CHAPTER 5

Implementation Support

This chapter references supplemental materials that are provided in the guidebook appendices that can be used to support implementation planning for data and information improvements.

These materials provide background on organizational practices as well as DOT case studies highlighting implementation.

Time and Resource Challenges

Appendix F
Strategic Planning
Strategic Governance
Portfolio Management

Expertise Challenges

Appendix F
Workforce Planning

Employee Development
Succession Management
Knowledge Capture and Dissemination

Coordination Challenges

Appendix F
Collaboration and Peer-to-Peer Learning

Change Challenges

Appendix F
Organizational Change Management
Performance Management
Enterprise Architecture

Organizational Practices

Making meaningful changes to how data are managed, shared, and used within and across a DOT TAM program requires much more than procuring new tools and technologies.

Agencies must ensure that they have the necessary workforce capabilities to successfully use and integrate new technologies—and that they can adapt to new processes for creating and using information.

Four key organizational practices can be employed to support the implementation of TAM data and information improvements:

- Strategic management,
- Initiative management,
- Talent management, and
- Knowledge management.

Part III, Appendix F provides additional guidance for each of these practices, identifying typical strategies and documentation that can be employed to apply them within a DOT TAM program.

Organizational Practice Use

Large organizations like DOTs will face institutional challenges to sustained improvement. Many of these challenges can be addressed through the deliberate application of the identified organizational practices.

Implementation Challenges: Overview

Improvement of DOT data and information systems and related TAM business practices requires:

- **Time and resources** for technical work and review and revision cycles;
- **Expertise** as needed to create workable standards and facilitate review and negotiation processes;

I-64 Guidebook for Data and Information Systems for Transportation Asset Management

- **Coordination** to reach agreement among different business and IT stakeholders, and potentially to create and manage agreements with outside vendors and partner agencies; and
- **Changes** to data collection processes, IT systems, and business processes for collecting, entering, reporting, and using data.

Assembling the needed time, resources, and expertise and navigating an agency's coordination and change management needs can be more challenging than conducting the actual technical work for improvement. This section of the guidebook highlights some organizational strategies that can be used to overcome these challenges,

DOTs can address time and resource challenges through:

- **Strategic planning,** by increasing agency direction and support for data- and information system-related improvement and initiatives;
- **Governance,** by establishing decision-making structures and prioritized investment in activities to develop enterprise data standards; and
- **Portfolio management,** by offering techniques to identify and advocate for the business value and return-on-investment from data and information system and TAM investments.

Expertise challenges can be addressed through:

- **Workforce planning and employee development**, by providing techniques to identify job skills and develop the associated recruitment and training as necessary to build the specialized technical skills (e.g., data modeling) and soft skills (e.g., group facilitation and engagement) to develop and implement meaningful data and information system practices; and
- **Knowledge capture and dissemination,** by establishing a common resource base for individuals involved in data- and information system-related efforts and TAM business processes.

Coordination challenges can be addressed through:

- **Collaboration and peer-to-peer learning,** by creating opportunities for collaboration between business and IT professionals and creating cross-functional work groups to focus on data and information-system related improvements.

Change challenges can be addressed through:

- **Change management,** by developing approaches to communicate the purpose, building awareness, and facilitating the adoption of new data standards, information systems, and related TAM business practices by individual staff, business units, and the organization at large;
- **Performance management,** by setting objectives and performance measures that promote awareness and compliance with new, data-informed business practices; and
- **Enterprise architecture,** by establishing a reference for existing or proposed business processes.

Organizational Practice Guidance

Detailed information on the four organizational practice areas can be found in Part III, Appendix F. For each practice area, the appendix content provides a brief practice overview, describes typical strategies, and addresses how they can be applied to specific implementation challenges (see the text box titled "Appendix F: Detailed Organizational Practices"). Appendix F also provides additional external references for further examination.

Appendix F: Detailed Organizational Practices

Appendix F offers detailed information and resources to assist transportation agencies as they address implementation challenges using strategic management, initiative management, talent management, and knowledge management.

Opening Pages (Overview)

For each organizational practice, the opening pages provide the essential concepts pertaining to the practice and recognize each of the typical strategies that are used with that practice.

Typical Strategy Details

Individual strategies are identified and documented within each organizational practice area. These strategies are not meant to be comprehensive, but are identified as they address institutional and organizational challenges that may be faced by DOTs as they advance their data and information system related practices supporting their TAM programs.

For each strategy, specific but high-level guidance is shared relating to its execution at the DOT. This approach is intended to provide a base understanding of how the DOT can pursue application of the strategy to address identified challenges.

References

Given the focus of this guidebook, it is not practical to provide comprehensive guidance for application of each practice area, even within the specific context of supporting DOT TAM programs. However, recognizing the critical role these organizational capabilities will play in sustained improvement in DOT practices, for each organizational practice Appendix F provides additional, external reference materials.

Case Studies

The case studies provided in Part III, Appendix G, offer practical examples of real projects completed by state DOTs that can serve as best-practice references.

These references can be used in conjunction with improvement recommendations to support projects and initiatives to enhance data management maturity in accordance with this guidebook. The format and content of the case studies is discussed in the text box titled "Appendix G: Case Studies."

Case Studies: Overview

Case study selection was guided by an understanding of some of the more challenging and progressive areas of the guidance in this report. To help with focus, each of the case studies presented has been aligned to an assessment area; however, any single case study could potentially cover more than one area or element.

Implementation Support: Case Studies

Appendix G

I-66 Guidebook for Data and Information Systems for Transportation Asset Management

Appendix G: Case Studies

The case studies presented in Appendix G are based on real projects completed by state DOTs that can serve as best-practice references. The interpretation and application of the improvement recommendations will vary amongst DOTs based on size, organizational structure, leadership objectives, and other factors. However, by reviewing how improvement recommendations have aligned with real project examples and various areas of the assessment, DOTs will be able to see how other agencies have approached similar challenges, how those challenges were addressed, and how desired outcomes were achieved.

Each case study is provided in a consistent format. This format provides the reader a concise and clear description of why the project was undertaken, the approach applied, the value delivered, and the key challenges faced. Supporting graphics are included with each case study to provide visual context in the form of charts, workflows, screen captures or other artifacts.

Motivation

The motivation section of the case study is designed to create a relatable position for why a DOT would undertake such a project. The goal of the motivation description is to help the reader identify with the originating challenge or opportunity and relate it to a similar challenge or opportunity within their own organization.

Approach

The approach is intended to provide a high-level walk-through of the key steps the DOT took to execute the project or initiative. Specific step, actions, tactics, and engagement strategies employed by the DOT are detailed as applicable.

Value Delivered

In this section, the outcome of the project or initiative is described in qualitative or quantitative fashion. From the outcome value information in the case study, readers can infer similar outcome value propositions for improvements that they are considering.

Key Challenges Faced

Each case study highlights important organizational requirements and challenges that are faced during implementation. Each case study categorizes these challenges by time, resources, expertise, coordination, and change.

Supporting Graphics and Content

To bring the project or initiative to life, select images are provided in each case study to support the text. Depending on the project, the images include photographs, screen shots or applications, charts, or other representative graphics to help illustrate motivation, approach, value or challenges.

For each case study, a brief overview has been provided in the remaining sections of this chapter. Each overview presents the assessment area, section, and/or element references identified for the case study, together with a brief description of how the case study provides a useful example of practice and how it is linked to the assessment and improvement framework. The detailed case study materials are provided in Part III, Appendix G.

Ohio DOT: Establishing a Governance Framework

Area A: Specify and Standardize Data

Section A.5: Governance Standards

Elements: A.5.a–A.5.d (All)

Project: Establishing and Applying a Data Governance Framework

Description: This project illustrates the criticality of stewardship and formal oversight for data standards within an organization. The case study reveals the necessity to engage across all levels of the organization to ensure that there is investment to provide a comprehensive, sustainable governance structure established by policy.

This case study demonstrates how a specific DOT could advance governance elements from Benchmark Practice Level 1 or 2 to Benchmark Level 3, by implementing improvements for stewardship roles and governance structures, data management maturity self-assessments, and data and integration through process mapping.

Utah DOT: Statewide Vehicle-Based Data Collection

Area B: Collect Data

Section B.1: Inventory, Condition, and Performance Data Collection

Elements: B.1.a, B.2.a, and B.3.a (Coverage) and B.1.b, B.2.b, and B.3.b (Automation)

Organization: Utah DOT

Project: Statewide Mobile LiDAR Data Collection

Description: This project demonstrates establishing enterprise standards and driving consistency so that statewide inventory can be collected uniformly. It also illustrates the need for careful analysis to determine the value of data collection, to guide investment decisions on how much data to collect, and the importance of automating processing steps to create efficiencies when dealing with large datasets.

This case study demonstrates how a specific DOT could advance these elements from Benchmark Level 2 to Benchmark Level 3 by implementing improvements for manual data collection automation and collection tools and methods consolidation.

Colorado DOT: DQMP Development

Area B: Collect Data

Section B.1: Inventory, Condition, and Performance Data Collection

Elements B.1.c, B.2.c, and B.3.c: Quality

Project: Pavement DQMP

I-68 Guidebook for Data and Information Systems for Transportation Asset Management

Description: This project showcases the ability to leverage federal requirements as an impetus to addressing a larger and more complex issue. Additionally, this project reveals the importance of change management and careful attention to understanding:

- The business process,
- What will change, and
- How the proposed change will affect the stakeholders.

The training and certification aspects of the case study illustrate a method to support sustained change. This case study demonstrates how a specific DOT could advance these elements from Benchmark Level 1 to Benchmark Level 2 or 3 by implementing improvements for a Data Quality Collection Plan.

Virginia DOT: Mobile Field Data Collection Implementation

Area B: Collect Data

Sections B.1, B.2, and B.3:

- B.1: Inventory, Condition, and Performance Collection
- B.2: Project Information Collection
- B.3: Maintenance Information Collection

Elements B.1.c, B.2.c, and B.3.c: Quality

Project: Mobile Field Data Collection of Maintenance Work Accomplishments

Description: This project showcases the value of defining data collection standards and data capture strategies that allow for consistency in field data collection. These standards and strategies are foundational to the development of mobile field data collection tools and downstream analysis tasks. Also highlighted in this project is the cost-benefit analysis that must be made with respect to software customization decisions.

This case study demonstrates how a specific DOT could advance these elements from Benchmark Level 3 to Benchmark Level 4 by implementing improvements for automated data quality collection audits.

Utah DOT: Mobile LiDAR and BIM/CADD Integration

Area C: Store, Integrate, and Access Data

Section C.2: Asset Life-Cycle Data Integration Workflows

Element C.2.c: Project Development to Project Delivery

Project: Integration of 3D Modeling Data to Support Asset Management

Description: This project exemplifies the value of leveraging asset inventory and condition data into the project delivery phase. It also shows that investments in one asset life-cycle stage can pay dividends in another: the additional returns on investment by looking at the larger life-cycle viewpoint can be considered to aid justification of new data and digitalization projects.

This case study demonstrates how a specific DOT could advance this element from Benchmark Level 3 to Benchmark Level 4 by implementing improvements for automation of asset life-cycle data transfers.

Ohio DOT: Multi-Objective Project Prioritization Program Implementation

Area E: Act as Informed by Data

Section E.2: Project Planning, Scoping, and Design

Element E.2.a: Data-Driven Project Planning and Scoping

Project: Transportation Asset Management Decision-Support Tool (TAMDST)

Description: This project illustrates the accumulated value and derived benefits from normalizing ratings and metrics to support cross-asset planning. It further demonstrates the value of dashboards and visualization techniques to support decision-making as well as making those decisions on prioritization defensible.

This case study demonstrates how a specific DOT could advance this element from Benchmark Level 2 to Benchmark Level 3, by implementing improvements for network-level performance monitoring programs.