Traffic Signal Management Capability Maturity Framework

U.S. Department of Transportation
Federal Highway Administration

Background

The concept of a capability maturity framework (CMF) emerged from the Strategic Highway Research Program 2 (SHRP2) L01 and L06 projects that promoted a process-driven approach to improve Transportation Systems Management and Operations (TSM&O). SHRP2 implementation activities have successfully used the overall framework to work with State DOTs to develop action plans to improve their TSM&O capabilities. To continue the emphasis on capability maturities and to provide program level guidance, the Federal Highway Administration (FHWA) developed additional TSM&O improvement actions-focused capability maturity frameworks including for Traffic Signal Management. More details can be found on the FHWA Operations web site: http://www.ops.fhwa.dot.gov/tsmoframeworktool/index.htm.

The Traffic Management Capability Maturity Framework

The traffic signal management capability maturity framework is intended for agencies or regions to assess current capabilities with respect to traffic signal program management. Once the current capabilities are identified, the tool provides a set of potential actions for consideration to address risks that could be associated with current practices. Adoption of incremental improvements to design, operations and maintenance activities within each dimension of capability will improve the capability of the organization.

Traffic signal programs should strive to achieve delivery of Good Basic Service (GBS); defined as doing what's most important in the context of limited resources. GBS requires strategically aligning design, operations and maintenance strategies to ensure that the agency is able to effectively design, implement and operate the traffic signals it constructs. Traffic signal management involves the planning, design, integration, maintenance, and proactive operation of traffic signal systems in order to achieve policy-based objectives to improve the efficiency, safety and reliability of signalized intersections.

This framework incorporates the concepts presented in the FHWA guidance document "Traffic Signal Management Plans: An Objectives and Performance-based Approach for Improving the Design Operations and Maintenance of Traffic Signal Systems". Development of a Traffic Signal Management Plan (http://www.ops.fhwa.dot.gov/arterial_mgmt/) would be beneficial to agencies or regions that are considering development or update of documents that direct the day to day maintenance, design, operation and management or strategic implementation plans for traffic signal systems.

In all these instances, the use of the framework will provide a structured approach to review the complex institutional architectures and business processes required to make traffic signal management a success. By reviewing the "non-technical" issues in detail and implementing the prioritized actions, agencies will increase the capability and reliability of their traffic signal management.

Structure

Consistent with the SHRP2 guidance, the frameworks are all described as a matrix that defines the process improvement areas and levels (from Level 1, ad-hoc to Level 4, optimized of capability).

Following a self-assessment process for each of the traffic signal program areas, specific actions are identified to increase capabilities across the desired process areas. Dimensions of capabilities are described for the following six Dimensions or Process Areas:

1. Business processes
2. Systems and technology
3. Performance measurement
4. Organization and workforce
5. Culture
6. Collaboration

Table 1. Capability Maturity Framework Process Overview

Process Improvement Areas   **Capability Levels**

Dimensions or Process Areas	What is it	Level 1 Ad-Hoc, Low Level of Capability	Level 2 Managed, Medium Level of Capability	Level 3 Integrated, High Level of Capability	Level 4 Optimized, Highest Level of Capability
Business Process	Plans, Programs, Budgets	Statement of Capability			
Systems & Tech	Approach to Building Systems		**Step 1** Self-Assessment. Work with your stakeholders to assess where you are in terms of the capabilities in each area		**Step 2** Identify areas of improvement and the desired levels of capability to improve program effectiveness
Performance Measurement	Use of Performance Measures				
Workforce	Improving Capability of Workforce				
Culture	Changing Culture and Building Champions		**Step 3** Identify actions that you need to take to move to the desired levels of capability		
Collaboration	Improving Working Relationships				

Traffic Signal Management Program Areas

Traffic signal program management should follow the Good Basic Service (GBS) Model. The definition of GBS is doing what's most important given a set of limited resources. Delivering GBS requires consideration of five principles and relies on balancing Design, Operations and Maintenance strategies. The GBS Model can be represented as shown in Figure 1.
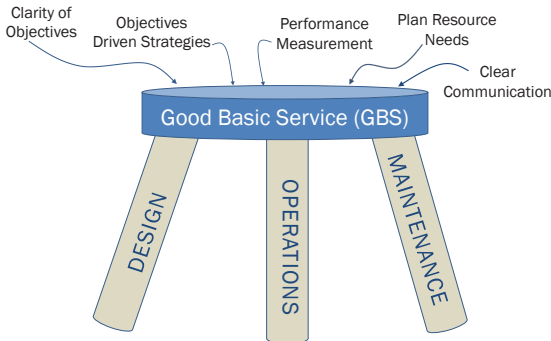

Figure 1. Good Basic Service (GBS) Model

The Design, Operations, and Maintenance strategy areas address activities such as systems engineering, operational flexibility, automation of performance measurements, training, data sharing, and collaboration with external stakeholders.

Each strategy area must also play a role in strategic planning, programming and budgeting, allocation of resources, procurement, reports, definition of performance measures, outreach and leadership, workforce development, and collaboration with external stakeholders.

Get involved:

If interested in using the framework, or hosting a CMF workshop for your agency or region, please contact the FHWA leads for this activity:

Eddie Curtis (eddie.curtis@dot.gov) or
Wayne Berman (wayne.berman@dot.gov).

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Using the Framework

A Traffic Signal Management CMF and a supporting interactive tool have been developed. The framework is available at http://www.ops.fhwa.dot.gov/tsmoframeworktool/available_ frameworks/traffic_signal.htm.

A collaborative process is recommended for using the CMF for Design, Operations and Maintenance strategy areas within the traffic signal program. Typically, a local agency champion or an agency program area champion will pull together stakeholders in the agency or region for a day-long workshop to walk through the framework. Traffic signal management stakeholders may include traffic engineers involved in signal design and operations, transit agencies and operators, emergency response personnel, and traffic and emergency operations staff in the region. The outcomes of the workshop are a consensus of the current capabilities across all the dimensions and an initial list of prioritized actions.

The champion might then convene future meetings or identify existing forums where the identified actions will be championed and implemented.

The framework is not intended as a benchmarking tool, but rather as a resource for agencies to identify appropriate actions for improving management and operations of traffic signal systems. While periodic assessments are not required, revisiting the tool is recommended when significant organizational change occurs or prior to major investments in the area.
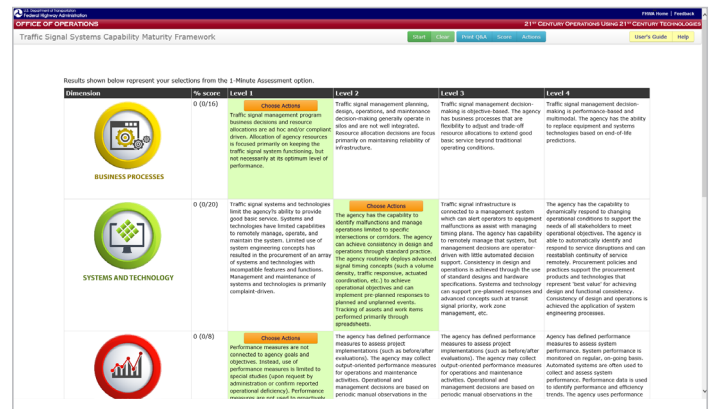

Figure 2. Screenshot of Tool