Data Usability and Analysis

U.S. Department of Transportation
Federal Highway Administration

Data Usability and Analysis is the existence of useful and valuable data sets and analysis capabilities available in accessible, convenient forms to support transportation performance management. While many agencies have a wealth of data, they are often disorganized, or cannot be analyzed effectively to produce useful information to support target setting, decision-making, monitoring or other TPM practices.

What it Takes

A proactive approach to data usability can ensure that available data are put to good use for TPM. Agencies should examine not only the data and tools that are available for performance monitoring and reporting but also the backgrounds and capabilities of the staff that will be analyzing and using the data. Build staff capacity through recruiting, training, and mentoring.

External collaboration can be pursued to help provide the necessary capabilities when partner agencies share common performance monitoring and reporting needs. In this situation, available staff resources can be pooled to take advantage of complementary skill sets across agencies. Staff roles and responsibilities can be negotiated as part of data sharing agreements.

It is important to keep in mind that most agencies already have capabilities for data analysis in place. The processes defined in this guidebook can be viewed as a way to build on existing capabilities in order to strengthen the value of data for transportation performance management.

Implementation Steps

Data usability and analysis is broken down into three interrelated subcomponents:

- **Data Exploration and Visualization**: Availability and value of data, tools, and reports for understanding performance results and trends.
- **Performance Diagnostics:** Availability and value of data, tools, and reports that allow an agency to understand how influencing factors affected performance results both at the system and project levels.
- **Predictive Capabilities:** availability and value of analytical capabilities to predict future performance and emerging trends.

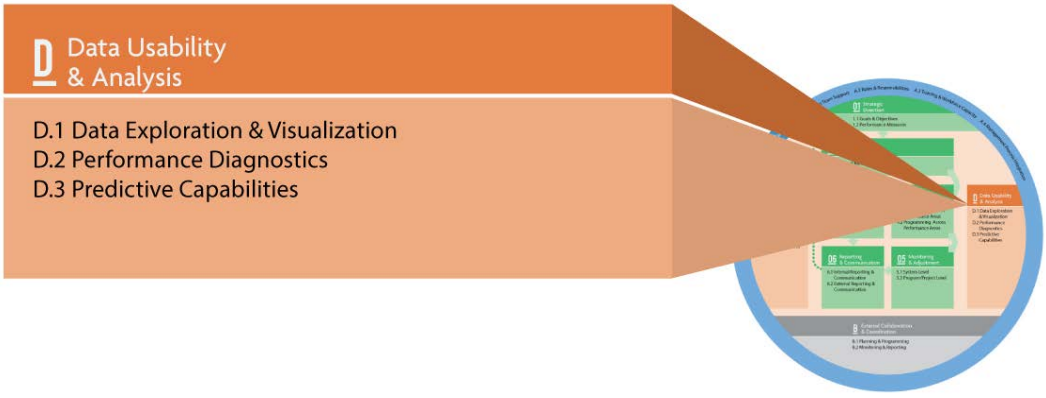
Each subcomponent has its own set of implementation steps.

Data Exploration and Visualization	Performance Diagnostics	Predictive Capabilities
D.1.1 Understand requirements	D.2.1 Compile supporting data	D.3.1 Understand requirements
D.1.2 Assess data usability	D.2.2 Integrate diagnostics into analysis and reporting processes	D.3.2 Identify and select tools
D.1.3 Design and develop data views		D.3.3 Implement and enhance capabilities

Making the Connection

Data Usability and Analysis (Component D) supports all TPM practices undertaken at an agency. Without data that is fully understood and utilized, an agency is wasting resources collecting and storing data that is not being used. Analysis of data provides the insight necessary for the agency to adjust strategies to improve performance.

Data Usability and Analysis and the TPM Framework



For more information on data usability and analysis and the other components of the TPM Framework visit: www.tpmtools.org

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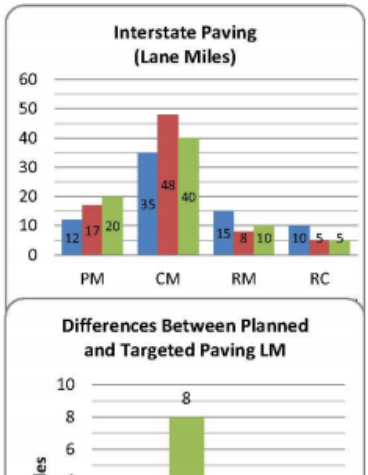
Case Study: Implementation Step D.3.3

Early warning of target non-attainment: VDOT

Virginia DOT uses a commercial Pavement Management System (PMS) to predict future network-level pavement performance as part of their annual maintenance and operations programming process. The agency sets pavement performance targets at the statewide and district levels. The PMS, together with a companion pavement maintenance scheduling system (PMSS) tool, provides early warning of targets not being reached. This analysis is based on the status of planned paving projects, the most recent pavement condition assessments, and predicted pavement deterioration based on PMS performance models. The pavement management tools allow VDOT to use multi-constraint optimization to predict future needs and performance, and to inform agency business processes (e.g., budgeting and programming). The figure below illustrates one of the reports used to summarize planned versus targeted work by highway system class and treatment type.

VDOT Pavement Management Analysis



Hampton Roads Interstate Paving Summary

Preventative Maintenance (PM)	
2011 Awarded (PMSS):	16 LM
2012 Planned (PMSS):	17 LM
2012 Targeted (PMS Optimized):	20 LM
Difference (Planned – Targeted):	**-3 LM**
Corrective Maintenance (CM)	
2011 Awarded (PMSS):	35 LM
2012 Planned (PMSS):	48 LM
2012 Targeted (PMS Optimized):	40 LM
Difference (Planned – Targeted):	**+8 LM**
Restorative Maintenance (RM)	
2011 Awarded (PMSS):	15 LM
2012 Planned (PMSS):	8 LM
2012 Targeted (PMS Optimized):	10 LM
Difference (Planned – Targeted):	**-2 LM**
Reconstruction / Major Rehab (RC)	
2011 Awarded (PMSS):	10 LM
2012 Planned (PMSS):	7 LM
2012 Targeted (PMS Optimized):	7 LM
Difference (Planned – Targeted):	**0 LM**

Given planned 2012 Interstate paving, Hampton Roads District:

- **Is not** predicted to achieve its 20 lane mile paving target for Preventative Maintenance on the Interstate system.
- **Is** predicted to achieve its 40 lane mile paving target for Corrective Maintenance on the Interstate system.
- **Is not** predicted to achieve its 10 lane mile paving target for Restorative Maintenance on the Interstate system.
- **Is** predicted to achieve its 7 lane mile paving target for Reconstruction / Major Rehabilitation on the Interstate system.

Source: Virginia Department of Transportation. (2014). Use of VDOT's Pavement Management System to Proactively Plan and Monitor Pavement Maintenance and Rehabilitation Activities to Meet the Agency's Performance Target. Richmond, VA. https://vtechworks.lib.vt.edu/bitstream/handle/10919/56388/ICMPA9-000321.PDF?sequence=2&isAllowed=y)

Perspectives

"You can have data without information, but you cannot have information without data."

— Daniel Keyes Moran, Programmer

"The reality about transportation is that it's future-oriented. If we're planning for what we have, we're behind the curve."

— Anthony Foxx, U.S. Secretary of Transportation

"The most reliable way to forecast the future is to try to understand the present."

— John Naisbitt, Author

"One asset that is…often overlooked is data. … However, when data is not treated like an asset, agencies do not derive full value from data investments. Agencies may be data rich, but have difficulties transforming their data into usable information."

— NCHRP Report 814: Data to Support Transportation Agency Business Needs: A Self-Assessment Guide

Connect Online to Learn More

Visit the TPM Toolbox online to learn more about data usability and analysis and to take your own TPM Capability Maturity Self-Assessment: **www.tpmtools.org**