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TAM Program Evaluation Overview

Multi-Year TAM Program Evaluation Overview.

May 2023

U.S. Department of Transportation

Federal Transit Administration

Contents

TAM Program Evaluation Overview 1
Contents 2
Executive Summary 3
1.0 Introduction 5
1.1. Evaluation Purpose and Objectives 5
1.2. Evaluation Design 6
2.0 Methodology 7
2.1. Evaluation Questions and Data Sources 7
2.2. Limitations of the Evaluation 9
3.0 Evaluation Themes 10
3.1. Policy Change Themes 10
3.2. Organizational Change Themes 15
3.3. Industry Change Themes 18
4.0 Conclusion 21
Appendix 24
A. Evaluation Logic Model 24
B. Evaluation Activities 25
C. Evaluation Interview Groups 26
D. Focus Group 27
E. Interview Guide 28
F. Organizations Considered in Twitter Analysis 30
G. Summary of 2018-2021 NTD Data Submissions 31

Executive Summary

The U.S. Department of Transportation (USDOT) Federal Transit Administration (FTA) implemented their Transit Asset Management (TAM) Program to support transit agencies in their implementation of TAM. TAM is a business model used by transit agencies to help prioritize funding based on asset condition and performance. The goal of TAM is to achieve and maintain a state of good repair (SGR) for transit assets.

In 2016, FTA published the Transit Asset Management Final Rule (TAM Rule), 49 CFR Part 625. The TAM Rule required all FTA grantees, meaning transit agencies that receive Federal grants or funding, to have a fully compliant TAM Plan by October 2018 and to update their TAM Plan by October 2022. FTA's TAM Program provides support to help agencies implement the TAM Rule by providing guidance, fact sheets, templates, and other resources as well as through capacity building events and activities such as webinars and peer-learning events.

To better understand how the FTA's development and publication of the TAM Rule has affected the practice of transit system management and operations at transit agencies that receive Federal grants or funding, as well as any changes to related activities, the FTA TAM Program tasked the USDOT John A. Volpe National Transportation Systems Center (Volpe Center) with evaluating, identifying, and documenting the gaps, opportunities, and lessons learned from FTA's deployment of the TAM Rule and support to agencies as they implemented the TAM Rule. This evaluation included a formative evaluation approach to analyze data over a five-year period. The TAM Program also deployed evaluative learning, meaning they used findings from each annual report to inform direct real time TAM Program improvements.

The evaluation's goal included identifying the overall effects of the TAM Rule and associated requirements on the transit industry. The Volpe Center Evaluation Team (Evaluation Team) focused on developing a baseline understanding of the rollout process for the TAM Rule to support an assessment of before and after conditions. Specifically, the Evaluation Team sought the following information:

- The effectiveness of FTA's support to transit agencies implementing the TAM Rule.
- The effects of the TAM Rule requirements on individual agencies.
- The effects of the TAM Rule requirements on the transit industry.

Overall, the Evaluation Team found that transit agencies benefited from the FTA guidance, communications, and outreach and the FTA TAM Program following the TAM Rule. Additionally, the TAM Rule encouraged agencies to update or make changes to their organizational structure or functions to move towards a TAM approach. Throughout the evaluation's data collection, transit agency representatives provided suggestions for improvement, some of which were used for real-time improvements to the TAM Program's support to transit agencies. Below is a summary of key findings from each of the three evaluation areas. More detailed themes and descriptions can be found in *Section 3.0 Evaluation Themes*.

Key findings related to the **Policy Change** evaluation area include:

- Transit agencies viewed FTA resources favorably, specifically those that supported implementation of the TAM Rule (including peer events, technical assistance resources, and the website).
- FTA TAM Program could continue to adapt to current challenges by providing up-to-date guidance, communications, and outreach.
- TAM Rule requirements helped agencies formalize business processes and contributed to more mature TAM Programs.

Key findings related to the **Organizational Change** evaluation area include:

- Internal and external coordination improved between staff at transit agencies, metropolitan planning organizations (MPOs), and State Departments of Transportation (State DOTs); this remained an opportunity to grow.
- Agencies continued to shift their individual focus from compliance to more complex topics including lifecycle analysis, risk-based planning, and investment prioritization.
- Agencies continued to implement new decision support tools.
- Challenges related to organizational change included TAM staffing shortages and reduced funding.
- Agencies focused more resources on the impact of severe climate events and risk-based planning from 2020 through 2022, impacting funding and staffing choices.

Key findings related to the **Industry Change** evaluation area include:

- Global trends, such as supply chain disruptions and an increase in unanticipated events like severe weather, negatively impacted the transit industry and may impact progress on TAM-related initiatives.
- Funding remained an industry-wide constraint throughout the evaluation period and was exacerbated by COVID-19 and the resultant supply chain disruptions.
- Transit industry professionals continued to request more complex resources and technical assistance support from the TAM Program.

1.0 Introduction

The U.S. Department of Transportation (USDOT) Federal Transit Administration (FTA) implemented their Transit Asset Management (TAM) Program to support transit agencies in their implementation of TAM. The American Public Transportation Administration defines TAM as "a business model that prioritizes funding based on condition and performance to achieve and maintain a state of good repair (SGR) for the nation's public transportation assets. It is a strategic and systematic process through which an organization procures, operates, maintains, rehabilitates, and replaces transit assets to manage their performance, risks, and costs over their lifecycle to provide safe, cost-effective, and reliable service to current and future customers."[1]

In 2016, the USDOT's FTA published the TAM Rule, 49 CFR Part 625. The TAM Rule required all FTA grantees to have a fully compliant TAM Plan by October 2018 and to update their TAM Plan by October 2022. FTA's TAM Program aims to support successful agency implementation of TAM through providing FTA guidance, fact sheets, templates, and other resources as well as through capacity building events and activities such as webinars and roundtable events.

1.1. Evaluation Purpose and Objectives

To better understand how the FTA's development and publication of the TAM Rule has affected the practice of transit system management and operations at transit agencies that receive Federal grants or funding, as well as any changes to related activities, the FTA TAM Program tasked the Volpe Center with evaluating, identifying, and documenting the gaps, opportunities, and lessons learned from the deployment of the TAM Rule. This evaluation included a formative evaluation approach to analyze and report data. The TAM Program also deployed evaluative learning, meaning they used findings from each annual report to inform recommended improvements to the implementation process.

The evaluation's goal included identifying the overall impacts of the TAM Rule and associated requirements on the transit industry. The Evaluation Team focused on developing a baseline understanding of the rollout process for the TAM Rule to support an assessment of before and after conditions. Specifically, the Evaluation Team sought the following information:

- The effectiveness of FTA's support to transit agencies implementing the TAM Rule.
- The effects of the TAM Rule requirements on individual agencies.
- The effects of the TAM Rule requirements on the transit industry.

[1] APTA's definition

The report summarizes findings and trends within three evaluation areas (see Table 1 below for the Evaluation Areas and Table 2 under *Methodology* for a detailed listing of evaluation questions in each area):

Table 1: TAM Evaluation Areas

A. Policy Change	Changes to Federal policy and FTA grant making introduced or required by the TAM Rule, Moving Ahead for Progress in the 21st Century Act (MAP-21) and the Fixing America's Surface Transportation Act (FAST Act), as well as related guidance development, communications, and outreach. Related findings often discuss changes within FTA, the way it interacts with grantees, and the ability of the rule to be implemented by transit agencies.
B. Organizational Change	Updates or changes to the organizational structure or organizational functioning of transit agencies, resulting from either the TAM Plan requirement or a move toward a TAM approach. Related findings include ways that TAM requirements have impacted agency processes, staffing structures, and outcomes of the asset management process.
C. Industry Change	The intermediate to long-term change in practice in the transit industry and at transit agencies to reflect a broad focus on improved asset management. Related findings include how agencies utilize data for decision-making and the impact of uncertain funding.

1.2. Evaluation Design

Prior to the evaluation, the Evaluation Team developed an evaluation plan in coordination with FTA. The Evaluation Team finalized the evaluation plan in April 2019, shortly after the TAM Rule and associated requirements took effect. The evaluation began with an initial assessment of baseline conditions and continued to collect data for four consecutive years (2019 – 2022).

The evaluation design included development of a logic model, available in the Appendix, which mapped the program inputs, activities, outputs, and outcomes. Logic models illustrate the expected relationships between a program's resources, the intended activities that use those resources, and the intended results. These models highlight the interdependencies between activities taking place and their expected outcomes. The logic model informed data collection efforts as well as the overarching strategy to complete the evaluation and produce a final report. By understanding the ways that FTA programming could influence outcomes, the Evaluation Team designed better data collection questions for interviewees and focus group participants. That understanding also helped the Evaluation Team assess whether FTA programming, or multiple factors, contributed to changes in the field. As noted above, the evaluation design included three key evaluation areas: Policy Change, Organizational Change, and Industry Change. It also included twelve evaluation questions across the three evaluation areas.

This evaluation report provides an overview of the multi-year evaluation of the TAM Program's support to agencies implementing TAM.

2.0 Methodology

The Evaluation Team collected and analyzed diverse quantitative and qualitative data sources to understand the three evaluation areas noted above. Data collection occurred concurrently and on an annual basis for most data sources. Table 3 includes a summary of the quantitative and qualitative data sources. Data sources included interviews with transit agencies, focus group discussions, the National Transit Database (NTD), social media mentions of TAM-related terms, and capacity building event registration data. For event registration, the TAM Program often asked those registering to identify topics of interest for future events as well as challenges they experienced. This report summarizes the Evaluation Team's key takeaways following a cross-year analysis of evaluation data collected beginning in calendar year 2019.

2.1. Evaluation Questions and Data Sources

The Evaluation Team identified several evaluation questions and their associated data source, shown in Table 2 on the following page. They used the logic model in Appendix A to guide data collection and analysis activities. The initial evaluation plan included the following list of questions based on the program inputs, activities, and anticipated outputs and outcomes. The evaluation questions helped the TAM Program identify the effectiveness of activities, gaps in existing programming, and opportunities for the TAM Program to engage in a new topic or new activity.

The TAM Program and the Evaluation Team understood that five years was also not enough time to assess the impact of the TAM Rule on Industry Change, such as overall cost savings or improvement in industry wide SGR. It may take an agency longer than five years to implement an identified change given the time between the moment they decide to prioritize a repair or replacement, when they procure necessary parts, and implementation. Yet, this was an important question to ask and an important question for the TAM Program to intentionally collect baseline data around. This data aims to establish a baseline understanding of the percent of assets in SGR when the TAM Rule went into effect (2018) compared to the percent of assets in SGR during the final year of data available (2021) for the evaluation period of performance. That data will continue to provide a baseline for future analysis.

Table 2: Evaluation questions

Evaluation Area	Evaluation Question (EQ)	Data/Information Source(s)
Policy Change	(EQ1) Has the FTA Rule been an effective regulatory action, in terms of the regulatory goals to advance performance management and TAM?	Agency Interviews/Focus Group Discussions Analysis of capacity building events
	(EQ2) Are there updates to the regulation needed to more effectively meet the goals of advancing performance management and TAM practices?	Agency Interviews/Focus Group Discussions NTD Narrative Reports Analysis of Capacity Building Events
	(EQ3) Have FTA's communications, guidance, and support effectively addressed the challenges faced by transit agencies and grantees in the implementation of the TAM Rule?	Agency Interviews/Focus Group Discussions Quarterly Evaluation Data Collection Analysis of Capacity Building Events
	(EQ4) Do Tier II agencies benefit from developing the additional TAM Plan elements, such that the potential economic benefit or cost savings outweigh the time and cost burden of developing those elements?	Agency Interviews/Focus Group Discussions
	(EQ5) Have transit agencies faced a higher-than-expected increase in the number of compliance findings or reviews as a result of the TAM Plan requirement?	Triennial Compliance Review Findings
Organizational Change	(EQ6) Has the TAM Rule led to an overall move toward a comprehensive TAM culture within agency organizations throughout the transit industry?	Agency Interviews/Focus Group Discussions
	(EQ7) Have agency efforts to implement the TAM requirements led to changes in organizational structure or key functions? If yes, to what extent?	Agency Interview/Focus Group Discussions NTD Narrative Reports
	(EQ8) Have the changes in organizational structure resulted in intended improvements to agency business processes, in terms of internal coordination, interagency collaboration, hiring, or other practices?	N/A
Industry Change	(EQ9) Has the implementation of the TAM requirements improved state of good repair (SGR) of the Nation's transit systems?	Agency Interview/Focus Group Discussions NTD Narrative Reports Social Media Mentions of TAM Related Topics Analysis of Capacity Building Events
	(EQ10) Has the SGR backlog nationwide been reduced as a result of the requirements?	*N/A
	(EQ11) Has the TAM Plan and performance management requirements improved overall outcomes for the transportation system, including safety, service reliability, operations and maintenance costs, and system performance?	*N/A
	(EQ12) Have agency efforts to implement the TAM requirements led to overall cost savings, economic improvement, or reduced taxpayer costs for transit operations?	*N/A

* NTD data provides insight to EQ 10 to 12; however, the five-year evaluation period is not long enough to assess impact. Data surrounding these questions aims to establish a baseline for future analysis and is included in Appendix G.

The Evaluation Team assessed whether each potential data source would provide information related to evaluation questions before deciding on a final set of evaluation activities. The Evaluation Team used the following data sources, shown in Table 3, throughout the evaluation to develop an understanding of the rollout process for the TAM Rule and where there were opportunities for the TAM Program to provide new or continued support related to the TAM Rule implementation process. See the Appendix for the interview guide, NTD data, and for a summary of the data used during the Social Media analysis.

The Evaluation Team relied on the calendar year when conducting data collection, referred to as the "calendar year" (CY).

Table 3: Summary of Evaluation Activities during calendar year (CY) 2019 through 2022.

Evaluation Activity	Year(s) Completed			
	CY 2019	CY 2020	CY 2021	CY 2022
Agency Interviews	X	X	X	X
Focus Groups	X	X		
Analysis of agency reported NTD asset inventory data	X	X	X	X
Review of agency Narrative Reports*		X	X	X
Review of FTA Survey of FTA TAM Regional POCs**		X		
Review of agency credit reports		X		
Review of Social Media mentions of TAM related topics		X		X
Quarterly Evaluation Data Collection	X	X	X	X
Analysis of TrAMS Grant Data			X	
Analysis of capacity building events***	X	X	X	X

* The calendar year for agency Narrative Reports is based off the year the reports were analyzed by the Evaluation Team. Agencies submitted their narrative reports during the year prior.
** The FTA Survey informed the Regional POC Focus Group discussion in CY2020 and informed an effort to rethink the POC role in the FTA TAM Program.
*** Includes, but not limited to Roundtable, Webinars, and Peer Events

Interviews in 2020, 2021, and 2022 included discussions of the ongoing impacts of the COVID-19 national health emergency (COVID-19) on transit agencies, particularly for financial health, staffing challenges, ridership levels and the effect of supply chain disruptions on agency operations. These changes significantly impacted transit agencies over the past three years and may have had implications for this evaluation.

2.2. Limitations of the Evaluation

During design of this evaluation, the Evaluation Team and FTA TAM Program tried to identify consistent data sources to help assess the effectiveness of the evaluation of each evaluation question and in developing an initial snapshot of the baseline conditions for the evaluation. This evaluation used both qualitative and quantitative approaches to address the goals and purpose of each evaluation question. Some of the limitations, specifically data limitations include the following:

1. Data collection methods varied slightly across evaluation years to allow the Evaluation Team to capture new, relevant data and in response to the usefulness of existing data sources. Table 3 shows the data sources used during each calendar year. The variation in data collected may affect the ability to show trends across evaluation years.
2. Due to requirements of the Paperwork Reduction Act[2], interviews were limited to nine transit agencies per year, which resulted in a limited sample. The Evaluation Team identified two groups of nine transit agencies to interview biannually; agencies were selected based on so-called maximum heterogeneity sampling, across a range of characteristics [agency size, TAM Tier (I or II), type of agency (Group Plan sponsor, State DOT, tribal, etc.), geography, level of experience with TAM, operating modes, etc.]. The Evaluation Team interviewed the first group of transit agencies in 2019 and 2021, and the second group in 2020 and 2022.
3. Much of the data are self-reported from interviews and focus groups, required NTD Narrative Report submissions, and event registration forms that asked those registering to include input on both topics of interest and challenges facing their agency. Respondents may have altered their answers and comments based on how they perceived that FTA would use the results.
4. A five-year evaluation period did not provide enough time to determine if the TAM Rule affected overall transit operations or industry change, partially due to the long period between when an agency decides to prioritize a repair or replacement, or procurement timelines, and when that agency implements that change. Yet, this was an important question to ask and an important question for the TAM Program to intentionally collect baseline data around.

3.0 Evaluation Themes

This section of the report provides a detailed analysis of the key themes connected to each evaluation question within the three evaluation areas: Policy Change, Organizational Change, and Industry Change.

3.1. Policy Change Themes

The Policy Change evaluation area helped the Evaluation Team analyze changes to Federal policy and FTA grant making introduced or required by the TAM Rule, MAP-21, and the FAST Act, as well as related guidance development, communications, and outreach. Related findings often discuss changes within FTA, the way it interacts with grantees, and the ability of the rule to be implemented by transit agencies. The analysis below is organized by evaluation question.

[2] Public Law 104-13. Paperwork Reduction Act of 1995.

Evaluation Question 1: Has the TAM Rule been an effective regulatory action, in terms of the regulatory goals to advance performance management and TAM?

During interviews, transit agency representatives responded positively to the TAM Rule and its impact on advancing asset management within transit agencies. Agencies continued to express their experience with the TAM Rule, including its role in formalizing business processes, increasing the use of data in decision-making, and helping communicate TAM benefits with those outside of their TAM office. While most agencies felt the TAM Rule encouraged their agency to develop more mature TAM Programs, some, specifically those interviewed during 2019 and 2020, felt that the TAM Rule had minimal impacts on operations. Several interviewees stated that the regulation helped frame and formalize the changes initiated before the TAM Rule went into effect.

Theme 1.1: TAM Rule requirements contributed to more mature TAM Programs.
Agencies, especially those interviewed in years two through four (2020 – 2022), reported that their TAM Programs matured since implementation of the TAM Rule. The TAM Rule encouraged agencies to implement more extensive asset inventories and databases, created consistency in data collection and reporting practices, and helped agencies implement updated maintenance and inspection procedures. The NTD narrative analysis also confirmed this theme. Capacity building event registration asked participants to identify challenges in implementing the TAM Rule or to identify additional resource needs. Registrants sought more complex topics at future events, suggesting agencies' own TAM programs moved beyond a compliance focus. During the final year of interviews, one agency emphasized the TAM Rule's impact on improving their TAM processes by stating, "I don't think it would've happened without the TAM Rule. It forced us to develop internal processes…for compliance and consistency."

Theme 1.2: FTA resources supported implementation of the TAM Rule and were viewed favorably by transit agencies (events, technical assistance resources, and website).
Agencies expressed high satisfaction with existing FTA resources across evaluation years, specifically during interviews, focus group discussions, and when registering for capacity building events that included questions about additional TAM resources or support needs. Early in the evaluation, interview participants stated that TAM Program resources helped direct their TAM operations or confirmed continuation of their existing processes while later in the evaluation, agencies expressed satisfaction with virtual events. Event registration data showed a sustained increase in event participation after shifting to a virtual format in 2020. When prompted during event registration and during interviews, agencies suggested additional resources including initial clarification on the TAM Rule requirements, templates for reports, and a desire for resources that supported the transition to low or zero-emission fleets and other similar topics.

Theme 1.3: The TAM Rule encouraged agencies to incorporate data-informed decision-making and formalized business processes.
Most agencies interviewed throughout the evaluation emphasized that the TAM Rule helped their agency frame and formalize changes they started to incorporate prior to the TAM Rule. Interviewees reported that the TAM Rule encouraged consistency throughout their organization and helped drive awareness of asset management across their agency. One participant noted that, while their function remained the same before and after the TAM Rule, their role within the agency "became official" following the TAM Rule. Agencies also reported that the TAM Rule encouraged them to develop more extensive asset inventories and databases and encouraged agencies to create consistent maintenance and inspection procedures.

Theme 1.4: The initial TAM Rule rollout created challenges, especially for smaller agencies, and would have benefited from additional clarification.
During 2020 and 2021 interviews, a few agency representatives recommended improved coordination and consistent communication across FTA and between FTA and transit agencies. During 2020 interviews, agencies asked for greater alignment in messaging between FTA Regional Offices and their State DOTs or Group Plan sponsors. That same year, a smaller agency representative reported feeling overwhelmed and recommended additional training, templates, and resources to support small agency staff. FTA Regional TAM Points of Contact (POCs) asked for clarity on their role moving forward during the 2020 focus group discussion with regional POCs. Many agencies requested clarification on the NTD Narrative Report instructions, a task the TAM Program addressed during 2021.

Theme 1.5: TAM Rule led to some duplication of effort, especially related to data entry and reporting.
A few of the agencies interviewed during 2019, 2020, and again in 2022 reported that the regulation created duplication of effort, specifically in how and where they tracked their asset information, entered data, and where they reported that data. Agencies referenced this duplication of effort most frequently in the first two years of the evaluation, but they did raise this challenge throughout. One representative reported their agency recorded data in multiple locations, resulting in an increased time burden. Another noted that the process felt like "a tool [to aid] government agencies rather than [the transit agency]." A third interviewee explained that they "find [the data entry] to be tedious. We end up doing it multiple times."

Evaluation Question 2: Are there updates to the regulation needed to more effectively meet the goals of advancing performance management and TAM practices?

During interviews, agency representatives provided feedback on the effectiveness of resources as well as suggestions on how FTA could improve their resources and reporting processes. Interview and focus group respondents across the evaluation period provided positive feedback on the effectiveness of the TAM Rule, FTA guidance, and educational resources available to help agencies understand and implement the TAM Rule. The TAM Program asked agencies to provide suggestions for additional support; one general suggestion heard early in the evaluation included clarifying and simplifying the TAM Rule as well as its instructions. Another suggestion, consistent throughout the evaluation, included improving clarity around data collection and transparency around how FTA used TAM data.

Theme 2.1: Smaller agencies remained focused on meeting TAM requirements.
Smaller Tier II and Tribal agencies[3] reported that they remain focused on meeting the requirements and streamlining processes to ensure compliance. They reiterated this throughout evaluation years, specifically during interviews. During interviews, agency representatives suggested FTA simplify the TAM Rule by using plain language, which is more easily interpreted by agencies with less Federal reporting experience. Agencies also reported that they found the current requirements appropriate and did not recommend additional requirements.

Theme 2.2: Target setting received mixed reviews from transit agencies.
Based on data analysis, the Evaluation Team concluded that many agencies set short-term targets around anticipated outputs rather than setting longer-term, aspirational targets. During interviews, some agency representatives found target setting unnecessary given the lack of consequences if an agency failed to meet

[3] Am I a Tier I or Tier II Agency? (dot.gov)

their target. By the final year of data collection, supply chain disruptions and delivery delays created additional challenges in setting and meeting targets. According to the NTD Narrative Report, those disruptions created the leading challenges in meeting targets. The lasting impacts of COVID-19 on supply chain disruptions continued to influence transit agency's ability to procure assets, resulting in assets that did not meet their targets, were no longer in SGR, or went beyond their useful life benchmark (ULB).

Theme 2.3: Agencies recommended clarifying annual TAM data reporting.
Early in the evaluation period, the new NTD reporting requirements raised multiple challenges since the NTD definitions differed from industry standards. Agencies in year one reported (i) challenges collecting and inputting asset and condition data according to NTD requirements and (ii) concerns about data accuracy for rail infrastructure. Some agencies proposed a threshold, such as percentage of vehicles not in a state of good repair (SGR), before requiring smaller agencies to submit data. Later in the evaluation, in year three and four, agencies reported the need to clarify NTD reporting requirements and processes, which some agencies described as cumbersome and having limited direct connection to day-to-day asset management or operations. Event registration data during the final year of the evaluation showed "NTD reporting/data" as a challenge more often than in the previous year.

Evaluation Question 3: Have FTA's communications, guidance, and support effectively addressed the challenges faced by transit agencies and grantees in the implementation of the TAM Rule?

The Evaluation Team found that agencies were satisfied with FTA resources and learning events. Overwhelmingly, interview, focus group, and event registration data showed satisfaction with the TAM 101 course as well as the other capacity building events. Event registration data included questions to gauge satisfaction with current resources and asked agencies to identify challenges and topics that require additional TAM Program support. The Evaluation Team also reviewed website analytics data to understand the most frequently referenced resources. In 2022, agencies were required to submit their TAM Plan update; resources that supported agencies in updating their TAM Plan, such as the TAM Planning Asset Template (TAMPLATE), received five times as many views (from 385 views in Q3 FY2022 to 1,818 views in Q4 FY22) during the quarter updates were due. The TAMPLATE User Manual, TAMPLATE, and TAM Plans website page views all increased by about 50% in the same period, revealing that agencies found those resources beneficial when updating their TAM Plans. Throughout evaluation activities, the TAM Program tried to ensure agencies had the opportunity to suggest additional resources during interviews, capacity building event registration forms, webinar question and answer submissions, and through the TAM email inbox, which is included on the TAM website.

Theme 3.1: Virtual events received overwhelmingly positive feedback and improved accessibility.
Following the COVID-19 pandemic, the TAM Program offered virtual capacity building events. Event registration data showed that attendance increased with the virtual format. Agencies provided positive feedback about the transition to virtual events in event evaluation forms and during interviews. Agency representatives noted that virtual events improved access for small agencies and resource-constrained agencies, as did on-demand viewing. They recommended continuing virtual events.

Theme 3.2: Agencies suggested additional resources for FTA consideration throughout the evaluation. During capacity building event registration, interviews, and focus group discussions, agencies were asked to provide suggestions for future event topics or resources that would benefit their agency or industry peers. The type of resource and topics requested changed over time. Multiple agencies recommended the TAM Program use clear and concise language in resources and on the TAM website. Specific types of resources that agencies requested are included below. Each includes an overview of the topics requested and how those topics changed over time.

- **Guidance documents**: During 2019, agencies requested new resources on implementing TAM including guidance on incorporating TAM into agency budgeting processes, guides on submitting data to NTD and the Transit Award Management System (TrAMS), and best practices for communicating with MPOs. By year three, 2021, evaluation participants sought guides on more complex topics including target setting given funding constraints, transitioning to low or zero-emission fleets, and collecting and effectively utilizing lifecycle and procurement data.
- **Fact sheet, how-to document, and templates**: During the first two years of the evaluation, agencies requested 'quick start guides' to help new TAM personnel understand the TAM Rule and its requirements as well as report templates to support compliance. By the final two years of the evaluation, agencies sought resources on setting short- and long-term targets given supply chain disruptions, using TAM targets to strengthen USDOT grant applications, and evaluating progress towards targets.
- **Learning and peer events:** Agency representatives provided positive feedback on TAM Program learning events including webinars, roundtable discussions, and other capacity building events during interviews, focus groups, and during event registration forms collected throughout the evaluation. At the start of the evaluation period, agencies suggested developing tailored trainings and learning events. Agencies specifically sought a more detailed follow-on to TAM 101, which received overwhelmingly positive feedback. By the final two years of the evaluation, agencies requested additional peer-to-peer learning opportunities, such as peer-exchanges. In response, during year three, FTA conducted a professional capacity building needs assessment and developed a corresponding action plan, which led to the development of a peer working group, virtual discussion forums, and peer exchange opportunities.

Theme 3.3: Encourage greater alignment in messaging with the FTA Regional Offices:
Early in the evaluation, specifically year one and two, interview participants recommended improved coordination and communication between FTA Regional representatives and agencies, specifically by providing more consistent communication or technical assistance. Regional POCs asked for renewed clarity on their role and for more support in answering nuanced questions from agencies during the Regional POC focus group discussion in 2020. FTA's TAM Program used this feedback to develop a proposal to provide additional support and direction to FTA Regional office staff.

Evaluation Question 4 (only for Tier II): Do Tier II agencies benefit from developing the additional TAM Plan elements, such that the potential economic benefit or cost savings, outweigh the time and cost burden of developing those elements?

Both Tier I and Tier II agencies are required to include the following four elements in their TAM Plan: an inventory of their assets, a condition assessment of inventoried assets, description of a decision support tool, and a prioritized list of investments. Tier I agencies are also required to include the following five elements: a

TAM and SGR policy, an implementation strategy, a list of key annual activities, identification of resources, and an evaluation plan. Tier II agencies have the option, but are not required, to include the final five elements.

While the original evaluation design included this question on additional TAM Plan elements, only one of the Tier II agencies interviewed had completed these additional, optional elements. That agency's representatives noted that the elements were helpful, particularly for the interviewee who was relatively new to TAM practices. However, the limited response to this question precludes drawing significant findings.

Evaluation Question 5: Have transit agencies faced a higher-than-expected increase in the number of compliance findings or reviews as a result of the TAM Plan requirement?

Triennial review findings started to include TAM findings in 2018. Findings from the triennial review process have been consistently low, and further decreased in 2021 to just 10. The decrease implies improvement in agency compliance with TAM Rule requirements, particularly in the areas of providing a complete TAM Plan and designating an accountable agency executive. There were no triennial reviews in 2020 due to a pause in reviews resulting from COVID-19. During 2018, there were 21 findings, while 2019 had 25; see below for an overview of those findings.

- *Insufficient oversight of sub requirements for TAM requirements* received 1 finding in 2018, increased to 4 in 2019, before returning to 1 in 2021.
- *Missing TAM Plan elements* had 5 findings in both 2018 and 2019, before falling to 1 in 2021.
- *Performance targets not set annually* had 1 finding in 2018 and 2019, before increasing to 3 in 2021.
- *No designation of an accountable executive* had 8 findings in both 2018 and 2019, before decreasing to 1 in 2021.
- *No designation of accountable executive by group plan participants* received 0 findings in 2018, increased by 1 each year after, reaching 3 in 2021.

3.2. Organizational Change Themes

The Organizational Change evaluation area helped the Evaluation Team analyze updates or changes to the organizational structure or organizational functioning of transit agencies, resulting from either the TAM Plan requirement or a move toward a TAM approach. Related findings include ways that TAM requirements have impacted agency processes, staffing structures, and outcomes of the asset management process. The below analysis is organized by evaluation question.

Evaluation Question 6: Has the TAM Rule led to an overall move toward a comprehensive TAM culture within your agency?

The TAM Rule helped agency staff foster greater TAM awareness, encouraged greater cross-departmental collaboration, and helped bring TAM into more agency-wide conversations. Over time, data analyzed by the Evaluation Team revealed greater coordination with a wider range of staff during goal setting, planning, and prioritization.

Theme 6.1: Leadership buy-in helped foster a culture of TAM.
Communication and leadership buy-in proved critical when agencies sought to improve the perception of TAM initiatives. During the first year of evaluation interviews, interviewees discussed leadership turnover as both a challenge and an opportunity. Interviewees felt new leadership presented an opportunity to raise the profile of TAM within the agency. During the final year of interviews, interviewees reiterated the importance of leadership buy-in and the need to help all staff understand TAM roles and responsibilities.

Theme 6.2: Agencies continue to shift their individual focus from compliance to more complex topics including lifecycle analysis, risk-based planning, and investment prioritizations.
During the first year of interviews, agencies discussed a focus on compliance. By year two, agencies focused on fostering a culture of TAM and overcoming operational challenges. In years three and four, agencies discussed a shift towards advanced topics including creating custom, context specific ULBs; streamlining data inventory and reporting systems; and planning for low- and zero-emission fleets.

Theme 6.3: Funding continued to impact many transit agencies.
Funding availability remained the most reported challenge from 2019 through 2021 in NTD Narrative Reports. A few agency representatives, specifically those interviewed in 2020 and 2021, identified a general lack of funding as problematic when developing internal procedures or managing unanticipated events, such as the COVID-19 pandemic or the increased frequency of severe climatic events. They also discussed how limited funding impacted staffing decisions. A small proportion of agencies interviewed noted increased financial well-being due to systematic investments made possible through COVID-relief funding. One agency mentioned how COVID-19 stimulus funding allowed their agency to fund several deferred maintenance projects, removing their deferred maintenance backlog. During the 2022 interviews, agencies discussed funding challenges alongside inflation challenges.

Evaluation Question 7: Have agency efforts to implement the TAM requirements led to changes in organizational structure or key functions? If yes, to what extent?

During interviews and focus group discussions, agencies reported that the TAM Rule helped formalize their business and decision-making processes and increased momentum for continued organizational improvements. Most agencies interviewed noted positive changes to their organizational structure, new or expanded TAM-related positions, updated business processes such as condition assessment processes, and new software procurement. Some agencies stated minimal to no change because of the TAM Rule and noted their day-to-day operations remained the same. Limited staff and an inability to hire full time staff due to funding constraints remained a barrier to implementing structural changes within many agencies, as noted in the NTD Narrative Reports and the interviews and focus group discussions.

Theme 7.1: The TAM Rule helped agencies break down organizational silos.
During interviews and focus group discussions, participants noted that the TAM Rule helped break down organizational silos, encouraging more frequent collaboration. In the early years of the evaluation, 2019 and 2020, multiple agencies reported the TAM Rule resulted in changes to their organizational structure including the addition of specific TAM positions and TAM liaisons with the specific goal of increasing coordination between departments. By 2022, interviewees reported engaging a wider array of staff in the development and review of their updated TAM Plan. Interviewees also discussed engaging a variety of divisions in their day-to-day TAM activities, including project prioritization.

Theme 7.2: Agencies continue to implement new decision support tools.
Starting during the 2020 interviews, agency representatives expressed increased interest and excitement in EAM systems that track all components of an asset in one convenient place, including equipment, infrastructure, and overall financial information. Interviewees applauded the ease of developing custom reports and automated invoices and work orders as well as their readability when reviewing replacement needs and ridership and to help answer the question, "is my fleet doing what's needed by [our] clients and community." Multiple agencies reported introducing new decision support tools and enterprise asset management (EAM) programs during 2021 interviews to meet data tracking needs and to support cross-agency collaboration. At a 2022 peer-event, transit agency representatives emphasized that EAM's cannot solve all agency issues; the use of EAM's require intentional data plans including identification of inputs before desired outputs. For some, implementation of EAM systems and data management plans remain a challenge. For example, in 2022, an interviewee discussed a challenge in connecting different EAM systems, including maintenance systems, with capital-level information.

Evaluation Question 8: Have the changes in organizational structure resulted in intended improvements to agency business processes, in terms of internal coordination, interagency collaboration, hiring, or other practices?

Throughout the evaluation period, interview and focus group data revealed increased coordination and collaboration across agency departments and offices, especially in developing performance targets, reviewing TAM Plans, or reviewing prioritized lists of projects. NTD Narrative data showed that staffing remained a challenge throughout the evaluation period, especially following the COVID-19 pandemic. Agencies often discussed staffing shortages which resulted in existing staff being stretched thin.

Theme 8.1: Staffing remained a challenge throughout the evaluation period.
Many agencies, especially small agencies, identified staffing as a key challenge throughout all four calendar years, both in the NTD Narrative Reports and throughout interviews and focus group discussions. Funding constraints prevented agencies from hiring full-time TAM position staff and limited TAM expertise at some agencies hindered their progress in developing a more mature TAM program. COVID-19 exacerbated this challenge since some individuals left the workforce resulting in staffing shortages. Early in the evaluation, some interviewees reported a need for more staff with TAM expertise while others reported the need for additional staff due to limited capacity. In their NTD Narrative Reports, agencies increasingly reported staffing as an extenuating circumstance; staffing was the most mentioned extenuating circumstance in 2021.

Theme 8.2: The TAM Rule spurred improved cross-department and interagency collaboration within transit agencies.
According to interview data, the TAM Rule helped agencies formalize processes that supported greater interagency collaboration. Over time, interviewees reported increased collaboration and engagement with a wide range of staff during goal setting, planning, and prioritization. One agency reported that asset-related meetings now included highway, bridge, and TAM staff to ensure consistent language and processes while another emphasized the importance of coordinating with human resources, budget, and finance departments. One agency reported that until summer 2022, their Grant and Capital Programming functions were in separate departments, which caused challenges with coordination. Some agencies also expressed an interest in new tools to further improve coordination. During registration for a 2022 capacity building event, agencies articulated internal and external coordination as one of the most frequent challenges. A group

sponsor[4] mentioned challenges in creating standard, uniform processes for condition assessments and data collection across group plan participants.

Theme 8.3: Coordination improved between staff at transit agencies and their counterparts at MPOs, State DOTs, and FTA regional offices but remained an opportunity for growth.
As noted above, in *Theme 7.1* and *Theme 8.2*, interview participants across evaluation years noted that the TAM Rule helped agencies break down existing silos within transit agencies and increase collaboration with other transit agencies. Interviewees also discussed the development of stronger relationships with MPOs and State DOTs due to alignment required by the Rule, and with FTA Regional offices due to their support to agencies as they implement the TAM requirements. Many agencies emphasized the need for continued, intentional cross-agency coordination, collaboration, and communication to ensure all the relevant stakeholders in the organization have a proper understanding of TAM requirements, and to promote consistent implementation of the TAM Rule. This was a challenge in the early years of the evaluation but persisted for some agencies throughout.

3.3. Industry Change Themes

The Industry Change evaluation area helped the Evaluation Team analyze the intermediate to long-term indirect outcomes of the TAM program. It helped analyze the TAM Rule's contribution to change in the transit industry and at transit agencies to reflect a broad focus on improved asset management. The Evaluation Team included this section to gather baseline data to measure future change against; however, the Evaluation Team understood that assessing intermediate to long-term outcomes related to the TAM Rule would likely take longer than the period of this evaluation. Related findings include how agencies utilize data for decision-making and the impact of uncertain funding. The analysis below is organized by evaluation question.

Evaluation Question 9: Has the implementation of the TAM requirements improved state-of-good-repair (SGR) of the Nation's transit systems?

Across evaluation years, interview data revealed that agencies felt the TAM requirements had a positive impact on SGR and that the rule benefited the industry. FTA requires agencies to submit data on their assets and the SGR of their systems to NTD each year. This data covers four asset categories: revenue vehicles, service vehicles, facilities, and infrastructure. It also includes the quantitative targets agencies set as performance measures, and information on agency finances. The TAM Program and the Evaluation Team used this data to establish a baseline understanding of the percent of assets in SGR when the TAM Rule went into effect (2018) compared to the percent of assets in SGR during the final year of data available (2021) for the evaluation period of performance. During interviews, the Evaluation Team asked agencies for their input on this question. While many agencies felt the TAM Rule had a positive impact, they noted that five years was not enough time to determine if the TAM Rule affected overall cost savings or overall transit operations, partially due to the long period between when an agency decides to prioritize a repair or replacement, or procurement timelines, and implementation of that change. While this question was included in the evaluation, the TAM Program understood that five years was also not enough time to understand the impact of the TAM Rule given the amount of time it may take an agency to implement identified changes and given there is no control case to

[4] FTA Group TAM Plan Sponsor Workbook. January 2018.

compare results against. Yet, this was an important question to ask and an important question for the TAM Program to intentionally collect baseline data around.

The COVID-19 pandemic had profound impacts on the transit industry, adding another complicating factor to understanding the potential impacts resulting from the TAM Rule. Agencies experienced financial hardships, ridership changes, and staffing shortages, forcing them to reassess how they manage their assets, and which assets to repair or replace, given service needs and resource constraints associated with the COVID-19 pandemic. While many agencies experienced financial hardships that may have impacted SGR, many agencies also referenced Federal funding received during COVID-19 as a critical reason for their reduced backlog rather than attributing those changes to the TAM requirements. Others discussed the benefits of the Buy America waiver[5] on obtaining equipment to reduce their backlog, and some took advantage of the low ridership to address deferred maintenance since it would be less disruptive. Based on data collection throughout the evaluation, multiple factors impacted SGR beyond just the TAM requirements, including ridership changes and staffing shortages associated with the COVID-19 pandemic, an increase in extreme weather events, and supply chain disruptions that many agencies discussed at length as the largest current challenge surrounding SGR. The themes below do not directly respond to the questions outlined under Industry Change, but do provide additional context on why agencies may not be able to respond directly to this question. Many of the themes below help outline the challenges facing the industry when trying to achieve SGR.

Theme 9.1: NTD data revealed minimal changes in the percent of assets within each asset category that are in SGR.

FTA requires agencies to submit annual data to the NTD database, allowing FTA to understand changes occurring within the transit industry. Between 2018 and 2019, the total percent of assets in SGR, for all asset categories, increased from 75 percent to 77 percent. The value remained constant from 2019 to 2020 and increased by one percent to 78 percent in 2021. NTD data also tracks the percent of assets in SGR within each of the four main asset categories. The table below includes a summary of the data collection for 2018 through 2021. A full summary of the 2019 – 2021 NTD data submitted to FTA is included in Appendix G.

Table 4: Summary of NTD Data Submitted to FTA

Asset Category	Percent of Assets in a State of Good Repair			
	2018	2019	2020	2021
Overall Assets	75%	77%	77%	78%
Revenue Vehicles in SGR	79%	80%	80%	80%
Service Vehicles in SGR	66%	63%	64%	63%
Facility's reporting condition scores over 3 on the TERM Scale	87%	88%	89%	90%
Infrastructure reporting percent miles under performance restrictions	6.1%	3.0%	3.7%	4.3%

[5] Federal Transit Administration. Buy America Waiver

Theme 9.2: Supply chain disruptions and delivery delays resulting from the COVID-19 pandemic created challenges in meeting agency SGR goals industry-wide since agencies have not been able to make expected repairs, updates, or replacements.
In the 2021 NTD Narrative Reports, agencies reported supply chain and delivery issues as the main challenge for revenue vehicles and the second most reported challenge for service vehicles, increasing from the third most reported challenge in 2020. Interview participants have highlighted this challenge since the start of COVID-19, noting they struggle to acquire both parts and replacement vehicles due to the current disruptions, meaning assets scheduled for repair or replacement stay in service beyond their useful life. This made it more difficult for agencies to meet targets and negatively affected the overall SGR of their assets.

Theme 9.3: Environmental factors, including an increase in unanticipated severe weather events, influences transit industry focus and forced agencies to use limited resources to address the damage resulting from severe weather events.
Agencies consistently mentioned environmental factors as an extenuating circumstance within all three years of the NTD Narrative Reports (2019, 2020, 2021) and reported environmental factors as the second most extenuating circumstance in the 2020 NTD Narrative Reports. During interviews, transit agency representatives discussed challenges in responding to severe weather, including the need to address damage to assets following unexpected weather events. They also discussed the need to prepare their assets to withstand weather events and sought TAM Program support in topics related to adaptation and resilience during 2020 and 2021 interviews.

Theme 9.4: Funding remained a key industry-wide challenge across evaluation years, forcing agencies to determine which assets to prioritize for SGR.
Agencies discussed funding as a key challenge in interviews, NTD Narrative Reports, and event registration data. Funding availability remained the most frequently reported challenge to meeting agency targets in the 2021 NTD Narrative Reports and the most reported challenge in all asset categories except revenue vehicles. Agencies reported that funding challenges impacted their ability to address repair or replacement needs as well as their ability to hire full-time employees to manage their TAM programs. This challenge persisted throughout the evaluation period and intensified following COVID-19.

Theme 9.5: Agency TAM Programs matured, and TAM awareness improved throughout the industry.
Interview and focus group discussion data revealed an industry-wide shift from a focus on compliance to a focus on improved decision-making, prioritization of risk, and improved data systems and processes, all of which helped agencies focus their efforts towards reducing their SGR backlogs. However, the level of maturity surrounding TAM concepts and processes continued to differ within and across agencies. In 2022, the Evaluation Team analyzed the use of TAM terms in transit-related tweets on Twitter to assess how often TAM terms appeared and whether TAM awareness changed over time. While tweets containing a few essential TAM terms increased in frequency since 2017, suggesting that TAM continues to enter transit-related conversations on social media, these tweets make up a low percentage of assessed organizations' Twitter activity. See Appendix F for details on the terms used.

Theme 9.6: The TAM Rule resulted in increased data availability, the use of EAM systems, and supported data-informed decision-making at transit agencies.
Agencies reported that data requirements under the TAM Rule benefited their decision-making; however, agencies are still figuring out how to make full use of this new data. During 2020 and 2021 interviews, agency representatives discussed that the increased data helped improve monitoring and informed budget decisions, capital planning, and investment prioritization. Some agency representatives reiterated the need for transparency on why FTA required specific data. Participants in a 2020 focus group discussion with FTA

Regional points of contacts (POCs) reported that the agencies began tracking trends and monitoring assets following the TAM Rule. They noted agencies used that data to better inform decision-making. POCs felt the improved data was evident in applications for funding. The TAM Program asked webinar and roundtable attendees to identify topics of interest and challenges when completing their event registration form. That registration data showed decision support tools as the top topic of interest and as the second most mentioned challenge for agencies in 2021.

4.0 Conclusion

FTA implemented the TAM Program to support transit agencies in the implementation of TAM, a business model used by transit agencies to help prioritize funding based on asset condition and performance. The TAM Program's support to agencies as they work to implement the TAM Rule requirements by providing guidance, resources, and tools, as well as through capacity building opportunities including peer-learning events. This evaluation aimed to develop a baseline understanding of the rollout process for the TAM Rule to assess the before and after conditions. Specifically, the Evaluation Team sought the following information:

- The effectiveness of FTA's support to transit agencies implementing the TAM Rule.
- The effects of the TAM Rule requirements on individual agencies.
- The effects of the TAM Rule requirements on the transit industry.

Overall, data collected by the Evaluation Team demonstrated the effectiveness of the TAM Program and FTA's progress towards strategic goal IV. State of Good Repair, which reads "Ensure the U.S. proactively maintains critical transportation infrastructure in a state of good repair." Transit agencies identified benefits from guidance, technical assistance, peer-learning, and capacity building resources provided by the FTA TAM Program following the TAM Rule.

The Evaluation Team found that the TAM Program has been effective in meeting its goals of providing support to transit agencies as they work to understand, comply with, and in some cases, go beyond the TAM Rule. Interviewees, NTD narrative reports, event registration data, and documentation demonstrate that the TAM Program adapted over the course of the evaluation to accommodate transit industry needs and to provide context-sensitive support including in response to the COVID-19 pandemic. Organizations continue to make changes as their programs mature and many agencies identified opportunities for growth within their TAM program. Throughout the evaluation period, transit agencies had the chance to suggest additional support needs. The TAM Program implemented some suggestions in real-time to improve the TAM Program's support to transit agencies while taking time to further consider others. The Evaluation Team identified the following high-level themes surrounding the evaluation purpose. Overall, the Evaluation Team recommends continued evaluative learning to ensure the TAM Program continues to respond to agency needs in real-time.

Policy Change – the effectiveness of FTA's support to transit agencies implementing the TAM Rule:

The Evaluation Team found that transit agencies viewed FTA resources favorably, including peer events, technical assistance resources, and the website. The TAM Program asked agency staff during capacity building event registration and during interviews to identify topics of interest, challenges and to suggest additional

resources and peer learning events that would further support agencies in implementing the TAM Rule and improving their agency's asset management practices. Potential actions include:

- Develop targeted peer-learning opportunities and events to help agencies learn from one another and to meet agencies where they are.
- Provide up-to-date guidance, communications, and outreach to inform transit agencies and to promote TAM; work with relevant FTA offices to coordinate on guidance and communications when appropriate.
- Track transit agency progress and use that data to identify gaps for the TAM Program to address through additional support.

Organizational Change – the effectiveness of TAM Rule requirements on individual agencies:

TAM Rule requirements helped agencies formalize business processes and encouraged agencies to update their organizational structure or organizational functions, both of which contributed to more mature TAM Programs. The Evaluation Team found that the maturity of TAM programs and the type of practices used within agencies varies widely; some transit agencies have shifted their focus from compliance to the strategic use of TAM to maintain assets more effectively, but many agencies, especially smaller agencies, remain focused on compliance and require additional support to understand how to incorporate TAM throughout their organization. Potential actions include:

- Encourage a culture of TAM within transit agencies. Data revealed that the TAM Rule led to an enhanced TAM culture, where asset management is considered more frequently during the decision-making process. Agencies sought guidance for discussing the value of TAM to leadership and ways to emphasize the value of TAM outside of TAM departments.
- Promote cross-departmental coordination. Agencies mentioned during 2022 interviews that TAM permeated other departments, such as capital planning and finance, and reduced silos in many agencies, but not in all agencies. Cross-departmental coordination resulted in increased coordination between staff within their respective agencies, as well as between staff at different transit agencies.
- Incorporate resiliency planning into the TAM Program support, specifically related to the impact of unanticipated events such as severe climate events or national pandemic planning and how to respond to current constraints such as funding and staffing.

Industry Change – the effects of the TAM Rule requirements on the transit industry:

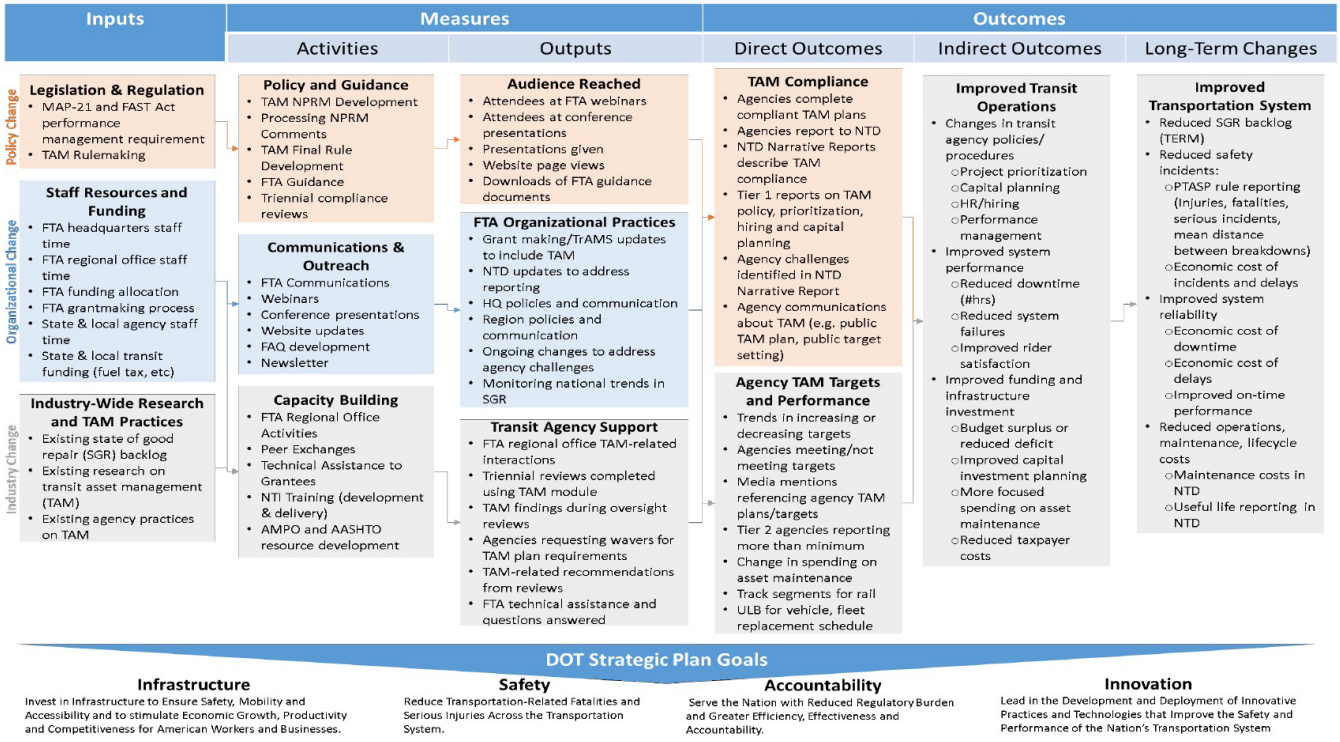
Global trends, such as supply chain disruptions and an increase in unanticipated events like severe weather, negatively impacted the transit industry and may impact progress on TAM-related initiatives. Those existential issues made it difficult for transit agencies to focus on asset management, but also revealed the importance of strategic asset management practices. In addition, funding and staffing constraints remained consistent challenges, across agencies and across evaluation years. Funding remained an industry-wide constraint throughout the evaluation period and was exacerbated by COVID-19 and the resultant supply chain disruptions. Some agencies did receive increased funding due to the Coronavirus Aid, Relief, and Economic Security (CARES) Act, which helped them address backlogs in their SGR; however, most agencies expressed severe funding shortages. Potential actions include:

- Coordinate internally with other FTA offices to direct transit agencies to Federal grant and innovative finance program content, including websites, to increase awareness of such programs and encourage agencies to consider a broader array of funding options.

- Promote new funding opportunities available under the Bipartisan Infrastructure Law that may help agencies reduce their backlog such as Safe Streets and Roads for All or the Reconnecting Communities Program.
- See above – incorporate resiliency planning into TAM Program support.

Appendix

A. Evaluation Logic Model



B. Evaluation Activities

Evaluation Activity	CY19	CY20	CY21	CY22
Agency Interviews	X	X	X	X
Focus Groups	X	X		
Analysis of agency reported asset inventory data from NTD	X	X	X	X
Agency Narrative Report reviews		X	X	X
FTA Survey of FTA TAM Regional POCs		X		
Analysis of TrAMS Grant Data			X	
Review of agency credit reports		X		
Review of Social Media mentions of TAM related topics		X		X
Quarterly Evaluation Data Collection	X	X	X	X
Analysis of Roundtable Registration Data on Agency Competency in TAM	X	X	X	X

C. Evaluation Interview Groups

Interviewee	Region	Agency Type	Rail	Interview in 2019	Interview in 2020	Interview in 2021	Interview in 2022
Vermont Agency for Transportation (VTrans)	1	Tier II		X		X	
New Jersey Transit Corporation	2	Tier I	X	X		-	
Central Shenandoah Planning District Commission	3	Tier II		X		X	
Transit Authority of River City (TARC)	4	Tier I		X		X	
Blue Water Area Transportation Commission	5	Tier I		X		X	
Comanche Nation	6	Tribal Tier II		X		X	
City of Dubuque	7	Tier II		X		X	
Tri-County Metropolitan Transportation District of Oregon (TriMet)	10	Tier I	X	X		X	
Franklin Regional Transit Authority	1	Tier II			X		X
Maryland Transit Administration	3	Tier I	X		X		X
Memphis Area Transit Authority	4	Tier I	X		X		-
Boise Forte Reservation Tribal Council	5	Tribal Tier II			X		-
Missouri DOT	7	Tier II			X		X
North Front Range Metropolitan Planning Organization	8	Tier II			X		X
Victor Valley Transit Authority	9	Tier I			X		X
Central Puget Sound Regional Transit Authority	10	Tier I	X		X		-

D. Focus Group

Focus Group Participants	Conducted in 2019	Conducted in 2020	Conducted in 2021	Conducted in 2022
Roundtable 2019 Focus Group	X			
TRB 2020 Focus Group: TAM Consultants		X		
TAM Regional POC Focus Group		X		

E. Interview Guide

Question Guide

The questions for this interview are roughly divided into the overarching evaluation areas, including policy change, organizational change, and industry change as a result of the TAM final rule implementation.

Policy Change

In this section of the interview, we will be discussing the changes to Federal policy and FTA grant making introduced or required by the TAM final rule, MAP-21, and the FAST Act, as well as related guidance development, communications, and outreach.

***(Evaluation Q1:** Has the FTA final rule been an effective regulatory action, in terms of the regulatory goals to advance performance management and TAM?)*

Key Question: Can you describe your experience thus far with transit asset management?

Key Question: The FTA issued both a pre-NPRM and NPRM prior to the publication of the final TAM rule. Were you aware of and engaged with this process, and if so, how did knowledge of the impending rule impact your work on transit asset management generally?

Key Question: Do you believe the requirements of the TAM final rule meet the goals of enhancing performance management in transit agencies?

***(Evaluation Question 2**: Are there updates to the regulation needed to more effectively meet the goals of advancing performance management and TAM practices?)*

Key Question: How could the FTA's final TAM rule be improved to allow for easier adoption by agencies?

Key Question: Does the final rule require any elements of the TAM plan or any other components that are not necessary for effective transit asset management? Why or how? Do these elements impact just your agency, or other transportation partners?

Key Question: When you think of the FTA rulemaking, contacts, resources, tools, or technical assistance available to support TAM implementation, do you have any suggestions for improvement?

***(Evaluation Question 3:** Have FTA's communications, guidance, and support effectively addressed the challenges faced by transit agencies and grantees in the implementation of the TAM final rule?)*

Key Question: What communications, guidance and support have you been aware of FTA offering?

Key Question: Do you recommend that FTA develop any other resources related to TAM?

***(Evaluation Question 4 (only for Tier II):** Do Tier 2 agencies benefit from developing the additional TAM plan elements, such that the potential economic benefit or cost savings outweigh the time and cost burden of developing those elements?)*

Key Question (Only Tier II): Which additional TAM plan elements did your agency develop?

***(Evaluation Question 5:** Have transit agencies faced a higher-than-expected increase in the number of compliance findings or reviews as a result of the TAM plan requirement?)*

Key Question: How did aspects related to your TAM plan factor into your Triennial Review?

Organizational Change

In this section of the interview, we will be discussing updates or changes to the organizational structure or organizational functioning of transit agencies, resulting either from the TAM plan requirement or a move toward a TAM approach.

***(Evaluation Question 6:** Has the TAM final rule led to an overall move toward a comprehensive TAM culture within agency organizations throughout the transit industry?)*

Key Question: What was the state of transit asset management, and asset management overall in your agency before the final TAM rule?

Key Question: Have the final rule requirements led to changes in priorities and the overall importance of asset management within your organization?

Key Question: Would you say that your agency is adopting/has adopted a culture of transit asset management? Why or why not?

*(**Evaluation Question 7**: Have agency efforts to implement the TAM requirements led to changes in organizational structure or key functions? If yes, to what extent?)*

Key Question: Which department (s) were involved in creating the initial TAM plan for your agency? Why were they selected?

Key Question: Has the organizational structure or types of functional groups (or job descriptions) in your organization changed as a result of the introduction of TAM requirements? How so?

Key Question: What strategy or process improvement most enabled your agency to meet the TAM requirements?

*(**Evaluation Question 8**: Have the changes in organizational structure resulted in intended improvements to agency business processes, in terms of internal coordination, interagency collaboration, hiring, or other practices?)*

Key Question: Has your agency noticed improvements in business processes related to restructuring/new TAM related positions?

Industry Change

In this section, we will be discussing the intermediate- to long-term change in practice in the transit industry and at transit agencies to reflect a broad focus on improved asset management.

***(Evaluation Question 9**: Has the implementation of the TAM requirements improved state-of-good-repair (SGR) of the Nation's transit systems?)*

Key Question: What was the estimated state-of-good-repair (SGR) backlog prior to the introduction of the TAM requirements?

Key Question: Have you had a TAM plan in place long enough to use data from it for the purposes of decision making? How has this data impacted your decisions?

F. Organizations Considered in Twitter Analysis

As noted in Theme 9.5, the Evaluation Team analyzed the use of TAM terms in transit-related tweets on Twitter during 2022 to assess how often TAM terms appeared and whether TAM awareness changed over time. While tweets containing a few essential TAM terms increased in frequency since 2017, suggesting that TAM continues to enter transit-related conversations on social media, these tweets make up a low percentage of assessed organizations' Twitter activity.

Type	Organization Name	Twitter Handle	Year of First Tweet Available*
National Transportation Associations	American Association of State Highway and Transportation Officials	aashtospeaks	2020
	American Public Transportation Association	APTA_Transit	2021
	Community Transportation Association of America	CTAA	2009
	National Association of City Transportation Officials	NACTO	2017
National News, Media, or Advocacy Organizations	Eno Center for Transportation	EnoTrans	2021
	MassTransit Magazine	MassTransitmag	2019
	METRO Magazine	METROmagTweet	2017
	Streetsblog USA	StreetsblogUSA	2020
	TransitCenter	TransitCenter	
State or Regional Transportation Associations	Arizona Transit Association	Arizona_Transit	2010
	California Transit Association	CalTransit	2016
	Georgia Transit Association	ga_transit	2016
	Community Transportation Association of Idaho	CTAIdaho	2010
	Illinois Public Transportation Association	ILPublicTransit	2016
	Central Maryland Transportation Alliance	CMTAlliance	2015
	Transportation Association of Maryland, Inc.	TAMINC_MD	2011
	Missouri Public Transit Association	MOPublicTransit	2016
	New York Public Transit Association	NYPublicTransit	2016
	Ohio Public Transit Association	OHNeedsTransit	2016
	Oklahoma Transit Association	OklahomaTransit	2019
	South West Transit Association	swtanation	2013
	Tennessee Public Transportation Association	TNTransit	2013
	Community Transportation Association of Virginia	OfficialCTAV	2020
	Virginia Department of Rail and Public Transportation	VirginiaDRPT	2016
	Virginia Transit Association	VaTransitAssoc	2012

G. Summary of 2018-2021 NTD Data Submissions

Agencies are required to submit data on their assets and the SGR of their systems to NTD each year. This data covers four asset categories: revenue vehicles, service vehicles, facilities, and infrastructure. It also includes the quantitative targets agencies set as performance measures, and information on agency finances. The table below includes this data for reporting year (RY) 2018 through RY 2021.

Data Element	Asset Category	RY 2018	RY 2019	RY 2020	RY 2021
Asset Inventory					
Total # of assets (not including track miles)	Overall	215,719	220,818	217,566	213,531
Total # of assets with capital responsibility (not including track miles)	Overall	279,083	192,278	190,354	188,665
Total % assets in SGR	Overall	52%	77%	77%	78%
Agencies reporting to NTD	Overall	2,758	2,761	2,915	2,975
# of Tier I agencies reporting	Overall	185	186	163	152
# of Tier II agencies reporting	Overall	2,573	2,575	2,752	2,823
# of agencies with reporting extensions	Overall	11	22	12	0
Revenue Vehicles					
Total number	Revenue Veh.	173,733	176,824	172,845	168,235
Total number with capital responsibility	Revenue Veh.	151,035	150,446	147,879	145,731
Avg. age (years)	Revenue Veh.	7.7	7.6	7.9	8.0
% of vehicles in SGR	Revenue Veh.	79%	80%	80%	80%
# of agencies setting custom ULB for any vehicle	Revenue Veh.	1,294	1,416	1,437	1,414
% agencies setting custom ULB for any vehicle	Revenue Veh.	51%	53%	54%	53%
# of assets with custom ULBs	Revenue Veh.	83,642	90,272	89,885	88,955
Avg. ULB (years)	Revenue Veh.	14.0	14.1	14.0	14.2
Avg. target for % in SGR	Revenue Veh.	77%	80%	81%	81%
# of additional assets targeted to be in SGR	Revenue Veh.	10,268	8,621	9,139	8,519
Net change in # of assets targeted to be in SGR	Revenue Veh.	1,537	-25	1,453	1,147
# of assets targeted to no longer be in SGR	Revenue Veh.	8,731	8,646	7,686	7,372
# agencies with capital responsibility reporting	Revenue Veh.	2,549	2,666	2,684	2,685
# of Tier I agencies with capital responsibility reporting	Revenue Veh.	181	177	154	143

Data Element	Asset Category	RY 2018	RY 2019	RY 2020	RY 2021
# of Tier II agencies with capital responsibility reporting	Revenue Veh.	2,368	2,489	2,530	2,542
# exemptions/extensions	Revenue Veh.	11	22	6	0
Service Vehicles					
Total number	Service Veh.	29,480	30,676	30,926	31,202
Total number with capital responsibility	Service Veh.	29,332	30,509	30,754	30,996
Avg. age (years)	Service Veh.	8.3	8.6	8.4	8.5
% of vehicles in SGR	Service Veh.	66%	63%	64%	63%
# of vehicles with custom ULB	Service Veh.	21,296	23,387	23,212	23,799
% of agencies reporting custom ULB	Service Veh.	41%	49%	49%	52%
Avg. ULB (years)	Service Veh.	10.9	10.8	10.6	10.7
Avg. target for % in SGR	Service Veh.	62%	65%	64%	64%
# of additional assets targeted to be in SGR	Service Veh.	2,282	1,792	1,554	1,500
Net change in # of assets targeted to be in SGR	Service Veh.	-331	568	125	95
# of assets targeted to no longer be in SGR	Service Veh.	1,951	1,224	1,429	1,405
# agencies with capital responsibility reporting	Service Veh.	885	932	951	975
# of Tier I agencies with capital responsibility reporting	Service Veh.	160	162	144	135
# of Tier II agencies with capital responsibility reporting	Service Veh.	725	770	807	840
# exemptions/extensions	Service Veh.	11	22	1	0
Facilities					
Total number	Facilities	12,506	13,318	13,795	14,094
Total number with capital responsibility	Facilities	10,720	11,323	11,721	11,938
% of facilities reporting condition	Facilities	78%	89%	93%	98%
Avg. age (years)	Facilities	28.3	27.6	28.0	27
% of facilities reporting condition above 3 (in SGR)	Facilities	87%	88%	89%	90%
Avg. condition	Facilities	3.5	3.5	3.5	3.5
Avg. target for % in SGR	Facilities	80%	86%	87%	88%

Data Element	Asset Category	RY 2018	RY 2019	RY 2020	RY 2021
# of additional assets targeted to be in SGR	Facilities	134	161	135	133
Net change in # of assets targeted to be in SGR	Facilities	-267	-58	-84	-102
# of assets targeted to no longer be in SGR	Facilities	401	219	219	235
# agencies reporting	Facilities	1,323	1,329	1,342	1,351
# of Tier I agencies with capital responsibility reporting	Facilities	171	171	150	138
# of Tier II agencies with capital responsibility reporting	Facilities	1,152	1,158	1,192	1,213
# exemptions/extension	Facilities	11	22	4	0
Infrastructure					
Total miles	Infrastructure	13,086	13,839	13,917	13,633
Total miles with capital responsibility	Infrastructure	11,442	11,729	11,752	11,457
Avg. age	Infrastructure	26.7	43.9	52.4	53.8
# of miles under performance restriction	Infrastructure	597	312	382	427
% miles under performance restriction	Infrastructure	6.1%	3.0%	3.7%	4.3%
Avg. target for % not under performance restriction	Infrastructure	87.4%	94.6%	96.7%	96.6%
# of additional miles targeted to be in SGR	Infrastructure	329	115	182	192
Net change in # of miles targeted to be in SGR	Infrastructure	-587	-211	43	88
# of miles targeted to no longer be in SGR	Infrastructure	916	326	139	104
# agencies with capital responsibility reporting	Infrastructure	75	77	77	77
# exemptions/extensions	Infrastructure	11	22	1	0
% miles beyond expected life	Infrastructure	28.5%	42.6%	49.5%	47.9%
Group Plans					
Number of group plans	Group Plans	70	70	70	74
Number of State sponsors	Group Plans	49	49	50	50
Number of other sponsors	Group Plans	21	21	20	24
# of participants	Group Plans	1,943	2,041	2,053	2,064
# optional participants	Group Plans	329	329	344	366
# assets included	Group Plans	40,083	42,183	42,793	42,979

Data Element	Asset Category	RY 2018	RY 2019	RY 2020	RY 2021
% assets in group plans (of all assets reported to NTD)	Group Plans	19%	19%	20%	20%
Reliability					
# Major mechanical failures	Rail	16,992	17,128	13,351	12,424
# Major mechanical failures	Bus	204,116	263,03	176,326	169,257
Mean distance between failures[6] (miles)	Rail	13,220	13,360	15,001	14,993
Mean distance between failures[7] (miles)	Bus	11,269	8,814	11,849	11,757
Capital Expenses					
Guideway		$7,377,237,328	$9,190,121,588	$9,159,163,163	$9,524,826,926
Stations		$3,397,582,298	$3,660,300,480	$3,605,691,552	$3,738,517,957
Admin buildings		$281,589,567	$265,336,180	$471,412,878	$593,027,233
Maintenance buildings		$1,379,438,867	$1,621,970,064	$1,801,983,969	$1,830,571,410
Passenger vehicles		$5,427,070,900	$6,001,881,831	$4,749,394,680	$5,000,552,097
Other vehicles		$117,070,197	$141,854,950	$440,556,643	$300,273,384
Fare collection equipment		$224,692,260	$232,469,264	$261,281,533	$312,218,578
Communication and info systems		$2,151,044,289	$2,191,049,368	$1,847,455,865	$1,874,562,389
Other		$834,699,739	$660,656,384	$720,833,862	$495,658,714
Reduced reporter expenses		$355,699,739	$446,262,213	$470,099,321	$484,692,571
TOTAL capital expenses reported to NTD (sum of above expenses)		**$21,545,972,679**	**$24,411,905,322**	**$23,527,873,466**	**$24,154,901,259**
Operating Expenses					
National total vehicle operations		$23,377,398,821	$24,420,576,291	$23,787,742,510	$22,943,677,741
National total vehicle maintenance		$8,742,819,825	$8,986,140,354	$8,842,077,856	$8,954,143,136
National total facility maintenance		$5,656,922,395	$6,022,793,430	$5,833,985,334	$6,108,047,453
National total general administration		$8,487,138,922	$9,035,249,117	$8,944,721,155	$9,390,019,654
TOTAL operating expenses reported to NTD (sum of above)		**$49,009,427,068**	**$48,464,759,192**	**$47,408,526,855**	**$47,395,887,984**

[6] Used total vehicle miles in calculation, not revenue miles.
[7] Used total vehicle miles in calculation, not revenue miles.