Improving Business Processes for More Effective Transportation Systems Management and Operations (TSMO) – Work Zone Management

Texas DOT

October 24, 2018
Purpose:
Learn how to apply business process improvements to enhance transportation systems management and operations (TSMO)

Objectives:
• Understand business processes in the context of TSMO
• Understand how enhanced business processes can lead to improved TSMO and Work Zone Management activities
• Apply available tools to develop or improve a specific Work Zone Management business process
• Understand how to apply these principles and tools to enhance other business processes in the future
Agenda

- Welcome and Introductions
- Business Process Applications and Tools for TSMO and Work Zone Management
- Improving Business Processes
- TxDOT Business Process Improvement: Implementing Smart Work Zones
- Lunch Break (off-site)
- Business Process Mapping Exercise
  - Report-Out and Discussion
  - Action Planning
- Applying What You’ve Learned and Next Steps
Background on SHRP2 and Reliability Research

• Pat Zelinski, AASHTO
Welcome and Introductions

Self-Introductions by Participants

- Anyone not at the yesterday’s workshop?
- A few volunteers to share one thing you’d like to learn from this workshop
Feel Free to Comment or Ask Questions at Any Time
Pre-Workshop Poll

Your first TEST!

1. How often do you think you use business processes in your work?

2. How important do you think business processes are in your work?
Pre-Workshop Poll

Go to www.menti.com and use the code 27 15 6

1. Grab your phone
2. Go to www.menti.com
3. Enter the code 68 93 70 and vote!
Pre-Workshop Poll

Use and Importance of Business Process

Participant Poll Results
https://www.mentimeter.com/public/ddb49eee2bb1fa36e848f7cef2581221
Business Processes and Application to TSMO
Overview of Business Process
What is a Business Process?

A series of logically related activities or tasks performed together to produce a defined set of results.
What is a Business Process?

Process Matters!

Several “processes” may be in place, but may not be followed

Change is ever-present (e.g., staff, leadership, technology, operations, reporting needs)
## Types of Business Processes

<table>
<thead>
<tr>
<th>Management Processes</th>
<th>Operational Processes</th>
<th>Supporting Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Govern the overall functioning of the agency’s TSMO effort</td>
<td>Define how the organization performs TSMO</td>
<td>Put in place to support the core operational processes</td>
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- **Needs identification, planning, programming, project development**
- **Operating procedures during, internal/external operating agreements**
- **Training, human resource management, contracting, procurement**

Business Processes Mapping
Business Process Mapping

- **Visual representation** of steps, connections, information flows, and responsibilities from start to finish

- Concise picture of the **sequences of tasks** needed to bring a service from genesis to completion
  - Indicates **decision points**
  - Identifies **when** the process takes place, **why** it takes place, and **who** is involved in the process & responsible for decisions

- A good business process map:
  - Can be **validated**
  - Helps identify **where delays exist**, where smooth handoffs are not taking place, and what steps may be eliminated
  - Helps to **improve** processes
Business Process Mapping Example

Inputs: eggs, milk, bread, butter, bacon, plates, utensils, cookware, potatoes

Outputs: scrambled eggs, toast, crisp bacon, pan-fried potatoes

Prepare Ingredients ➔ Cook Ingredients ➔ Serve Ingredients

Cook Bacon ➔ Cook Eggs ➔ Toast Bread ➔ Fry Potatoes

Heat Pan ➔ Pour Mixture ➔ Stir Mixture ➔ Add Pepper ➔ Remove Eggs
Business Process Mapping
Example (with interactions)

Participants in the Process:
- Mom
- Dad
- Suzie
- Johnny

All:
- Discuss & determine breakfast menu

Mom makes grocery list → Mom buys groceries ("Inputs")

Dad makes breakfast

All:
- Eat breakfast ("outputs")

All:
- Discuss and evaluate breakfast ("outputs")

All:
- Create dirty dishes ("outputs")

All:
- Eat breakfast ("outputs")

Suzie clears the table

Suzie sets dirty dishes next to sink

Johnny washes and dries dishes

INPUTS: eggs, milk, bread, butter, eggs, jam, pears, potatoes, cereal, potatoes

MAKE BREAKFAST

OUTPUTS: scrambled eggs, toast, crisp bacon, plain fried potatoes

PREPARE INGREDIENTS

COOK INGREDIENTS

SERVE INGREDIENTS

COOK BACON → COOK EGGS

TOAST BREAD

FRY POTATOES

HEAT PAN → POUR MIXTURE

STIR MIXTURE

ADD PEPPER

REMOVE EGGS
Business Process
Application to TSMO and Work Zone Management
Application to TSMO

Transportation Systems Management and Operations (TSMO)

“Integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects designed to preserve capacity and improve mobility, safety, and reliability of the transportation system.”

*Supported by ITS technologies*
Application to TSMO

TSMO Strategies

- Traffic incident management
- Road weather management
- Planned special events
- **Work zone management**
- Traveler information (511)
- Arterial management
- Managed Lanes
- Integrated Corridor Management (ICM)
- Active Traffic Management (ATM)
- Transportation Demand Management
- Ramp metering
Application to TSMO

Examples: Work Zone Management Strategies

• Innovative contracting approaches
• Increased stakeholder engagement
• Transportation Management Plans (TMPs)

Technology / ITS / Smart Work Zones:

• Queue warnings
• Variable speed limits
• Speed detection and feedback
• Dynamic merge
• Traveler information - alternate routes, trip times, lane closures, work zone limits
Why are Business Processes Important to TSMO?

• **Successful operational activities** and relationships are highly dependent upon effective business practices.

• Helpful in **breaking down organizational barriers**, improving **coordination**, and increasing **efficiency**.

• Documentation of business processes **enables efficient transition with staff turnover** and new organizational partners.

• **Lack of effective business processes** can **hinder an agency’s capacity** to advance more complex operational strategies.
Why are Business Processes Important to TSMO?

Goal to move from one level to the next

<table>
<thead>
<tr>
<th></th>
<th>1 - Performed</th>
<th>2 - Managed</th>
<th>3 - Integrated</th>
<th>4 - Optimized</th>
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<tbody>
<tr>
<td><strong>Business Processes</strong></td>
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<tr>
<td><strong>Systems &amp; Technology</strong></td>
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<td><strong>Performance Measurement</strong></td>
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<td><strong>Culture</strong></td>
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<tr>
<td><strong>Organization &amp; Staffing</strong></td>
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<td><strong>Collaboration</strong></td>
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Examples of TSMO Business Processes

• TSMO in **planning and programming** processes
  – Work Zone Management strategies in agency-wide plans, policies, budgets
  – Coordination among divisions (e.g. design and construction for WZs)

• Establish **lines of communication** internally and with stakeholders
  – Internal and external communication protocols
  – Statewide or project-specific committees (RWM, TIM, major WZs)

• Develop **agreements** with partners and stakeholders
  – Resource sharing – e.g. fiber, data
  – Define working relationships – local agencies, law enforcement

• Enhance **organizational support** to accommodate TSMO
  – TSMO divisions established, operations-focused training in place

• Evaluate and revise **operating procedures & processes**
  – Standard operating procedures (SOPs) for integrating camera systems
  – Statewide innovative contracting procedures
Work Zone Planning and Monitoring by NCDOT Traffic & Safety Operations Committee

<table>
<thead>
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<tbody>
<tr>
<td><strong>IMPACT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work zone plan review</td>
<td>Monitor and modify as needed during construction</td>
<td></td>
</tr>
<tr>
<td><strong>NCDOT Work Zone Traffic Control</strong></td>
<td></td>
<td></td>
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<tr>
<td>Initiate TMP</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NCSPH / Local Police / Emer. Response</strong></td>
<td></td>
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<tr>
<td>Award Contract</td>
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<tr>
<td>Review Plans</td>
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</tr>
<tr>
<td>Conduct multi-agency plan review meeting</td>
<td></td>
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<tr>
<td>Confirm TMP</td>
<td></td>
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<tr>
<td><strong>Traffic &amp; Safety Engineers</strong></td>
<td></td>
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<tr>
<td>Review Plans (e.g. TMP, TCP)</td>
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<tr>
<td><strong>NCDOT Division Office</strong></td>
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<tr>
<td>Initiate TMP</td>
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<tr>
<td><strong>Contractor</strong></td>
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<tr>
<td>Review Plans</td>
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<tr>
<td>Review Plans (e.g. TMP, TCP)</td>
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<tr>
<td>Implement Work Zone</td>
<td></td>
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<tr>
<td>Implement traffic shift</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance issues?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Modify work zone plans?</td>
<td>No*</td>
<td></td>
</tr>
<tr>
<td>Implement solutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work zone complete?</td>
<td>No</td>
<td>No*</td>
</tr>
<tr>
<td>Issue addressed?</td>
<td>No</td>
<td>No*</td>
</tr>
<tr>
<td>Project complete, remove work zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluate impacts and identify policy changes</td>
<td></td>
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</tr>
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**LEGEND**
- Start or End Points
- Steps
- Decisions or Alternatives
- Direction of Flow

Michigan DOT Work Zone Traffic Control Modeling

### Specific Process (MDOT Work Zone Traffic Control Modeling)

- **Policy Level/Organizational Structure**: MDOT Metro Region Planning
  - Project Initiated
  - MDOT Metro Region Construction
  - MDOT Traffic & Safety MITS Center Operations

- **Evaluation/Documentation**
  - Evaluate impact of closure strategy based on total delay and cost of delay

- **Steps**
  - Develop Traffic Control Models
  - Evaluate Alternatives
  - Construct and Operate Work Zone

- **Decisions or Alternatives**
  - Evaluate alternatives for construction closure and select a plan
  - Evaluate impact of closure strategy based on total delay and cost of delay

- **Legend**
  - Start or End Points
  - Steps
  - Decisions or Alternatives
  - Direction of Flow

**What Business Processes Do You Use in Your Work?**

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**Diagram:**
- Needs identification, planning, programming, project development
- Operating procedures during, internal/external operating agreements
- Training, human resource management, contracting, procurement

Issues and Challenges

• Business processes and changes can be developed at a relatively low cost!

• However they can be difficult to accomplish:
  – Requires input of multiple individuals
  – Current processes are often entrenched
  – Some processes may be beyond the control of DOT
  – People generally don’t like change
  – Need to make the case for business processes
No two agencies or regions are alike

- Unique institutional policies and cultures
- Different organizational structures and reporting relationships
- Variation in stakeholders
- Varying and sometimes changing levels of institutional readiness and leadership support for TSMO
- Different TSMO strategies require different types of business processes
Tools for Developing Business Processes
There is no one-size-fits-all solution to developing and improving business processes...

But there are tools agencies can use to IDENTIFY / DEVELOP / IMPROVE business processes within unique environments
Tools for Business Processes

- **FHWA Capability Maturity Frameworks (CMF)**
  - Assess various aspects of an operations program
  - Online self-assessment tools to identify actions & business process improvements

- **Primer: “Improving Business Processes for More Effective Transportation Systems Management and Operations”**
  - Developed under the Second Strategic Highway Research Program (SHRP2) L01 (Businesses Processes for Reliability)
  - Guidance with 7-step approach to improve business processes

- **E-Tool for Business Processes to Improve Travel-Time Reliability**
  - For use in group setting, to create or improve a business process
Assess capabilities, identify improvements, select actions

**Online Assessments:** Work Zone Management, Traffic Management, Signal Management, Special Event Management, Incident Management, Road Weather Management

Available at: [https://ops.fhwa.dot.gov/tsmoframeworktool/index.htm](https://ops.fhwa.dot.gov/tsmoframeworktool/index.htm)
TSMO Business Process Primer

Helps transportation agencies accomplish the following:

- Understand the **importance of developing sustainable business processes** to effectively advance TSMO as a mainstream, core agency function
- Assess agency **business processes related to TSMO**
- Identify **constraints and gaps** within agencies’ current business processes
- Engage **the right stakeholders** to identify needs and develop actions and strategies that can improve business processes to support more effective TSMO programs
TSMO Business Process Primer

1. Introduction
2. Business Process Development
3. Traffic Incident Management
4. **Work Zone Management**
5. Planned Special Events
6. Road Weather Management
7. Traffic Management
8. Checklist for Getting Started
9. Available Resources

- Business process issues
- Case studies
- Example questions to consider in identifying specific business process issues
- Business process challenges
- Potential stakeholders
Introduction to E-Tool

• Developed as a follow-up to SHRP2’s Integrating Business Processes to Improve Travel Time Reliability (L01) research

• E-tool used as a discussion guide to:
  – Define and evaluate current business processes
  – Identify improvements to enhance operations
  – Help remove barriers to implementing and maintaining improved processes
  – Capture inputs and action items

• Orientation module and application module

• Available at:
  http://www.fhwa.dot.gov/goshrp2/Solutions/Available/L06_L01_L31_L34/Organizing_for_Reliability_Tools
Business Processes and Application to TSMO
Preparing for Business Process Improvement

• **Engage Stakeholders**
  – Critical for effective process improvements
  – Involving multiple perspectives can raise awareness of potential or actual issues that might not otherwise be identified

• **Assemble Relevant Materials**
  – Planning documents (TSMO plans, ITS architecture, long-range plans)
  – Organizational structures (org charts, levels of authority)
  – Agency mission statement, goals, and objectives
  – Performance measures and data
  – Agreements, policies, guidelines
  – Current operating procedures

• **Facilitate a forum for examining business processes**
  – Workshop or structured discussions
7-Step Approach for Improving Business Processes
Step 1 - Identify Influences

What made it apparent that there is a need to improve a business process in order to improve travel time reliability?

- TOP DOWN
- EVENT DRIVEN
- NEEDS BASED
Top Down Influences

- Also known as “big directive”
  - Legislative requirements
  - Directives from agency management
  - New venues or expansions driven by elected officials
    - Need for coordinated special event management with new event facilities
    - Need for signal retiming with new development
Event Driven Influences

• Caused by a specific event or hazard
  – Fatality in a construction work zone
  – Weather event causing significant impacts to travelers
  – Major incident with significant closure times and traffic disruption
  – May be accompanied by media and public perception impacts
Needs Based Influences

• Also known as “opportunity based”
  – Initiated at grass-roots level
  – Evolves over time according to recurring needs
  – Influences day-to-day operations
  – E.g. Florida DOT Road Rangers Highway Assistance Program
    • Initially implemented for work zones
    • Later expanded to assist stranded motorists
2 – Define Goals

• Used to measure success
• Focuses your efforts
• Assists in developing benchmarks
  – Reducing incident clearance time
  – Providing 24/7 operations
  – Improving resource efficiency
  – Reducing congestion
  – Reducing delays
2 – Define Reliability Goals

Examples:

• Provide incident clearance within 60 minutes for major freeway incidents

• Achieve on-time performance service within 5% of scheduled times for major transit bus routes

• Reduce delays through work zones by providing information about alternate routes

• Achieve actual travel times through work zones within 10% of anticipated travel times
• As previously discussed, a **business process**:  
  – Defines a series of actions or activities that result in a specific or desired outcome to accomplish a goal  
  – Is likely something your agency does on a daily basis

• This step documents the existing business process
Why?

• Better understand your current process
• Identify appropriate stakeholders
• Identify gaps in communications or data flows
• Identifies roles and responsibilities to:
  – Ensure continuity
  – Retain institutional knowledge
Change or develop new business process to reflect:

- Influences, goals, policy, procedures
- Input from stakeholders
- How could the process be improved?
4a – Develop/Change Process

• Document the process or reverse engineer the current process
  ➢ Data flows
  ➢ Decision points
  ➢ Process integration points
  ➢ Critical input and output
  ➢ Responsible entities
  ➢ Integration of processes

• Create a visual representation of the process

Business Process Mapping
Business Process Mapping – Symbols

- **Start or End Point**
- **Steps in a Process**
- **Decisions or Alternatives**
- **Direction of Flow**
3 – Identify and Document Business Processes

Work Zone Planning and Monitoring – NCDOT Traffic and Safety Operations Committee

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<td>Notify Media / Public Outreach</td>
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<td>Conduct multi-agency plan review meeting</td>
<td>Evaluate impacts and identify policy changes</td>
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<tr>
<td>Award Contract</td>
<td>Changes to WZ Plans?</td>
<td>Identify cause and solutions</td>
</tr>
<tr>
<td>Plan review meeting</td>
<td>Modify work zone plans*</td>
<td>Evaluate impacts and identify policy changes</td>
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<td>Performance issues?</td>
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<td>Work Zone</td>
<td>Work zone complete?</td>
<td>Evaluate impacts and identify policy changes</td>
</tr>
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<td>Evaluate and document</td>
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LEGEND
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- Steps
- Decisions or Alternatives
- Direction of Flow
4b - Implement Process

• The approach to this step varies:
  – Number of agencies involved
  – Depth of process

• Involve all stakeholders

• Timeframe for implementation
  – Depends on agency’s ability to develop/change the current business process
  – Needs to be sufficient to allow stabilization of new process
  – May include more than one iteration to implement/assess
5 – Assessing the Process

Important to determine the effectiveness of the newly developed process
5 – Assessing the Process

• Assessment:
  – Identify measures of success
  – Outline methods of continuous evaluation
  – Identify data needed
  – Review results against the defined goals

• Benefits:
  – Better communication with stakeholders
  – Opportunity for ongoing performance measurement
  – Comparison to pre-implementation conditions
6 – Documenting the Process

• Formal documentation occurs once the process has been implemented and proven effective

• Includes:
  – Details of the business process
  – Assessment procedures
  – Benefits
  – Lessons learned
  – Roles and responsibilities
6 – Documenting the Process

• Facilitates updates to processes as conditions change

• Examples of documentation:
  – Internal memoranda
  – Memoranda of understanding
  – Agreements between stakeholders
  – User guides
  – Reports
  – Flowcharts
Institutionalizing the Process

- Process is embedded into existing policies or programs
- Starts at higher levels and survives changes in management
- Linked to established agency goals
- Documentation is key!
7 - Institutionalizing the Process

• Strategies for Institutionalizing Process
  – Obtain buy-in and ongoing support
  – Link to agency goals
  – Make documentation accessible and available
  – Maintain documentation – keep it current
  – Communicate performance to inform management and decision-making
TxDOT Business Process

“Implementing Smart Work Zones”
Resources for TxDOT Smart Work Zones

Henry Wickes, TxDOT and John Song, AECOM
SMART WORK ZONE STANDARDS DEVELOPMENT

John Song, PhD, PE
AECOM
Agenda

- General process for standards development
  - Smart Work Zone Systems Considered
- Smart Work Zone Specifications
- Smart Work Zone Guidelines
  - Selection criteria for the Smart Work Zone Systems
- Smart Work Zone Standard Drawings
- Next Step
General Process

- State of the Practice Review
- State District/Division Surveys
- Initial Recommendations
- Initial Standard Sheet, Specs and Design Guidelines Development
- State Districts and Vendor/Manufacturer Comments
- Revised Standard Sheets, Specs and Design Guidelines Development
- State Spec Committee Approval
- Submittal to Outside Agencies and other State Entities - Finalizing
General Process

State District/Division Surveys:
- Intended to solicit District input on operational needs and requirements.
- Distributed to all Districts 8/23/17.

Standard Sheet, Specs and Design Guidelines Development:
- Distributed to Districts and Vendors 12/1/17 for review.
- Focused on 6 proposed work zone ITS systems.
- Received responses from 12 districts, TRF, and 5 vendors/integrators.
- Proposed Specs were submitted to CST - Specification Committee.
- All six proposed specs approved with comments at February 2018 Spec Committee meeting.
- CST to submit to AGC, FHWA, etc. for review.
- Addressed comments from review.
General Process

Systems Considered:

» Temporary Queue Detection System (End of Queue Warning System)
» Temporary Travel Time System
» Temporary Construction Equipment Alert System
» Temporary Incident Detection and Surveillance System
» Temporary Over-height Vehicle Warning System
» Temporary Speed Monitoring System

Smart Work Zone Scope:

» Specifications
» Guidelines
» Standard Drawings
Problem Statement:

- Incoming vehicle being confronted with slowed or stopped traffic in work zone

Countermeasure:

- A system with queue detector, messaging feature, and a network to link the two and TMC
- Increase situational awareness
Problem Statement:
• Excessive, unsafe speed in work zone
• Non-uniformity of speed (high or low)

Countermeasure:
• Basic system: trailer mounted radar detector with 2-digit LED message board
• Advanced: speed compliance system
• Improve speed compliance
**Problem Statement:**
- Construction vehicle merging to traffic stream from work zone

**Countermeasure:**
- Truck detector, a message board and wireless communication to trigger the sign
- No link to TMC required
- Inform approaching vehicle
Problem Statement:
- Motorist need travel time / delay in advance work zone

Countermeasure:
- Detector throughout the work zone to calculate travel time, message board and communication links
- Make informed decision, set realistic expectation, encourage diversion
Problem Statement:
- Higher than normal incident risk in most work zones and worse impact

Countermeasure:
- Speed detector, CCTV and communication links
- Reduce the time to detect, respond and clear incidents
Problem Statement:
• Higher than normal incident risk in most work zones and worse impact

Countermeasure:
• Speed detector, CCTV and communication links
• Reduce the time to detect, respond and clear incidents
Specifications

Performance based Specifications

- Statewide Specifications
- Materials requirement
- Equipment requirement (hardware, communications, and etc.)
- Performance requirement
- System Coordinator duties
- Measurement of the item
- Payment including deductions for failed systems
Guidelines

- Description of each system
- Identification of data needs
- Conceptual layout drawings for each system
- Criteria and selection process for determining feasibility
- Design guidelines, metrics
Selection Criteria

• Example scoring criteria to establish feasibility of WZ ITS -- FHWA document (page 25).

• Similar Proposed Scoring criteria were developed in guidelines document.

• Go/No-Go Decision Tool for each of the Smart Work Zone system is available in:
  • Excel Spreadsheet
  • Printable version in Guideline Appendix

Source: FHWA "Work Zone Intelligent Transportation Systems Implementation Guide" (Page 25)
Selection Criteria

Factors considered are:

- Duration of work zone
- Road Functional Class
- ADT
- Local Generators
- Alternate routes availability
- Estimated queue lengths
- Other issues are expected (e.g. Extreme weather, Complex traffic control layouts, Merging conflicts, Speed variability...)

<table>
<thead>
<tr>
<th>Scoring Factors</th>
<th>Scoring Range Criteria</th>
<th>Score</th>
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<tbody>
<tr>
<td>Impact from local traffic generators</td>
<td>Significant local facilities are large enough to have official destination signs on the interstate highway such as conference centers, sports arenas, etc., so they produce large volumes traffic during large events (20 points)</td>
<td>0</td>
</tr>
<tr>
<td>Est. Queue Length (calculated, or see Max Queue Length tab for rough estimate)</td>
<td>&gt; 7 mile (130 points) 5.5 to 7 mile (60 points) 0 to 5.5 mile (5 points) none (0 points)</td>
<td></td>
</tr>
<tr>
<td>Sight Distance at back of Queue</td>
<td>Sight distance issues exist where the back of queue will likely occur. (30 points) Not applicable (0 points)</td>
<td></td>
</tr>
<tr>
<td>Existing traffic issues</td>
<td>Higher than normal crash rates, gradual or frequent cut ramp backups (20 points) Not applicable (0 points)</td>
<td></td>
</tr>
<tr>
<td>Availability of Alternate routes merging conflict or hazards on the approach to frontage road</td>
<td>A convenient alternate route is available and can be available (5 points) No alternate route available (0 points)</td>
<td></td>
</tr>
<tr>
<td>Complex traffic control layout</td>
<td>External merging conflicts or hazards on the approach to or within the workzone (5 points) Not applicable (0 points)</td>
<td></td>
</tr>
<tr>
<td>Adjacent/consecutive project</td>
<td>There are adjacent or consecutive projects that impact the area... (5 points) Less than 2 miles of between 2 to 5 miles (1 point) Less than 5 miles (0 points)</td>
<td></td>
</tr>
<tr>
<td>Scattered/short term project</td>
<td>The project includes multiple short-term projects requiring coordination that are scattered across the state. (5 points) Not applicable (0 points)</td>
<td></td>
</tr>
<tr>
<td>Extreme weather condition</td>
<td>Work zone has a known history of severe extreme weather conditions, conditions, etc. Or project duration covers several harsh weather seasons. (5 points) Not applicable (0 points)</td>
<td></td>
</tr>
<tr>
<td>Connected vehicle</td>
<td>Project fits inside an existing Advanced Traffic Management System? (2 points)</td>
<td></td>
</tr>
<tr>
<td>Existing ITS Systems</td>
<td>The TMC has the intent to incorporate the travel time and delay estimating system into the TMC operations? (2 points)</td>
<td></td>
</tr>
<tr>
<td>Heavy vehicles</td>
<td>&gt;15% (5 points) &lt;15% (0 points)</td>
<td></td>
</tr>
</tbody>
</table>

Flow Score: 0
Normlized Score (0 to 100): 0
• Temporary Queue Detection System

• Two Types of System:
  • Estimated Queue <=3.5 mile
  • Estimated Queue <=7.5 mile

• Layout of Smart Work Zone Devices

• Guideline for PCMS Messages
Next Step

- Smart Work Zone Standards Training Workshop
  » On-site meeting with WebEx option
  » Recorded session
  » December 2018
Contact

TxDOT – Traffic Safety Division

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Applying the 7-Step Approach to Implementing Smart Work Zones
Applying the 7-Step Approach

1. Influences
2. Define the Specific Reliability Goal
3. Identify and Document Current Business Processes
4. Develop/Change Process
5. Assess Process
6. Document Process
7. Institutionalize Process

Operational Integration

Programmatic Integration
Implementing Smart Work Zones:
• Focus on business process from planning through procurement

Overview of Steps:
Step 1: Identify Influences
Step 2: Define Goals
Step 3: Identify Current Process
• Existing TxDOT project development process in place
• Use of Smart Work Zones is ad-hoc, roles not clearly defined

Step 4a: Develop New Process
– Large group – discuss initial planning considerations
– Small breakout groups - map out process for using Smart Work Zone guidelines and resources – 3 scenarios
– Large group - reconvene for reports from small groups

Steps 5-7: Assess, Document, Institutionalize the Process
Current Project Development Process

**TxDOT Project Development Process:**
- Early Design Stage
- Budget Estimations
- Road/Bridge Design Process
- Traffic Management Plan
- Letting
- Construction

Using the new Guidelines and Resources, Smart Work Zones are considered early in the planning and procurement process.
Implementing Smart Work Zones

Initial Planning Considerations:

- How are SWZ strategies considered early in the planning process for construction projects? By whom?
- What stakeholders are involved in planning for SWZs? Internal and external?
- Is the data needed for assessment/scoring available in your district? Gaps? How to obtain data if not readily available?
Implementing Smart Work Zones

Business Process Mapping Exercise:

- At what point in the process are the SWZ Guidelines used? By whom?
- Who is responsible for selecting the Smart Work Zone strategies? Are any checks or approvals required? How is final decision made?
- How will the selected temporary SWZ system be connected to in-place TMC systems (e.g. ATMS, communications infrastructure)? How is this coordinated? Who is involved?
- How are optional system features determined?
- How are data collection needs from Guidelines determined and incorporated into contract documents? Who is involved?
- How will resources for contracting (special specs, plan sheets) be accessed and incorporated?
Steps 1-2: Influences and Goals

Influences and Goals (Large Group):

- Step 1 - Influences
- Step 2 – Define Goals
Step 3 – Current Process

**TxDOT Project Development Process:**
- Early Design Stage
- Budget Estimations
- Road/Bridge Design Process
- Traffic Management Plan
- Letting
- Construction

- Use of Smart Work Zones is ad-hoc, roles not clearly defined
- Using the new Guidelines and Resources, Smart Work Zones are considered early in the planning and procurement process.
Initial Planning Considerations (Large Group):

• How will SWZ strategies be considered early in the planning process for construction projects? By whom?

• What stakeholders should be involved in planning for SWZs? Internal and external?

• Is the data needed for assessment/scoring available in your district? What are the data gaps? How to obtain data if not readily available?
After lunch, we will convene back for instructions
Then break into small groups

Consider a construction project:
- Map out process from initial planning to procurement
- Includes a Smart Work Zone in one of the following:
  1. Urban/metro scenario
  2. Rural freeway scenario
  3. Rural non-freeway scenario
Lunch Break (Off-site)
Business Process Mapping Exercise
Instructions and Small Group Breakouts
INSTRUCTIONS for Business Process Mapping Exercise:

➢ Break into small groups

➢ Consider a construction project:
  • Map out process from initial planning to procurement
  • Includes a Smart Work Zone in one of the following:
    1. Urban/metro scenario
    2. Rural freeway scenario
    3. Rural non-freeway scenario
Step 4a – Develop Process
Business Process Mapping Exercise

➢ Create a process map (using flip chart paper)
  • Identify key stakeholders
  • Identify start and end points
  • Show key inputs, outputs, steps, and decision points
  • Indicate who is responsible for each step and when that occurs within the existing process for construction planning, design, and operations

![Diagram with symbols: Start or End Point, Steps, Decisions or Alternatives, Direction of Flow]
### Step 4a – Develop Process Business Process Mapping Exercise

- During process mapping, consider the boxes and questions on your handout

<table>
<thead>
<tr>
<th>Identify work zone</th>
<th>Gather data</th>
<th>Analyze data</th>
<th>Select Smart Work Zone</th>
<th>Engage stakeholders</th>
<th>Integrate SWZ with TMC</th>
</tr>
</thead>
</table>

- **NOTE:** Assign a reporter who will provide an overview of the process map created during report-outs
REMINDERS:
• Visual representation of steps & connections
• Concise picture of sequence of tasks
  – Identify when each step takes place and who is responsible
  – Call out decision points
• A good business process map should:
  – Show where improvements can be made
  – Where smooth handoffs are not taking place
  – What steps may be eliminated
Small Group Breakouts
(60 minutes)
Re-Convene in Large Group to Review Mapping
Re-Convene in Large Group:

- Report-out from Small Groups
  - Share process maps: key steps, responsibilities, decision points

- Discussion
  - Similarities and differences among process maps?
  - What do you like about each map?
  - Does the process change for metro, rural freeway, rural non-freeway? How?
  - Should maps be merged?
Looking Ahead
Looking Ahead

Continue documenting 7-Step Approach:

• Step 4b – Implement the Process
• Step 5 – Document the Process
• Step 6 – Document the Process
• Step 7 – Institutionalize the Process
Action Planning
Action Planning

• **Small Group Breakouts**
  – Develop action items
  – Bring top 3 actions back to large group

• **Groups Report Out**
  – Recommend your group’s top 3 action items

• **Large group discussion**
  – Prioritize and document highest priority action items
Applying What You’ve Learned and Next Steps
Other Aspects of Implementing Smart Work Zones

• Do TxDOT field staff have adequate expertise to oversee Smart Work Zone strategies in the field?

• How are issues and lessons learned identified from Smart Work Zone deployments? How are these communicated to facilitate future improvements?

• How is work zone data evaluated and archived?

• What additional outreach/training is needed?
Next Steps and Wrap-Up

- PDH Tracking Form
- Workshop Evaluation

Next Steps:
- Workshop Summary Report – to be distributed to agency champion
  - Business process map
  - Action items
THANK YOU for your participation!