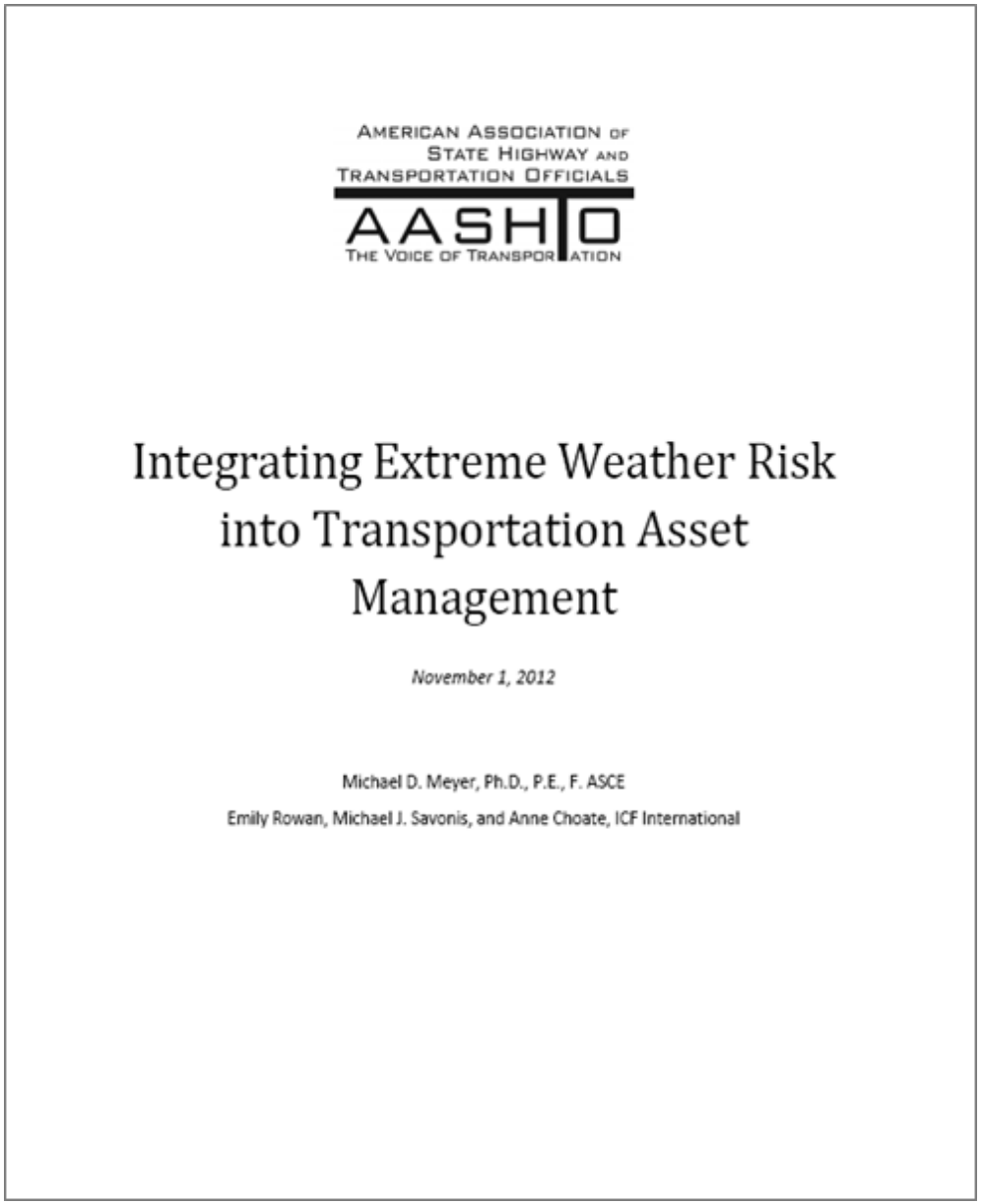
Extreme Weather Events and Transportation Asset Management

AASHTO Annual Meeting
November 17, 2012

Mike Savonis
ICF International



- AASHTO commissioned a short paper on how to address Extreme Weather Events in Asset Management
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  - Mike Savonis, ICF
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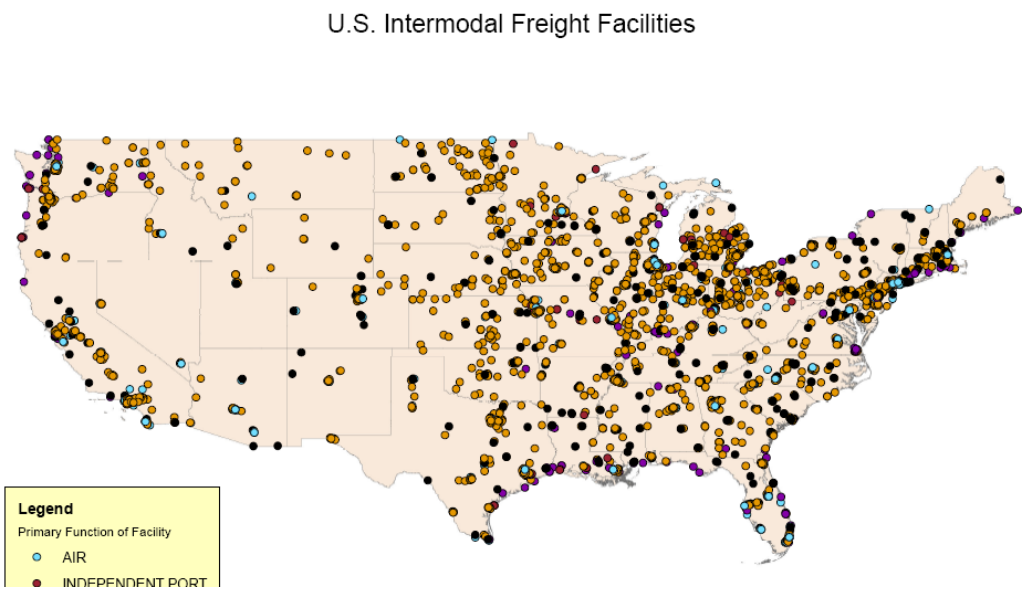
- Issued November 1, 2012

TAM Core Questions*

- What is the current state of my assets?
- What are required levels of service and performance delivery?
- Which assets are critical to sustained performance delivery?
- What are best investment strategies covering operations, maintenance, replacement and improvement?
- What is the best long-term funding strategy?

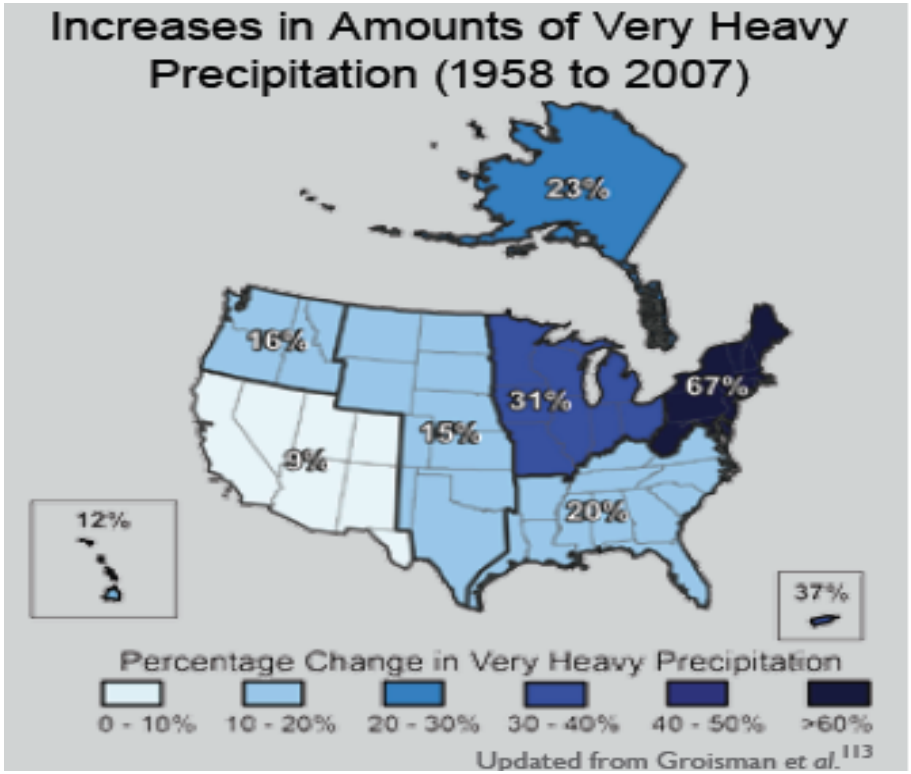


** Source: Transportation Asset Management Guide: A Focus on Implementation, AASHTO 2011*

What are Extreme Weather Events?

- Extreme weather events are typically rare and cause damage, destruction and/or severe economic loss (FHWA 2012)
  - Heavy precipitation
  - Storm surge
  - Flooding
  - Drought, windstorms
  - Extreme heat and cold
- Specific definitions vary regionally

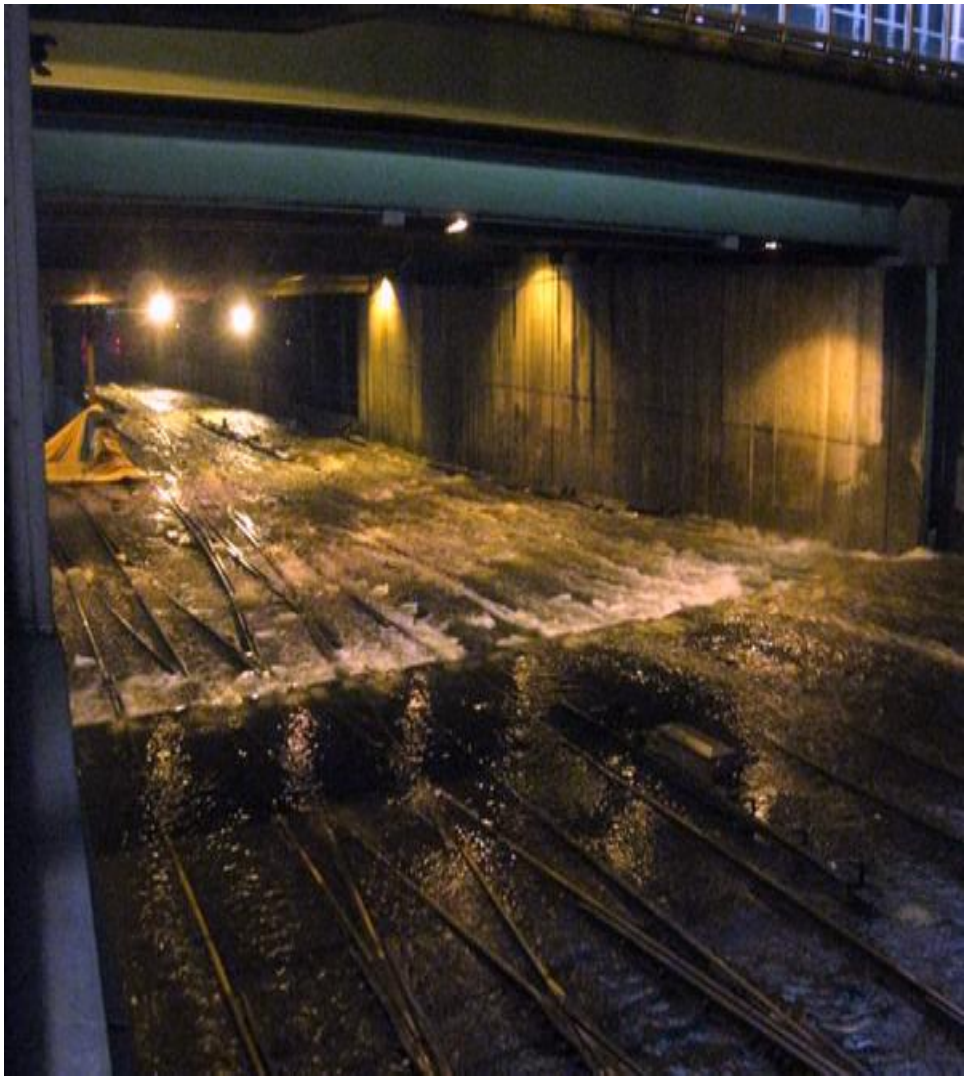
Increases in Very Heavy Precipitation Days, 1958-2007



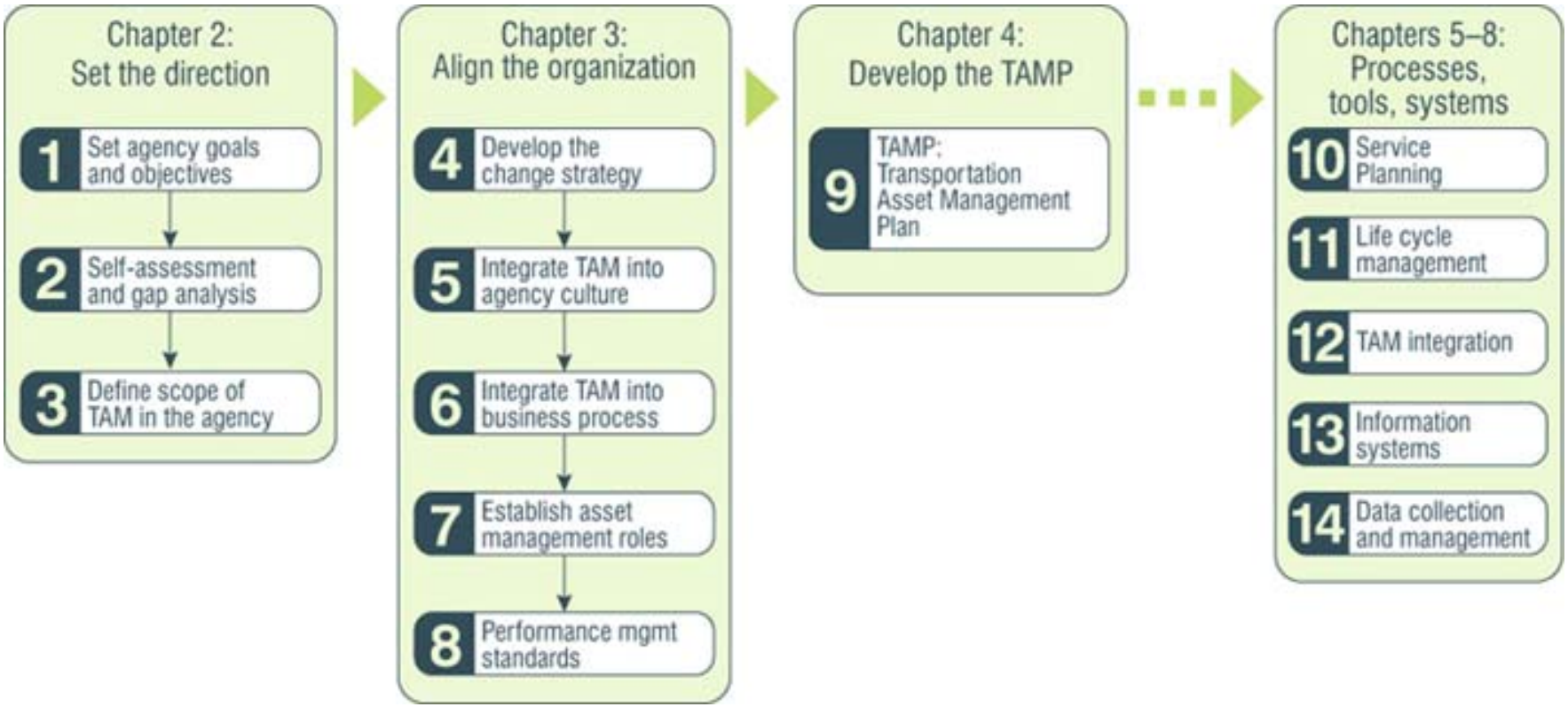
“Superstorm” Sandy

UPI Business News:

“Sandy affected U.S. industrial production”



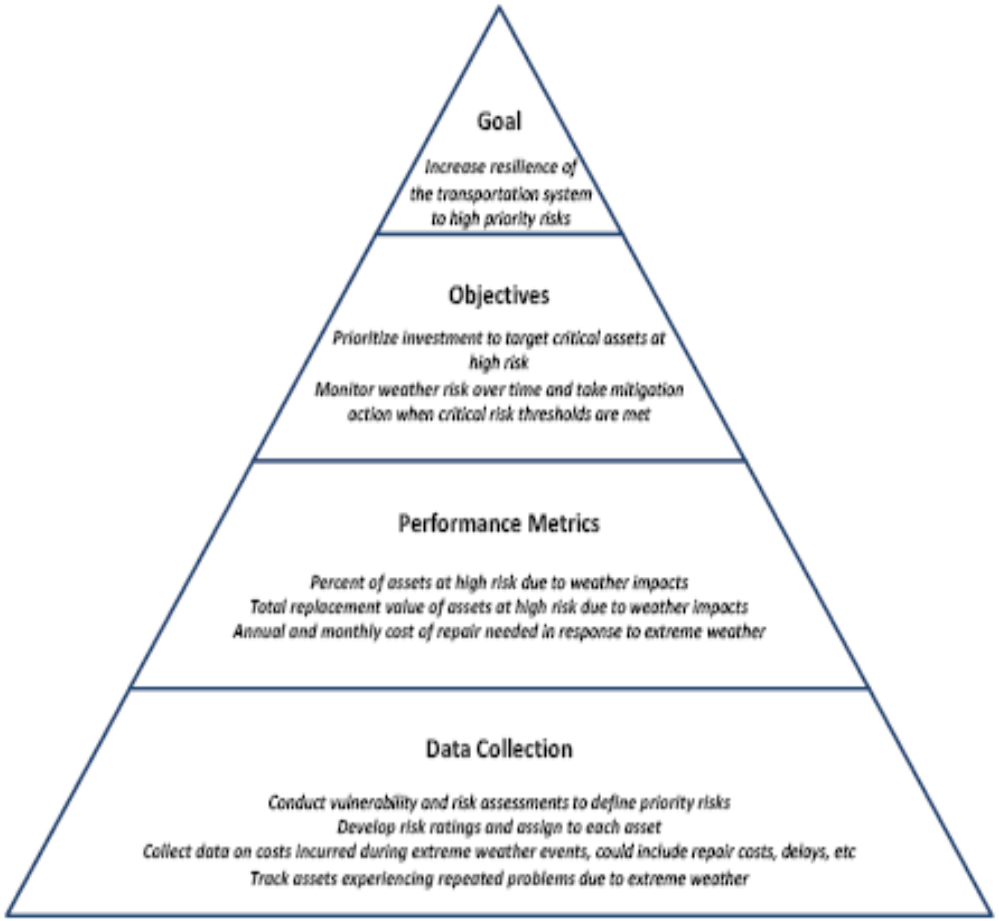
TAM Implementation Steps



Source: Transportation Asset Management Guide: A Focus on Implementation, AASHTO 2011

TAM: Setting Agency Goals and Objectives

- Goal: Increased resilience in the face of high priority weather risks
- Objectives:
  - Prioritize Investments to target assets at risk
  - Monitor weather risk
  - Mitigate risk when thresholds are exceeded
- Performance Metrics
- Data



Enabling Processes and Tools for Service Planning (*Step 10*)

- Agency-wide Strategic Performance Measurement
  - Managing weather risk can achieve other goals of agency mission, including safety, mobility, accessibility, reliability
- Writing and Updating Links to Levels of Service
- Growth and Demand Forecasts
  - Anticipate changes to the external environment, including extreme weather events
- Risk Management
  - Risk of service disruption due to extreme weather events in conjunction with other risks

	Consequence				
Likelihood	Insignificant	Minor	Significant	Major	Catastrophic
Very Rare	Low	Low	Low	Moderate	High
Rare	Low	Low	Moderate	High	High
Seldom	Low	Moderate	Moderate	High	Extreme
Common	Moderate	Moderate	High	Extreme	Extreme
Frequent	Moderate	High	High	Extreme	Extreme

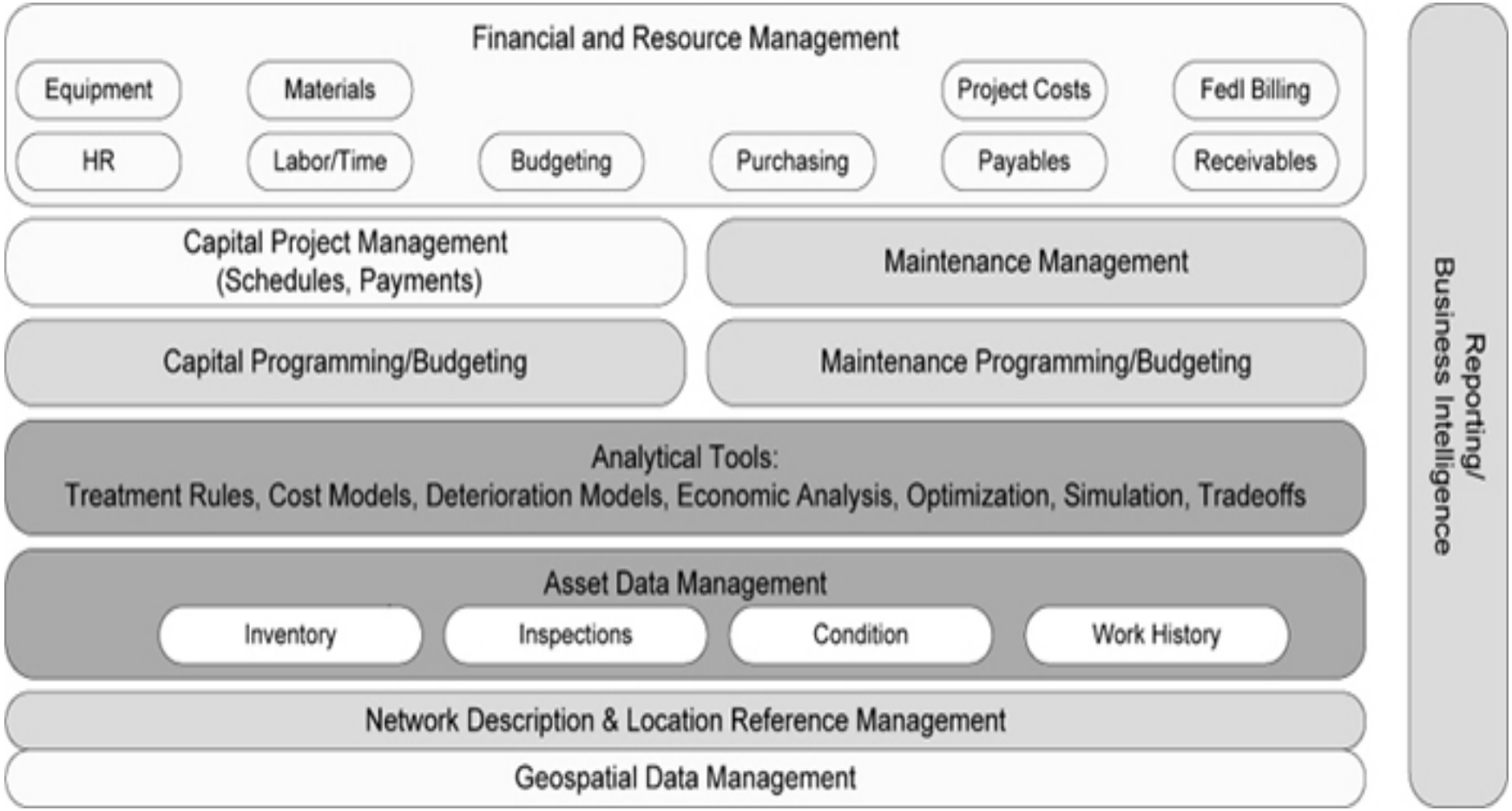
Life Cycle Management and Asset Preservation (*Step 11*)

- Life cycle assessments includes routine maintenance, rehabilitation and renewal at regular intervals
- Weather events can impact asset condition and performance
  - Heat
  - Freeze/thaw cycles
  - Sustained inundation
- AASHTO Implementation Guide includes a continuous improvement approach
  - Need to monitor impacts of extreme weather events where unknown
  - Integrate into life cycle monitoring

TAM Integration (*Step 12*)

- Program planning and program delivery
  - Inclusion of extreme weather events in planning will result in more reliable service at lower cost.
  - Inclusion of anticipated changes in the frequency/intensity of extreme weather in design specifications more realistically addresses future needs.
- Asset Valuation and depreciation
  - Assets repeatedly exposed to extreme events are likely to deteriorate , and thus depreciate more quickly .

Information Systems for Decision Making (*Step 13*)



Source: Transportation Asset Management Guide: A Focus on Implementation, AASHTO 2011

Data Collection and Management (*Step 14*)

- Use of management information and maintenance management systems serve as data resources (e.g., bridge, pavement, safety)
  - Spatial referencing allows for weather events to be addressed
- Four major types of asset data: inventory, inspection, condition and work history
  - Changes can be made in data collection to include impacts from extreme weather
  - Allows for linkages between condition, work history and incidence of extreme weather.

Research Needs

- Identify reasonable and appropriate levels of service during extreme events
- Understand weather impacts and their direct and indirect costs
- Expand risk management in TAM to address extreme weather risks
- Identify and test the efficacy of extreme weather performance indicators
- Develop approaches to track and obtain data on extreme weather events

Thank you!