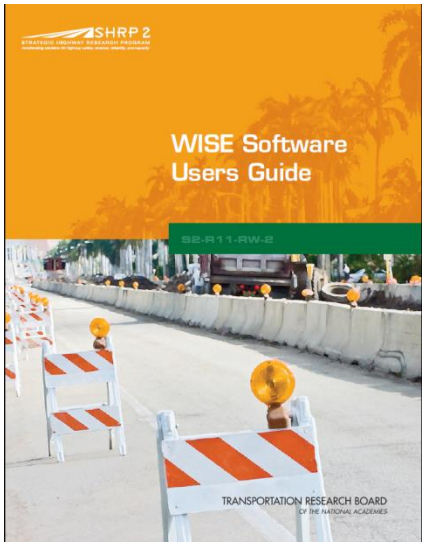
Field Validation and Calibration

- **Validation** - test in locations with completed projects
  - Des Moines, IA
  - Phoenix, AZ
- **Pilot tests** - test in locations with project plans
  - Orlando, FL
  - Worcester, MA
- Continued testing and code stabilization

WISE Products

http://www.trb.org/Main/Blurbs/168143.aspx

- **Software tool**
  - Planning and Operations modules
  - Use existing DynusT network or develop network in WISE
- **User guide**
- **Reports**
- **Target audience**
  - DOT program managers in moderately and densely urbanized States, experiencing congestion, and with an active renewal program
  - Planners and program managers in moderate and large MPOs, with an active renewal program

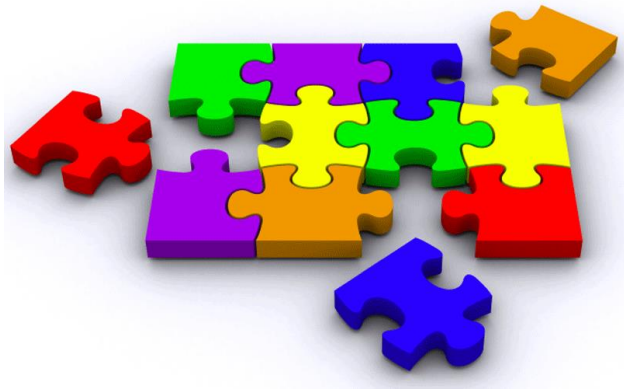


Limitations of WISE

- Labor-intensive to enter a network if not already in NeXTA
- Limited number of work zones for an analysis
- Was not adequately sensitive to changes in inputs
- Results not always intuitive

WISE needed true pilot testing and improvements in user interface and algorithm

WISE Implementation Plan



Implementation Goals

1. Software enhancement and readiness
2. Software validation, demonstration, and application
3. Transportation community awareness and use
4. Institutionalization

R11 Implementation Assistance Projects

- Identify, assess, and address software needs for refinements to address readiness
- Enable and expand software demonstration and application
- Build national work zone traffic analysis knowledge base

SHRP2 Pilot Sites for WISE

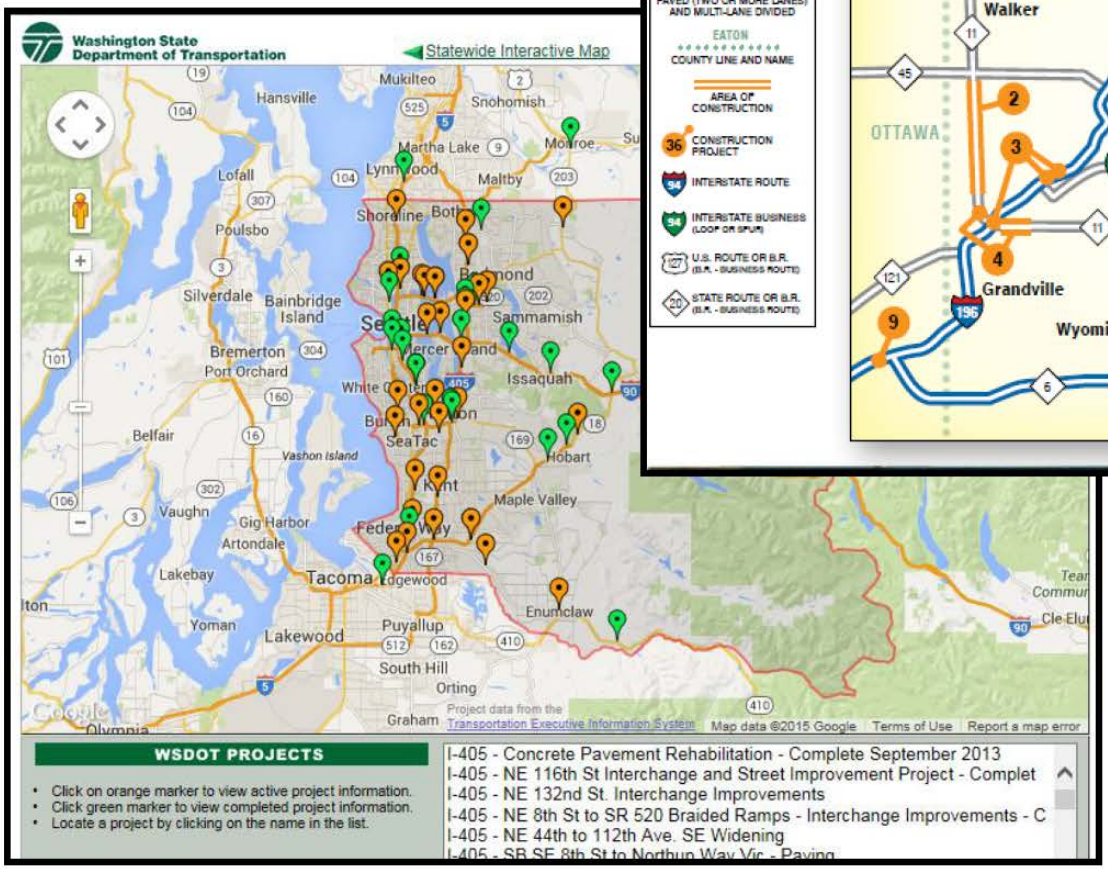
- 2 State DOTs
  - Maryland
  - Tennessee
- 2 MPOs
  - AMBAG MPO – Monterey Bay, CA
  - Metroplan MPO – Orlando, FL
- Received funding from SHRP2 to test and deploy the software in their agencies
- Each has made significant enhancements to WISE

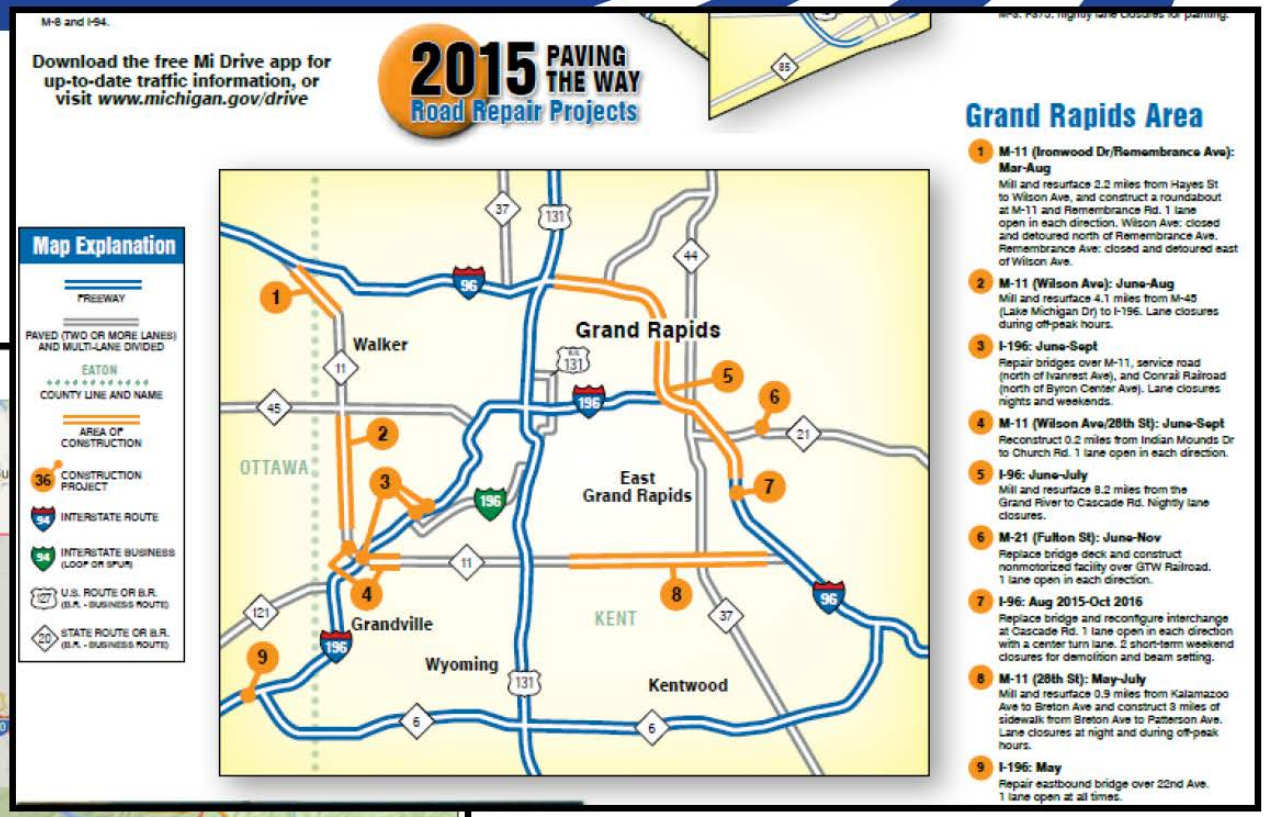
WISE in the Context of a Work Zone Management Program

- Work Zone Safety & Mobility Rule (2004)
- Transportation Management Planning
- State-level work zone safety and mobility
  - Work Zone Delay Policy
  - Processes & Procedures
  - Work Zone Impacts Assessment & Management

  …Project-specific Work Zone Transportation Management Plans
- Increasing number and impacts of highway work zones
- Need for corridor or network-level planning and coordination across multiple projects
- WISE supports the decision making “engine” in work zone transportation management planning

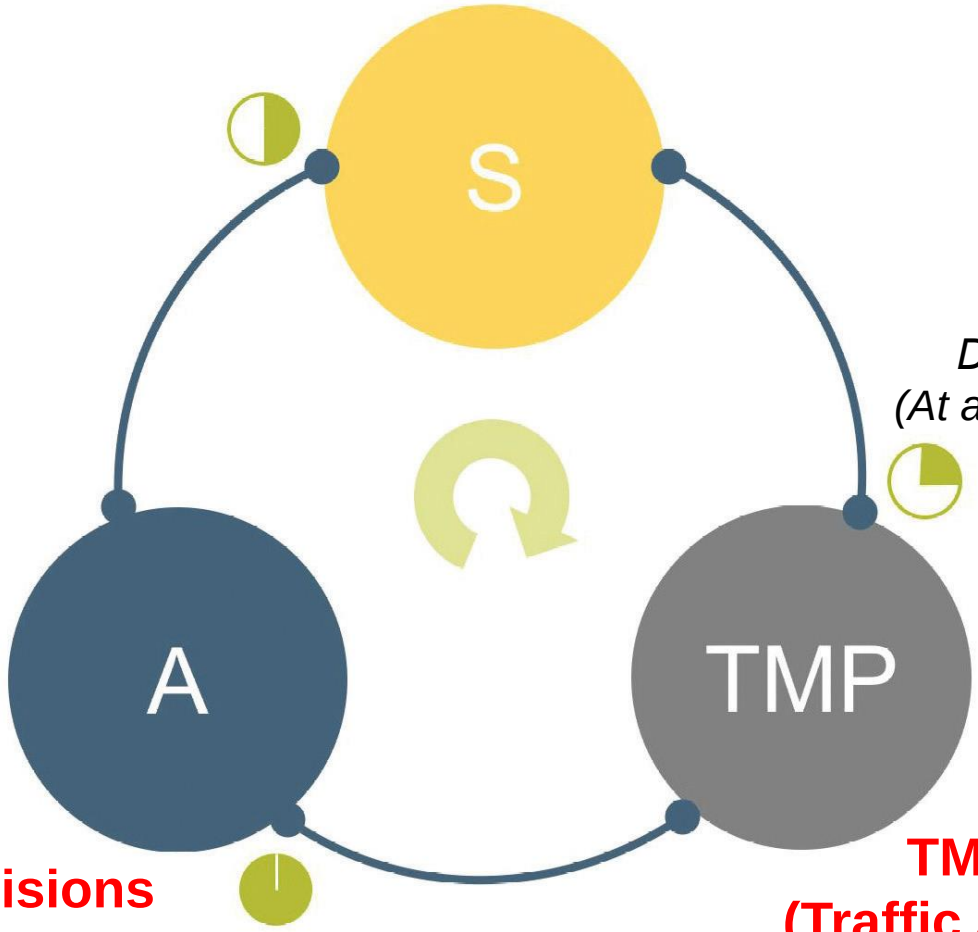
How Travelers Experience Work Zones





Work Zone Decision Engine

Scheduling Decisions

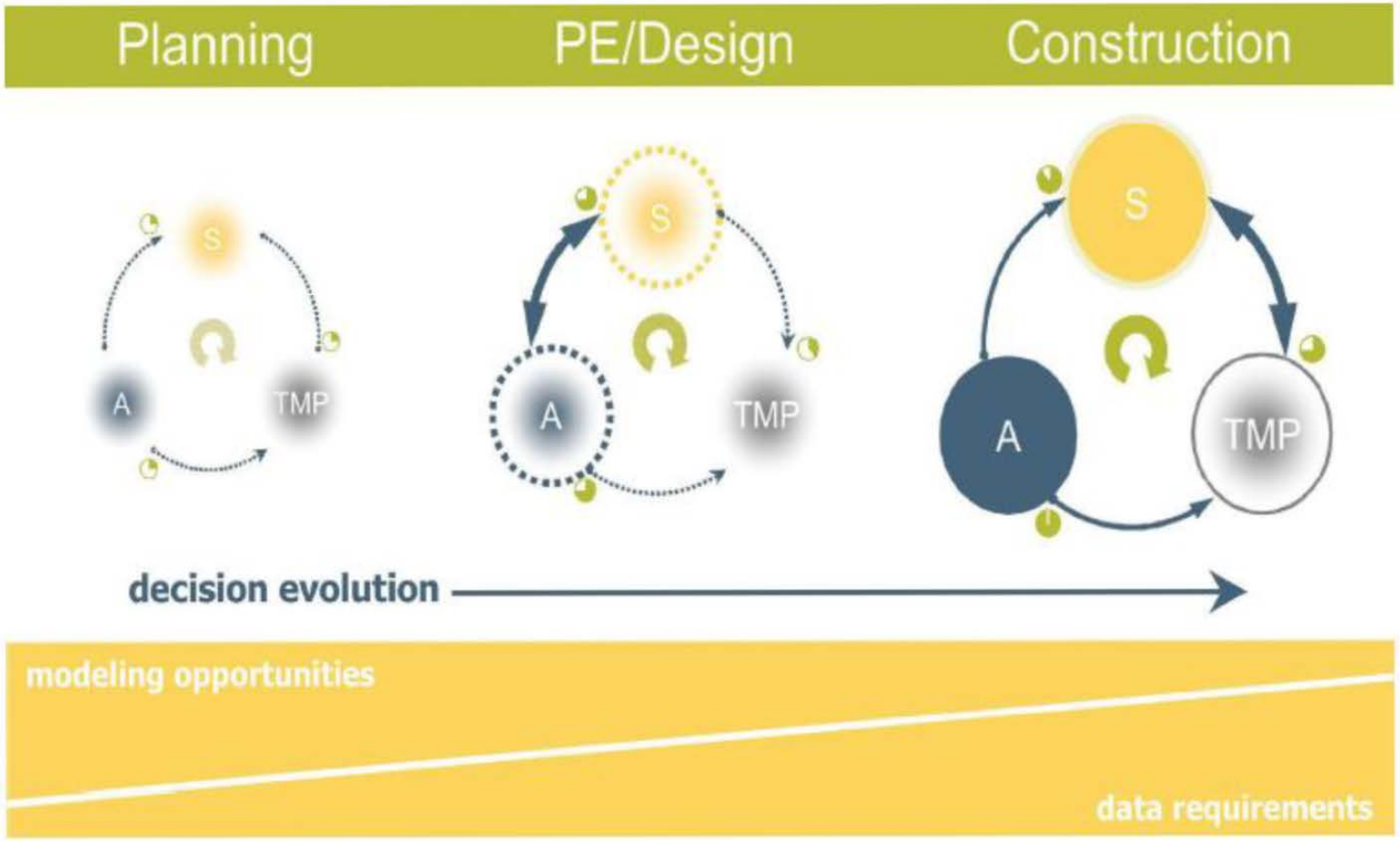


Degree of "Finality"
(At a point in the process)

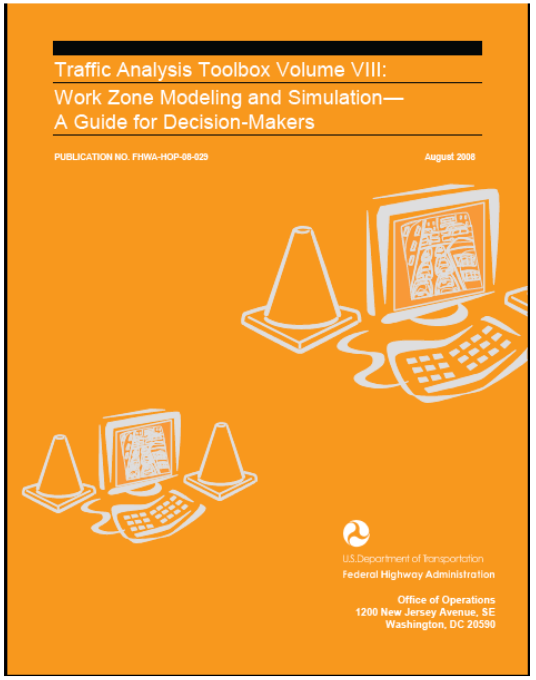
Application Decisions
(Construction Techniques)

TMP Decisions
(Traffic Accommodation)

Work Zone Decision-Making Process



FHWA Work Zone Traffic Analysis Tools Guidance



- **Vol. VIII for Decision-Makers**
  - Guidance for engineers & reviewers
  - "Decision-Making Engine"
  - Selecting correct tools
- **Vol. IX for Analysts**
  - Guidance for analysts
  - Case studies
- **Vol. XII "Decision Framework"**
  - Maintenance of Traffic Alternatives Analysis (MOTAA)
  - Modeling tool selection framework
  - Model development and application process
  - Detailed case studies

http://ops.fhwa.dot.gov/trafficanalysistools/index.htm

Participant Introductions

- Name
- Agency
- Role
- Your agency's key work zone coordination efforts/issues