2014 NWPMA Conference

Asset Management – The Big Picture

- Factors contributing to asset management
- Status of asset management in state DOTs
- Current TAM initiatives
- Future trends

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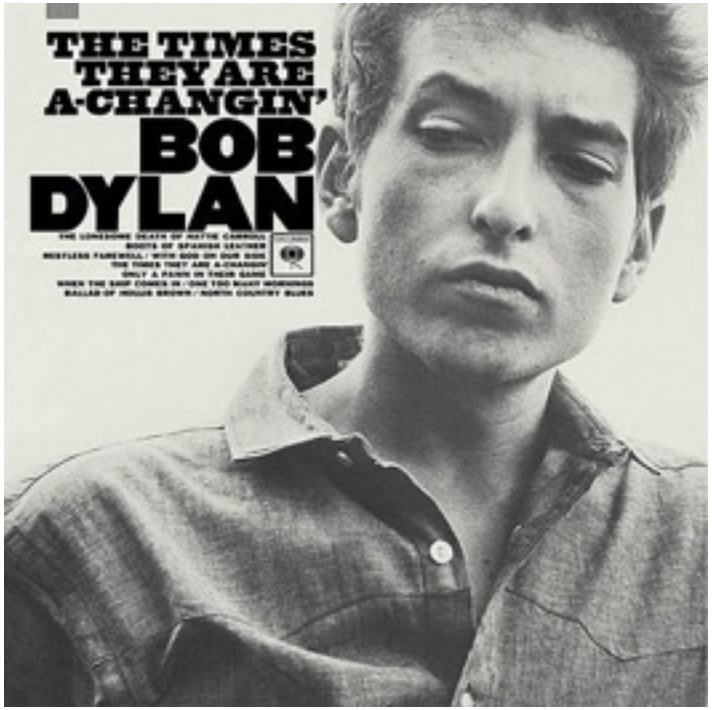
Factors Impacting Transportation Agencies

The Times They Are a Changin'…

- More focus on preserving existing assets
- Targeted efforts to improve agency efficiency & effectiveness
- New legislation supporting performance-based decisions



Circa 1964

Agencies Have Adopted TAM Principles

1. POLICY DRIVEN
2. PERFORMANCE-BASED
3. EVALUATES OPTIONS
4. DATA DRIVEN
5. TRANSPARENT

TAM Helps Manage Assets Effectively

Tradeoff Analysis

Goals & Investments Are Aligned With Performance Data

Resource Allocations

Improvement Programs & Delivery

Performance Monitoring

MAP-21

- *State Performance Management-*
- *(1) IN GENERAL- A State shall develop a risk-based asset management plan for the National Highway System to improve or preserve the condition of the assets and the performance of the system.*

MAP-21 (cont)

- *(4) PLAN CONTENTS- A State asset management plan shall, at a minimum, be in a form that the Secretary determines to be appropriate and include--*
  - *(A) a summary listing of the pavement and bridge assets on the National Highway System in the State, including a description of the condition of those assets;*
  - *(B) asset management objectives and measures;*
  - *(C) performance gap identification;*
  - *(D) lifecycle cost and risk management analysis;*
  - *(E) a financial plan; and*
  - *(F) investment strategies.*

MAP-21 National Goal Areas

- Safety
- Infrastructure Condition
- Congestion Reduction
- System Reliability
- Freight Movement & Economic Vitality
- Environmental Sustainability
- Reduced Project Delivery Delays

Other MAP-21 TAM Requirements

- Minimum standards for States to use in developing and operating bridge & pavement management systems
- Measures for States to use to assess the condition & performance of pavements on the Interstate & NHS
- Minimum service levels for the condition of pavement on the Interstate system
- Minimum service levels of no more than 10% of the total bridge deck area on the NHS classified as structurally deficient

Asset Management Implementation in the States

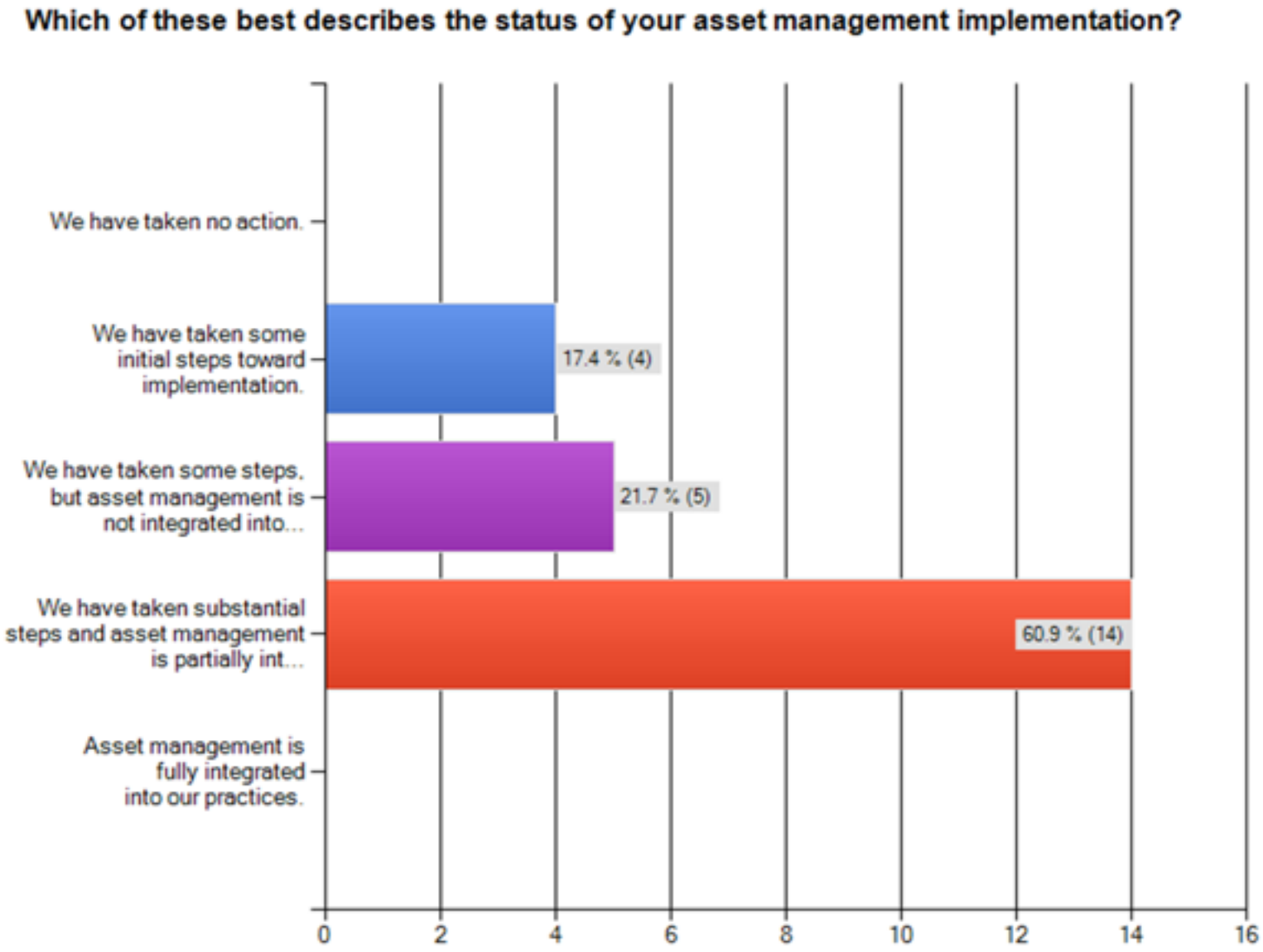
General Observations (NCHRP Synthesis 439)

- **Organization** - 60% of respondents had an asset management group
- **Data** – In addition to pavements, 70 to 90% collected data on signs, guardrail, culverts, & lighting
- **Decision Making** – Still focused primarily on pavements & bridges, formal consideration of risk is rare
- **Documentation** – Few agencies in 2013 had developed Asset Management Plans

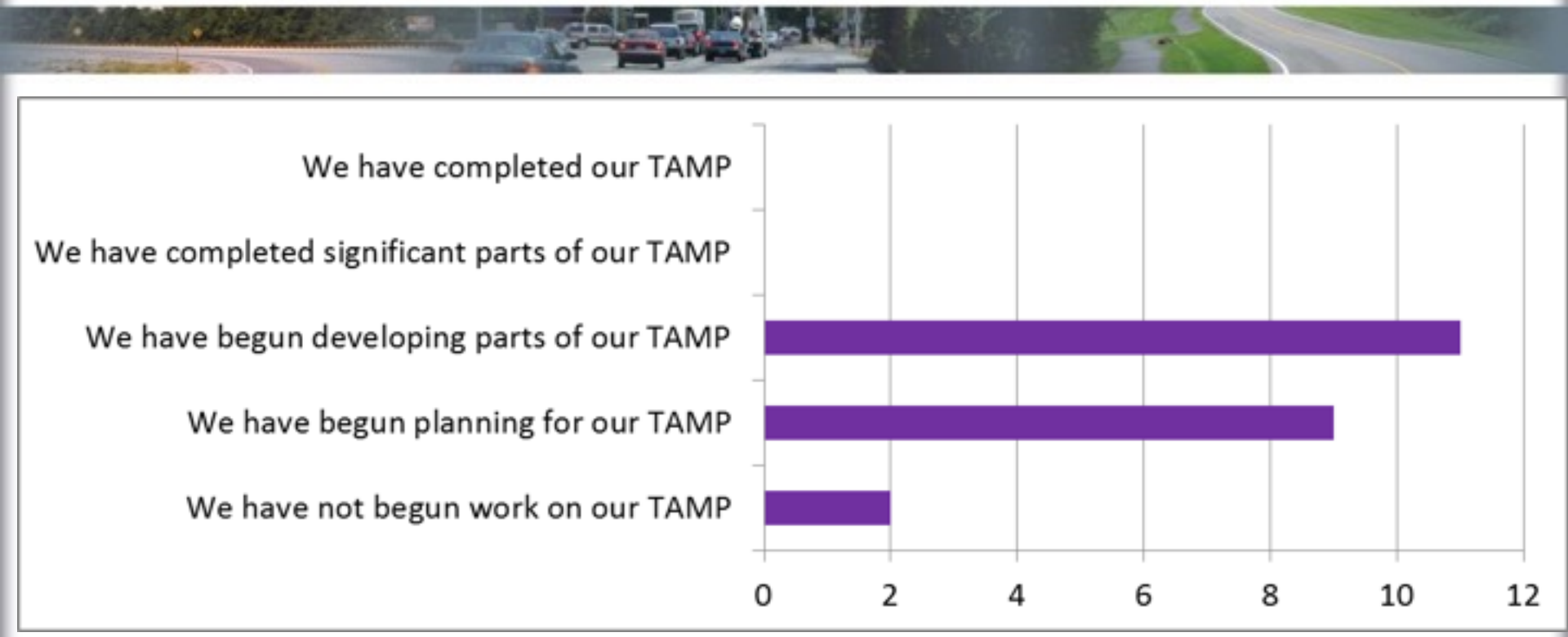
Completed Inventories(From NCHRP Synthesis 439)

- Pavements & bridges 100%
- Signs 77%
- Guardrail 63%
- Culverts 60%
- Roadway lighting 49%
- Pavement markings 33%
- Earth retaining walls 27%

Status of Asset Management (2013)



TAMP Status (2013)



Today, draft TAMPS can be found on the FHWA website for Colorado, Georgia, Minnesota, New York State, Pennsylvania, Utah, and Wyoming DOTs (see http://www.fhwa.dot.gov/asset/plans.cfm)

Current TAM Initiatives

Gap Analysis
Target Setting
Life Cycle Assessments
Risk Management
Financial Sustainability

Gap Analysis

Gap Analysis

Where are you today?

Where do you want to be?

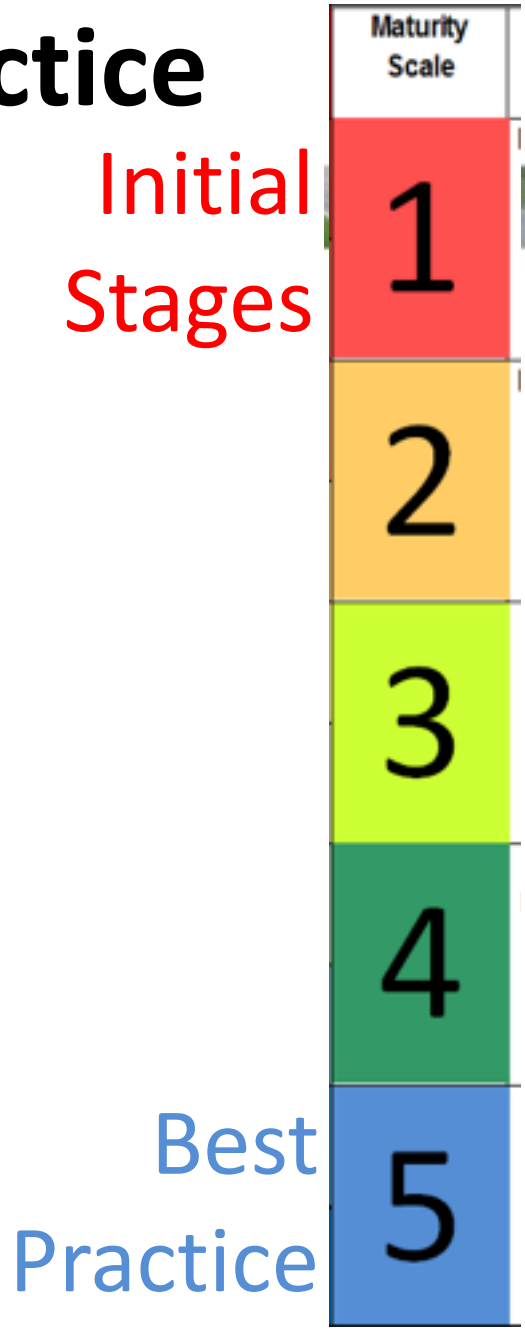
What gaps exist between the two?

Gap Analysis Rating Areas

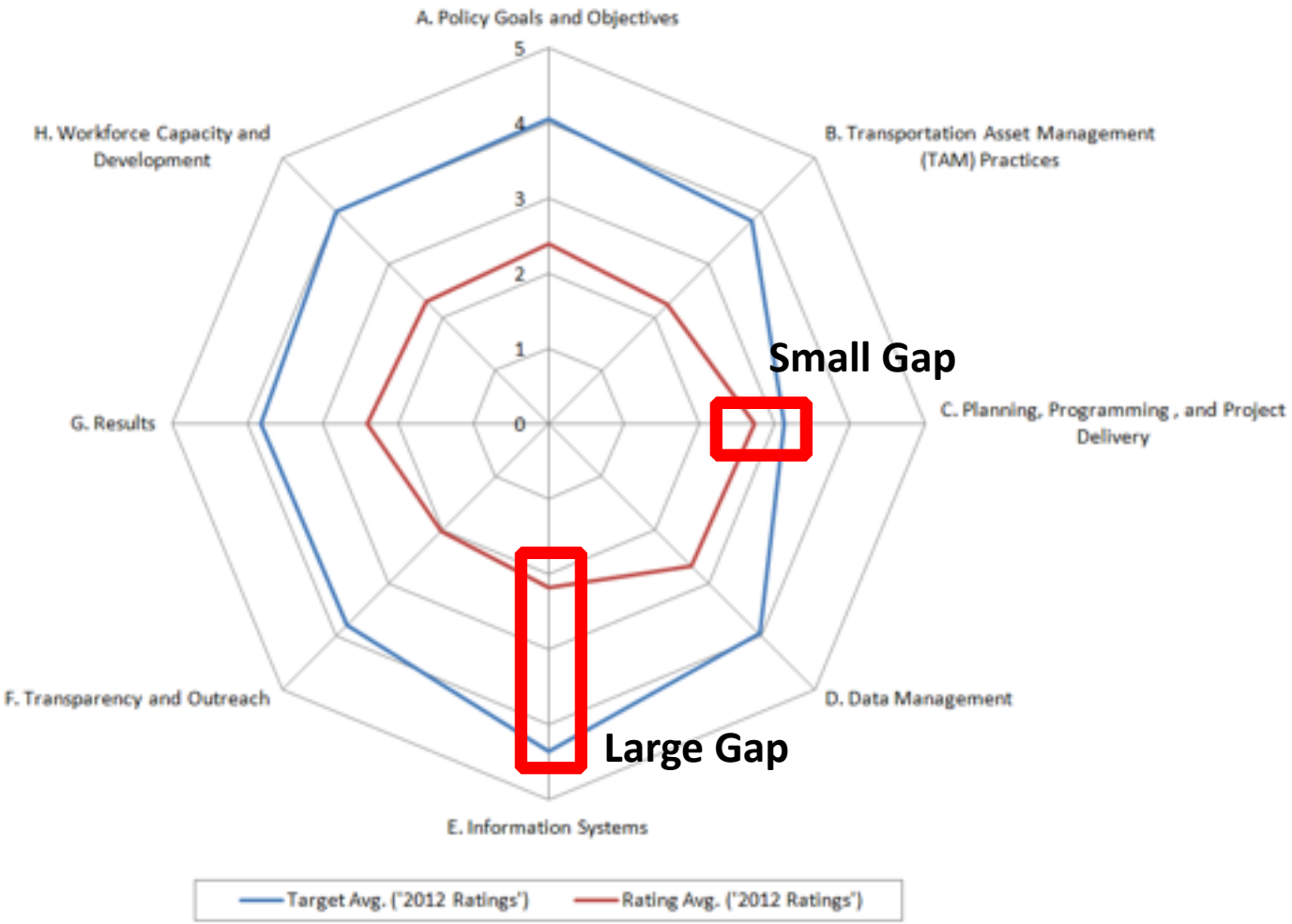
Assessment Areas	Elements (and Criteria(in parenthesis)
1: Policy Goals and Objectives	• Goals and Objectives (6) • Agency Policies (6)
2: Asset Management Practices	• TAM Framework (7) • Leadership Support for TAM (5) • Asset Management Plan Development (9) • Lifecycle Management (4)
3: Planning, Programming, and Project Delivery	• Planning and Programming Processes (9) • Performance-Based Management (6) • Resource Allocation (5) • Project Delivery (7)
4: Data Management	• Asset Inventory (9) • Asset Condition and Performance (8) • Data Governance (9)
5: Information Systems	• System Technology and Integration (5) • Decision-Support Tools (4) • System Features (9)
6: Transparency and Outreach	• Transparency and Accountability (4) • Benchmarking (5) • Communication and Outreach (4)
7: Results	• Compliance (4) • Data-Driven Targets (8) • Program and Plan Alignment (3)
8: Workforce Capacity and Development	• Workforce Capacity (5) • Workforce Development (2)

Comparing to Best Practice

- Example: Agency policies encourage a business-oriented, customer-focused approach to asset management
  - Current rating?
  - Desired rating?



Outputs Identify Gaps in Practice



Gaps Inform Your Implementation Plan (taken from the Colorado DOT Draft TAMP)

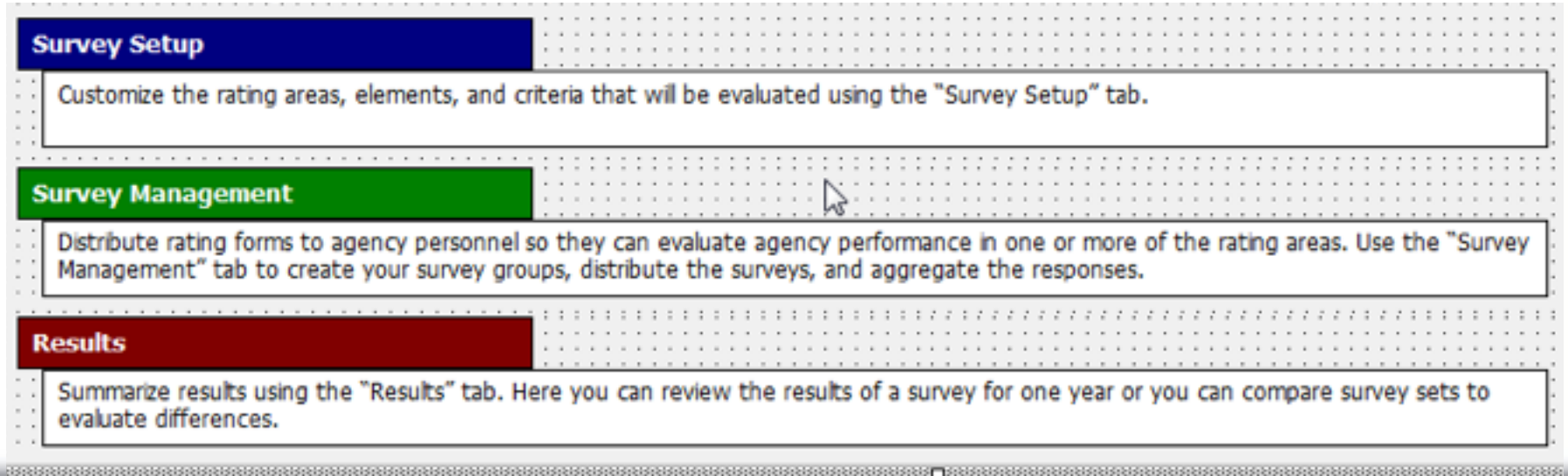
No.	Title	Category	Gap	Desired State	High-Level Steps Being Taken to Achieve Desired State
4	Establish a Risk Framework to Evaluate Alternative Strategies	Planning and Programming	An overall framework to consider mitigation strategies for various risk events/sites is needed, as well as for comparing and trading off investments across various risk opportunities. Need to merge "risk-based" management with "performance-based" management of assets.	Risk opportunities – a framework to include the opportunities and threats related to uncertain events, and tradeoff the ROI of candidate risk mitigation strategies.	CDOT has engaged a consulting firm to provide tools for characterizing the consequences of various risks, and these tools will be valuable in supporting the larger risk framework.
5	Analyze Budget Tradeoffs Across Programs	Planning and Programming	The type and impact of maintenance work on pavement and bridges and their impact on extending the life of these assets is not clearly understood. There is a need to better understand the investment of capital and the subsequent impact to maintenance.	Capital versus maintenance expenditure tradeoffs are explicitly considered in the preservation of assets like pavements and bridge.	The new Bridge Maintenance Report is assisting bridge analysis, while the Roadway Surface-Surface Treatment project is working to better understand the relationship on the pavement side.
6	Improve Project Scoping and Optimization	Policy Guidance	Disconnect between Statewide Plan and Asset Management. Corridor planning does not recognize that maintenance needs are increasing and funding should be based on the asset need, not on a formula. Continuity between corridor plans and the targets used in asset management as well as ties to the Maintenance program operations are missing.	Corridors defined to support asset management, spanning regions and terrain types; and Maintenance is tied to long-range plans.	New statewide long-range plan is being written and is intended to address corridor ties to asset management considerations.
7	Incorporate Life-Cycle Analysis into Decision-Making	Information and Analysis	The Bridge Program does not currently include preventive maintenance in its life-cycle analysis of bridges, or in the types of projects that are performed.	Ability of the Bridge Program to express performance and life as a function of investment level, including preventive maintenance expenditures.	Staff Bridge is working to incorporate preventive maintenance into its analysis; starting with those elements with the highest ROI. These first two considerations are whether or not a bridge has joints, and whether or not the bridge deck is sealed.

Sample Implementation Plan Content (taken from the Colorado DOT Draft TAMP)

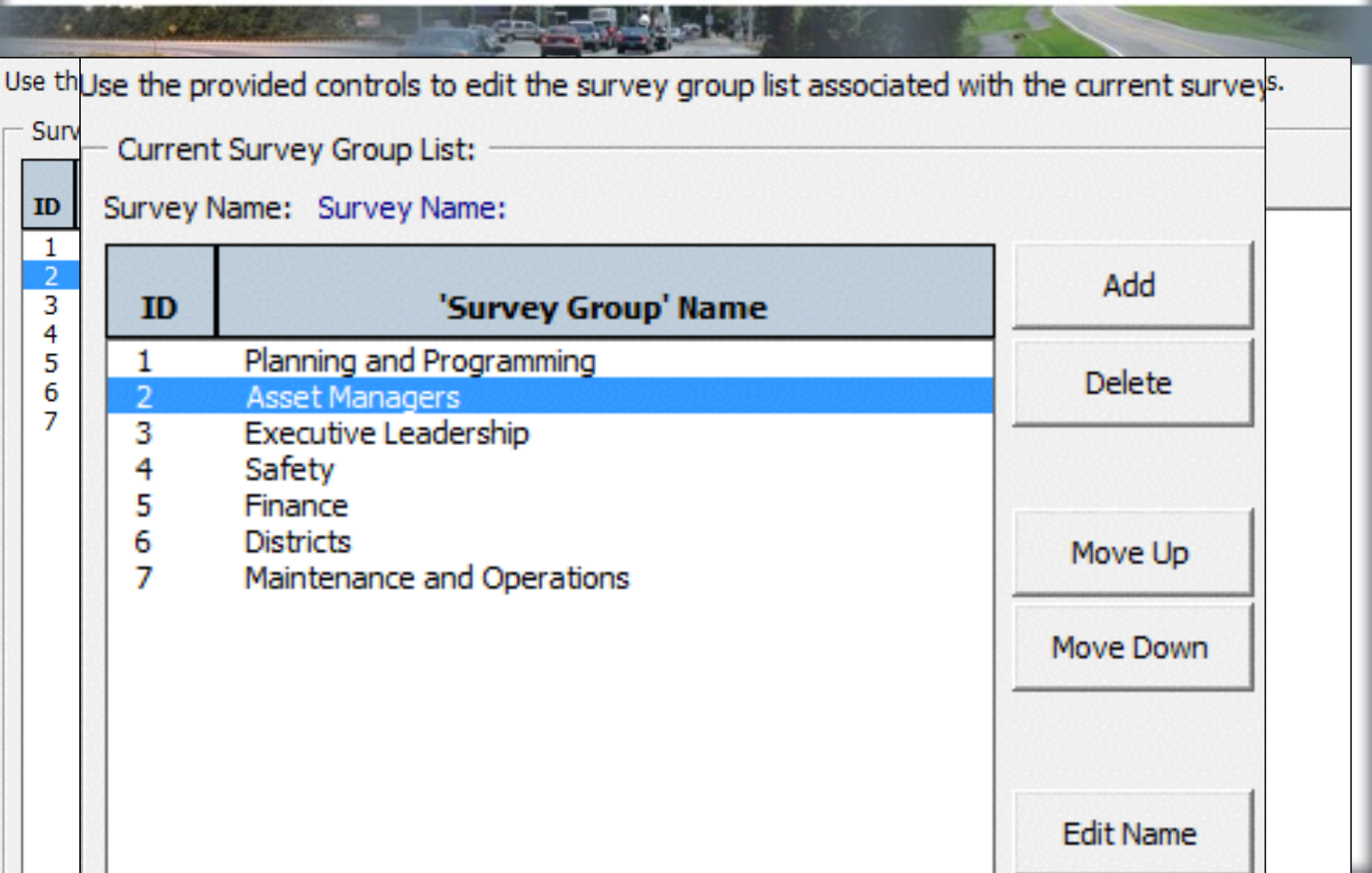
No.	Gap	Gap Dependencies (Prerequisites, etc.)	Resources Required	Project Lead	Begin Date	Deliver Date
1	Budget Distribution Process (FY 2017)	This capability will be improved by each asset documenting their process and tracking the status	Each asset manager is responsible for documenting how needs are assessed (incorporating risk) and funds are distributed for their asset.	Laurie Freedle/Kevin Henry	Aug 2014	Nov 2015
2	Risk Analysis	None	Staff time to identify, understand and rank risks to CDOT, and identify mitigation strategies	John Vetterling	Jan 2014	Oct 2014
3	Project and Program Delivery Risks	This capability will support the Strategic Management Framework	Managing delivery risks. This is part of the project pipeline and project portfolio management projects.	Richard Zamora	Jun 2014	Oct 2014
4	Establish Risk Framework	This capability will provide context for risk analysis	Staff time to suggest alternatives and SMT time to select and communicate chosen methodologies.	John Vetterling	Ongoing	Jun 2014
5	Analyze Budget Tradeoffs	Follows life cycle; this capability will support the asset budgeting process	CDOT is working towards cross-asset optimization, to better understand how to prioritize spending limited funds for the best overall ROI.	JoAnn Mattson/Laurie Freedle	Apr 2014	Nov 2014
6	Improve Project Scoping and Optimization	None – put this into place ASAP	Staff time to digest asset mgmt. concepts and determine how to apply them at every level, in a holistic manner to programs and projects.	Scott McDaniel/William Johnson	Ongoing	June 2014
7	Incorporate Life-Cycle Analysis	None – do ASAP, since this feeds other capabilities	Each asset manager must incorporate life cycle analysis into their asset management system and improve their understanding of how maintenance activities extend the life cycle of their assets.	JoAnn Mattson	Ongoing	Aug 2014
8	Target-Setting for RB AMP Update	Follows Tradeoff Analysis and supports Budgeting; Adjusted periodically	DTD and Staff Branches will work to make sure they understand direction from the TC and the SMT on this, and document accordingly.	DTD Planning: TBD	Oct 2014	Apr 2015
9	Strategic Management Framework	None – put this into place ASAP	Staff time from asset managers, regions, DTD, OFMB and Staff Branches, address the items listed in the Plan, Do, Check and Act framework.	Maria Sobota	Aug 2013	June 2015
10	TAM Benefits Communication	None – plan to provide communication regularly	Staff time to communicate change; and on the receiving side staff time to understand and implement the changes.	William Johnson	Aug 2013	Jun 2014

Gap Analysis Tool

- Microsoft Excel platform with form-based user interface
- Dual workbook approach
  - Master workbook – used to create surveys, manage data, & view results
  - Rater survey workbook – used by individual raters to rate assigned criteria



Rater Survey



Rater Surveys With Status Bars

Asset Management Gap Analysis - Survey Tool

Use the controls below to provide your scores to all assigned criteria. Use the 'Previous' and 'Next' buttons to move to another group of criteria (i.e., another 'Element'). Assign your ratings in the 'Criteria List' area.

Return To 'Home' Page

Current Critera Categories

Criteria Category	Description	Category Index
Assessment Area	A. Policy Goals and Objectives	1 of 8
Element	A.1. Goals & Objectives	1 of 2

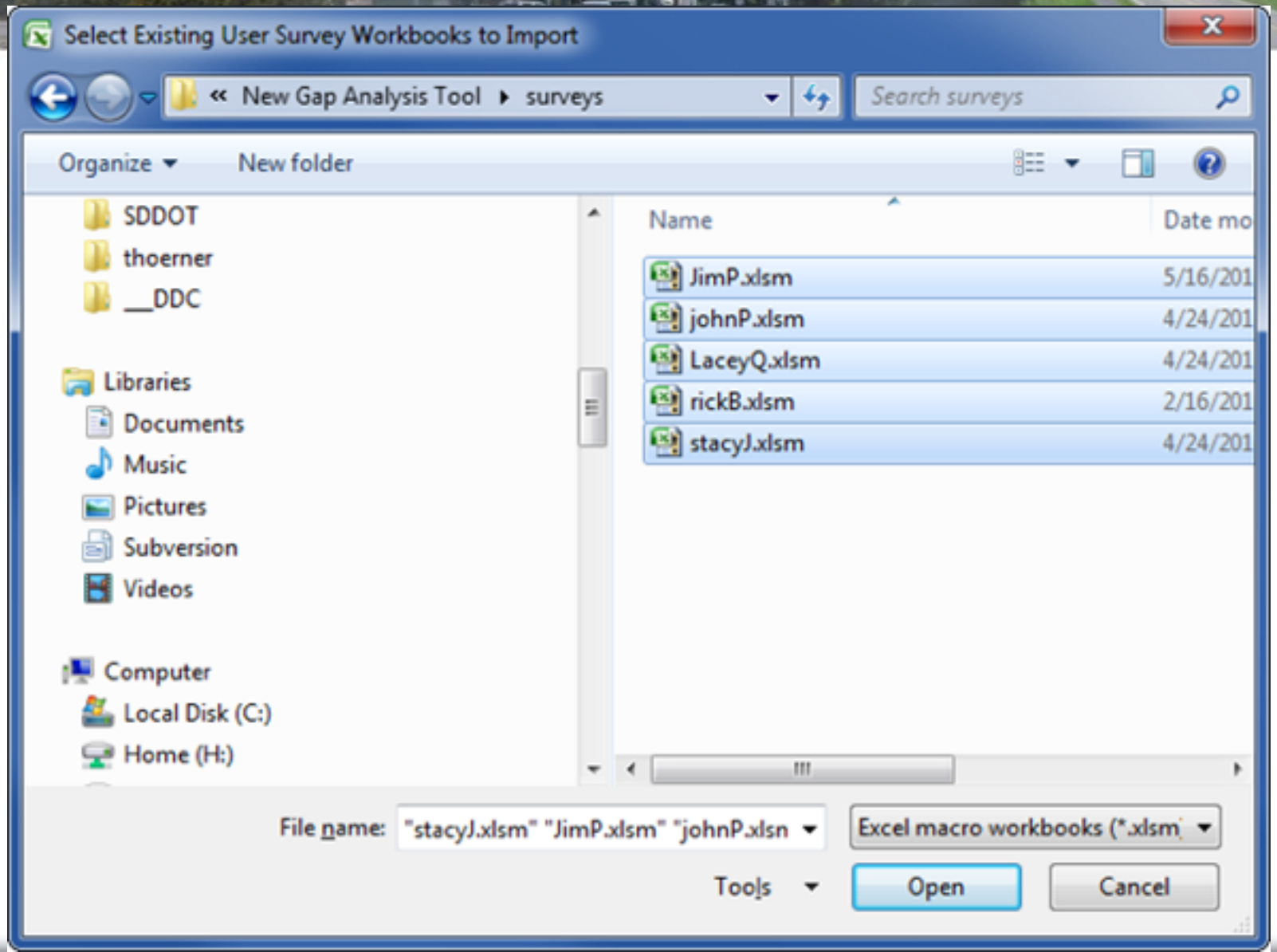
Previous

Next

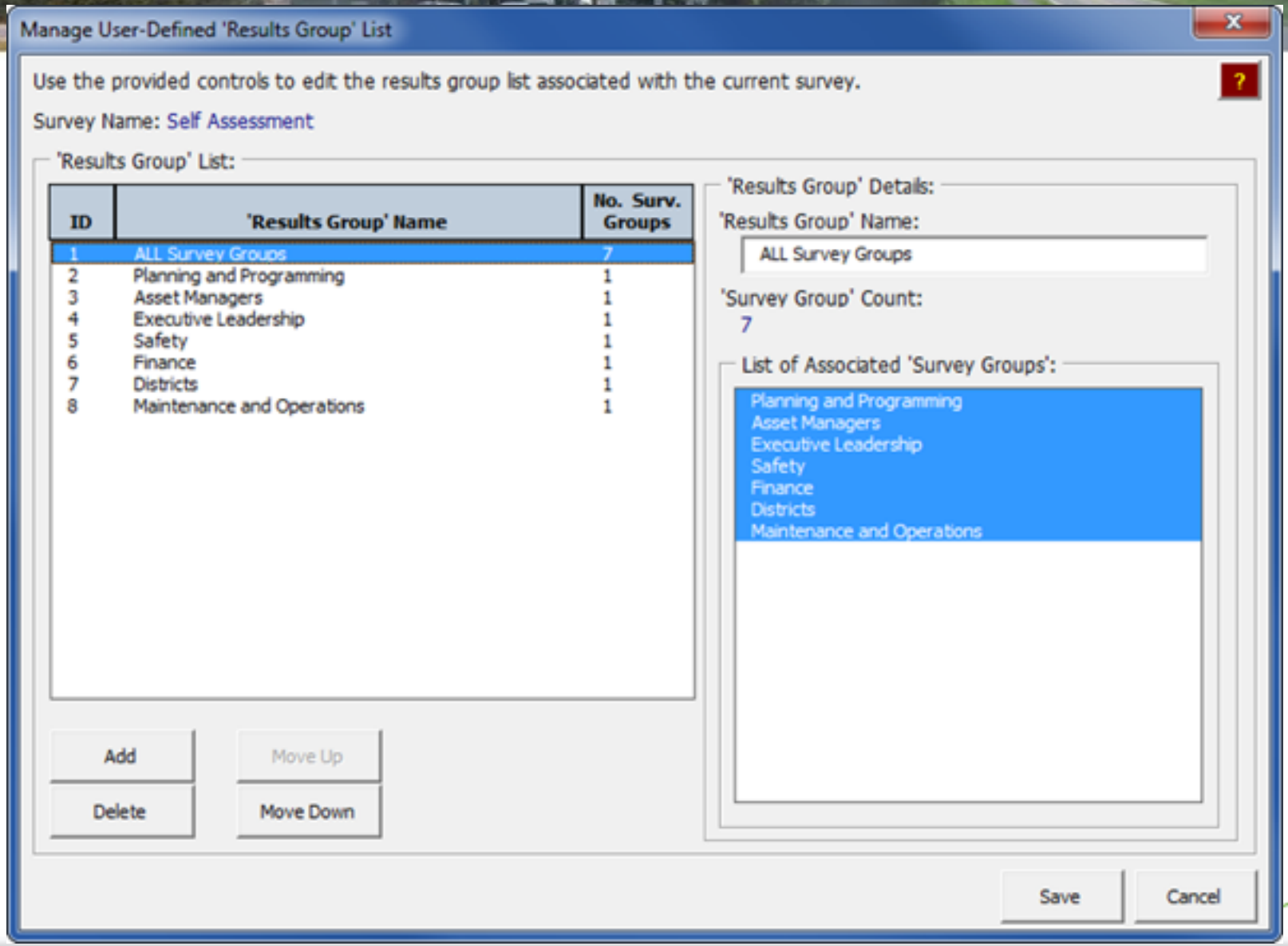
Current Detailed Criteria List

Criteria Index	ID	'Criteria' Description	Target Rating	Current Rating	Skip?	Status
1 of 6	A.1.1	Agency goals and objectives are comprehensive, integrated with other statewide policy objectives, and supported by quantitative and measurable performance measures or criteria.	5	4	☐	COMPLETE
2 of 6	A.1.2	Agency goals and objectives consider the costs over the whole life of an asset and encourage strategies to lower life-cycle costs, to reduce agency risk, and to provide long-term benefits.	5	4	☐	COMPLETE
3 of 6	A.1.3	Agency goals and objectives are established based on reliable information on asset condition and public perceptions.	5	3	☐	COMPLETE
4 of 6	A.1.4	Reported system performance is measured against agency goals and objectives.	-	-	☑	SKIPPED
5 of 6	A.1.5	Agency leadership actively involves political leaders, community leaders, and other policy makers to establish system performance expectations that consider funding constraints, legislated requirements, public interests, and other similar factors.	5	3	☐	COMPLETE
6 of 6	A.1.6	Agency goals and objectives are aligned with asset management policies through the asset management plan.	5	-	☐	INCOMPLETE

Import Survey Screen



Results Groups

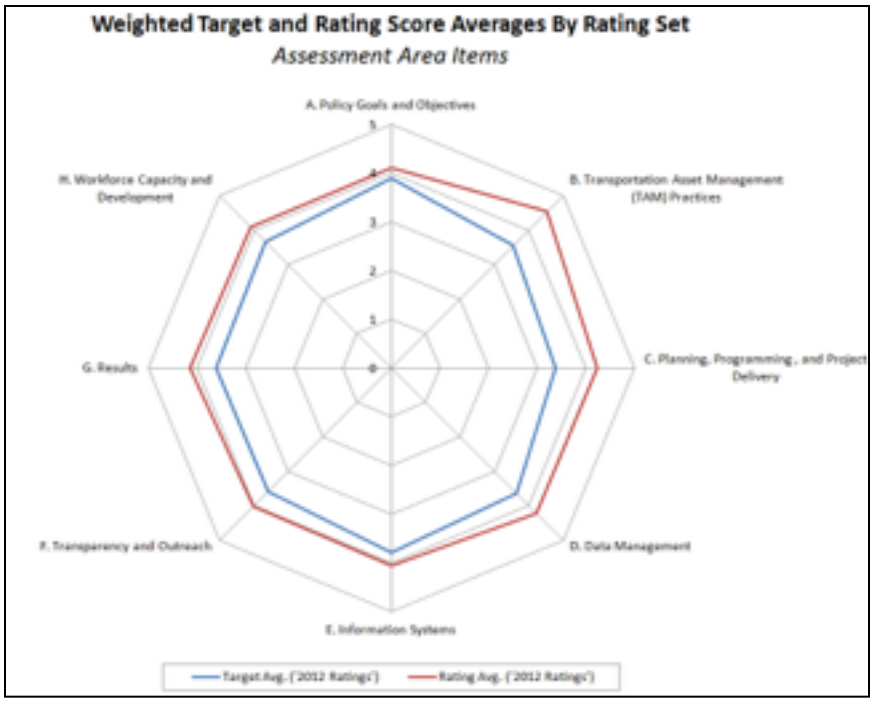


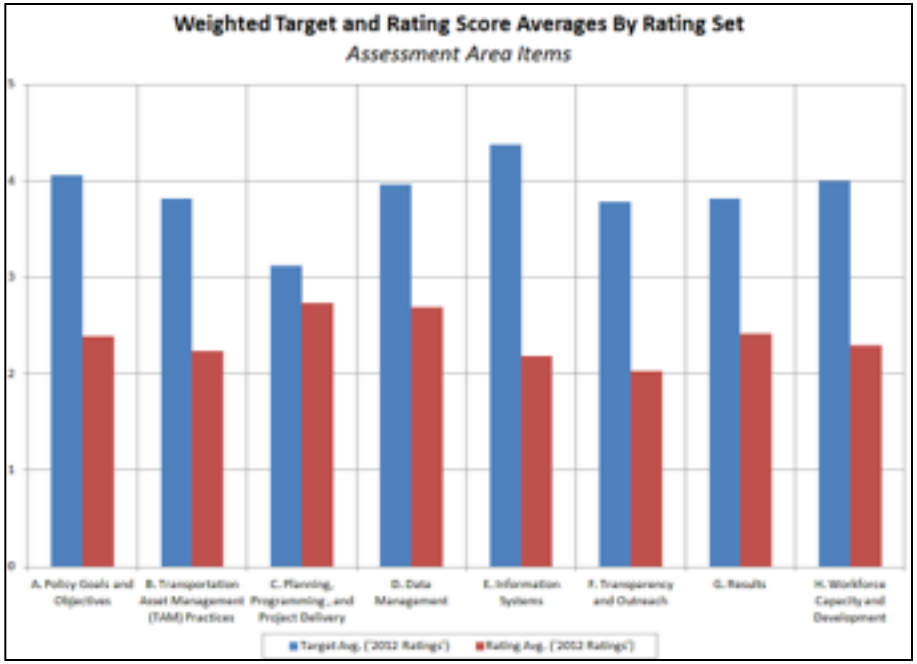
Assessing Results

- Graphs
- Spider Charts
- Export Tables

Summary of Results by 'Assessment Area'

Assessment Area	Count	Rating Set 1: '2012 Ratings'							
		Non-Weighted Values					Weighted Values		
		Target Avg	Target Std Dev	Rating Avg	Rating Std Dev	Gap	Target Avg	Rating Avg	Gap
A. Policy Goals and Objectives	12	3.92	1.08	2.42	0.90	1.50	4.06	2.39	1.67
B. Transportation Asset Management (TAM) Practices	13	3.85	1.14	2.23	1.01	1.62	3.82	2.24	1.58
C. Planning, Programming , and Project Delivery	27	3.15	0.86	2.74	0.76	0.41	3.12	2.73	0.39
D. Data Management	26	3.96	0.66	2.69	0.84	1.27	3.96	2.69	1.27
E. Information Systems	18	4.28	0.75	2.28	0.75	2.00	4.37	2.19	2.19
F. Transparency and Outreach	13	3.77	0.83	2.00	1.00	1.77	3.78	2.03	1.75
G. Results	15	3.67	0.90	2.40	0.99	1.27	3.82	2.42	1.40
H. Workforce Capacity and Development	7	4.00	0.58	2.00	0.82	2.00	4.00	2.30	1.70





User's Guide – Survey Setup

- Helps evaluate what portions of the survey should be sent to each group

Assessment Areas	Elements	This Element Evaluates:	At a Minimum, Send This Element to These Groups:
1: Policy Goals and Objectives	1.a. Goals and Objectives	The extent to which agency goals & objectives are based on quality data, are monitored, and are aligned with good asset management practices	• Executive leadership • Asset managers • Asset management • Policy • Performance measurement
	1. b. Agency Policies	The existence and use of policies supporting asset management practices	Same as 1.a.plus: • Planning and programming • Finance

User's Guide Assistance - Results

Assessment Area	Elements Included	Improvements to Consider	Helpful Resources
Policy Goals and Objectives	• Goals and Objectives • Agency Policies	• Review the process used to establish agency goals and look for ways to better incorporate asset management practices • Evaluate whether performance measures are tied to agency objectives • Establish an asset management policy	• Chapter 2, AASHTO *Transportation Asset Management Guide – A Focus on Implementation* • National Highway Institute (NHI) Course 131106A, An Introduction to Transportation Asset Management
Asset Management Practices	• TAM Framework • Leadership Support for TAM • Asset Management Plan Development • Lifecycle Management	• Document existing business processes and look for areas of improvement • Confirm agency objectives for asset management • Establish links between asset management and executive leadership • Prepare/update an asset management plan • Identify strategies for accounting for maintenance trade-offs associated with capital investments	• AASHTO *Transportation Asset Management Guide – A Focus on Implementation* • National Highway Institute (NHI) Course 131106A, An Introduction to Transportation Asset Management • NHI Course 131106B, Developing a Transportation Asset Management Plan • FHWA Asset Management Website (http://www.fhwa.dot.gov/asset/)

Distribution Through AASHTO

- Excel Spreadsheet
- User's Guide
- Quick Setup Guide
- Reference Files

Target Setting

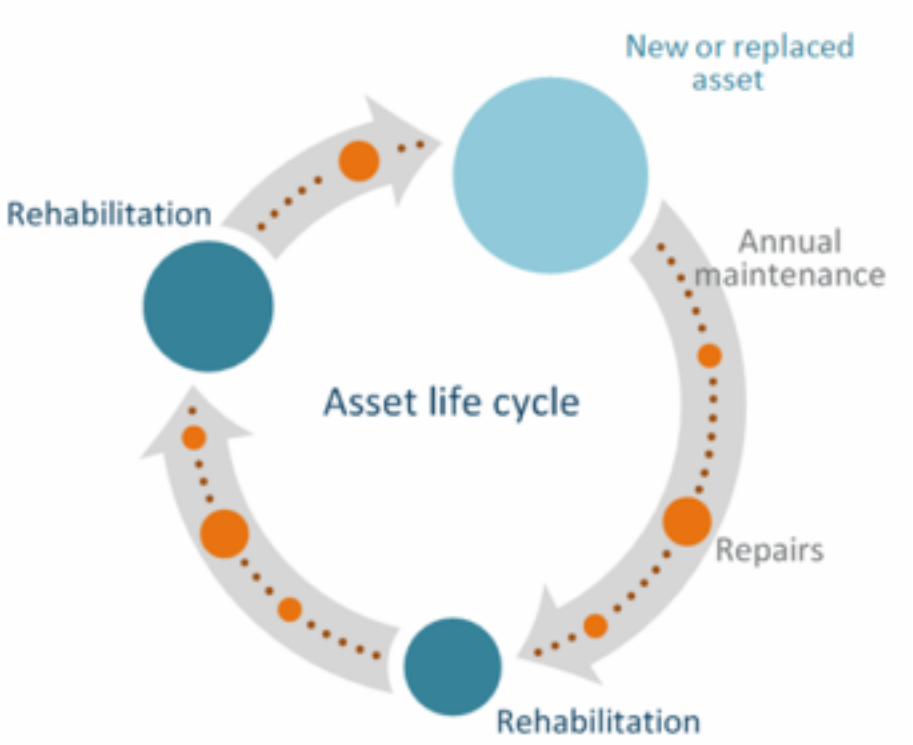
Setting Performance Targets

Asset Listing (from Asset Register)	10-Year Investment Levels	2012 Result	Revised Target	Projected Result 2023
Pavement				
Interstate	$392M	2.4% Poor	2% Poor	2% Poor
Non-Interstate NHS*	$1.133B	4.3% Poor	4% Poor	4% Poor
Non-NHS	$1.375B	7.5% Poor	7.5% Poor	12% Poor
Total	$2.9B	5.6% Poor	5-9% Poor	7.5% Poor

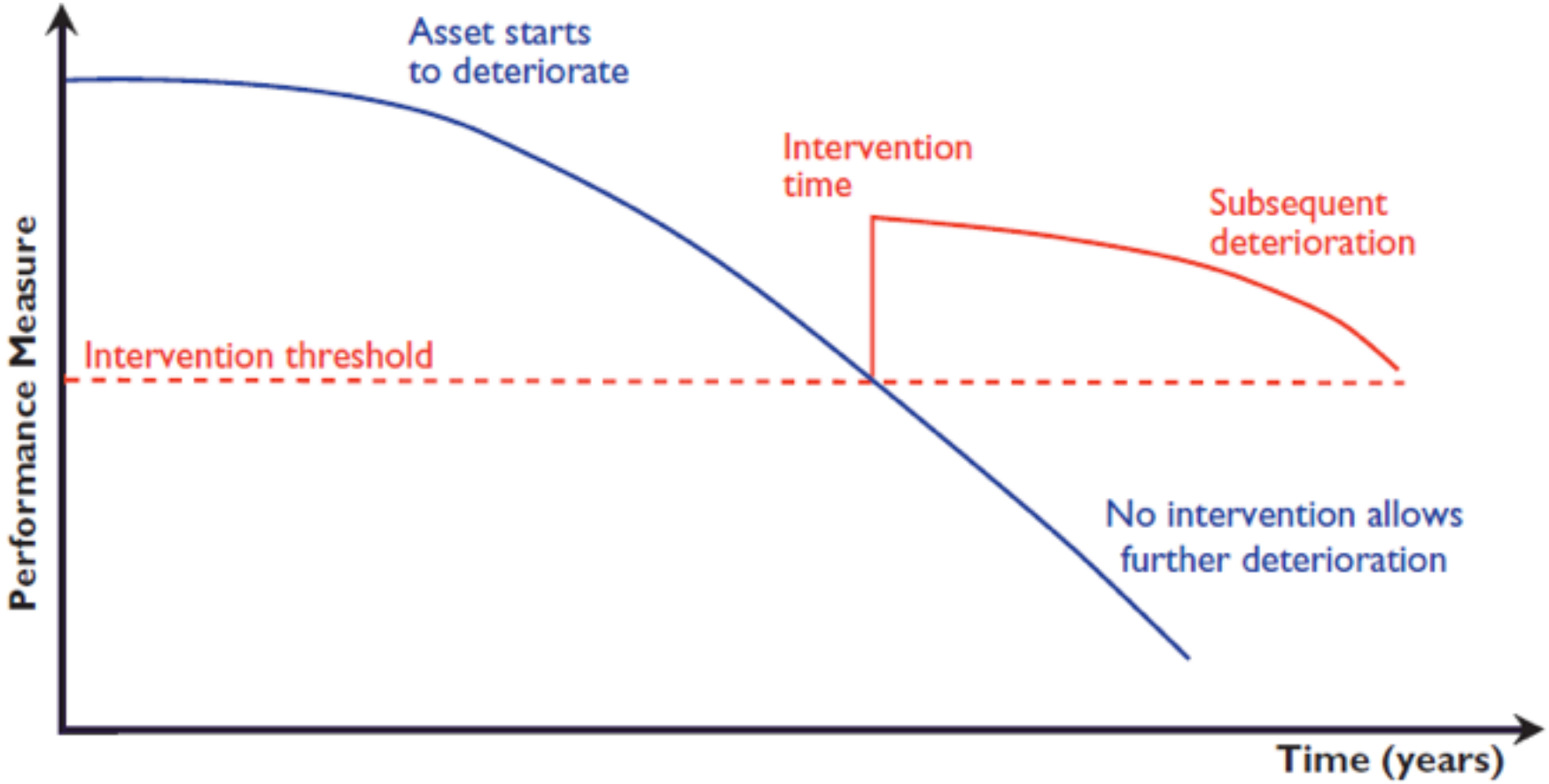
Life Cycle Assessments

What is a Life-Cycle Assessment?

- Analytical technique used to assess total cost of asset ownership associated with construction, inspection, maintenance, and disposal



Concept –Transport Scotland



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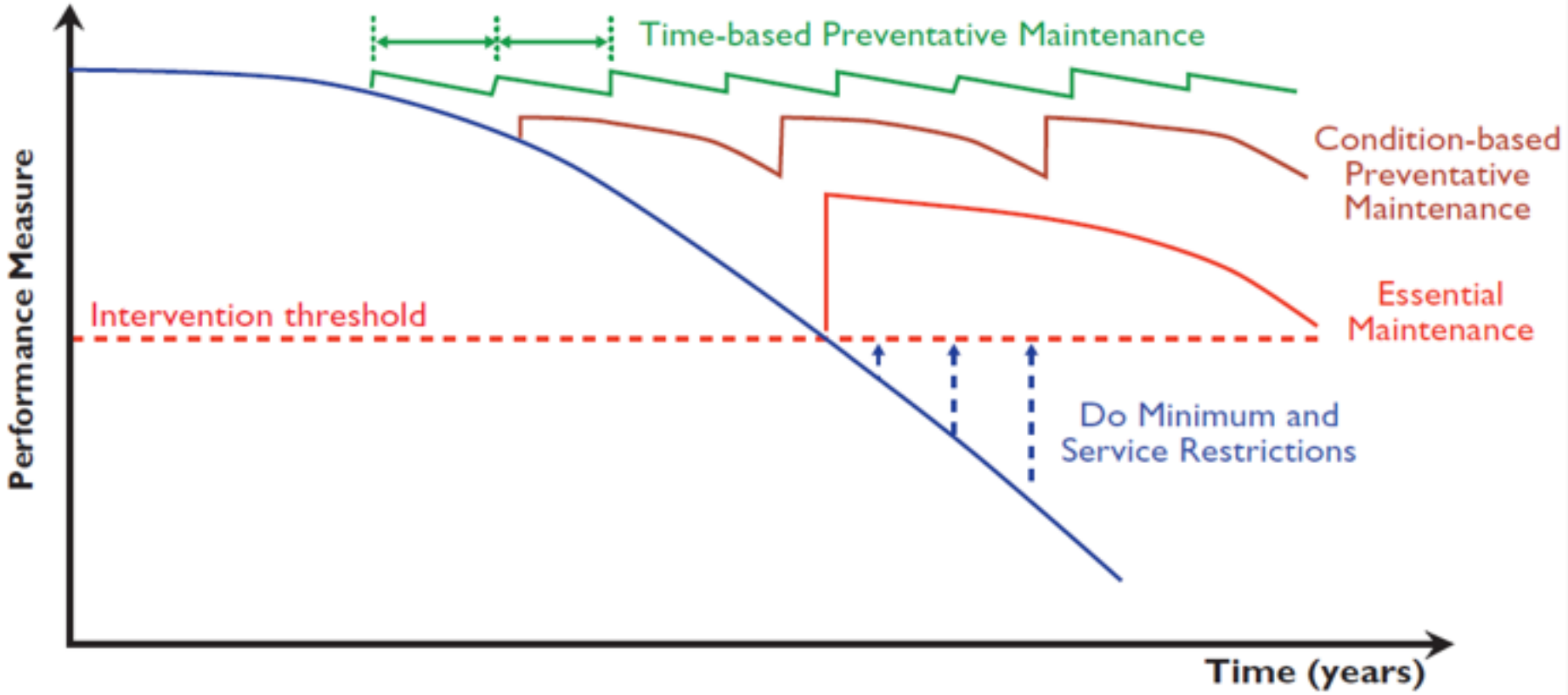
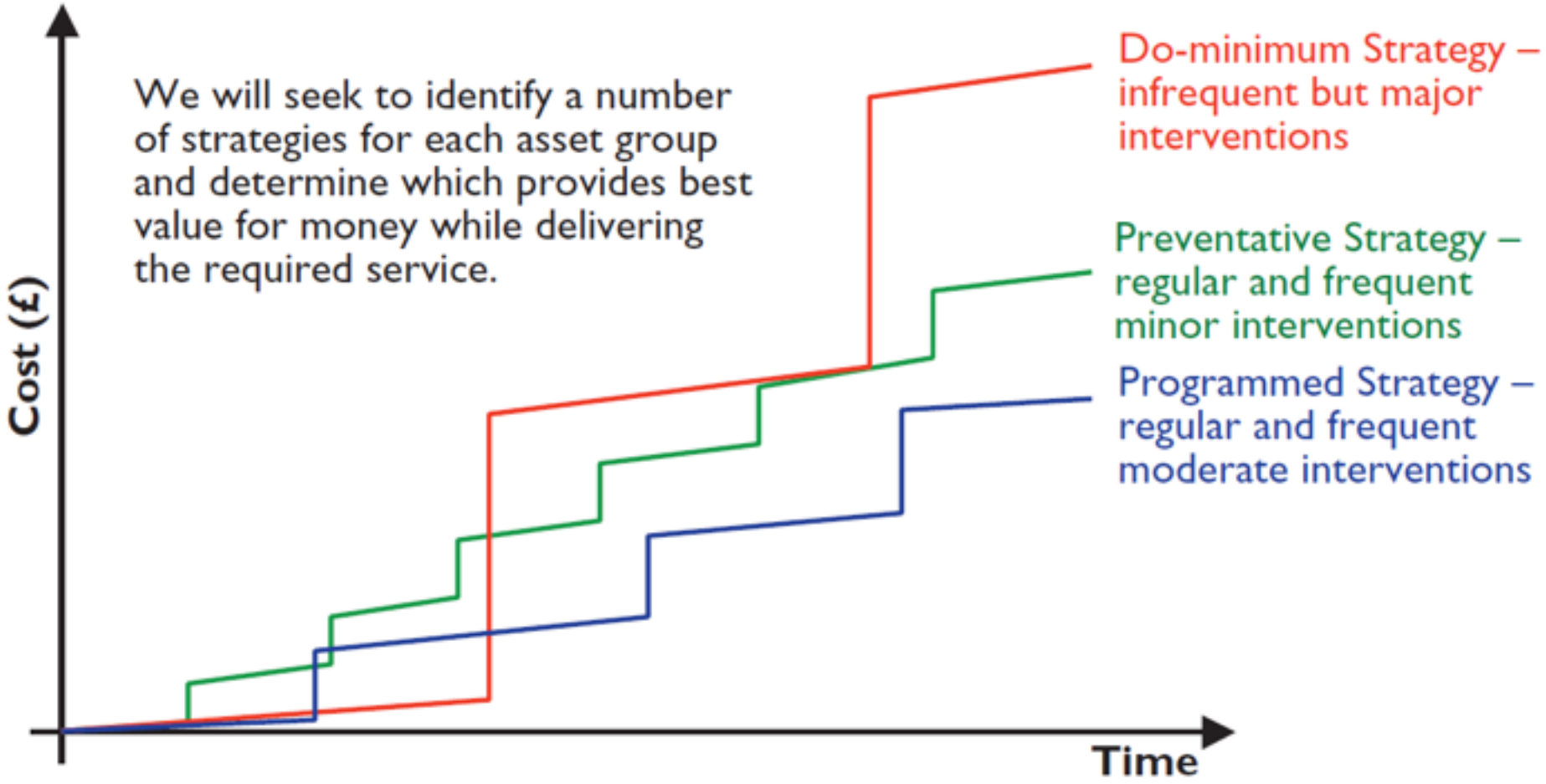
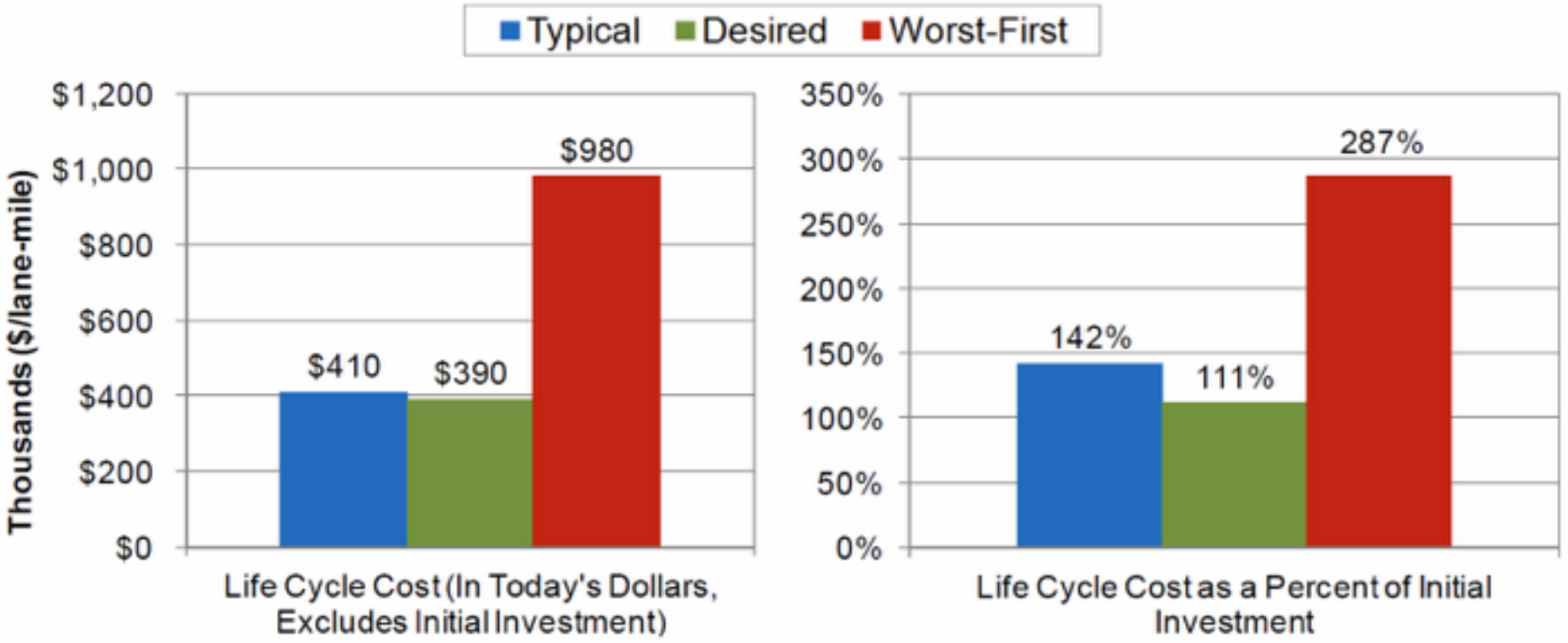


Concept –Transport Scotland

We will seek to identify a number of strategies for each asset group and determine which provides best value for money while delivering the required service.



Pavement Life Cycle Results

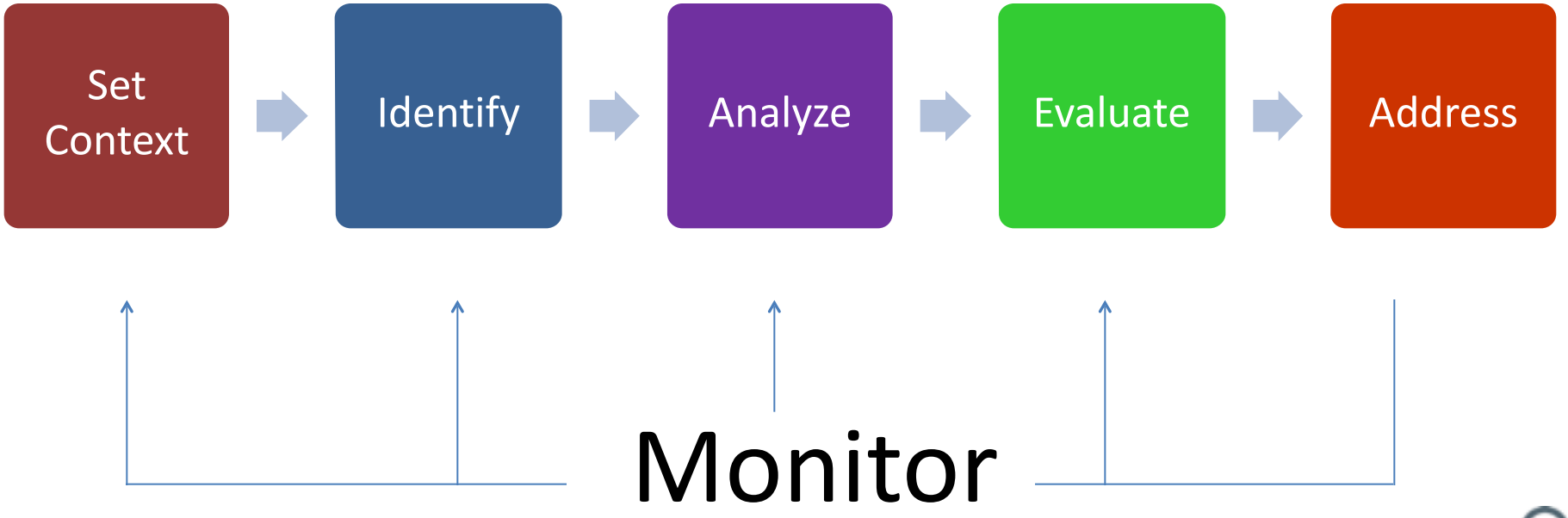


- Agency's current policy saves approximately $17 Billion when compared to the worst-first strategy (over entire inventory).
- The desired strategy will result in savings of approximately $600 million over the current strategy (over entire inventory).

Risk Management

- Risk is “the effect of uncertainty on objectives” (ISO)
- Risk management is “a systematic process to identify risks that may impact agency objectives, to analyze their consequences, and to develop ongoing measures to address them” (Adapted from New South Wales Government Asset Management Committee)

Risk Management Steps



Types of Risk

Enterprise Risk

Agency Risk

Affects the agency's ability to accomplish the its mission and achieve strategic goals

Owned by Chief Executive

Program Risk

Affects the agency's ability to achieve program objectives

Owned by Program Manager

Project Risk

Affects the successful accomplishment of project objectives

Owned by Project Manager

Types of Risk

Risk Type	Considerations
Financial Risk	• *Is future funding adequate to achieve our targets?* • *What is the impact of inflation on our purchasing power?*
Information Risk	• *Do we have tools to predict and manage asset conditions for the next 10 years?*
Asset Risk	• *Are key assets such as poor-performing pavements or bridges a continuing risk to asset management targets?* • *Are specific functional classes particularly vulnerable?*
Operational Risk	• *Is our project delivery mechanism reliable enough to meet our asset condition performance targets?* • *Do we have a sound preventive maintenance program?* • *Do we have sound contracting mechanisms to ensure material and construction quality?*
Decision Risk	• *Does our project selection process identify appropriate candidates and treatments?*
Climate Risk	• *Will increased climate-related events have a noticeable impact on asset conditions or level of service?*

Source: FHWA/AASHTO Webinar on Approaches to Integrating Risk into TAM Programs and Plans

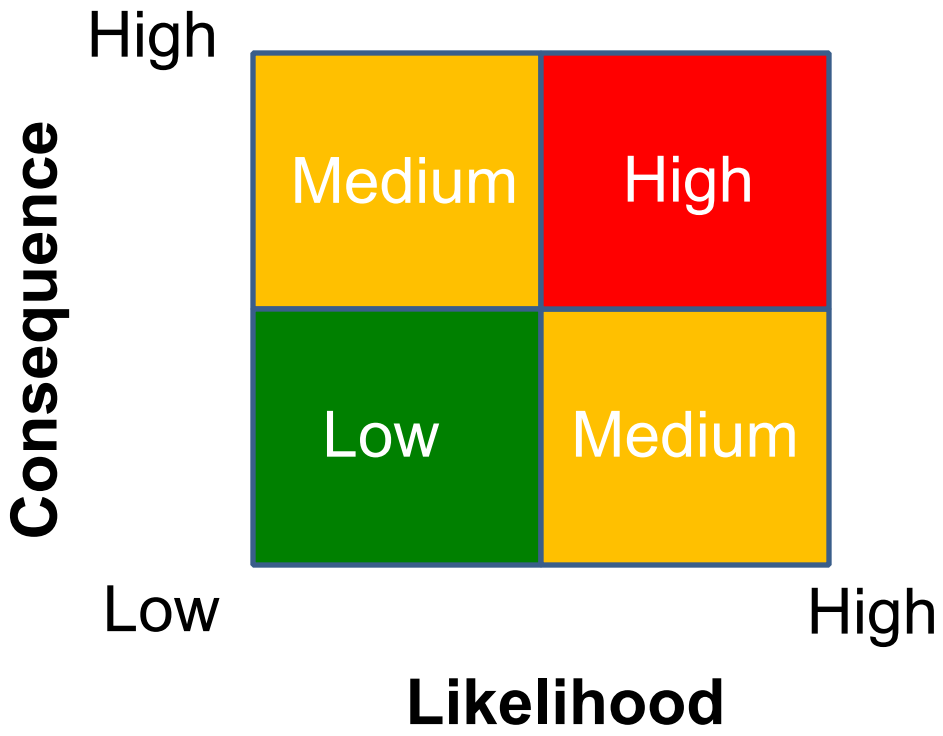
Identify Risk Statements

- Consists of a defined event and its impact
- Represents one risk event
- Helps analyze likelihood and impact

- Example: “If (RISK EVENT) happens then (CONSEQUENCE) will happen to (WHAT OR WHOM), causing (RESULT).”

Analyzing Risk

- Likelihood of event
- Consequence of event



Establish Risk Likelihood Ratings

Ranking	Likelihood	Frequency	Score
Very High or Almost Certain	Near Certainty (90%)	Likely to occur within the year	5
High or Likely	Highly Likely (70%)	Likely to occur within 2 years	4
Moderate	Likely (50%)	Likely to occur within 3 to 5 years	3
Low or Unlikely	Unlikely (20-30%)	Likely to occur within 6 to 10 years	2
Very Low or Rare	Remote (10%)	Not likely to occur for 10 or more years	1

Establish Risk Consequence Ratings

Consequence	Score
Catastrophic Impact on System Performance	5
High/Large Impact on System Performance	4
Moderate/Noticeable Impacts on System Performance	3
Low/Some Noticeable Impacts on System Performance	2
Insignificant/Little Noticeable Impacts on System Performance	1

Risk Consequence: Asset Value & Economic Impact

Factors/Considerations	Score
Greater than 50% of the budget controlled at the decision level	5
30% to 50% of the budget controlled at the decision level	4
15% to 30% of the budget controlled at the decision level	3
5% to 15% of the budget controlled at the decision level	2
Less than 5% of the budget controlled at the decision level	1

Risk Map

Likelihood						
	5 Almost Certain	Low	Medium	High	Extreme	Extreme
	4 Likely	Low	Medium	High	High	Extreme
	3 Moderate	Low	Low	Medium	High	High
	2 Unlikely	Very Low	Low	Low	Medium	Medium
	1 Rare	Very Low	Very Low	Low	Low	Low
		1Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
				Risk Impact		

Risk Mitigation Strategies

Terminate	• *Eliminate threat posed by the risk*
Transfer	• *Shift risk to third party*
Treat	• *Take steps to reduce probability and/or impact of risk*
Tolerate	• *Deal with the risk, monitor it, lack of options due to*
Take	• *Opportunity – External funding or partnership*

Example – NY State DOT

Risk Event	Primary Impact	Mitigation Strategy	Responsible	Status
A. If federal funding continues to be inadequate (sustainability index currently 0.30) and further limited in where funding can be used, e.g. NHPP requiring approximately 2/3 of federal highway funding be spent on the NHS system or other mandates,	Then, 1. Infrastructure conditions will continue to deteriorate with even the most cost effective treatment strategies. 2. NYSDOT will be unable to meet the Federal mandate of < 10% Structurally Deficient bridges on the NHS, 3. Assets on non-NHS system, which are already in a condition state significantly worse than the NHS system, will deteriorate even more rapidly resulting in large portions becoming poor and some portions becoming economically unrecoverable. 4. Any mandate that requires available funding to be spent on assets in a manner other than the most cost effective, for purposes of sustaining existing infrastructure will lower the number of bridges or lane-miles of pavement that can be sustained.	Leverage TAMP for outreach and education.	External Relations	Ongoing
		Engage our political representatives and explain the consequences of current funding and urgency of providing adequate funding to sustain the existing transportation system.	External Relations	Ongoing
		Develop a funding plan that most cost effectively gets the State's infrastructure to a sustainable condition at the lowest cost including levels of service achievable for various funding levels.	Office of Finance / CPT	Ongoing
		Engage the Federal Highway Administration and our political representatives and encourage them to expand the eligibility within the NHPP funding category to include non-NHS bridges to allow the State the flexibility to fund projects based on needs and system use.	CPDC	Short Term

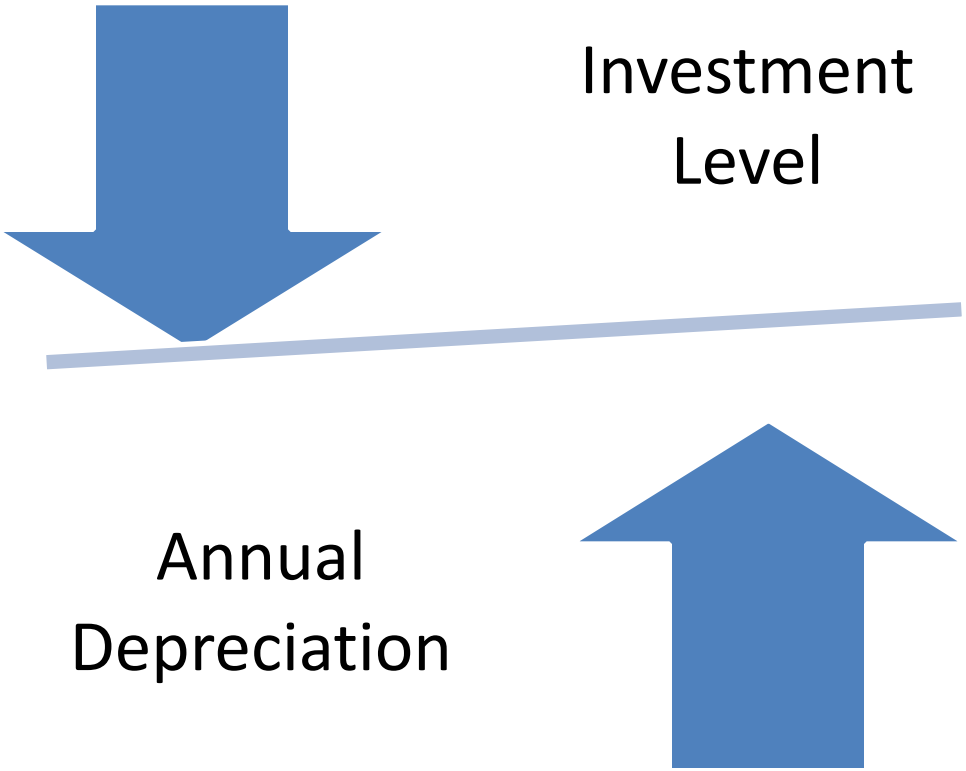
Risk Can Be Used To:

- Set priorities
- Assign resources
- Improve communication with stakeholders
- Increase the likelihood of organizational success
- Reduce agency liability

Financial Sustainability

Financial Sustainability

Investing at levels equal to annual depreciation



Future Trends

Future Trends

- It is important to have strong leadership and a clear strategy in place
  - Executives have to facilitate the organizational change needed to support a data-driven culture
  - MAP-21 is helping to provide a reason for making the change
  - Have to think of asset management as more than just tracking pavement and bridge condition

Future Trends

- Executive leadership is very outward focused
  - Managing the flow of goods and service for economic development
  - Addressing quality of life issues
- Technical staff are very inwardly focused
- Need better links between these levels and better ways of telling the story
- "Historic funding allocations will not exist in the future. Funding has to be more aligned with shifts in system use."

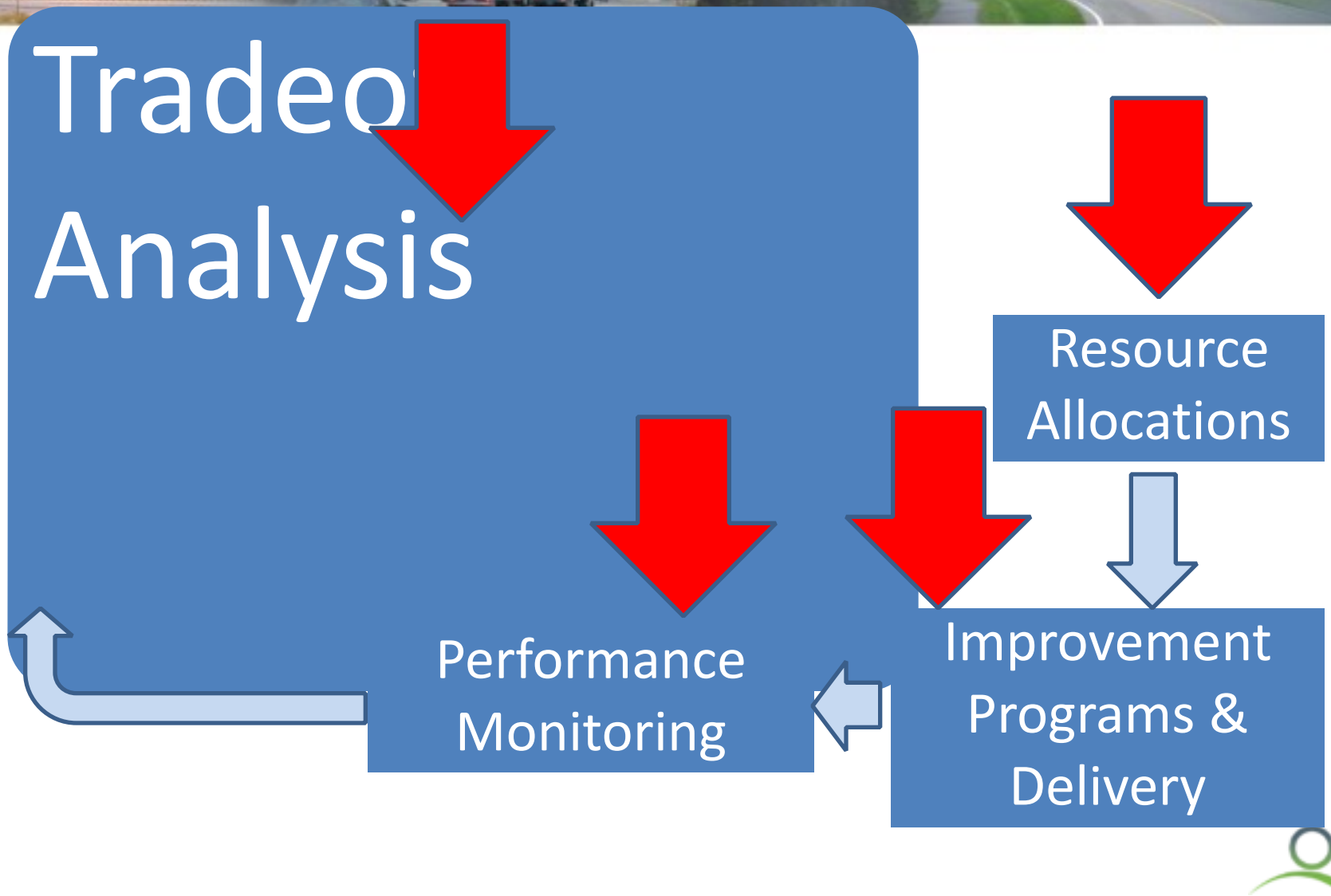
Future Trends

- The role of transportation agencies is evolving to include serving as a facilitator (or server) of information so users can decide how they will use the system
  - Miami Dade County Transit – access to service information vs service levels
  - "Successful agencies will figure out how to use data to put trends and indicators in customer's hands."

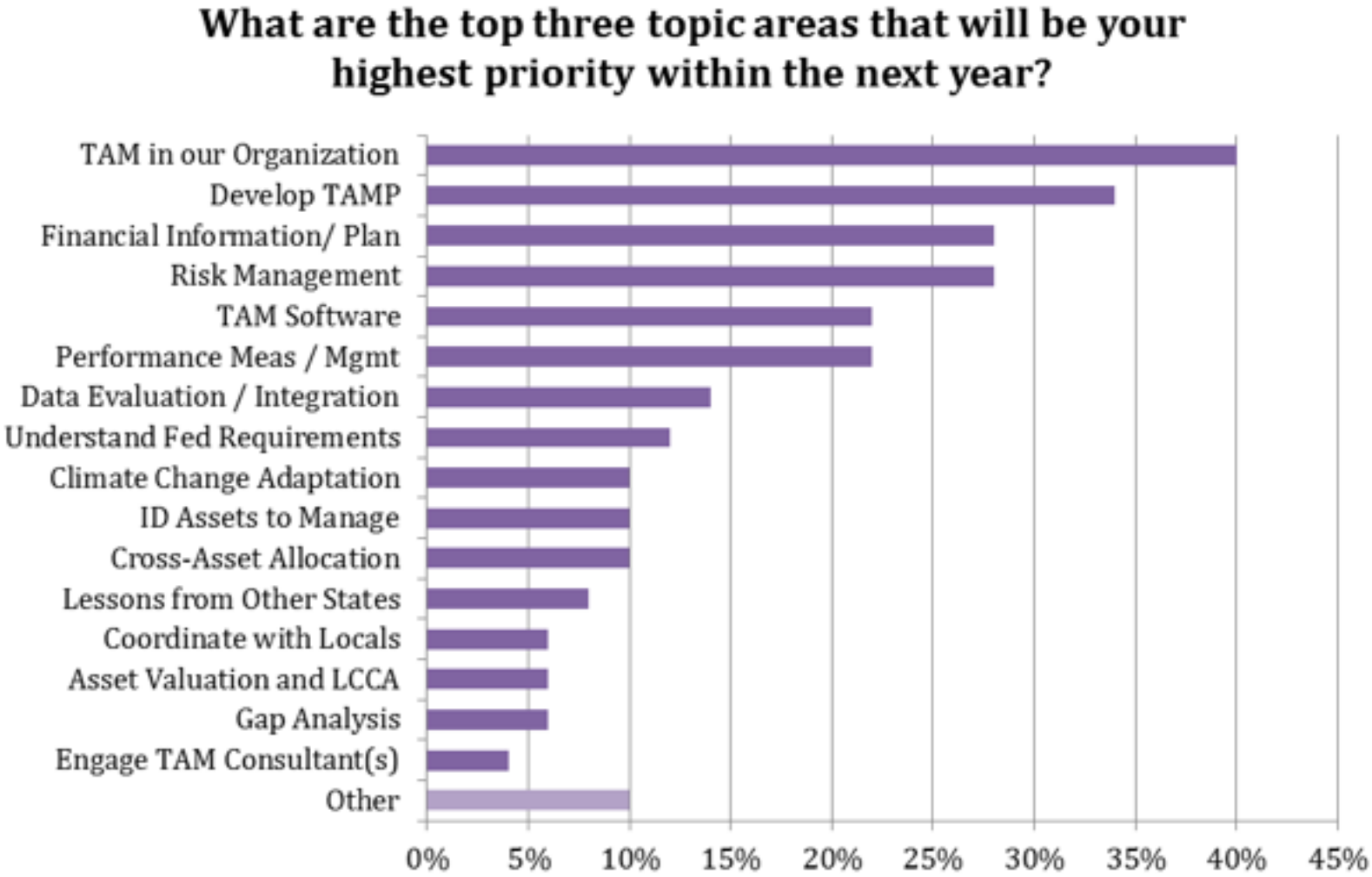
Future Trends

- Data and information have to be managed as an asset that has value
- Data must be market-oriented vs. system oriented– decisions based on functionality and value of the link
  - What is the dollar volume carried on the system?
  - What is the target level for the lowest cost of ownership?
- "Model is changing from a DOT-driven conversation to a customer-driven conversation"

Pavement Management Is Key to TAM



Future Areas of Focus



Research Initiatives Underway

- Cross-asset optimization (NCHRP)
- TAMP templates and pilots (FHWA/NCHRP)
- Workforce development & skill building (FHWA/AASHTO)
- Risk-Based Asset Management Guidelines (NCHRP)
- Financial Sustainability Guidance (FHWA)

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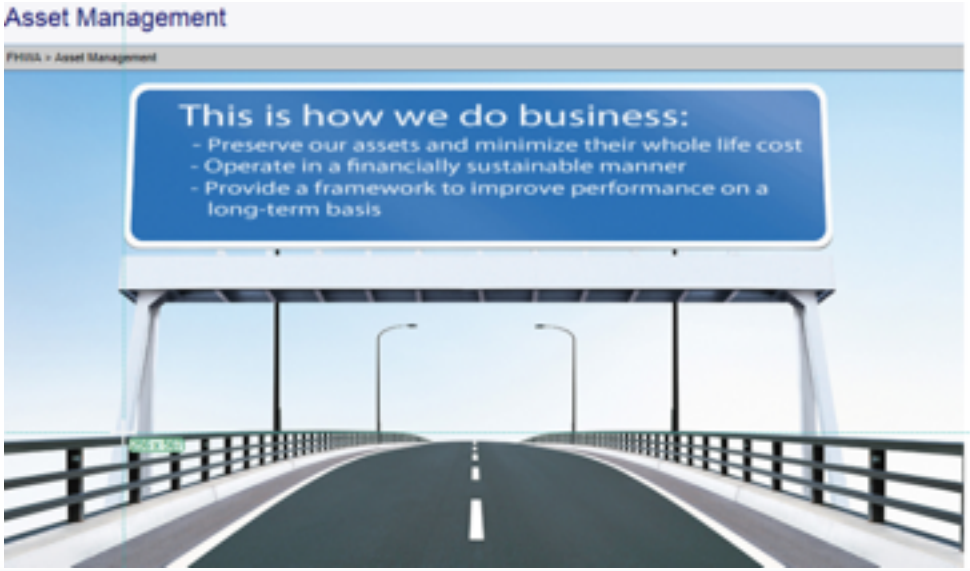
Resources Available

- FHWA Website
  - http://www.fhwa.dot.gov/asset/
- FHWA/AASHTO Asset Management Webinar Series
  - http://tam.transportation.org/pages/webinars.aspx



Questions?

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