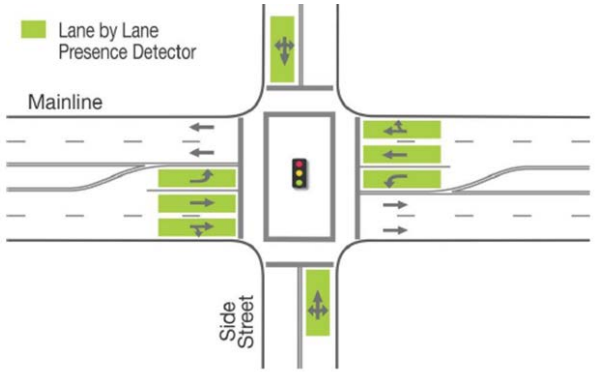
OREGON DEPARTMENT OF TRANSPORTATION

TRAFFIC SIGNAL MANAGEMENT PLAN (TSMP)

MARCH 10, 2020

TSMP

- Purpose
- Background & Outline
- Operational Objectives
- Performance Measures
- Next Steps



TSMP

Purpose

- Describe how the traffic signal system supports the transportation and mobility goals of ODOT and partner agencies
- Identify typical operational situations and objectives for varying context-based scenarios
- Provide a framework to sustain and advance the design, operation and maintenance of the traffic signal system
- Provide a basis for funding operations and resources
- Provide a basis for succession planning

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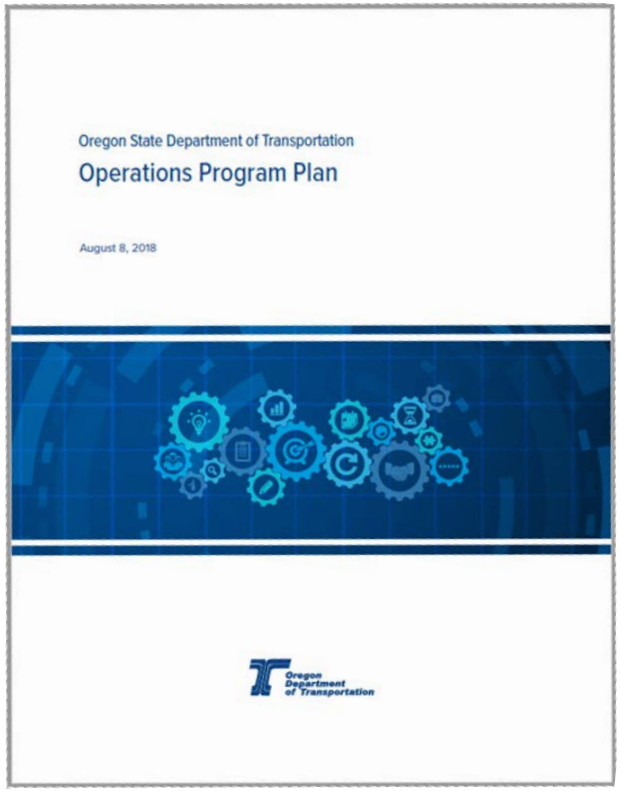
Background - Why



- Operations quick fix program
- Operations guide
- ***Traffic signal management plan***
- Operations program training plan
- Recruitment & retention strategy
- Private sector data sharing

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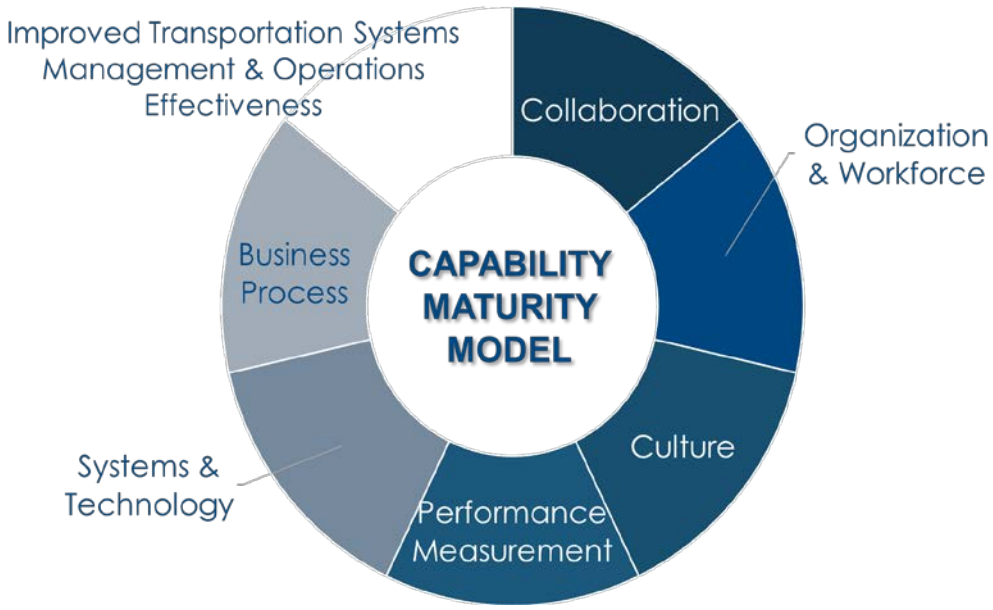
Background - Efforts

U.S. Department of Transportation
Federal Highway Administration

FHWA TSMP Workshop

ODOT CMM – Self Assessment



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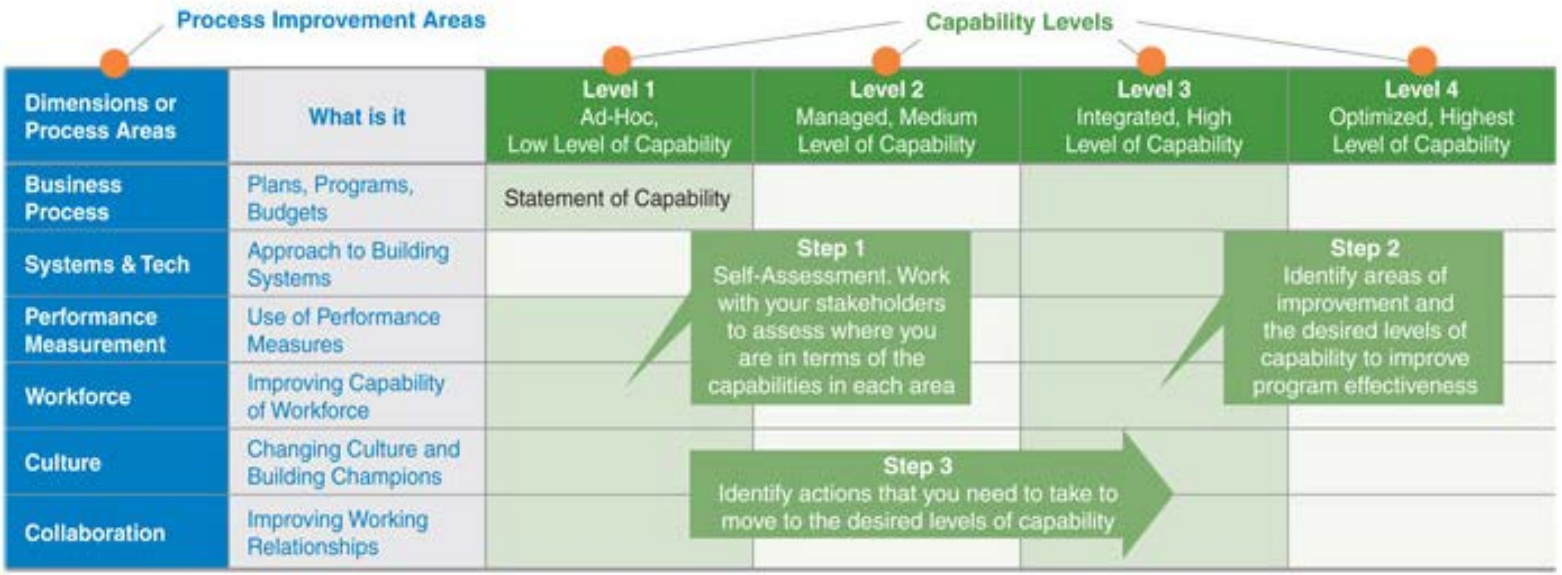

Dimension	ODOT Level
Business Process	
Design	2.1
Operations	1.9
Maintenance	1.5
Management	1.3
System & Technology	1.5
Infrastructure	1.6

Dimension	ODOT Level
Workforce	1.8
Organization & Staffing	1.3
Performance Measurement	1.5
Workforce	1.8
Culture	1.5
Collaboration	1.2

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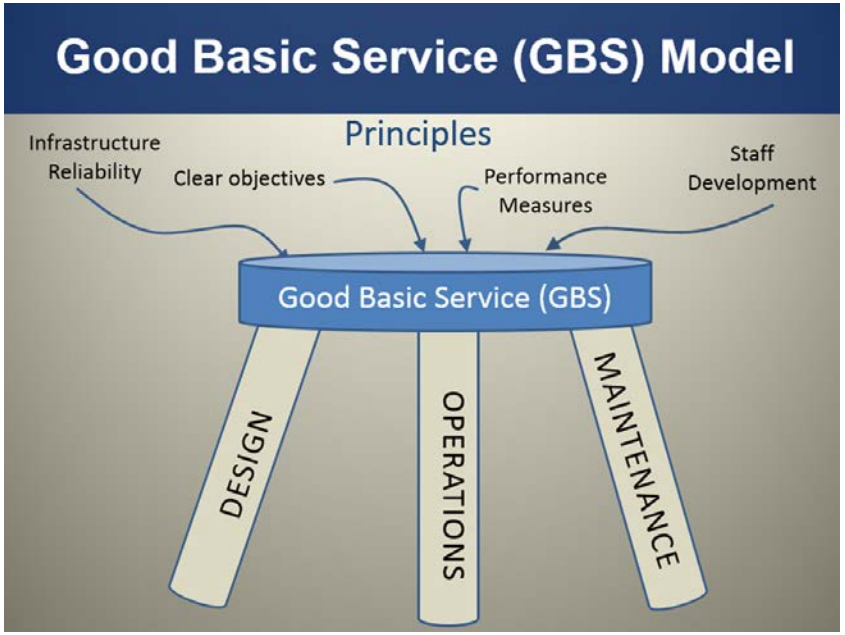
Background - Good Basic Service

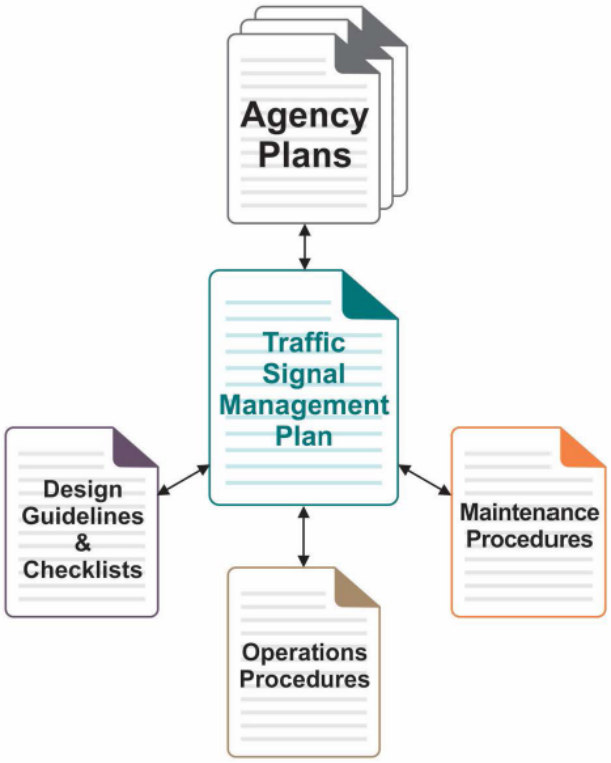
- Document processes
- Clearly articulate objectives
- Have expert, committed staff
- Have predictable resources
- Measure performance in a meaningful way



TSMP

Document Outline

- Mission, Goals, Objectives
- Strategies and Tactics
  - Design
  - Operations
  - Maintenance
- Performance Measures
- Action Plans
- Management (Future)*
  - Administration
  - Budgeting
  - Staffing



Source: DKS

Figure 2. Graphic. Relationships among agency documents.

*Note: Current TSMP to be used to inform this future section

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GOST

Source: FHWA

TSMP

Mission & Goals - Oregon Department of Transportation provides a safe and reliable multimodal transportation system that connects people and helps Oregon's communities and economy thrive.

TSMP Goals

1) Optimize mobility and accessibility
2) Maximize operational efficiency
3) Provide safe right-of-way assignment
4) Support economic vitality
5) Preserve traffic signal infrastructure
6) Develop workforce (Future)

TSMP

Goals & Objectives

- Design
- Operations
- Maintenance

Goal 1 – Optimize mobility and accessibility
Objective D-1: Design traffic signals to accommodate all users (pedestrians, bicycles, vehicles, transit and freight) **Objective O-1**: Operate traffic signals to accommodate all users (pedestrians, bicycles, vehicles, transit and freight) **Objective O-2**: Operate traffic signals based on context and operational objectives
Goal 2 – Maximize operational efficiency
Objective D-2: Design traffic signals with appropriate infrastructure (controllers, detection, communication) to allow flexible operations. **Objective O-2**: Operate traffic signals based on context and operational objectives. **Objective O-3**: Proactively monitor traffic signal (system) operations **Objective O-4**: Coordinate with neighbor agencies to develop regional solutions **Objective M-1**: Maintain traffic signal infrastructure so that it operates as it was designed to.
Goal 3 – Provide safe right-of-way assignment
Objective D-3: Design traffic signals with appropriate infrastructure (controllers, detection, communication) and signal phasing to provide safe operations. **Objective O-2**: Operate traffic signals based on context and operational objectives. **Objective M-1**: Maintain traffic signal infrastructure so that it operates as it was designed to.
Goal 4 – Support economic vitality
Objective D-1: Design traffic signals to accommodate all users (pedestrians, bicycles, vehicles, transit and freight) **Objective O-1**: Operate traffic signals to accommodate all users (pedestrians, bicycles, vehicles, transit and freight)
Goal 5 – Preserve traffic signal infrastructure
Objective D-4: Design traffic signal with reliable infrastructure and equipment **Objective M-1**: Maintain traffic signal system proactively so it operates as intended. **Objective O-3**: Proactively monitor traffic signal (system) operations **Objective M-2**: Undertake maintenance in a cost-effective manner.
Goal 6 – Develop workforce (Future)

Performance Measures Vs. Detection Requirements

STOP BAR PRESENCE DETECTION:

Phase Termination – graphical representation of why each phase terminated (Gap Out, Max Out, Force Off, Ped)

Split Monitor – report showing the duration of each phase per cycle and the reason for phase termination.

Split Failure – report showing when a phase "fails" (based on occupancy ratios)

Benefits:

Helps evaluate/optimize local operations

Helps determine if Max/Split times set appropriately

Helps identify potential detector failures

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Objectives – Context Based

How do you operate traffic signals given the following conditions?

- Isolated Intersection
  - Congested
  - Uncongested
- Corridor/Network
  - Congested
  - Uncongested
- Interchange Ramps
  - Isolated
  - Corridor
- Special Conditions
  - Event
  - Downtown Grid
  - Bicycles
  - Transit
  - Freight
  - Inter-agency
  - Others?

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Objectives – Metrics

- Maximize Throughput
  - Provide green split times that maintain high level of saturation without causing unacceptable congestion or delay on minor movements
- Minimize Queuing
  - Design timings to prevent or minimize phase failures (queues)
    - splits, sequence, phasing
- Equitably Distribute Green Time
  - Provide green split times that serve all movements in an equitable manner and minimize delay
- Smooth Flow
  - Design coordinate timings that provide green band along corridor in one or both directions to minimize stops for platoon

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Cut Sheets

ISOLATED INTERSECTION

CONGESTED

In this context, the intersection operates in isolation (all or part of day). It operates isolate because:

1. It is not physically close to other traffic signals.
2. The natural cycle length is different than nearby signals.
3. There is a sudden traffic surge that overwhelms the coordinated cycle length (school dismissal).

OBJECTIVE: MAXIMIZE THROUGHPUT

Provide green split times that maintain high degree of saturation without causing unacceptable congestion or delay on minor movements (move as many cars as possible through the intersection – on all approaches).

TACTICS:

- Program Max green times and detector settings based on traffic conditions to optimize use of green time (may be different max time and/or passage time at different times of day)
- Program Variable Max green times to allow timings to adjust to conditions.
- Program Phase Sequence to optimize use of green time.
- Operate left turn phase type to provide safe assignment of right of way.
- Consider time-of-day (TOD) restrictions on flashing yellow left-turn arrow (FYLTA) during peak periods.
- If in rural location, review phase times and detector settings to match expected vehicle type.

PERFORMANCE MEASURES:	REQUIRED DETECTION:
• Split failure (ROR/GOR)*	• Stop bar presence
• Phase termination	• Stop bar presence
• Split time	• Stop bar presence
• Yellow/red actuations	• Stop bar count
• Approach delay time	• Advance

*Red Occupancy Ratio/Green Occupancy Ratio

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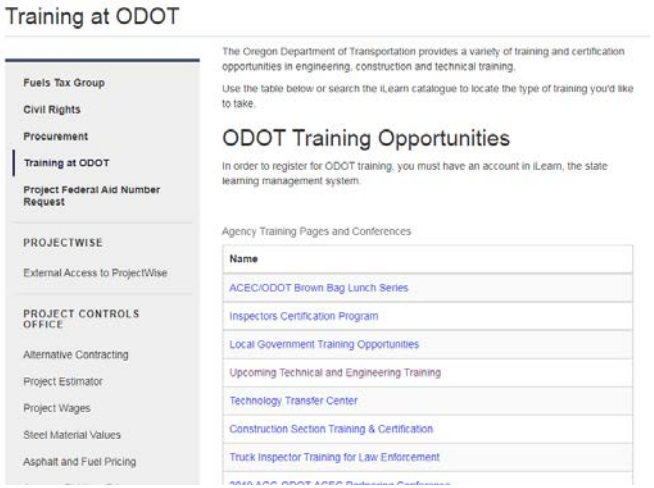
Management & Administration (Future)*

- Staffing
- Training
- Funding
- Budgets
- Customer Service
- Inter-department coordination
- Inter-agency coordination



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TSMP

Next Steps

- Complete TSMP – Estimated end of March, 2020
- Distribute to ODOT Regions and interested Agencies
- Develop plan for Administration/Staffing/Budget Section
- Develop Plan for interagency communication and collaboration

THANK YOU

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