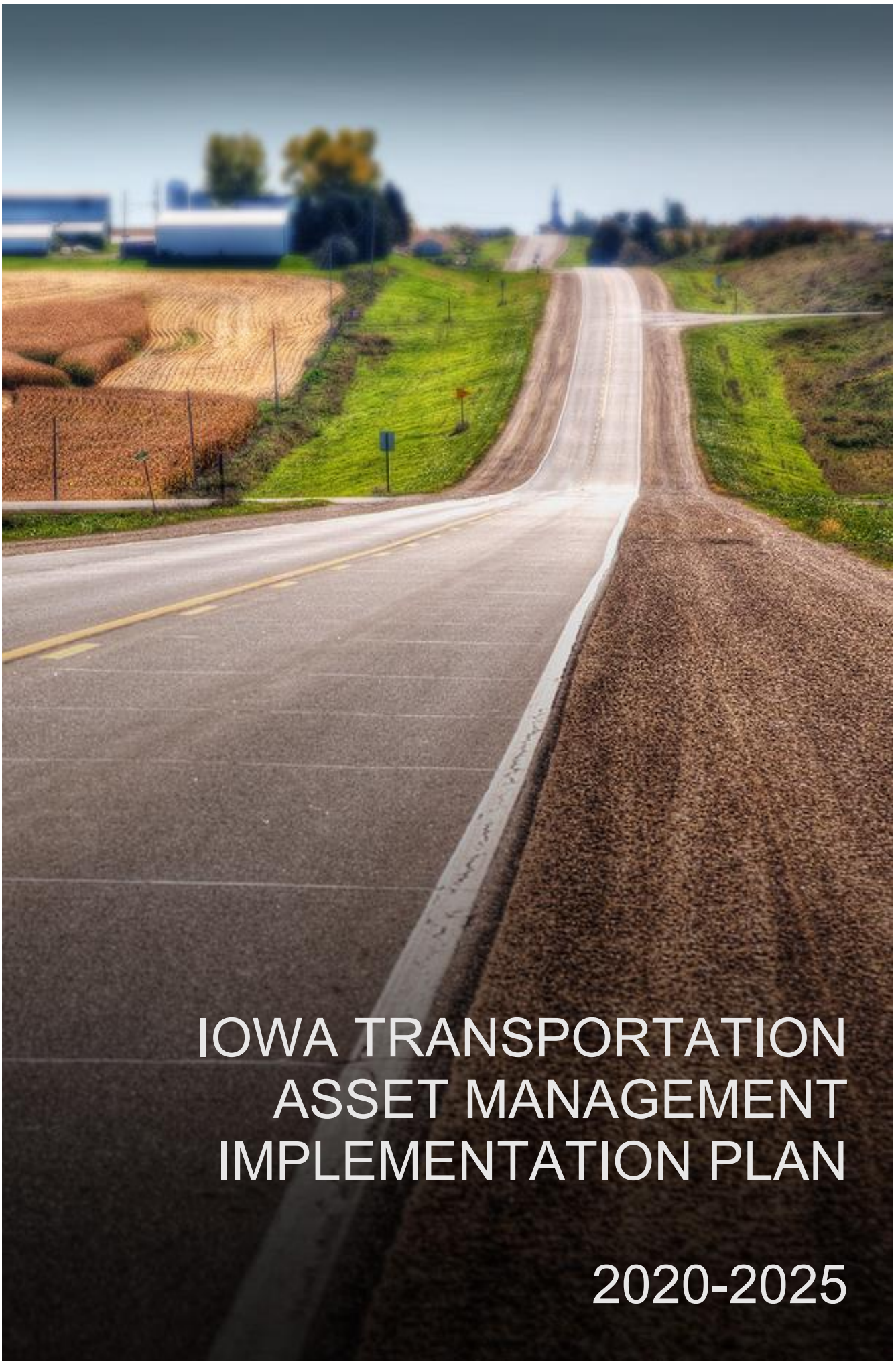


IOWA TRANSPORTATION ASSET MANAGEMENT IMPLEMENTATION PLAN

2020-2025

Contents

Abbreviations

AASHTO	American Association of State Transportation Officials
CFR	Code of Federal Regulations
DOT	Department of Transportation
FAST	Fixing America's Surface Transportation
FHWA	Federal Highway Administration
IIMM	International Infrastructure Management Manual
MAP-21	Moving Ahead for Progress in the 21st Century
MPOs	Metropolitan Planning Organizations
NCHRP	National Cooperative Highway Research Program
NHS	National Highway System
PPM	Planning, Programming and Modal
SDBP	Strategic Data Business Plan
SP	Strategic Performance
TAM	Transportation Asset Management
TAMP	Transportation Asset Management Plan
TIMP	TAM Implementation Plan

1.0 Introduction

Transportation Asset Management (TAM) is a business and engineering process that uses information gathered on transportation assets for decision-making. The Federal Highway Administration (FHWA) defines asset management as "a strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively throughout their lifecycle."[1] TAM is foundational for state Departments of Transportation (DOT), pertaining to resource allocation. When the Moving Ahead for Progress in the 21st Century (MAP-21) bill was passed in 2012, followed by the Fixing America's Surface Transportation (FAST) Act in 2015, TAM became formalized; each state was required to develop a risk-based Transportation Asset Management Plan (TAMP) that meets FHWA's TAM rules (US 23 CFR 515). The TAMP must be updated every four years. A TAMP provides a high-level look at transportation asset management within a state and discusses the goals and direction of the program.

1.1 Background

A Transportation Asset Management Implementation Plan (TIMP) is a document used to define implementation strategies to achieve asset management objectives and goals. The TIMP allows state DOTs to identify and monitor specific actions that both support the Agency's TAM needs and improve the maturity of the TAM program. The Iowa DOT created its first TIMP in 2016 through strategic self-assessment, in-depth interviews with staff, and a workshop to better understand the internal and external needs of the TAM program. The 2016 TIMP identified key action items to improve the maturity of Iowa DOT's asset management program and to achieve best practice.

1.2 TAM Business Needs

The action items in the 2016 TIMP were identified to meet the needs of a state-of-the-art asset management program. The needs of the program were categorized into seven TAM focus areas including:

1. Inventory and condition,
2. Asset management objectives and measures,
3. Asset performance and gap identification,
4. Lifecycle planning,
5. Risk management,
6. Financial planning, and
7. Investment strategies.

Each area is based on FHWA's TAM rules and best practices and represents elements that would be present in a strong TAM program as defined in **Figure 1-1**.

[1] https://www.fhwa.dot.gov/asset/if08008/amo_02.cfm

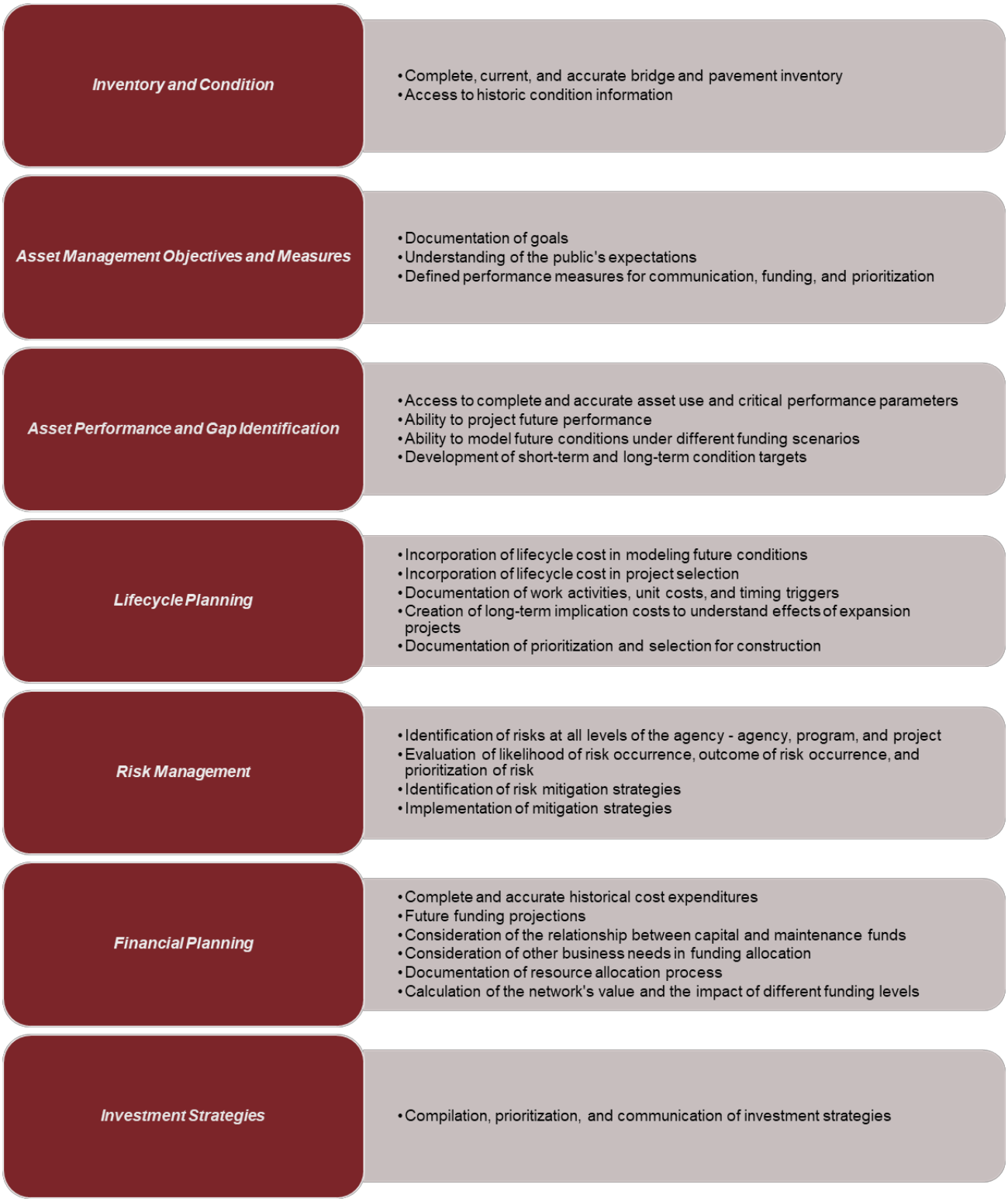


Figure 1-1. TAM best practices

1.3 Purpose

While Iowa DOT made progress in implementing initiatives documented in the 2016 TIMP and addressing some of the business needs discussed, TAM is an iterative process and growth and improvements to TAM can still be made. The purpose of this document is to summarize the progress Iowa DOT has made since the adoption of its first TIMP, identify the areas of strengths and weaknesses in existing TAM practice through a gap analysis, and define the next steps for the Agency to improve current TAM practices.

1.4 Plan Organization

The plan is organized into four sections (including the introduction). The remainder of the plan is as follows:

- *Section 2 TAM Vision and Goals:* Section 2 of this document focuses on establishing a strategic direction - the vision statement, mission, and goals of TAM for Iowa DOT.
- *Section 3 Existing TAM Practices:* Section 3 discusses the progress Iowa DOT has made towards the strategic goals and action items established during the first TIMP. This section also contains the results of the asset management maturity assessment.
- *Section 4 TAM Implementation Work Plan*: The final section of the document identifies the practical steps or actions needed to improve TAM practices across the Department.

2.0 Transportation Asset Management

2.1 TAM Vision Statement

Iowa DOT's Vision for TAM is:

Vision: *Make the right investment to the right asset at the right time in order to provide the best transportation network value for the users of today and tomorrow.*

2.2 TAM Mission

Transportation Asset Management is an agency-wide agenda to promote smarter and more efficient decision-making. The primary mission of Iowa DOT's Asset Management process builds on the Department's vision of smarter, simpler, and customer driven. The mission is as follows:

Mission: *Balance customer needs in the most cost-effective manner, through focused teamwork and leadership in the execution of asset management principles and practices.*

TAM provides a bridge between Iowa DOT's long-range plan and programs. The systematic assessment of conditions, performance targets, lifecycle planning considerations, risk management, and funding scenarios inform the development of the transportation program and enables Iowa DOT to cost-effectively achieve its mission.

2.3 TAM Goals

Based on the needs of Iowa DOT, the Agency identified the following goals for TAM program:

Build, preserve, operate, maintain, upgrade, and expand the transportation system more cost-effectively throughout its whole life.

1. Improve the coordination between the capital and maintenance programs to ensure that highway assets are being managed as cost-effectively as possible throughout their whole life;
2. Expand transportation asset management to other priority asset features beyond pavement and bridge;

Improve performance of the transportation system.

3. Develop a performance management framework with clearly defined guiding principles and performance targets;
4. Incorporate risk formally into the TAM process;
5. Coordinate with Metropolitan Planning Organizations (MPOs), Regional Planning Associations, Cities and Counties, and other key stakeholders;

Deliver to Iowa DOT's customers the best value for every dollar spent.

6. Create integrated data and information systems that are based on a uniform reference platform with clearly established data governance standards that is accessible and comprehendible and supports the business needs and improves services;

7. Find a balance between preservation-first and reconstruction strategies and establish detailed preservation strategies for high priority assets;

Enhance Iowa DOT's credibility and accountability in its stewardship of transportation assets.

8. Create a unifying asset management message and culture through training and communication where TAM is viewed as the way of doing business;
9. Provide resources and training for Iowa DOT staff on Transportation Asset Management to ensure a knowledge continuity throughout the years; and
10. Coordinate and align the TAMP, Transportation Asset Management Improvement Program (this document), Long Range Transportation Plan, and other department plans.

3.0 Existing TAM Practice

To update the TIMP work plan for the TAM practice in Iowa DOT, the Department evaluated the existing TAM practice, using both internal and external criteria. Internally, the action items addressed since the 2016 TIMP were summarized using an accomplishment tracking tool and through interviews with key staff. Externally, the Department assessed the maturity of existing practice using a TAM maturity model developed using the TAM principles in the 2015 International Infrastructure Management Manual (IIMM), which encompasses elements of the AASHTO TAM guide. This tool was selected after a comprehensive evaluation of several other maturity models and gathering feedback from the project team. Through these activities, the team assessed TAM practice and ultimately used these activities to update the implementation work plan. The following subsections summarize the efforts used to understand the progress made and identify the strengths of the TAM practice and areas of opportunity for Iowa DOT.

3.1 TAM Implementation Progress

The appendices and subsections below describe the progress made since the 2016 TIMP.

3.1.1 Key Accomplishments

Iowa DOT's TAM Implementation Team and other key staff within the Department assessed the state of the TAM program. The team used an accomplishment tracking tool to better understand the progress made on each of the strategic goals and action items documented in the first TIMP. Each of the action items from the initial TIMP were discussed and assessed in terms of completion. The team classified the progress made as the percent of the actions completed (0-100%) or as ongoing for action items requiring continuous improvement. Action items that were identified as short-term goals in the initial TIMP were to be completed while long-term goals needed to be started. Based on the progress made since the 2016 TIMP, Iowa DOT categorized action items as on or above target, action items that require caution, or missed target.

In general, Iowa DOT was on target for 22 of the 78 action items identified in the 2016 TIMP as depicted in **Figure 3-1.** Most of the accomplished (i.e., on or above target) tasks focused on establishing the fundamentals of asset management and implementing processes or frameworks essential to creating a more robust asset management program. These tasks came from the exploration or analyses conducted during the completion of the initial TIMP.

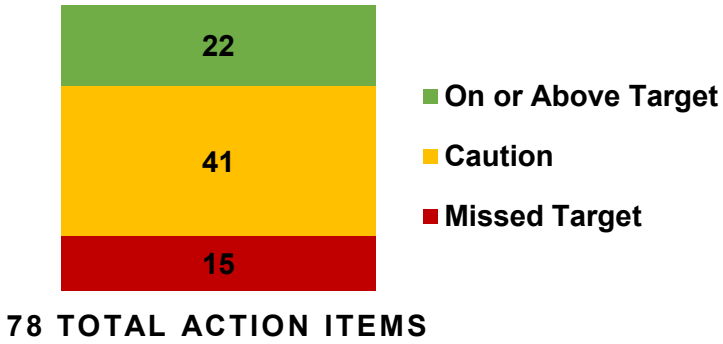


Figure 3-1. Summary of action item progress

Specific accomplishments since the first TIMP include:

- Documentation and implementation of an initial governance plan.
- Development of an asset class template and evaluation of ideal characteristics for an asset class.
- Development of a certified TAMP, which documents investment strategies and a risk management plan for the duration of the TAMP.
- Improved communication about TAM with executive leaders.
- Identification of the need for increased training and communication.
- Development of a data management strategy and management plan.

Appendix 1 provides additional discussion on the progress made since the 2016 TIMP.

3.1.2 Interviews

The second tactic used to better understand existing TAM practice in the Agency was interviews. A total of seven different teams of Iowa DOT staff participated in the interviews, including the data management team, the Transportation Asset Management Implementation team, the maintenance and operations team, the Districts, the pavement management team, the programming team, and the bridge management team. Each team answered a series of questions that enabled relevant information, key accomplishments, strengths, weaknesses, opportunities, and threats in existing business practices to be gathered. **Appendix 2** presents a detailed summary of the findings.

3.1.3 Maturity Assessment

In addition to performing an assessment on the accomplishments achieved since Iowa DOT's last TIMP, Iowa DOT also reassessed the maturity of the TAM practice overall. The tool used for the assessment is based on the 2015 IIMM Maturity Model and considers sixteen components of asset management. Each component received a maturity level score ranging from 0 to 100. These maturity ratings are assumed to roughly coincide with the maturity rating of the initial TAM maturity assessment conducted in 2015, which used the asset management maturity scale presented in the AASHTO *Transportation Asset Management Guide, Volume 2.* **Table 3-1** provides a comparison of the two maturity rating systems.

Table 3-1. Transportation Asset Management Maturity Scale for IIMM and AASHTO Assessment

AASHTO TAM Maturity Scale	*Maturity Level Classification*	*General Description*	*IIMM TAM Maturity Scale Level*	*IIMM Maturity Level Scale*
1	Initial	No effective support from strategy, processes, or tools. There can be lack of motivation to improve.	Aware	20
2	Awakening	Recognition of a need and basic data collection. There is often reliance on heroic efforts of individuals.	Basic	40
3	Structured	Shared understanding, motivation, and coordination. Development of processes and tools.	Core	60
4	Proficient	Expectations and accountability drawn from asset management strategy, processes, and tools.	Intermediate	80
5	Best Practice	Asset management strategies, processes, and tools are routinely evaluated and improved.	Advanced	100

2015

2019

Using the IIMM scale, the existing TAM practice has an Intermediate maturity, or Proficient maturity using the AASHTO maturity assessment. The initial maturity assessment conducted in 2015 resulted in a maturity slightly higher than a 2 – Awakening or Basic for the AASHTO tool and the IIMM tool, respectively. While the two maturity assessments cannot be directly compared, in general, the maturity growth since 2015 is in line with progress made by the Department.

Figure 3-2 and **Figure 3-3** provide a summary of the maturity of key elements and goals, and **Appendix 3** details the entire maturity assessment.

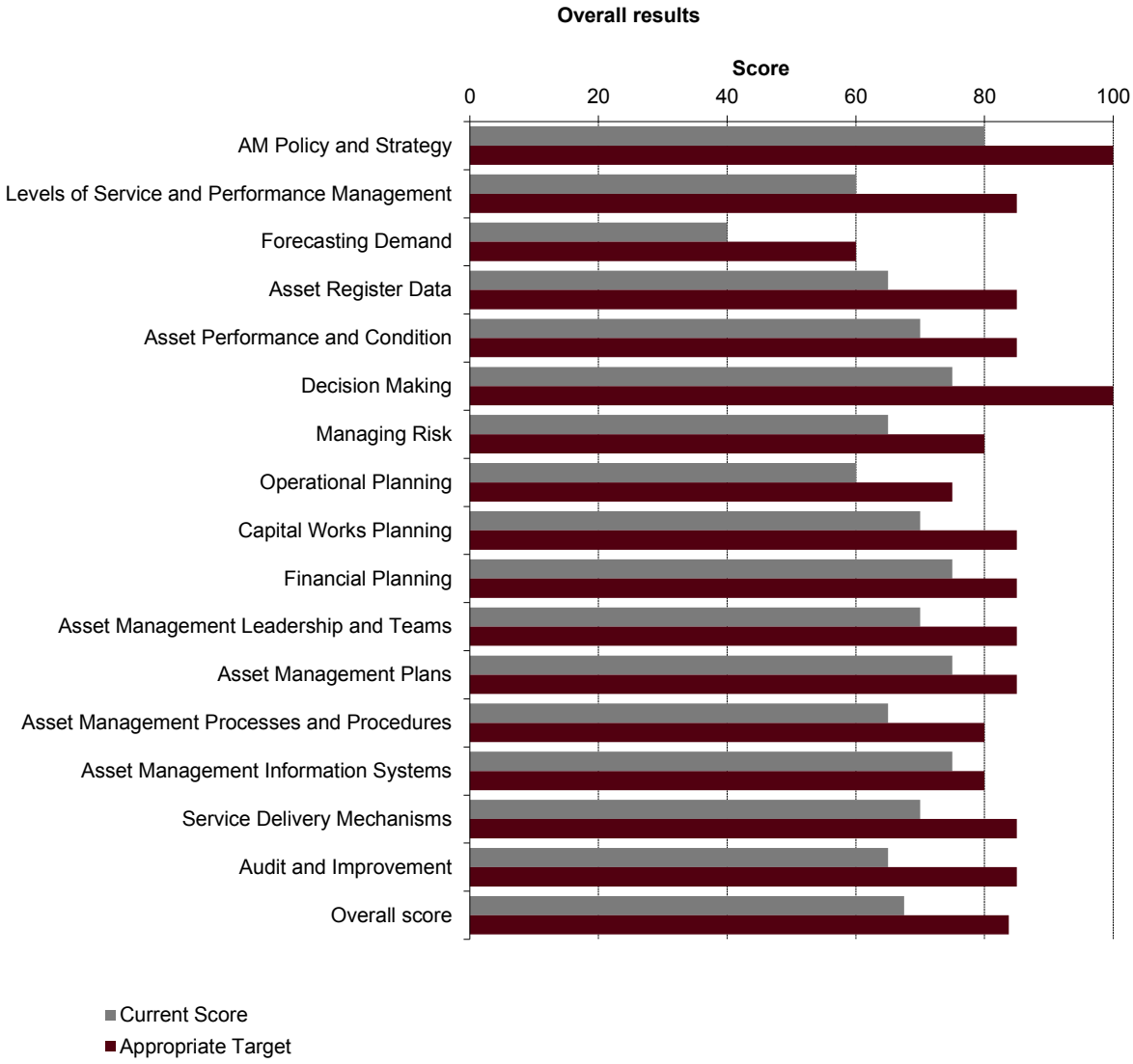


Figure 3-2. Summary of TAM maturity

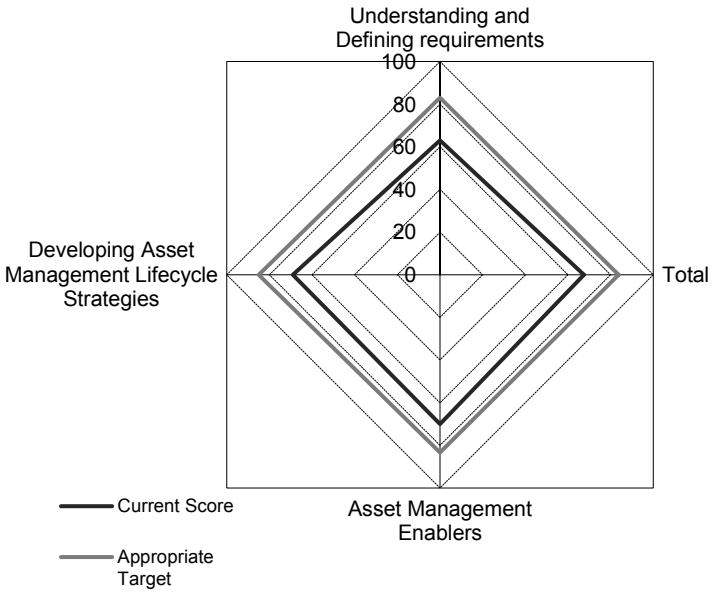


Figure 3-3. Summary of asset management maturity

3.2 TAM Strengths

Through the progress assessments and interviews, three themes or asset management enablers emerged. Communication, business processes, and data and technology represent areas that Iowa DOT has placed emphasis on in terms of accomplishments and needs. These enablers are defined as follows:

Below is a summary of the key strengths of the existing TAM program.

Communication

- Development of regular meetings with Executive Leadership to discuss TAM practice findings – small gains, challenges, and needs.
- Improved coordination with District offices. The Districts now accept the bridge management program.
- Strengthened leadership throughout the Department, which fosters good communication and innovation with regards to asset management.
- Improved ability to efficiently identify gaps and action items within the asset management practice.

Business Processes

- Creation of rigorous guidance documentation for data collection of most assets.
- Development of flow charts describing the planning and prioritization flow for projects within the agency.
- Increased awareness and acceptance of data-driven decision-making policies.

Data and Technology

- Creation of metadata for all existing data forms. Once fully documented, data that is available internally will be more easily accessed and understood.
- Increased readily available/structured/consistent data since the last TIMP making the data easier to use.
- Better integration of data systems into the RAMS/LRS system, enabling cross-cutting analyses to occur.

3.3 TAM Areas of Opportunities

While the Iowa DOT accomplished multiple action items in the 2016 TIMP, several opportunities still exist to improve asset management practices and procedures. The findings of the interviews and maturity assessment, as well as the TAMP development process, provided insight and direction for the next steps in the Iowa DOT's implementation plan. The Agency considered the recommended actions for each asset management enabler in developing the work plan described in Section 4, which incorporates the areas of Opportunities for Improvement documented in the TAMP.

4.0 TAM Work Plan

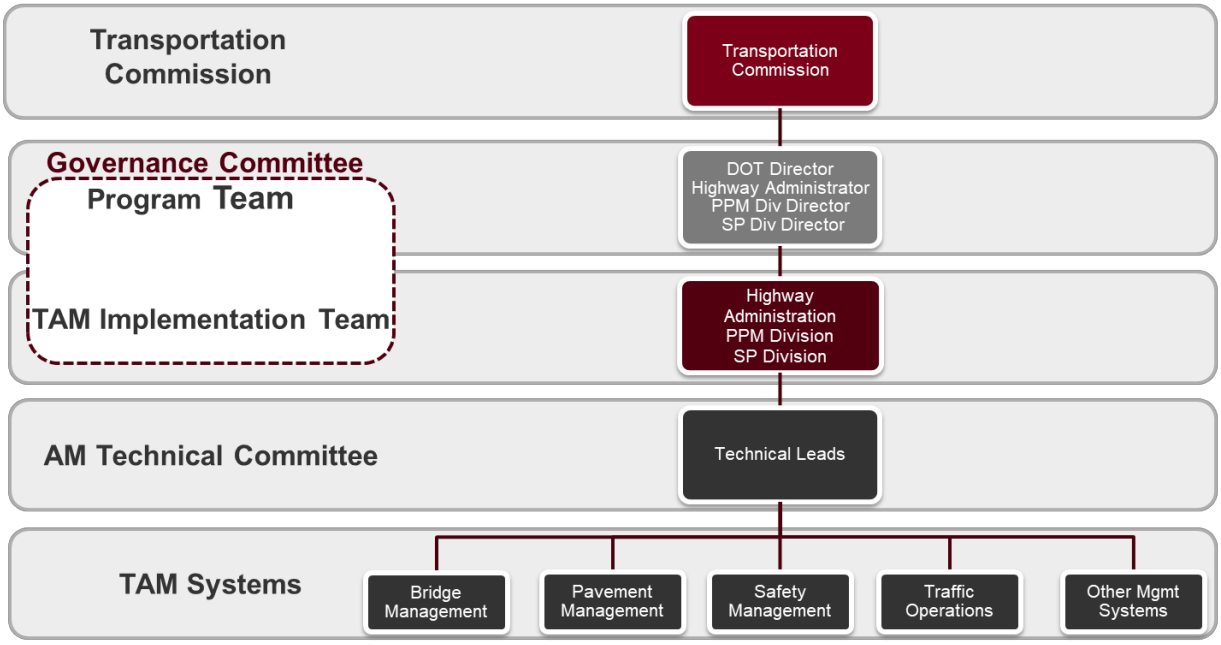
This section identifies the practical steps or action items required to improve existing TAM practice and decision-making efficiencies. The development of this TAM work plan is two-fold; first is the identification of divisions or individuals to lead and monitor the implementation of the actions generated from the recommended initiatives and second is the recommendation of improvement initiatives. The following sections describe the key personnel, list the recommended initiatives, identify key tasks for the long- and short-term, and designate owners to oversee the implementation of each task.

4.1 Key Personnel

The Agency has identified the following personnel and teams to champion the implementation of this work plan:

1. Executive Champion(s);
2. Implementation Manager; and
3. TAM Implementation Team.

These roles collectively form the Governance Committee as depicted in **Figure 4-1**. The governance committee is a high-level functional group consisting of both executive- and program-level support as well as Bureau-level support. **Table 4-1** contains the roles and responsibilities of the Governance Committee, and **Appendix 4** provides information on the individuals who currently serve in these roles.



Planning, Programming and Modal (PPM). Strategic Performance (SP).

Figure 4-1. Structure of the TAM governance body

Table 4-1. Key roles and responsibilities

Position	Role	Responsibilities
Executive Champion(s)	This position serves as the executive champion of TAM initiatives set by the TAM Implementation Team.	• Supports and promotes the importance of TAM activities to executive leadership. • Makes recommendations to the asset management strategy that directs TAM. • Ensures the availability of resources to undertake TAM and to develop and implement the TAMP. • Motivates key people to buy into the TAM culture.
Implementation Manager	This position is focused on providing oversight to the TAM Implementation Team as well as acting as a liaison between the TAM Implementation Team and the Executive Champion(s).	• Supports and promotes the importance of TAM activities to key people across the agency. • Ensures that the TAMP is developed, updated, and certified within schedule. • Coordinates meetings between the key workgroups. • Identifies and engages with key external stakeholders (transportation agencies and consultants). • Ensures the smooth flow of asset management information between key stakeholders.
TAM Implementation Team	This team provides strategic direction for TAM, setting priorities to implement TAM initiatives.	• Develops and promotes TAM vision, mission, objectives, and principles. • Provides guidance for the implementation of TAM initiatives and action items. • Ensures asset management information is clear, consistent, and well-documented. • Meets periodically for program updates.

4.2 Recommended Initiatives

This subsection contains the recommended initiatives for implementation. The section defines key tasks, timing and dependency, and preliminary costs for each initiative.

4.2.1 Implementation Planning

The maturity assessment of the existing TAM practices in Iowa DOT revealed the Department made significant progress since the 2016 TIMP; the Department moved from having a newly defined asset management program to a more well-defined program. Despite the progress made, TAM practice still requires additional improvement. The gap between current TAM practice and the target maturity level helps identify areas of improvement. The goal of this work plan is to advance the Agency from a maturity level of 4 - Intermediate to a maturity level of 5 - Advanced by 2025.

The implementation of this work plan is expected to take place in three phases, allowing for a structured approach to allocating resources and prioritizing actions over a five-year period. Iowa DOT will continue to advance at each phase as presented below:

- ***Phase 1—Communicate and Integrate Existing TAM Processes:*** The first step in moving TAM practice forward is to improve the existing communications about asset management and to successfully integrate all TAM systems to maximize synergies between tools and information. Communication and integration are foundational, as they provide an understanding of TAM practice which is necessary for implementing more advanced/sustainable practices. Phase 1 will focus on accomplishing tasks related to Initiatives 1-4.
- ***Phase 2—Develop More Sustainable Asset Management Practices:*** The second phase of the implementation process is to improve the tools and procedures in place to sustain the foundational processes. The Department will introduce risk assessment into most procedures and analyses in place to strengthen the decision-making capabilities of these tools. Initiatives 5-9 will be the main objectives of Phase 2. Through the introduction of additional analyses related to funding, quality, and risk, the life of assets will be better understood and compared.
- ***Phase 3—Structured TAM:*** By improving the maturity of the TAM practice, the Department will move towards a structured TAM. It is expected that the Department will complete most of the action items identified by the end of this phase. It is also anticipated that changes in practice and standards will prompt needed revisions to these items. Hence, the Department will continually assess and make the necessary revisions to keep the TAM practice in Iowa DOT current. The accomplishment tracking tool will support this task.

The actions recommended for each phase fall under the broadly defined initiatives below:

Primary Phase of Action Items	Initiative
Phase 1	*Initiative 1*: Expand the TAM Governance Structure
	Initiative 2: Develop TAM Communications Plan
	Initiative 3: Develop TAM Training/Succession Plan

Primary Phase of Action Items	Initiative
	Initiative 4: Develop Centralized Data Management Structures
Phase 2	*Initiative 5*: Develop Additional Trade-off Capabilities for Pavements and Bridges
	Initiative 6: Refine and Integrate Lifecycle Planning for Pavement and Bridge
	Initiative 7: Define and Implement a Risk Management/Resiliency Process
	Initiative 8: Develop and Implement a Quality Assurance/Quality Control Program
	Initiative 9: Finalize, Review, and Publicize Asset Class TAM Procedures
Phase 3	*Initiative 10*: Review and update Procedures for Revaluation of Asset Management Practice

4.2.2 Alignment of Priority Goal Areas with Strategic Initiatives

This section describes the discussed initiatives in greater detail; the section explores key action items, a preliminary timeline of events, and a cost estimate for each initiative. As TAM practice is constantly changing and the needs and resources of the organization differ year to year, the work plan suggested is not meant to be static. Discussion and revision should be woven into the entire implementation process.

Costs are quantified and categorized as indirect or direct. Indirect costs represent costs necessary for in-house staff to perform the action items for the stated initiative and are stated in terms of full-time equivalent (FTE) hours. Direct costs cover any resources to engage external assistance or consultants. Direct costs are further categorized into low (<$50K), medium ($50K-$100K), and high (>$100K).

Each initiative is described as follows:

Initiative 1: Expand the TAM Governance Structure

Description: Initiative 1 focuses on strengthening the existing TAM governance structure. Currently, Iowa DOT has a TAM Implementation Team and has designated a TAM Coordinator and DOT TAM Champion. While these governance structures have enabled Iowa DOT to implement items from the initial asset management work plan, develop a TAMP, report asset management progress to Iowa DOT's Commission, and generally communicate the value of asset management internally, additional governance positions and actions may be necessary.

Initiative Leader: Executive Champion

Timing/Dependency: This initiative is among the first to be targeted. Discussions and role assignment can begin immediately.

Preliminary Cost Estimate: Indirect (0.4 FTE)

Implementation Phase	Action Items
Phase 1	• Conduct a TAM-related workforce analysis to identify opportunities in existing positions, gaps in job functions and skills, and number of staff required to meet TAM demands. Specify a liaison in each business unit who will identify business unit needs and communicate the importance of asset management internally.
Phase 2	• Update documentation on TAM governance structure regularly.
Phase 3	• Continually assess and adjust governance structure as needed.

Initiative 2: Develop TAM Communications Plan

Description: The maturity assessment and interviews revealed a lack of strong communication about asset management internally and externally. The development of a communication plan should be a primary target for the agency moving forward. A formal communication plan would help remedy some of the issues around communication within the Department. The plan should focus on creating avenues to disseminate TAM-related information and practices to Management, to business units, and to Districts. The frequency, type, and channel of communication should be defined. Based on the interviews conducted, any plan created should aim to develop a formal feedback channel for employees to discuss the effectiveness and appropriateness of different asset management strategies and discuss the importance of asset management.

Initiative Leader: Implementation Manager

Timing/Dependency: This task is critical and can be started immediately.

Preliminary Cost Estimate: Indirect (0.3 FTE) and Consultant (low)

Implementation Phase	Action Items

Phase 1	• Review current communication strategies on asset management internally and externally.
	• Leverage the TAM communication flow charts in disseminating information about programs and scoping procedures for TAM activities.
	• Conduct a formal brainstorming session on effective communication strategies with the TAM implementation team and relevant communications Bureaus.
	• Develop a draft Communications Plan focused on communication between:
	  ○ Business Units
	  ○ The Central Office and Districts (i.e. regular meetings between the pavement team and the Districts and the bridge team and the Districts)
	  ○ The Central Office and key stakeholders
	  ○ The Central Office and the public
	• Receive Management Team approval of Communications Plan.
	• Implement actions items created in the Communications Plan.

Phase 2	• Evaluate and update the Communications Plan as necessary.
Phase 3	• Update the Communications Plan on a biannual basis.

Initiative 3: Develop TAM Training/Succession Plan

Description: Training and succession planning was another continually discussed need of Iowa DOT. A TAM Training Plan needs to be developed to discuss the extent of training required for employees, frequency of training, location or overview of the training materials, and the process or procedure to deliver the training. During the interviews, the need to train employees and the Commission on the basics of asset management was discussed and made a priority action item for this initiative. General asset management knowledge will help drive the importance of the practice to employees who are less familiar with TAM.

Initiative Leader: Implementation Manager

Timing/Dependency: This task is critical and can be started immediately.

Preliminary Cost Estimate: Indirect (0.3 FTE) and Consultant (low)

Implementation Phase	Action Items
Phase 1	• Brainstorm general training needs for all employees. Draw from information created through the Communications Plan and suggestions from the TAM implementation team and Employee Services Bureau. • Brainstorm advanced training needs for employees directly involved in asset management efforts (i.e. District training on the uses and the benefits of the data collected). • Develop and review a Training Plan based on brainstorming session. • Receive Management Team approval for Training Plan. • Develop necessary training materials.
Phase 2	• Roll out TAM training on trial group of employees. Document feedback. • Revise TAM training documentation and plan based on feedback.
Phase 3	• Update Training Plan every two years.

Initiative 4: Develop Centralized Data Management Structures

Description: A centralized data structure is a high-priority need for agency-wide integration and cross-cutting analyses. While centralized data management structures exist, formalized documentation and descriptions of data flows have not been publicized or reviewed. Therefore, the development of centralized management structures will be a primary target of Phase 1. The effort, which includes the development of data governance and data management policies, will largely be executed through the creation of a Strategic Data Business Plan which is currently underway.

Initiative Leader: Data Management Committee

Timing/Dependency: This activity is currently being conducted and will determine the progress of Initiatives 8 and 9.

Preliminary Cost Estimate: Indirect (0.4 FTE) and Consultant (High), however, this effort is funded and currently on-going.

Implementation Phase	Action Items
Phase 1	• Finish the creation of the central data warehouse or Master Data Management System. • Finish the development of enterprise-wide data management policies and a Strategic Data Business Plan (SDBP) for bridge and pavement. • Expand strategic data business planning to other asset data systems. • Document the flow and integration of asset data. • Develop a procedure for the selection of vendors for data and management systems services.
Phase 2	• Revise SDBP based on feedback from data users and administration.
Phase 3	• Refine and improve SDBP on a yearly basis.

Initiative 5: Develop Additional Trade-off Capabilities for Pavements and Bridges

Description: Improvement of trade-off capabilities was one of the highly recommended improvements made throughout the interviews. With the incorporation of risk and lifecycle planning for assets, project-level trade-offs can be used to determine projects programmed and help optimize budget allocations. Investments in bridge projects versus pavement projects, rural projects versus urban, etc. could be assessed and used to justify programming decisions.

Initiative Leader: Implementation Manager

Timing/Dependency: The activity is recommended to begin immediately and should be continually updated.

Preliminary Cost Estimate: Indirect (0.4 FTE) and Consultant (High)

Implementation Phase	Action Items
Phase 1	• Continue to research the current state-of-the-practice of trade-off analysis in the US (literature review). There are national (FHWA, NCHRP, AASHTO) research projects in the pipeline that may assist with this effort.
Phase 2	• Select a model for the trade-off analysis. If no suitable model exists that meets the needs of Iowa DOT, then consultant assistance may be needed to develop the trade-off model. Begin development of a manual to be used for trade-off analysis. • Identify a management system to perform the project-level trade-off analysis. • Pilot the management system to perform the project-level trade-off analysis. • Incorporate project-level trade-off analysis results into the TAMP.
Phase 3	• Identify and revise trade-off analysis program based on input from the pilot study • Review trade-off analysis processes yearly within the TAM implementation team to evaluate the appropriateness of analyses.

Initiative 6: Refine and Integrate Lifecycle Planning for Pavement and Bridge

Description: Lifecycle planning, has been identified as a necessary tool for project scoping and project prioritization. Lifecycle analysis enables the Agency to better understand and optimize decision-making for the entirety of an asset's service life rather than for a near term. The objective of this initiative is to identify and develop processes to better incorporate lifecycle planning into the Iowa DOT's decision-making process.

Initiative Leader: Implementation Manager

Timing/Dependency: This activity is recommended to begin immediately and should be continually updated.

Preliminary Cost Estimate: Indirect (0.5 FTE) and Consultant (High)

Implementation Phase	Action Items
Phase 1	• Develop an approach (documentation of key steps and processes) for incorporating lifecycle cost information when evaluating and prioritizing investment alternatives. • Identify and assess existing funding streams for maintenance, rehabilitation, and reconstruction projects to better understand budgeting needs, funding trends, and project prioritization. • Integrate asset financial data (valuations, replacement value, depreciation, remaining life, and maintenance and capital investment costs) and condition data for critical assets.
Phase 2	• Identify efficient cost strategies for managing critical assets throughout their lifecycle. • Develop an effective management system/model to include, but not limited to, cost tracking and updating asset condition immediately after work has been performed with regards to maintenance and construction activities. • Establish procedures for the development of economic analyses for projects such as cost-benefit analyses and/or return-on-investment. • Incorporate procedures for economic analyses into the TAMP.
Phase 3	• Refine tools for forecasting asset condition of critical assets at various levels of investment on a yearly basis.

Initiative 7: Define and Implement a Risk Management/Resiliency Process

Description: Risk and resiliency have not been fully incorporated into lifecycle analysis and project prioritization for Iowa DOT. The identification and communication of risks and the potential costs can help justify decisions made internally and externally.

Initiative Leader: Implementation Manager

Timing/Dependency: The activity is recommended to begin immediately and should be continually updated.

Preliminary Cost Estimate: Indirect (0.3 FTE) and Consultant (Medium)

Implementation Phase	Objectives
Phase 1	• Brainstorm agency areas or procedures that would benefit from the incorporation of a risk/resiliency assessment. • Create a workplan to discuss and determine appropriate risk metrics for the areas or procedures recommended.
Phase 2	• Refine risk management processes and document procedures. • Update and implement risk mitigation strategies. • Incorporate risk mitigation strategies into the TAMP.
Phase 3	• Monitor and respond to risks. • Review and adjust risk management processes on an annual basis.

Initiative 8: Develop and Implement a Quality Assurance/Quality Control Program

Description: For most assets, Quality Assurance/Quality Control are not well-documented or well-defined. The goal of this initiative is to create a structured quality assurance program to assess the quality of collected data, monitor the performance/quality of treatments, and assess the funding strategies used under current TAM practice.

Performance metrics are important components to properly assess the network of assets and will be reviewed accordingly.

Initiative Leader: The TAM implementation team will take the lead on this effort, but most actions will be conducted by the business units and data stewards involved.

Timing Dependency: This initiative will require continual action. The recommended tasks are dependent on having a strong governance and management structure in place.

Preliminary Cost Estimate: Indirect (0.4 FTE) and Consultant (Medium)

Implementation Phase	Action Items
Phase 1	• Conduct a workshop to discuss the current quality assurance measures and performance metrics used in the office and in the field. • Identify potential approaches to capture the effects of maintenance treatments on assets over time. Document procedures and data used to monitor. • Review the current state-of-the-practice for QA/QC in TAM.
Phase 2	• Assess and revise performance metrics based on discussions. Special consideration will be given to determining whether federal metrics are appropriate for reporting pavement and bridge condition. • Utilize condition data collected to draw conclusions about the effectiveness and trigger criteria for maintenance treatments. • Develop QA/QC procedures for each asset class based on discussions and best practices. Document procedures for internal use. This is especially important for data that is currently considered low quality such as culvert, ITS device, and guardrail data. • Create a manual of quality assurance processes based on the individual QA/QC procedures developed.
Phase 3	• Review performance metrics and quality assurance procedures on a yearly basis.

Initiative 9: Finalize, Review, and Publicize Asset Class TAM Procedures

Description: Since the first TIMP, the Iowa DOT has made noticeable progress in advancing TAM procedures for pavement and bridge assets. The focus of this initiative is to further improve and publicize the procedures created across the Agency. This will enable the Agency to integrate publicized plans into enterprise-wide asset management efforts.

The final TAM asset class system will consist of the following - A centralized IT system based on geospatial data that is easily accessed, queried, analyzed; A Data Steward assigned to each asset class; Condition data collection procedures; Establishment of risk assessments in each procedure created; and Scenario-based analysis tools.

Initiative Leader: The TAM implementation team will take the lead on this effort, but most tasks will be conducted by asset owners or business units involved.

Timing/Dependency: This initiative will require continual action. The recommended action items are dependent on having a strong governance structure (Initiative 1) in place and creating a data management structure (Initiative 4).

Preliminary Cost Estimate: Indirect (0.5 FTE) and Consultant (Medium-High)

Implementation Phase	Action Items
Phase 1	• Brainstorm optimal TAM characteristics for each asset class; this includes the types of data collected. Some Agency staff recommended additional asset data such as pavement markings (which is useful for future Automated/Connected Vehicles) and detailed ITS element data should be considered. • Integrate existing data and procedures in a centralized IT location. • Assess and improve existing asset-specific deterioration models to ensure high confidence condition predictions (particularly for ITS and bridge elements).
Phase 2	• Develop work plan for each asset identified in the TAMP (beyond pavement and bridges). Discuss a timeline for each work plan. • Discuss the priority of each asset plan action item identified in the TAMP (beyond pavement and bridges). Create a master timeline for all work items. • Develop and begin implementation of master asset class work plan (a compilation of individual asset work plans). • Revise existing procedures for each asset plan (for assets identified in the TAMP) to incorporate new procedures created.
Phase 3	• Refine processes based on observations and discussions during the review period.

Initiative 10: Revise and Create Procedures for Reevaluation of Asset Management Practice

Description: With Iowa DOT having developed its first certified TAMP, the focus now shifts from the development of an asset management plan to the appropriateness and consistency review of the TAMP results and investment strategies. The focus of this initiative is to identify procedures to evaluate the TAM practice and implementation of the results into decision making. The initiative should provide opportunities for staff to discuss and communicate issues that may exist with procedures and hinder the implementation process at Iowa DOT.

Initiative Leader: Implementation Manager and TAM Implementation Team

Timing/Dependency: This task can be started immediately and is independent of other initiatives.

Preliminary Cost Estimate: Indirect (0.1 FTE) and Consultant (Low)

Implementation Phase	Action Items
Phase 1/2/3	• Establish effective criteria for evaluating the TAMP and other supportive resource guides. • Conduct an objective and independent evaluation of the TAMP. • Determine an appropriate schedule for discussion of high-level issues and strengths of the asset management practice. • Develop a guiding document to facilitate these discussions. • Research best practices from peer organizations for conducting, documenting, communicating consistency reviews. Meet and discuss TAM practices using the guiding document and schedule created. • Update any action items within the TIMP.

Appendix 1. Key Accomplishments Technical Memo

Memo

To: Matthew Haubrich, Peggi Knight

From: Lauren Gardner, Richard Boadi, Jonathan Groeger

Date: June 19, 2019

Re. Transportation Asset Management (TAM) Implementation Plan
Major Accomplishments

Major Accomplishments

The primary strategic goals of Iowa DOT's Transportation Asset Management Implementation Plan (TIMP) are to 1) establish awareness of basic TAM processes (Goal 1), 2) create a shared understanding, motivation, and coordination for the TAM program (Goal 2), and 3) form a structured TAM program (Goal 3). The first goal was to be accomplished within two years of creating the initial TIMP, the second goal in three to four years, and the third goal within five years.

The overarching goals of the Iowa DOT TIMP are supported by ten strategic initiatives and several cross-cutting action items. The initiatives are depicted in **Figure 1**. Each of the goals and initiatives are coded as high risk (red), medium risk (yellow), or low risk (green) depending on their state of completion. Initiatives with action items that have already missed a target deadline for completion are considered high risk whereas initiatives where all action items have been completed are considered low risk. All initiatives that have not missed any target dates but are also not completed are considered medium risk initiatives.

Iowa DOT conducted an initial assessment of the Department's asset management program to better understand the progress made on each of the strategic goals and the subsequent initiatives described. Each of the action items tasked under the strategic initiatives were discussed and assessed in terms of the completion of the action. The progress of the task was identified as the percent of the task complete (0-100%) or as on-going for action items requiring continuous improvement. Based on the progress made since the 2016 TIMP, actions were categorized as on or above target, missed target, or action items that require caution. Based on the timeline proposed for each strategic goal, all action items that fall under Goal 1 should have been completed, and all action items that fall under Goal 2 should be over 50% complete.

In general, Iowa DOT was on target for 22 of the 78 action items proposed in the initial TIMP. **Figure 2** summarizes the overall accomplishments of the organization.

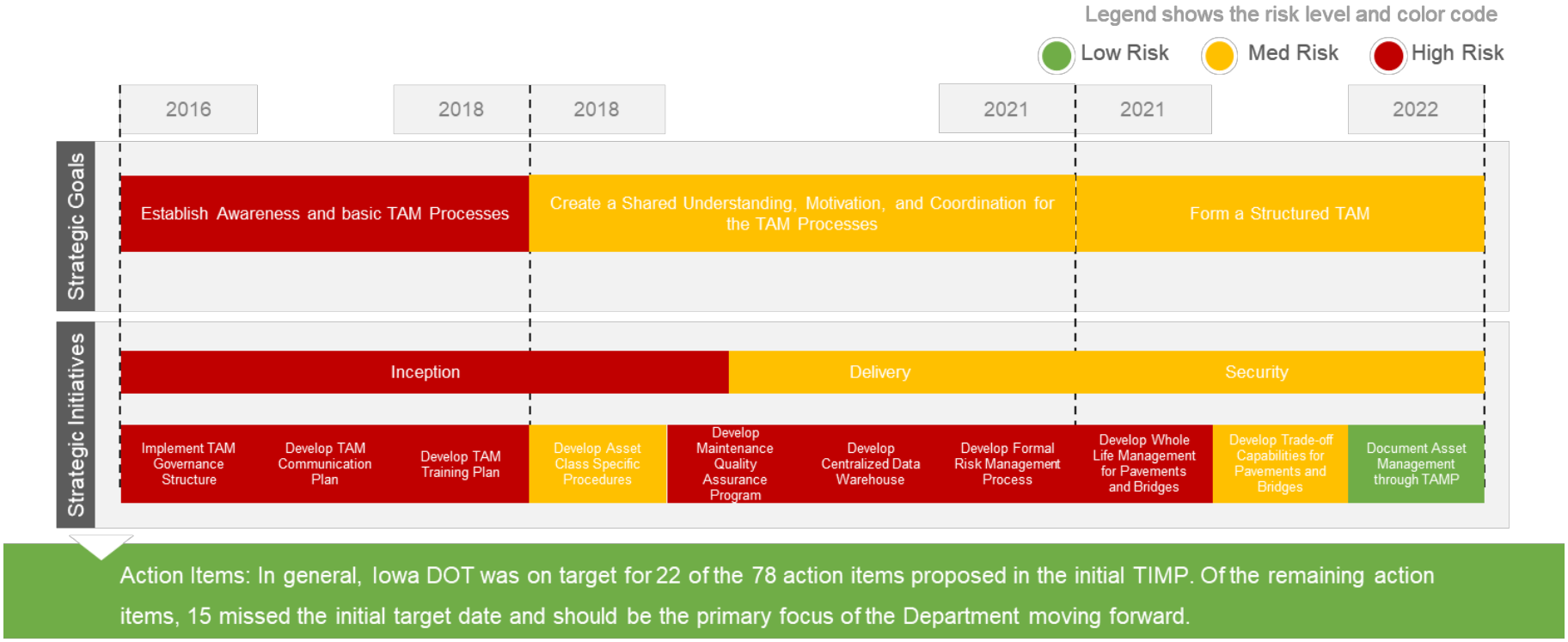


Figure 1. Strategic initiatives of Iowa DOT's TIMP

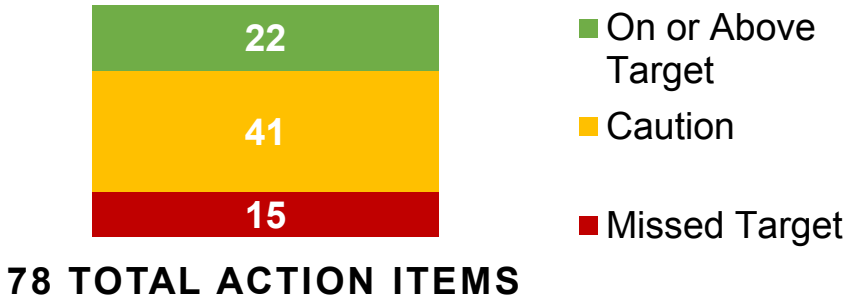


Figure 2. Summary of action item progress

Figures 3 to 5 depict the number of action items for Goals 1 through 3 classified as On or Above Target, Missed Target, or Action Items that Require Caution.

Goal 1: Establish Awareness and Basic TAM Processes

Figure 3 shows that there was a total of 29 action items that fell under Goal 1. Of these 29 action items, 14 actions were considered on or above target meaning these actions had been completed. The remaining action items (15 in total) were not completed within the 2-year period since the initial TIMP. The action items that were not completed in the 2-year period were distributed throughout the ten initiatives apart from the development of asset class specific procedures, the development of trade-off capabilities for pavements in bridges, and the documentation of asset management through the TAMP, which had all Goal 2 action items completed. The action items that missed the target date for Goal 1 should be considered priority action items for the Department to accomplish.

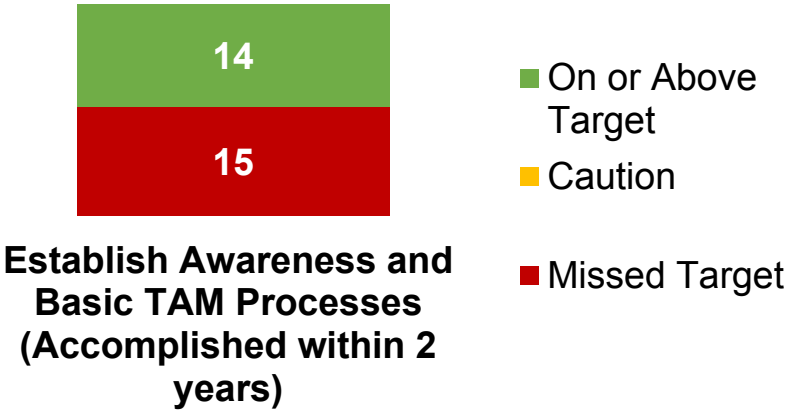


Figure 3. Distribution of accomplishments for Goal 1

Goal 2: Shared Understanding, Motivation, and Coordination

Figure 4 shows that a total of 29 action items fell under Goal 2. Of these 29 action items, 7 actions were considered on or above target, meaning these actions had been completed or were close to completion. The remaining action items (22 in total) were not completed but had not missed the target of being completed in 3-4 years from the initial TIMP. These action items should be considered as the second priority for the Department. The action items that were not completed in the 4-year period were distributed throughout the first nine initiatives.

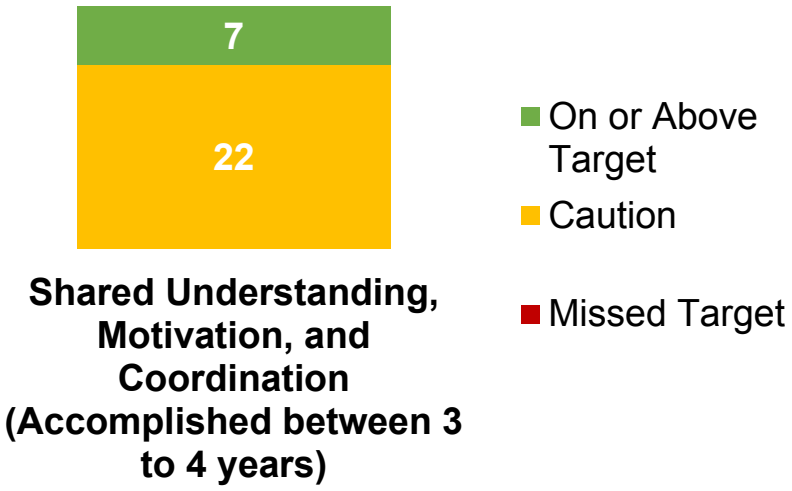


Figure 4. Distribution of accomplishments for Goal 2

Goal 3: Structured TAM

Figure 5 shows that there were 20 action items under Goal 3. Of these 20 action items, 1 action item was considered on or above target, meaning this action had been completed or was close to being completed. The remaining action items (19 in total) were not completed but had not missed the target of being completed in 5 years from the initial TIMP. These action items should be considered as the third priority for the Department. The action items that were not completed in the 5-year period were distributed throughout the first nine initiatives.

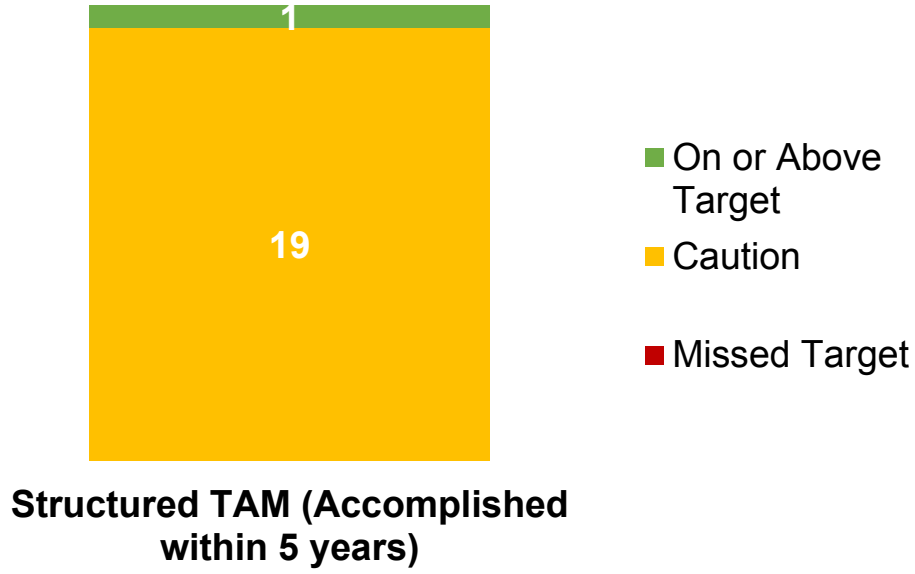


Figure 5. Distribution of accomplishments for Goal 3

Appendix 2. TAM Interview Summary Notes

Memo

To: Matthew Haubrich, Peggi Knight

From: Lauren Gardner, Richard Boadi, Jonathan Groeger

cc: None

Date: July 12, 2019

Re. TIMP Update Project: Task 3 – TIMP Interview Summary Notes

Introduction

In 2014, the Iowa Department of Transportation (DOT), with assistance from the Federal Highway Administration, initiated a process to assess the Department's existing capabilities and maturity in Transportation Asset Management (TAM). The process included a self-assessment, interviews with key stakeholders in the Department, and a gap analysis. In 2016, Iowa DOT published its maiden Transportation Asset Management Implementation Plan (TIMP) using the information gathered throughout the process. The TIMP contained three high-level strategic goals, 10 strategic objectives (Initiatives), and several cross-cutting action items to support the achievement of the goals and objectives. The Department is in the process of updating the TIMP published in 2016.

The process of updating the TIMP includes a new set of interviews with key stakeholders, which were conducted on June 24th and 25th in Ames, Iowa. The purpose of the interviews was to gather relevant information, key accomplishments, strengths, weaknesses, opportunities, and threats in existing business practices. The information that was gathered from these interviews will be extremely useful in understanding the current practice, developing a consensus on the Department's asset management maturity level and identifying needs and action items to update the TIMP.

Specifically, these interviews enabled the stakeholders to:

- Understand the current maturity in the asset management practice since the first assessment.
- Identify needs, gaps, and opportunities to improve the agency-wide asset management practice.
- Develop an updated action plan to accomplish asset management goals.

The interviews were facilitated by the consultant project team, Richard Boadi and Lauren Gardner from Wood Environment & Infrastructure Solutions, Inc. Appendix A contains the interview schedule and questions and Appendix B contains the participants' sign-in sheet.

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Interview Summary

The consultant project team conducted interviews with individuals with expert knowledge of Iowa DOT's activities. The teams participating in the interviews included data management, the Transportation Asset Management Implementation team, maintenance and operations, the Districts, pavement management, programming, and bridge management. The key takeaways from the interviews include:

Data Management Team

- *Data Governance:* There are no real data governance policies, standards, templates, or quality management processes existing at the enterprise-level. The Information Technology (IT) Team does have a data management plan and a Steering Committee that has been developed within the last year. The management/governance system includes metadata (for all business data in Iowa DOT), and will be able to publicize data if there is business-level sign-off. However, there are no defined data management roles within IT to ensure an integration and governance of all asset data making it difficult for IT to focus on data management.

- *Asset Management Roles*: There are also no clearly defined roles for asset management/data management. The Data Management Team promotes coordination and communication between departments because of their common interest not because it is a part of each member's job description.

- *Linear Referencing System*: Iowa DOT uses the Roadway Asset Management System (RAMS) to store most of its roadway business data. RAMS is a database directly integrated into the state's Linear Reference System (LRS). The LRS is the foundational system that allows analysis and integration of data tied to a linear network across business units through APIs and REST (Representational State Transfer) services. The Structure Inventory and Inspection System (SIIMS) is used to collect and store bridge information. SIIMS uses latitude and longitude as it's geospatial referencing system and can export data to formats that are easily accessed by state employees such as a .kmz/.kml files.

- *Geographic Information Systems (GIS) or Geospatial Infrastructure*: Iowa DOT uses GIS concepts to analyse, display, manage, maintain and collect data. This geospatial infrastructure brings together data from various systems and data storage formats using keys like project number, FHWA number, or route and measure from a LRS to tie data together. The geospatial infrastructure flushes out spatial relationships between unrelated datasets.

- *Data Linkage/Integration*: Integration of asset data varies by the type of data. There is currently no enterprise-wide asset management system due to the lack of maturity of asset databases. Below is a description of asset management data integration at the business-level (by asset).

    - **Pavement condition data**: Data is collected using high quality automated vans. The data collected by these vehicles are verified for locational accuracy (within 10 meters of the base geospatial map), and subsequently, tied into the LRS.
    - **Finance data**: Finance data is linked to RAMS by project number. Project numbers provide a key identifier for integration into the LRS.
    - **Maintenance data**: Two systems are used to collect and record data. The first system is the Resource Management System (RMS). The RMS records what occurs in the field in terms of

materials used, trucks used, and location of the work following the work being performed (since Iowa currently doesn't use Work Orders). The second system used is Workday. Workday is an Enterprise Resource Planning system that enables all employees of Iowa DOT to be on the same payroll (previously field staff were managed through a separate system), but also feeds information into the RMS. The issue with Workday, however, is its lack of an extensive historical database due to its recent adoption.

  - **Bridge data**: SIIMS is the main database used for bridge condition data. It is linked to the LRS through latitude and longitude information and ties into the RMS.
  - **Other systems**: Project scheduling and vertical facilities data managers are in the process of updating their systems which will be fully integrated into the existing LRS.
  - **Location**: Location of objects are tied together through GIS. Any data that either has a location or has a key that ties back to a location can be analysed, visualized, managed and maintained with geospatial infrastructure and technology.
  - **Geolibrary**: The geolibrary is a warehouse that uses extract, translate and load (ETL) processes to harvest hundreds of authoritative datasets and makes them available from one location. Users can access this data via direct database connection or through one of Iowa DOT's GIS portals Open Data, ArcGIS Online, or Geohub (https://data.iowadot.gov | https://iowadot.maps.arcgis.com | https://gis.iowadot.gov/portal/home/).

- *Communication, Marketing, and Training:* The team agreed that communication and training on asset management will play an increased role moving forward. Currently, asset management is discussed and coordinated due to the interest of key individuals. While the program team is an important group for communicating the benefits of asset management internally, they approach issues within individual business units from a high-level perspective. A vetting body to discuss issues between business units would be helpful in breaking down some of the existing siloes.

- *Successes in Asset Management:* The Data Management Team agreed that good progress has been made in asset management. It was noted that the IT Division is in the process of developing an enterprise data dictionary and metadata to track existing data. Once fully documented, the resource will be a tool for communicating what data is available internally. Additionally, the group mentioned that since the last TIMP, the Department has become efficient in the identification of gaps in the asset management system. Formal policies or scheduled meetings to review gaps will be important moving forward.

- *High-Priority Needs:* While there were successes in asset management since the initial TIMP, the data group identified several high-priority needs for the program. These include:

  - Creating documentation and communication strategies that ensure an understanding of how asset data is treated and how the data is integrated. A general understanding of data workflow will help the group identify cracks in the existing process. Additionally, it will improve transparency within the Department and enable data users to determine what data is already available to them.
  - The creation or redefining of roles that are specific to asset management and data integration is important at the enterprise level. The group suggested creating a business analyst position for asset management. This would enable the system to be considered in its entirety.
  - The participants noted the need for better communication. It may be useful to have each business unit identify one person as a liaison for identifying business unit needs and communicating within

their unit the importance of asset management. Additionally, efforts to communicate asset management generally to all Department staff are needed. At a high level, a communication schedule can be created with the program team so the TIMP committee can communicate the value of certain projects related to asset management, and at the local level, communication through internal marketing may be helpful for creating asset management buy-in.

- In terms of the data management to support asset management, the creation of a data warehouse and policies to dictate how data is stored, accessed, and made public is necessary. The use of a central warehouse would enable data quality to be checked between data sources. Additionally, it was discussed that a new unique identifier for road segments be incorporated into the central data system. The unique identifier would be a single element name that could be used throughout the entire database and make accessing information easier for the user.
- The group suggested introducing new hires to data management practices and data availability would be a good onboarding exercise. The early training of employees on how to access data would free up IT staff to work on non-query related tasks that would better data management and therefore asset management. The IT staff could subsequently spend more time on maintaining and improving the data warehouse.
- Another improvement discussed was the need to make efficient use of resources in the Department. Since there are many competing interests, how and what areas of asset management receives funding should be justified with benefit-cost analysis. For example, the acquisition and implementation of new software systems must be supported by a good business case analysis.

Maintenance and Operations Team

- *Data Inventory*: The Maintenance and Operations Team currently collects data related to work zones (such as shoulder widths, staging, shoulder improvements, etc.), crashes (including critical intersections), culverts, signage, ITS, and other physical assets (rumble strips, cable median barrier, etc.). Work zone data collection has been the most innovative over time; however, the dataset can still be further improved.
    - Crash data for the state is publicly available via Open Data and Geohub and provided through a third-party. The team currently does not have direct access to the dataset.
    - Culvert data is collected using an ESRI GIS tool. Culvert condition and basic statistics regarding culverts are recorded. The dataset is owned and maintained by the maintenance department and made available via Open Data and Geohub. There is currently no QA/QC program in place for culvert data.
    - Signage data is collected and stored by the maintenance department as well. The data is publicly available via Open Data and Geohub.
    - The ITS data inventory is one of the more advanced inventories the Maintenance and Operations Team works with; however, ITS devices are not well documented. The locations of fiber within the state system are collected in Net Designer. ITS maintenance is mostly out-sourced and maintenance that occurs within the state ITS system is recorded using a ticketing system. The data is publicly available via Open Data and Geohub.
    - Additional assets collected include guardrail; however, the quantity and quality of the data collected on guardrail is lacking. The data is publicly available via Open Data and Geohub.
    - *Linear Referencing System*: All the maintenance and operations data are tied to the state LRS. Therefore, location is key for linking databases. However, detailed information is not

made available on the ITS. The team plans to collect and report more detailed information in the future. The current data is publicly available via Open Data.

- *Decision-making*: Currently, maintenance and operations projects are selected based on long-term plans (such as a 5- or 10-year plan). Critical intersections for improvement are among the programmed safety projects and are determined using probabilistic modeling. The Design Bureau and the Bridges and Structures Bureau use project concepts to determine potential projects. The projects that are included as project concepts are typically small or spot projects. While most of the project selection is data-driven, each project selected for maintenance or general improvement still requires a field survey to determine its appropriateness.
- *Deterioration Modeling*: Iowa DOT does not have strong modeling capabilities for maintenance and operations data. The Department has initiated an effort to develop an asset management plan for its ITS infrastructure, which will include modeling and life cycle analysis. Modeling for ITS components is typically regional (through microsimulation), so the new models will focus on signal optimization using Integrated Corridor Management. The models will be able to predict when ITS devices need replacement. The GIS team is looking to leverage spatial temporal data store that is currently operational and load data from DTIMS to aid in these efforts. The team plans to use Artificial Intelligence (AI) tools to help understand and develop a model, but is only in the beginning stage.
- There is no funding for the plan development currently, as the asset management plan for ITS is just being kicked-off.
- *Successes in Asset Management*: The Maintenance and Operations Team mentioned that the strength of the asset management program is in its innovation, use of data to drive decisions, and strong leadership. Iowa DOT has been very supportive of trying new and innovative techniques to best manage work zones. Finally, the team agreed that there is strong leadership throughout the Bureau helping to foster good communication and creativity in the realm of asset management.
- *High-Priority Needs*: The team identified the following as areas within asset management that could be further improved:
    - The team would like to monitor the effects of maintenance treatments moving forward. Previously, Iowa DOT would collect information before and after a treatment was applied, but this process stopped happening when the resources no longer were available (field personnel were spread too thin). By monitoring the effects, treatment selection for future projects could be based on data/observational results rather than solely engineering judgement.
    - The group also suggested that extra consideration be given to the selection of vendors for Maintenance and Operations data management. Vendors' systems must have the capability to interface with agency-wide data systems for easy querying and exporting of data into suitable format. The group prefers to fully own their safety data rather than relying on third-party as there have been issues with losing data when vendors are changed in the past.
    - The group expressed interest in collecting additional data such as pavement markings (which is useful for the future with Automated/Connected Vehicles) and improving the quality of existing data collected such as data on culverts and guardrails. The collection of additional information on assets that are not currently required will improve the decision-making abilities as the Department explores new areas of asset management.

- Another area of improvement discussed was the way maintenance and safety projects are funded. Currently, the programming of projects is still very traditional, emphasizing construction of roadways rather than roadway maintenance. Funding for maintenance projects is provided through multiple funding streams rather than a single stream like newly constructed roads. The team agreed that the funding stream for maintenance projects should be more direct, so the Bureau does not have to consider multiple funding buckets to get a project let.
- Coordination between bridges, pavement, and ITS was another area the team felt could be improved. Many times, there is no easy way to check if an ITS project should be advanced based on proposed pavement or bridge work in a similar area. The communication of what work is scheduled and when it would be initiated would be helpful in prioritizing maintenance projects. It was recommended that this coordination occur by getting operations and ITS projects integrated into existing project concepts. This would enable more maintenance and operations projects to be done concurrently with other work within a defined proximity.
- The team revealed the need for a cultural shift. The group discussed that it was important for staff at all levels to understand the value of asset management and the value of operations and maintenance within asset management. Having the awareness of its importance paired with strong leadership can enhance the efficient use of funding and improved resources focused on this area of asset management.

Transportation Asset Management (TAM) Implementation Team

- *Trade-off/Prioritization Analysis:* Since the last TIMP, two flow charts have been created to layout the decision-making processes that occur leading to planning and project selection and prioritization. The first flow chart is focused on the basic parameters of the project and is used as a scoping tool. The second flow chart provides guidance on prioritizing scoped projects. The metrics used for scoping projects are generated from the typical high values of existing distresses within the system. These targets also drive project selection for long-range plans.
- *Performance Metrics:* The performance metrics used by Iowa DOT vary by asset. For bridges, the Bridge Condition Index (BCI) is the metric used for understanding the state network-level condition of bridges. The use of BCI differs from the federal approach in assessing bridge performance. Pavements are assessed using the Pavement Condition Index (PCI), which is calculated using federal metrics—cracking, faulting, rutting, and IRI data. The PCI calculated is used to categorize pavements into Good, Fair, or Poor condition. However, these categories do not correlate to the federally-defined categories of Good, Fair, and Poor. The state-defined PCI categories are what is used for internal and external communication with stakeholders, such as customers and the Commission. The team would like to reconsider the metrics reported internally and externally as there may be some confusion as to whether state or federal performance metrics are being used.
- *Performance Targets:* The Department uses trend analysis and expert judgment in establishing short- and long-term performance targets for pavement and bridges. The Department expects to get to a point where target setting is driven by available data, analytical tools, and supported by expert knowledge.
- *Asset Management and Long-range Planning:* It is was noted that currently asset management does play a role in long-range planning. Asset management and sustainability are connected at the

strategic level, and stewardship of the system is the clear priority identified in the long-range plan. Asset management represents the approach for achieving effective stewardship of the system.

- The Department expects to integrate resiliency and sustainability as complementary pieces of asset management in future Strategic Plans.
- *Risk Management:* Like asset management and long-range planning, the Department envisions incorporating a resiliency index as part of the asset management process. The Federal Highway Administration (FHWA) has created a method to incorporate resiliency into project prioritization, but the team discussed how they would modify the method, so it considers user cost. The team also discussed reporting resiliency in terms of the availability of the system to system users.
- *Communication:* Members of the team also discussed the importance of communication and the existing efforts Iowa DOT uses to engage external and internal stakeholders. The main communication strategy used by the Implementation Team is to inform the Program Team (Management Sponsors) of how asset management is being used to identify and prioritize projects for programming. Representatives of the Implementation Team periodically meet with the Commission at prescheduled times to discuss asset management and its implementation.
- *Successes in Asset Management:* The team mentioned that data is more readily available, structured, and consistent since the last TIMP, making it easier to use. However, the use of data to drive decision-making is still maturing.
- *High-Priority Needs:* The team identified the following as areas within asset management that could be further improved:
    - The need for formal feedback on how the strategies proposed for asset management performed was also discussed. The focus would be to share or communicate implementation successes and failures in asset management to help guide the Department in determining further actions to take. The accomplishment tracker tool (a Microsoft Excel-based tool) would be one such method of determining failures and successes. Ultimately, the team would like to report the progress of the TIMP every two to five years so that future employees will have a historical log of successes and failures. The idea is that by measuring progress, action items will actually get accomplished.
    - Improved and more frequent communication and training was also suggested. The team noted that internal communication has been challenging. The Department has tried some Bureau-level communications and have provided the opportunity for any employee to attend the Commission meetings. The team would like to communicate the value of asset management to specific Bureaus and to the Districts through training and other communication efforts that may increase buy-in for asset management. The Implementation Team also suggested setting up additional meetings with the Commission to discuss what the Commission finds valuable to support decision-making. This meeting could provide the team with additional insight on how and what information should be produced for project recommendations.
    - While some trade-off analyses are in place, the team proposed additional analyses to be a part of the TAM toolkit. Some examples of useful analyses for project prioritization include the funding distribution for bridge projects versus pavements, the funding distribution for rural projects versus urban, and the funding distribution for congested versus non-congested projects. It was noted that these analyses can aid the Department in more fully understanding the implications of investment decisions.
    - Another area of improvement discussed was funding distribution protocol. Currently, funding is distributed without regard to the local or network benefit that is innately a part of asset

management. The development of new tools that identify a project's far reaching benefits and costs could be paired and integrated with existing tools and frameworks for project prioritization. This approach, however, would not replace the discussion of project specifics and feasibility.

- Another recommendation the group made was to create a policy or meeting schedule for the team to periodically discuss and amend existing asset management documentation. This is particularly important for the flow charts developed so they are both up-to-date and able to be shared internally.

District Team

- *Data Inventory*: Pavement condition data collected is not typically used by the District for determining 3R projects (projects limited to resurfacing, restoration, and/or rehabilitation). Instead, the District uses this data to validate their project selection for 3R funding. Bridge data is collected and used for project selection by the Central Office. The Central Office decides which bridges will receive treatments and allows for District feedback. The District generally accepts this method. In terms of other assets, the District officials discussed the usefulness of signage data collected for the inventory. For almost all signage programming, selection is based on the signage data. In addition, the participants discussed the collection of drainage data. There is a general impression that drainage data is less useful than other datasets collected due to the poor quality of the data and limited information it provides.
- *Federal Metrics and Targets*: It was noted that the Districts rely mainly on expert knowledge to program and prioritize projects with limited emphasis on the federal metrics and performance targets.
- *Asset Management at the District-Level*: There is a slow push for Districts to become more involved with asset management. This is especially true for pavement deterioration modeling for which the Districts have volunteered one District employee to work on these issues and act as a liaison between the District and the Central Office. Through this integration, the hope is that the District will be able to use the data collected for decision-making more often and that selected projects can be validated using this data.
- *Tools Necessary for Implementation*: Currently, the Districts assist in the creation of decision trees for treatment selection. These decision trees, which are regularly updated, are not, however, typically utilized by the Districts. The Districts would benefit from these decision trees if they were easily accessible and continued to be regularly updated. While the Districts would still rely on field observation for the final selection of 3R projects, decision trees would act as a method of verification or validation. Another useful tool at the District level is documentation on the effect of treatments after its application. Knowing the extension of life provided by a treatment would be useful in the selection of treatments.
- *Successes in Asset Management*: As stated previously, the Districts utilize bridge data, bridge project recommendations, and the signage data for project selection.
- *Highest-Priority Needs*: The participants described two major challenges in coordinating efforts by Central Office and the Districts. The first is the lack of coordination between the pavement asset management group and the District. The lack of communication is related to the type of projects the Central Office funds and the types of projects the Districts fund. However, there is a need for communication between the two groups. Another area of improvement discussed was the need to connect and communicate the importance of the data collected. Data for the Central Office is typically collected by the Districts. This includes drainage data which is not being used. For Districts to continue to collect this information, the benefit of the data internally must be communicated. Without the

benefit communicated, the District engineers will lack the interest to collect this information, and the data quality may suffer as a result.

Pavement Management Team

- *Data Inventory/Data Issues*: The Pavement Management Team summarized the data collected, used, and stored for the purposes of pavement asset management. While other groups alluded to both in-house and out-sourced data collection, the pavement group specified that International Roughness Index (IRI) data is collected in-house while other distress data is collected using a contractor and subsequently tied into RAMS. These collection methods yield data that the team is comfortable with. However, the existing data has some challenges pertaining to missing data (approximately 5%) due to construction in progress. For non-construction related missing data, the Pavement Management Team can estimate data values based on the construction history of a segment or similar segments. Iowa DOT has an extensive database of construction data which can be used for predictions or to simply determine the pavement type of a segment. Condition data is stored in dTIMS where it is centralized and easily accessed. Despite having good data to pull from, the ability of the Pavement Management team to replicate FHWA definitions of distresses has been a limitation of the data. The pavement management team has difficulty replicating the percent of pavements in Good, Fair, or Poor condition and the Crack Percent of a pavement segment per FHWA definitions. Instead, state definitions are used for these metrics. The last data-related issue discussed was the quality of the data. Iowa DOT currently has a contract to develop quality check procedures. The procedure has been developed with input from FHWA.
- *Deterioration Modeling*: Deterioration modeling for the state's pavements is conducted with high confidence. The state-created models use quality data and are currently used for future condition predictions.
- *Decision-making Issues*: In terms of decision-making tools, the Department has developed decision trees and scoping tools to facilitate project/treatment selection and prioritization. The decision trees which were developed through expert opinion are used for the selection of pavement treatments. The initial engineering-judgment-based trees were verified and checked using data. The other tool discussed was a project scoping tool which could include dTIMS. Since the Districts must create 3-year work plans for maintenance programming, the database of future projects enables the Districts to determine whether maintenance is appropriate at a specific location. These decision-making tools do not quantify lifecycle costs, but the Department is working to use this information and these tools to support lifecycle planning in the future.
- *Successes in Asset Management:* Among the strides the Pavement Management Team has taken towards a more comprehensive asset management program is the use of dTIMS to create a long-term plan for budgeting. Using dTIMS, the pavement management team was able bring their funding needs to the Commission.
- *Highest-Priority Needs:* The team identified the following as areas within asset management that could be further improved:
    - The ability to determine proper goals and targets was one suggestion from the Pavement Management Team. The participants discussed how there needs to be a check to determine whether existing pavement metrics and established goals are appropriate.
    - Communication was one of the big topics discussed by the group. There was a consensus that more internal communication and documentation must occur. This documentation could help the Pavement Management Team organize data and processes in a way that is helpful for all the

Bureaus and Districts that rely on the data or procedures created in the pavement management plan.

- The team would also like to perform additional analyses. For example, there is interest in understanding whether there is a balance in the funding of concrete projects versus asphalt projects and which projects receive funding (pavement versus capacity projects). Generally, the team would like to explore themes in programming and use this information for creating more robust plans. Additional analysis would help refine the 20-year prediction/programming plan for Interstate pavements and the Strategic Plan currently being implemented for pavement management.

Program Team

- *Funding Plans:* There was a consensus that the Department is doing well in summarizing and projecting funding for asset management related programs. The Program team currently provides a 10-year plan for the Commission's approval. Funding for this plan is mostly limited by federal authorization bills, which only provide funding one year at a time. The unpredictability of federal funding creates uncertainty in state funding and project letting predictions.

- *Risk Management:* The Program Team expressed that the one of the main risks asset management faces is the uncertainty in funding that will be made available through the Highway Trust Fund. Iowa DOT manages this risk by providing a list of projects that will be deferred if there is insufficient funding. This helps emphasize the importance of this funding to lawmakers. Other types of risk such as the effect of flooding, winter events, and loss of staffing are dealt with through an ad hoc process. Communication of these risks to the Commission during scheduled meetings is a primary risk management tool Iowa DOT employs. The team discusses general program budgets, letting, and cash flow at a project-level during Commission meeting. Only state-funding is discussed in these meetings.

- *Successes in Asset Management:* The Program Team noted that the implementation of regularly scheduled meetings with the Commission was one of the biggest successes of the team since the initial TIMP. The communication developed between Iowa DOT and these stakeholders is important for emphasizing the value of asset management.

- *Highest-Priority Needs*: The team identified the following as areas within asset management that could be further improved:
  - One of the items the team identified for further improvement was the implementation of risk management at an enterprise level. Currently, formal risk management is applied to funding while ad hoc assessment is applied in other places. By having a formalized framework or procedure to incorporate risk agency-wide, the Department can deal with funding predictions in a consistent approach and make the process resilient.
  - While the scheduled meetings with the Commission were deemed a great success, the team noted additional communication and training might be necessary for the Commission. The team identified the need to succinctly communicate the basics of asset management in layman's terms and potentially share a communication campaign or training with the Commission. This would enable the Commission to be more informed.
  - Finally, the team would like to see the 5-year Plan and the TAMP be made more complementary. Since asset management is focused on the outcomes and performance of a plan, the 5-year plan will provide the proper narrative for what projects will occur and be analyzed by the TAMP.

Bridge Management Team

- *Data Inventory*: The Bridge and Structures Bureau uses a Bentley system as the primary data inventory. The Department currently has two cycles worth of new data elements for bridges and structures and a historical database of different data elements from 1980 to present. The bridge management system not only is used for the storage of condition information, but also collects and stores maintenance information. All bridge information is tied into the RAMS.
- *Deterioration Modeling*: Deterioration modeling is conducted using Infrastructure Data Solutions software. The deterioration modeling predicts conditions 6 years into the future and was used for the analysis required in the TAMP. In addition to predicting network conditions, the software can select projects for treatment through the implementation of selected criteria (like a decision tree). The system uses data submitted to FHWA and therefore is not tied into the other systems used for data storage. One of the biggest challenges encountered in the analysis is the lack of reliable cost data to support the required analysis.
- *Successes in Asset Management:* The bridge management team noted that a very thorough and complete guidance structure has been created for bridge data collection. The team is confident in the data collected and collects more data than required by federal reporting standards.
- *Highest-Priority Needs:* The team identified the following as areas within asset management that could be further improved:
    - One of the areas of improvement suggested by the Bridge Management Team is improvement in unreliable cost data. Currently, because of the way project costs are lumped together, there is no means to estimate or model cost. The team would be open to the creation of a cost model, using other states in the Midwest as examples for its development.
    - The team discussed the desire for additional improvements in the existing deterioration modeling for bridges. Iowa DOT currently has a contract with Iowa State University to develop a deterioration model using BrM. The use of BrM would enable the existing deterioration model to be verified and individual data elements to be modeled (rather than the BCI). Additionally, modeling improvements could extend to incorporating lifecycle analyses focused on optimization.
    - The bridge management team would also like to see documentation on how resources should be spent on assets. This is needed specifically at the District level where project selection and prioritization are based on engineering judgment rather than data. A sound flow chart or decision tree for the type of funding a project can or will receive would be helpful.

      Coordination was another area of improvement. The bridge management team mentioned that there should be more coordination with Pavement Asset Management Team so projects can be programmed with information about the entire system rather than just based on bridge information.

Appendix A

Interview Guide

Interview Schedule

The following was the schedule for the on-site interviews.

Date/Time	Teams
June 24	
9:00-11:00 am	9:00 – 10:00 am – Data Management Team: *TIMP interview*
	10:00 – 11:00 am – Data Management Team: *SDBP project meeting*
11:00 am-12:00 pm	Maintenance and Operations Team
1:00-2:00 pm	Transportation Asset Management Implementation Team – *TIMP interview*
2:00-3:00 pm	District Team
3:00-4:00 pm	Pavement Management Team
June 25	
9:30-10:30 am	Program Team
10:30-11:30 am	Bridge Management Team

Interview Questions

Data Management Team

- Is there a data governance (policies, standards, templates, quality management processes) in place to manage data lifecycle for any of the applications/systems used by Iowa DOT?
- Could you please provide a brief overview of the improvements to the information systems currently used at the agency level?
- How is GIS currently used within the Department to support asset management?
- Is there a unified location referencing system (LRS)?
- How does GIS tie into other major agency systems?
- How are various systems linked together? How could this linkage be improved? Are there plans to improve the linkages?
- How is information provided to decision makers from your systems? Is it on-demand (self-serve), custom reports and information?
- What role do you see for your group in the overall development of asset management in the agency?
- What improvement do you envision for enhanced data/information transfer?

- What training, marketing, or communication may be necessary to achieve best practice agency-wide data management?
- What are your key strengths, needs, and opportunities for improvement in being able to integrate information for use in an asset management process?
- What are the key risks associated with integrating systems into a more holistic asset management process?
- What would be the key agency considerations from an information systems perspective of implementing a vendor-provided asset management system?
- What are your agency's greatest strengths, from your perspective, in asset management?
- What are your agency's highest priority needs, from your perspective, for asset management?
- How have previous asset management efforts been successful? Where/how could we improve?

Maintenance & Operations

Inventory and Condition

- What inventory and condition information is currently collected, beyond pavement and bridges?
- Do you have live access to pavement and bridge asset information related to future plan work?
- For inventory, is the data tied to an Agency-wide linear referencing system?
- How is the inventory and condition information that is currently collected used?
- Do you currently prepare a report/documentation of the assets condition? If so, please describe.
- What inventory or condition information is not currently collected but needs to be?
- What inventory and condition information should be collected for decision-making and predicting future performance and maintenance needs?
- Do you have documented operational procedures in place? And how often do you assess your procedures against industry standard approach?
- What performance measures are used for assessment and how are they linked to outcome measures for the asset?
- Is the collection of condition data done in-house or outsourced?
- Do you evaluate the benefits associated with data collection and asset management?
- How objective/subjective is the condition data? E.g., are there accepted practices/guidelines for condition assessment? Are these practices documented?
- What degree of confidence do you have in the inventory and condition data? Are quality management procedures documented and audited?
- What kind of database is used for the condition data, e.g. Access, Excel, other?
- How accessible is the inventory and condition data to decision makers and users and how accessible does it need to be?
- How often is the inventory and condition data updated?

- Are cyclic condition assessment processes in place? Is the cycle length appropriate?

Deterioration Modeling

- What models exist to project maintenance needs?
- Can future maintenance and funding needs be projected ten years out?
- What level of confidence do you have in any models currently used?
- What studies are needed to enable reasonable estimates to be made?

Decision-Making Issues

- How is the maintenance program for the asset class currently developed, i.e. how are maintenance projects selected and prioritized?
- Does engineering judgment play an important role or is the process objective and transparent?
- Does customer or stakeholder feedback play a role in project selection and prioritization?
- How is the specific type of remedial action/improvement identified now?
- What relationship exists between maintenance remedies and capital improvement treatments?
- What problems currently exist that hinder implementing the best investment fix?
- How are funding needs established and linked to performance outcomes?
- How is the maintenance program for the asset classes delivered? For example, projects are done in-house, projects are done under open-end or area-wide contracts, other? – Any procurement strategy or policy in place? Do you conduct risk and benefit analysis?
- Can you quantify the whole life costs of the asset, including assessing the whole life costs of adding an asset to the system?
- How is risk handled in decision-making?

Summary

- How have previous asset management efforts been successful? Where/how could we improve?
- What other thoughts do you have to better manage assets to meet desired service level objectives and minimize long-term costs?
- What is your agency's greatest strength, from your perspective, in asset management?
- What is your agency's highest priority need, from your perspective, for asset management?
- Are there any other opportunities for improvement that should be highlighted in the updated TIMP?

TAM Implementation Team

- Please describe the current strategic planning and project programming practices and opportunities for improvement:
- Assessing current inventory, conditions, and performance.

- Developing policy guidance.
- Analyzing tradeoffs across investment areas—e.g., bridge vs. pavement or preservation vs. capacity expansion.
- Prioritizing projects within investment areas.
- Are there any current initiatives or future plans related to the items listed above?
- How has the agency's risk management process evolved in the past two years and what plans have been established to move from qualitative to quantitative analysis?
- How is the agency planning to implement whole life planning and lifecycle cost analysis into decision-making?
- What is the nature of the most difficult planning and project programming decisions your agency is faced with?
- What management systems, tools, and/or other data sources do you use to support the planning and project programming process? – You mentioned a planning tool in the tracking spreadsheet. Please speak to that tool and others.
- How has your team influenced the agency's overall asset management initiative and what needs to be done to improve your role?
- Please describe what and how performance measures (including the FHWA measures) are tracked within the agency. Does the rank and file understand the process and goals?
- How has your performance-target-setting processes changed to align with FHWA requirements?
- How is asset management influencing the long-range plan and STIP processes? – One of the requirements of the TAM rules is to integrate all planning process with TAM.
- How does project programming tie into the performance management approach?
- How are customer expectations factored into the overall process?
- Please provide feedback on the following aspects of the systems you use to generate performance measures:
- Data/results reliability.
- Functionality.
- Integration with other systems and data sources.
- Reporting and accessing information.
- What additional data or system functionality would be most beneficial to you?
- What efforts were in place to engage external stakeholders of the NHS? Do you need additional engagement activities to improve the process and results?
- How have previous asset management efforts been successful? Where/how could we improve?
- What is your agency's greatest strength, from your perspective, in asset management?
- What is your agency's highest priority need, from your perspective, for asset management?

Districts

- How is asset management going to change the way you do business as it pertains to the following: funds appropriation, resource allocation, project selection, target setting, etc.
- What data (inventory, condition, projects, costs, etc.) are available for the following asset types? What is the best source of data for each?
- Pavement.
- Bridge.
- Roadside features (signs, lighting, drainage, etc.).
- Other.
- Who tracks information for each asset type? What process is used for tracking asset data?
- Who is responsible for managing each asset type? What process is used to handle maintenance?
- Is your current funding stream/expected future revenues enough to achieve established performance targets?
- What management systems, tools, and/or other data sources do you use to support the resource allocation process?
- How do you see the District fitting into the Iowa DOT's overall asset management initiative?
- What measures and initiatives are put in place to use asset management principles in support of the Agency's goals and targets?
- What type of guidance/tools/data would be most beneficial to you?
- How have previous asset management efforts been successful? Where/how could we improve?
- What is your agency's greatest strength, from your perspective, in asset management?
- What is your agency's highest priority need, from your perspective, for asset management?

Pavements

Inventory and Condition

- Is the collection of condition data done in-house or outsourced?
- What inventory and condition information are currently collected, and how is the agency working to meet the data requirements stipulated in the Transportation Performance Management (TPM) rules?
- What inventory or condition information is not currently collected but needs to be?
- For inventory, is the data tied to an Agency-wide linear referencing system?
- Please describe how your existing reporting aligns with the reporting requirements of TAM and TPM, and how you plan to address any ensuing gaps.
- What inventory and condition information should be collected for decision-making and predicting future performance and program needs?

- How is the agency dealing with the FHWA performance measures and agency-specific measures used for condition assessment and how are they linked to decision-making?
- How much time (man-hours) and money are used annually to collect inventory and condition data?
- How is the collection of condition data currently funded?
- Has your agency done benefit-cost analysis in collecting data for asset management?
- How objective/subjective is the condition data? For example, are there accepted practices/guidelines for condition assessment?
- What degree of confidence do you have in the inventory and condition data?
- What percentage of the asset is assessed to determine its condition? Does it meet or exceed the federal data collection requirements? Does it vary by functional classification of the road or geographic area?
- What kind of database is used for the condition data, e.g. dTIMS, MS Access, MS Excel, Oracle, other?
- How accessible is the inventory and condition data to decision makers and users and how accessible does it need to be?
- How often is the inventory and condition data updated? Does it meet or exceed the federal reporting cycle?
- Are cyclic condition assessment processes in place? Is the cycle length appropriate?
- Are quality management procedures documented and audited?

Deterioration Modeling

- Do you currently use deterioration models to predict future performance and program needs?
- Do you have reliable treatment cost data to estimate future needs and associated cost?
- What deterioration models exist to project asset conditions?
- Can future asset condition levels and funding needs be projected ten years out?
- What level of confidence do you have in any deterioration models currently used?
- What studies/investigations are needed to enable reasonable deterioration estimates to be made?

Decision-Making Issues

- How is the program for the asset class currently developed? That is, how are investment strategies developed and projects selected and prioritized?
- Does engineering judgment play an important role or is the process objective and transparent?
- Does customer or stakeholder feedback play a role in project selection and prioritization?
- Does your system consider tradeoff analysis in programming and project selection decisions?
- What is the procedure for resource allocation?
- How is the specific type of remedial action/improvement identified now?

- What relationship exists between maintenance remedies and capital improvement treatments?
- What problems currently exist that hinder implementing the best investment fix?
- How are funding needs established and linked to performance outcomes?
- How is the program for the asset class delivered? For example, projects are done in-house, projects are done under open-end or area wide contracts, other?
- Can you quantify the lifecycle costs of the assets, including the consideration of maintenance cost?
- How is risk handled in decision-making?

Summary

- How have previous asset management efforts been successful? Where/how could we improve?
- What are the greatest strengths of your group and what are the opportunities that can be capitalized on in asset management?
- What is the greatest need in asset management?
- Are there any other opportunities for improvement that should be highlighted in the updated TIMP, such as need for additional information not currently available? If so, what information?
- Is there a documented pavement management policy that guides the development of long-term investment strategies?

Program Team

Financial Planning and Risk Management

- Could you please provide a brief overview of the financial planning process, focusing on the process for developing yearly and long-term financial plans?
- What initiatives are you taking to tie the planning process with the transportation asset management plan (TAMP)?
- Please describe your experience in summarizing and providing historical and projected (beyond the current six-year plans) funding information pertaining to pavement and bridge assets in supporting the TAMP development process.
- Can you perform similar analysis for other assets?
- Do you have live access to asset information, and if yes, for what assets? Do you need access?
- How do you measure financial sustainability and report to stakeholders?
- Can the agency provide estimates of current asset value and projected asset value over a 10-year planning horizon? If so, for what assets can this be done?
- Describe the approach you used in developing the investment strategies in the TAMP. Is the process documented to allow replication?
- Are there opportunities for improvement in financial planning and investment strategies development processes that should be highlighted in the updated TIMP?

- Are there improvements to the financial planning systems that could benefit the process of managing assets?
- How is risk management considered at the programming level?
- How does the existing TAMP risk register fit into your business approach? Do you have a separate risk register?
- Describe your overall involvement in developing your TAMP.
- What are your agency's greatest strengths, from your perspective, in asset management?
- What are your agency's highest priority needs, from your perspective, for asset management?

Local System

- Please describe how you treated the local NHS road network in the TAMP.
- What type of legislative mandates or policies (if any) do you have with respect to asset management?
- How is your funding appropriation and resource allocation (e.g., by program, by asset type, by project) impacted by or expected to change with asset management implementation (e.g., policy goals, performance targets, legislative requirements)?
- Asset management calls for investigating tradeoff analysis. How much flexibility do you have in shifting funds between different types of assets and activities? Did you consider any tradeoff analysis in your asset management processes leading to the development of the TAMP?
- Who tracks information for each asset type? What process is used for tracking asset data?
- Do you have different targets or performance goals than the state targets? How does your financial situation allow you to meet those goals? What management systems, tools, and/or other data sources do you use to support the resource allocation process?
- How have previous asset management efforts been successful? Where/how could we improve?
- Do you have any current initiatives or future plans related to asset management?
- How do you see your jurisdiction fitting into the Iowa DOT's overall asset management initiative?
- What type of guidance/tools/data would be most beneficial to you?
- What is your Division's greatest strength, from your perspective, in asset management?
- What is your Division's highest priority need, from your perspective, for asset management?

Bridge Management Team

Inventory and Condition

- Is the collection of condition data done in-house or outsourced?
- What inventory and condition information are currently collected, and how is the agency working to meet the data requirements stipulated in the TPM rules?
- What inventory or condition information is not currently collected but needs to be?
- For inventory, is the data tied to an Agency-wide linear referencing system?

- Please describe how your existing reporting aligns with the reporting requirements of TAM and TPM, and how you plan to address any ensuing gaps?
- What inventory and condition information should be collected for decision-making and predicting future performance and program needs?
- How is the agency dealing with the FHWA performance measures and agency-specific measures used for condition assessment and how are they linked to decision-making?
- How much time (man-hours) and money are used annually to collect inventory and condition data?
- How is the collection of condition data currently funded?
- Has your agency done benefit-cost analysis in collecting data for asset management?
- How objective/subjective is the condition data? For example, are there accepted practices/guidelines for condition assessment?
- What degree of confidence do you have in the inventory and condition data?
- What percentage of the asset is assessed to determine its condition? Does it meet or exceed the federal data collection requirements? Does it vary by functional classification of the road or geographic area?
- What kind of database is used for the condition data, e.g. dTIMS, MS Access, MS Excel, Oracle, other?
- How accessible is the inventory and condition data to decision makers and users and how accessible does it need to be?
- How often is the inventory and condition data updated? Does it meet or exceed the federal reporting cycle?
- Are cyclic condition assessment processes in place? Is the cycle length appropriate?
- Are quality management procedures documented and audited?

Deterioration Modeling

- Do you currently use deterioration models to predict future performance and program needs?
- Do you have reliable treatment cost data to estimate future needs and associated cost?
- What deterioration models exist to project asset conditions?
- Can future asset condition levels and funding needs be projected ten years out?
- What level of confidence do you have in any deterioration models currently used?
- What studies/investigations are needed to enable reasonable deterioration estimates to be made?

Decision-Making Issues

- How is the program for the asset class currently developed? That is, how are investment strategies developed, and projects selected and prioritized?
- Does engineering judgment play an important role or is the process objective and transparent?
- Does customer or stakeholder feedback play a role in project selection and prioritization?

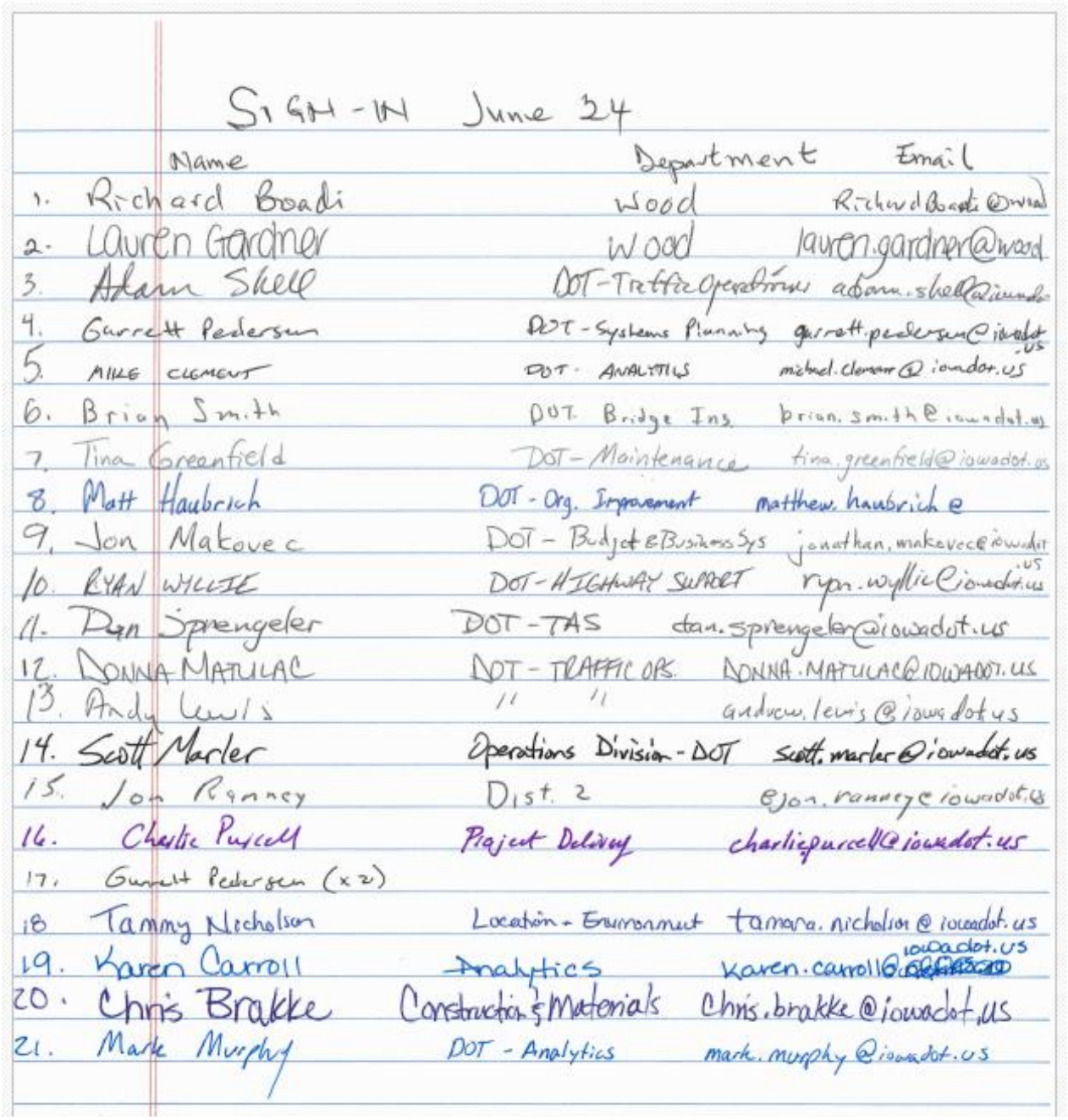
- Does your system consider tradeoff analysis in programming and project selection decisions?
- What is the procedure for resource allocation?
- How is the specific type of remedial action/improvement identified now?
- What relationship exists between maintenance remedies and capital improvement treatments?
- What problems currently exist that hinder implementing the best investment fix?
- How are funding needs established and linked to performance outcomes?
- How is the program for the asset class delivered? For example, projects are done in-house, projects are done under open-end or area wide contracts, other?
- Can you quantify the lifecycle costs of the assets, including the consideration of maintenance cost?
- How is risk handled in decision-making?

Summary

- How have previous asset management efforts been successful? Where/how could we improve?
- What are the greatest strengths of your group and what are the opportunities that can be capitalized on in asset management?
- What is the greatest need in asset management?
- Are there any other opportunities for improvement that should be highlighted in the updated TIMP, such as need for additional information not currently available? If so, what information?
- Is there a documented management policy that guides the development of long-term investment strategies?

Appendix B

Workshop Participants Sign-in Sheet



SIGN-IN June 24

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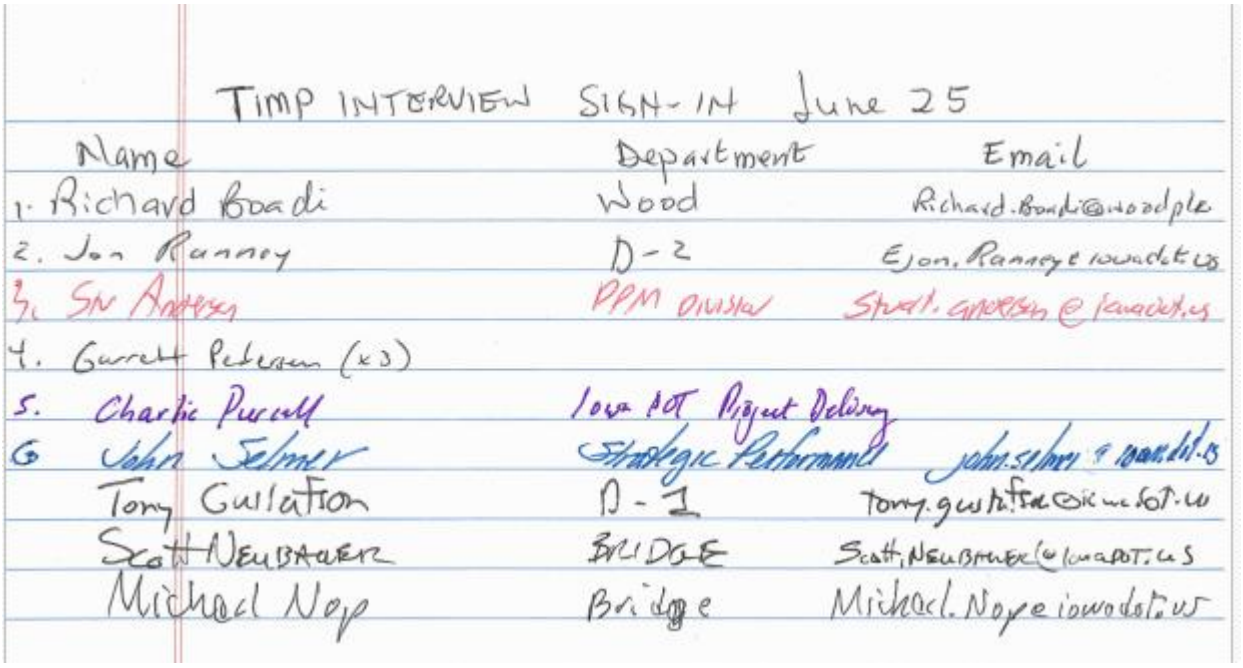

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Appendix 3. Summary of Asset Management Maturity in Iowa

#	Business Need	Maturity (0 to 100) Current	Target	Comments
Understanding and Defining Requirements				
1	*AM Policy and Strategy* – What extent has the system been articulated, approved, communicated, and acted on, and how consistent is policy/strategy with state/federal policies?	80	100	The policy and strategy of AM has been articulated through the state's TAMP; however, the policy and strategy have not been fully integrated at the enterprise level yet.
2	*Levels of Service and Performance Management* – How is performance defined and ensured for Iowa DOT customers?	60	85	Iowa DOT has established performance measures and targets for asset management and is focused on reporting state- and federally required information. Iowa DOT has yet to consider whether the federal metrics are appropriate and are valuable for external communication and needs.
3	*Forecasting Demand* – How easily is Iowa DOT able to predict and use future conditions for asset management purposes?	40	60	While many of Iowa DOT's forecasting tools are well-developed (i.e., tools for pavements and bridges), not all assets have forecasting tools to predict future conditions and needs. Additionally, risk assessment has yet to be fully integrated into these forecasts and predictions.
4	Asset Register Data – What data is collected and how is quality ensured?	65	85	While Iowa DOT has a strong inventory of asset data for critical assets, extensive cost and performance data are not regularly collected. In addition, improvements to storing and accessing data using a central warehouse are still being made.
5	*Asset Performance and Condition* – How is performance of assets measured and managed?	70	85	Iowa DOT uses forecasted condition information to assess the performance of assets in the long-term, but these forecasts do not fully optimize assets' lifecycles yet.
Lifecycle Decision-Making				
6	*Decision Making* – How are decisions made about replacing, rehabilitating, or performing other treatments made for assets?	75	100	Most decision-making follows a formal decision-making process (decision trees or flow charts) that was created through engineering judgement and data analysis. However, decision-making is often finalized using non-procedure-based methods (i.e., field surveys) and often is siloed or business-unit-specific.
7	*Managing Risk* – To what extent is risk management and resilience planning integrated into AM decision making?	55	80	Resiliency and risk management have not been defined or formalized at the enterprise level.

#	Business Need	Maturity (0 to 100) Current	Target	Comments
8	*Operational Planning* – How is operational activity to keep assets in service planned and managed?	60	75	Operational procedures are available for bridge and some other asset data. These operational procedures are accepted, but also supplemented by in-field judgements. Improved planning for maintenance projects is necessary to improve the operational activities at a District level.
9	*Capital Works Planning* – What processes are in place to plan and prioritize capital expenditure?	70	85	Capital projects are scoped and included in long-range planning. Many of these projects have project concepts associated with them which describe the benefits of the project to the system. Planning is still limited to traditional decision techniques and modelling.
10	*Financial Planning* – How does Iowa DOT plan for funding capital expenditure and asset-related costs?	75	85	Financial planning is limited to 10-year predictions with greater uncertainty in the predictions further in the future. While the funding structures are understood and used, there is a need for more advanced cost modeling and improved funding allocation procedures.
Asset Management Enablers				
11	*Asset Management Leadership and Teams* – What is the level of organization commitment to AM and how is this reflected in the organization structure?	70	85	Iowa DOT has established a strong Asset Management Leadership Team through the TAM Implementation Team. Roles have been identified for some asset management needs and the asset management team has a consistent vision. The Department does require additional asset management roles, responsibilities, and communication to improve the practice.
12	*Asset Management Plans* – How does Iowa DOT develop, communicate, resource, and action its AM plans?	75	85	Iowa DOT's asset management plan is well-developed and identifies performance trends and future forecasts. The plan can be strengthened by continually reviewing the appropriateness of reported metrics to customers and incorporating more advanced risk, cost, and performance analysis tools.
13	*Asset Management Processes and Procedures* – How does Iowa DOT ensure AM processes and practices are appropriate and effective?	65	80	Some asset management processes are documented and in place; however, not all processes are formalized, and the quality of the processes are not formally reviewed.

#	Business Need	Maturity (0 to 100) Current	Target	Comments
14	*Asset Management Information Systems* – How does Iowa DOT meet the information needs of those responsible for AM?	75	80	Spatial capabilities exist for almost all the asset data collected and stored by Iowa DOT. Querying data is moving towards being automatized, but centralized data storage and data understanding is still being developed for other data and information areas, such as financial data.
15	*Service Delivery Mechanisms* – How does Iowa DOT procure AM services and how is control exercised over outsourced services?	70	85	Some policies and analyses are in place to assess the acquisition of potential services. However, documentation and additional criteria should be set in place to strengthen this area.
16	*Audit and Improvement* – How does Iowa DOT ensure continual development towards an appropriate maturity level?	70	85	The establishment and updating of the TIMP is the main method of monitoring and reporting improvement of the asset management program internally. The TAM Implementation Team has identified and made steps towards achieving necessary action items for improvement.
Overall Score		**66.8**	**85**	

Appendix 4. TAM Implementation Personnel

Role	Members
Executive Champions	• *Mark Lowe*, Department of Transportation (Director) • *Stuart Anderson*, Planning, Programming & Modal Division • *Mitch Dillavou*, Highway Administration • *John Selmer*, Strategic Performance Division
Implementation Manager	• *Matt Haubrich*, Organizational Improvement
TAM Implementation Team	• *Peggi Knight*, Research and Analytics Bureau • *Deanna Maifield*, Project Management Bureau • *Donna Matulac*, Traffic Operations Bureau • *Tammy Nicholson*, Location and Environment Bureau • *Garett Pedersen*, Systems Planning Bureau • *Charlie Purcell*, Project Delivery Division • *Jon Ranney*, District 2 • *Don Tebben*, Program Management Bureau