

Asset Management Decision Support Tools



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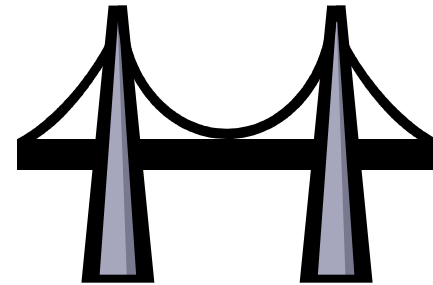
November 14th, 2000

Asset Management System (Roads and Bridges)



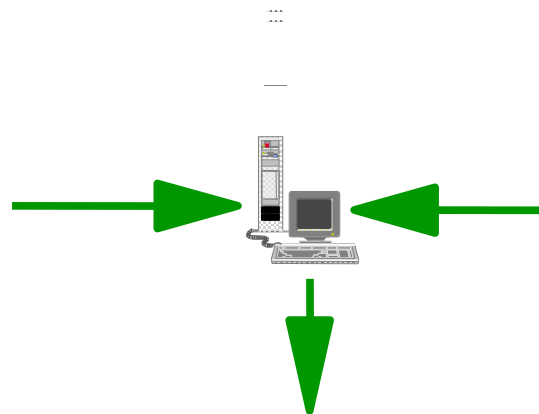
Pavement Management System:

Inventory
History
Current Condition
Budget



Bridge Management System:

Inventory
History
Current Condition
Budget



Valuation Model

Asset Management System

(Rolling Stock, Facilities and Human Resources)

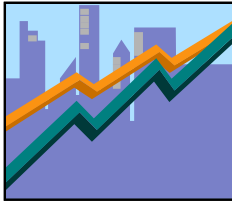


Fleet Management System

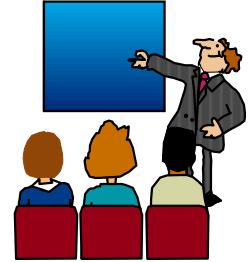
Maintenance Records
Mileage
Condition
Depreciation



Facilities Management System

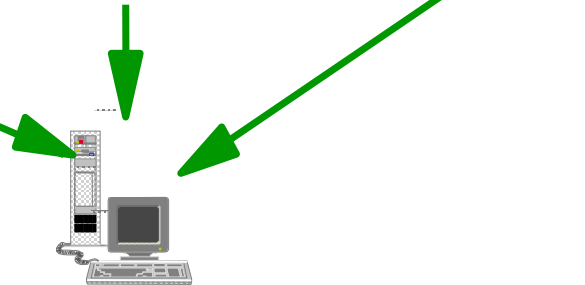


Inventory
Plans
Condition



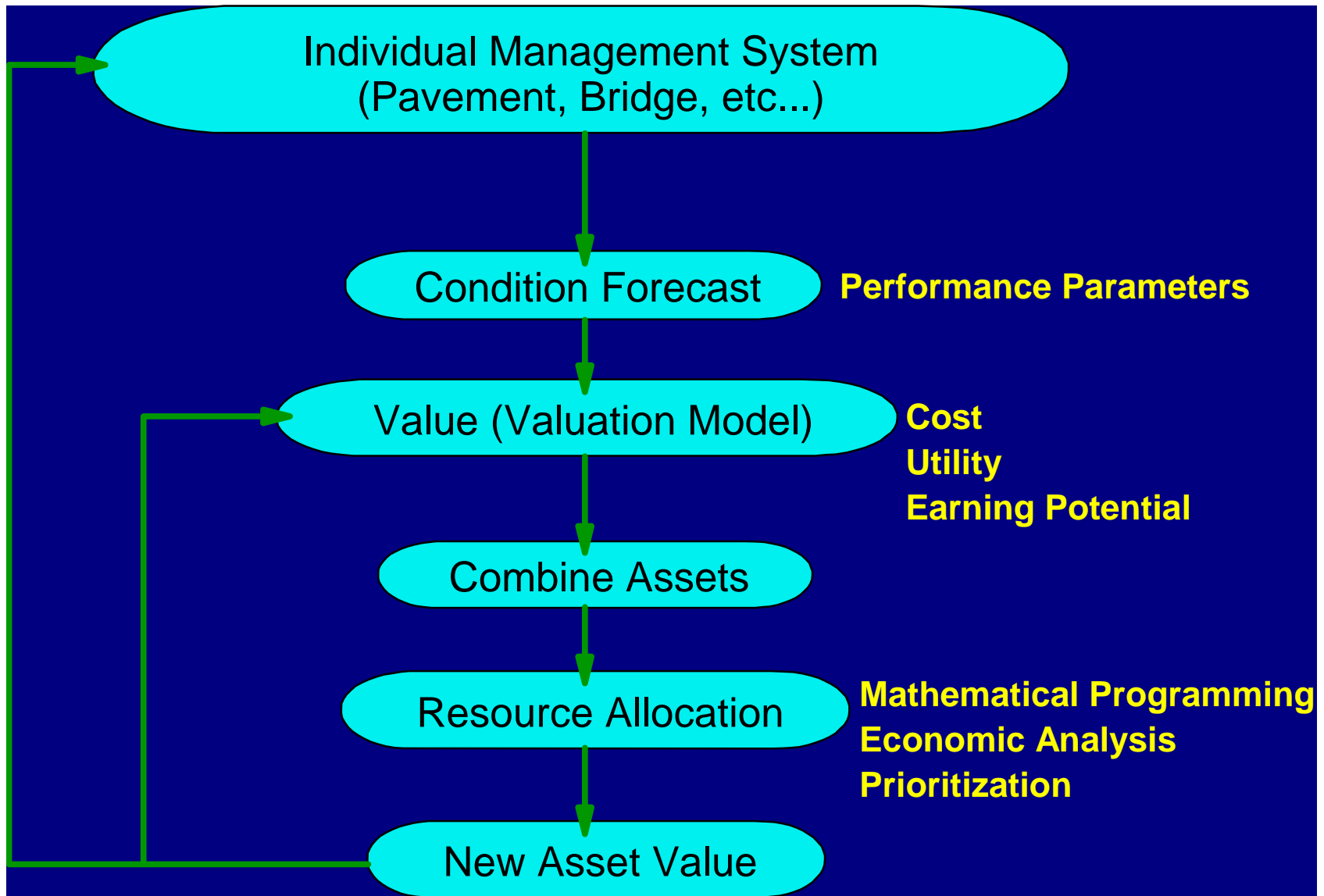
Human Resources

Job History
Training
Turnover Rate



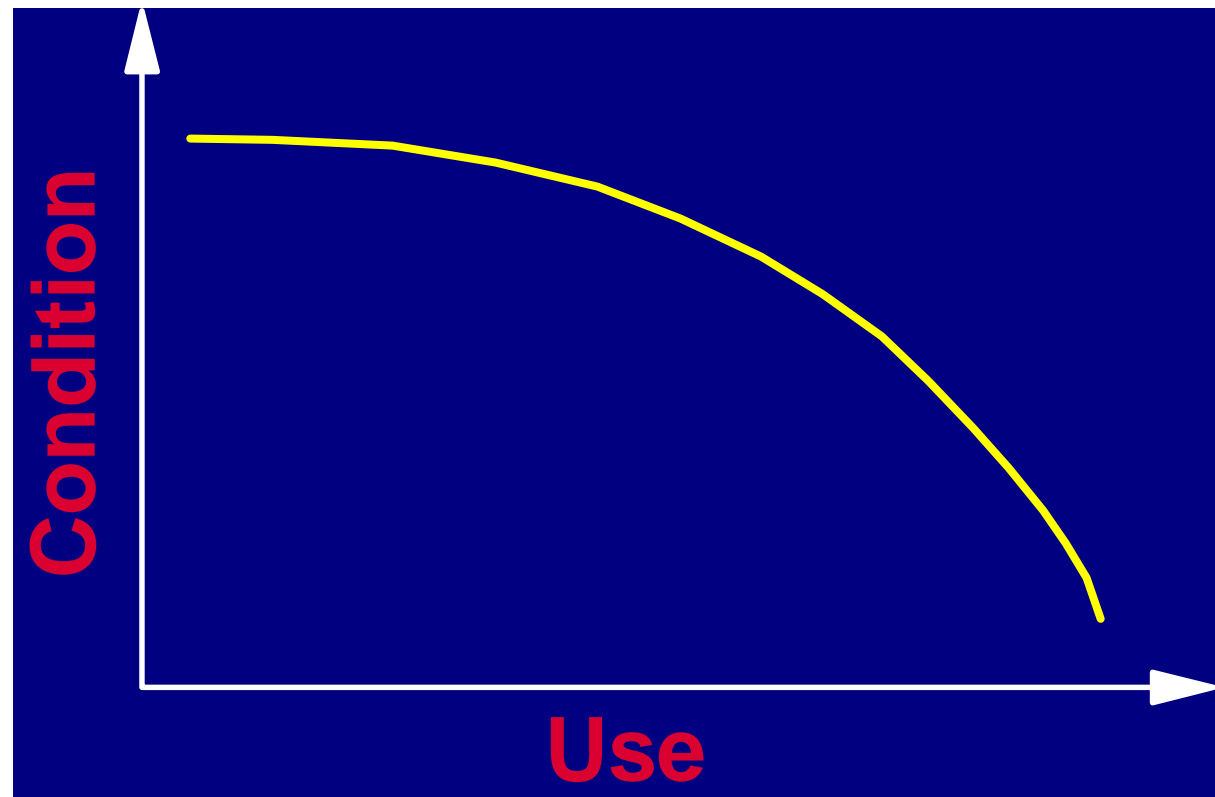
Valuation Model

Asset Management Flow Chart



Condition Forecasting

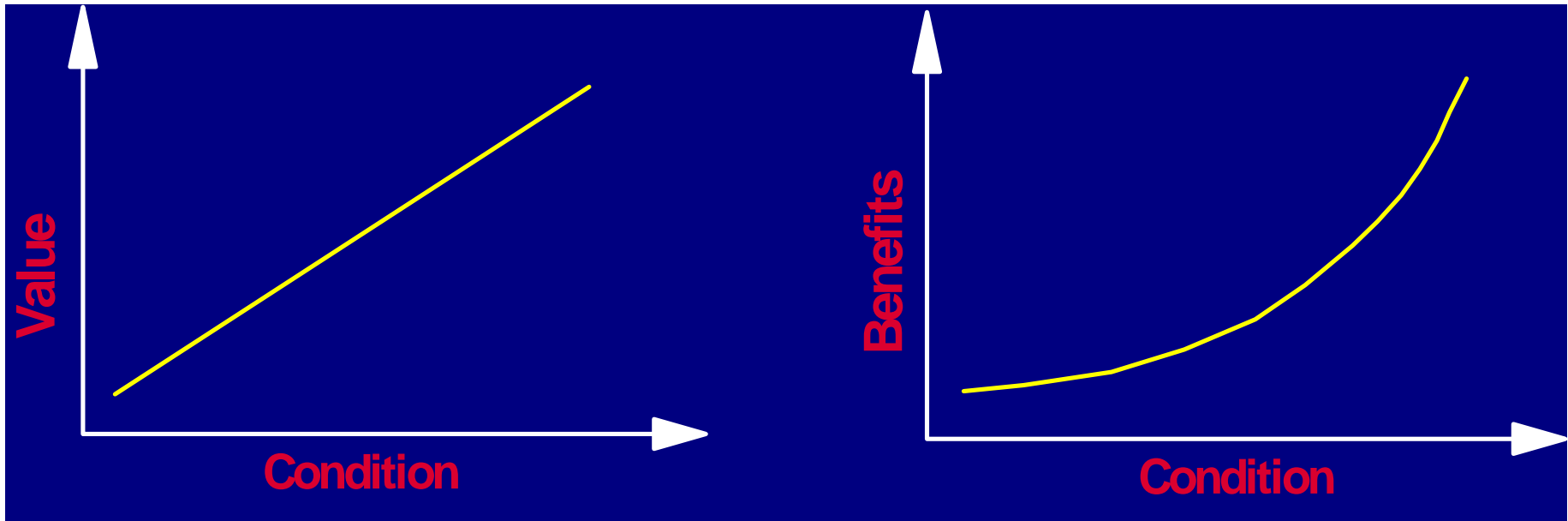
Forecast asset condition in the future.
Use is based on age, traffic, mileage,
etc...



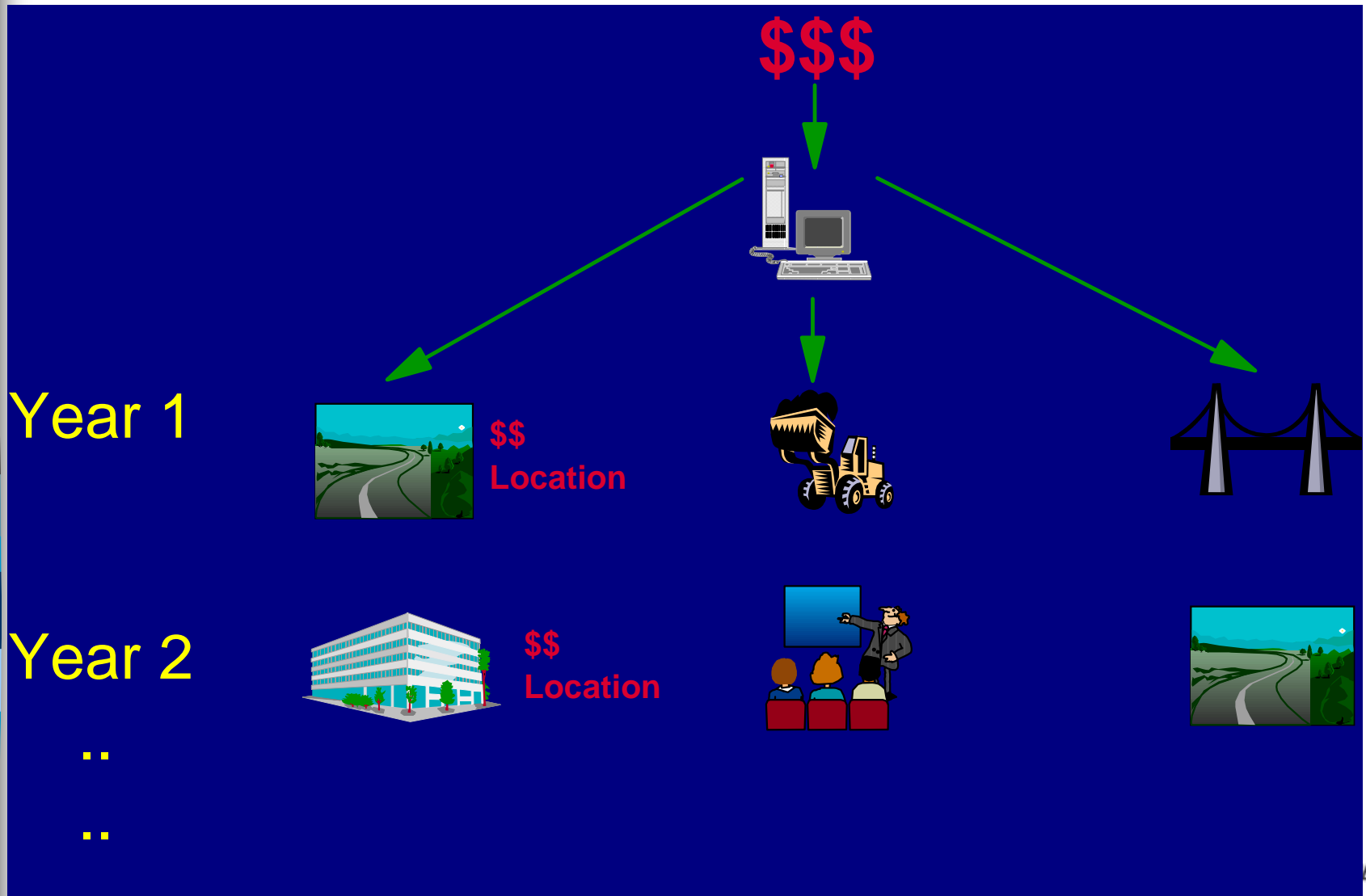
Valuation Models

Determine the value of the asset based on the condition

The value can be cost, utility (benefits), or earning potential.



Resource Allocation





Decision Support Tools

Inputs

Mathematical Models

Results



Decision Support Tools

Inputs:

- Condition data
- Performance parameters
- Policy goals
- Funding



Decision Support Tools

Techniques:

- Optimization:
 - Linear Programming
 - Dynamic Programming
 - Goal Programming
- Multi-year Prioritization
 - Incremental Benefit Cost
 - Marginal Cost Effectiveness
- Prioritization



Decision Support Tools

Results:

- Resource allocation across assets
- Network level performance
- Funding impacts/trade-off
- Input to the individual management systems:
 - Project selection
 - Rehabilitation and maintenance projects



Essential Questions For AM

What Assets Do We Have?

What is Their Condition and/or Status?

What is Their Value and How Do We Determine it?

Asset Management Implementation



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November 14th, 2000



Outline

Why Implement AM?

Asset Management Survey (FHWA and AASHTO)

State DOT's Experiences

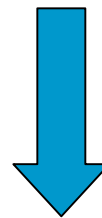
Canadian Experience

Lessons Learned

Why?

The Bottom Line:

- \$1 Trillion investment
- Aging Infrastructure
- Change from construction to preservation
- Change in government role/function
- Performance based management
- Increased accountability



Asset Management



Asset Management Survey

AASHTO and FHWA

(Sue McNeil, Mary Lynn Tischer, Alan DeBlasio)

**Organize an Asset Management
Workshop**

State DOTs

July 1999

30 Responses Received



AM Survey - Summary of Results

States are not Overtly Practicing Asset Management

Many States are Undertaking Activities that form the Building Blocks for Asset Management

Many State DOTs are Utilizing their Building Blocks



Asset Management Building Blocks

Inventory

Individual Management Systems:

- Pavement
- Bridges
- Signs
- etc...

Asset Valuation

Decision Support Tools



Survey Results - The Numbers

Inventory:

30 States with an Inventory system

Average # 9

Management Systems:

30 States

Average # 7



Survey Results - The Numbers

Valuation:

Yes 12 States attempted

No 18 States



Survey Results - The Numbers

Decision Support Tools: 29 States

- 7 states applied across modes
- 10 states with analysis to allocate for capital vs. maintenance
- 11 states with benefit cost analysis of major maintenance expenditures
- 11 states with benefit cost analysis for operational improvements

Survey Results - Inventory

<i>Asset</i>	<i>Inventory %</i>	<i>Condition %</i>
<i>Pavements</i>	93%	93%
<i>Bridges</i>	97%	93%
<i>Signals</i>	80%	47%
<i>Lighting & Signs</i>	57%	33%

Survey Results - Management Systems

<i>Asset</i>	<i>Using %</i>	<i>Performance %</i>
<i>Pavements</i>	97%	90%
<i>Bridges</i>	97%	90%
<i>Safety</i>	70%	53%
<i>Maintenance</i>	70%	50%

Survey Results - Analysis Tools for Investment Decision

Life Cycle Cost	80%
Trade-Off Analysis	27%
Benefit Cost Analysis	83%
Quantitative Analysis	13%
Other	23%

29 out of 30 use Analysis Tools



State DOTs Experiences

AASHTO

Maryland

Minnesota

Virginia

New York

Montana



AASHTO

Task Force on Asset Management (1997)

Mission:

Champion concepts and practices that integrate transportation investment decisions regarding operation, preservation, and improvement of transportation systems for member agencies

Vision:

Supports AASHTO's vision through the incorporation of asset management as an accepted way of managing the transportation system

AASHTO AM Task Force

Strategic Plan

AASHTO Asset Management Guide

Conferences and Workshops

Develop and Utilize Lead State Models



1998 to 2003 - Budget of \$3 Million



State of Maryland

Asset Management Team

- Charged with Development of AM Strategic Plan
- Evaluated how Assets are Currently Managed
- Provided Recommendations on how each can be better Managed
- Recommendations on how to Manage Statewide and Across Assets



State of Maryland

Evaluation Process:

- Asset description
- Asset inventory
- Asset value:
 - Depreciated replacement cost
 - Condition bases
- Expenditures (to maintain the assets)
- Performance indicators
- Improvement repair process

Completed evaluation of 12 out of 19 Assets



State of Maryland

Lessons Learned:

- Include technical staff on evaluation team
- Dedicated staff to complete effort
- Keep an open mind and keep it simple
- Develop long term implementation with **MANY** small successes along the way



State of Maryland

Contributors:

- Support from senior management
- Adequate resources
- Willingness to change from asset managers

Impediments:

- Lack of dedicated staff
- Resistance from asset managers
- Time



State of Minnesota

Asset Management Approach:

- Customer input
- System management
- Policy and goals
- Performance monitoring



State of Minnesota

Common Elements:

- Consistent process framework
- Decision making models
- Data reliant
- Technology dependent



State of Minnesota

Lessons Learned:

- Focused leadership
- Demonstrated benefit
- It takes time and resources (expensive)
- Organizational Readiness
- System managers cooperation



State of Minnesota

Challenges:

- No clear understanding of benefits
- Linking asset management with performance based planning
- Integration across modes and jurisdictions
- Technical and data issues



State of Virginia

System Integration vs. silos and stovepipe systems

Financial Data

Customer Input

Policy, Expectations, and Outcomes

From an acorn, grows an oak.... (Andrew Bailey)



State of New York

A Blueprint for Developing and Implementing Asset Management Organizational Placement

Focus Areas:

- Benchmarking AM
- Asset identification and categorization
- Asset valuation
- New technologies



State of New York

Asset Valuation:

- Determine the value of the transportation assets covered by the AM system
- Traditional accounting practices vs. GASB34
- New York DOT process:
 - Calculate replacement value
 - Depreciation to date
 - Loss of asset value
 - Preventive maintenance
 - Capital improvements

State of New York

	Pavements	Bridges	Total
Replacement Values	\$36,000	\$19,400	\$55,400
Depreciation to date	\$8,200	\$8,800	\$17,000
Net Value	<u>\$27,800</u>	<u>\$10,600</u>	<u>\$38,400</u>
Preventive Maintenance	\$127	\$95	\$222
Capital Improvements	\$520	\$540	\$1,060
Program as % of Asset Value	0.5% 1.9%	0.9% 5.1%	0.6% 2.8%



State of New York

Lessons Learned:

- Asset management improves the decision making process
- Asset management is not a black box
- Develop your own plan to meet your needs
- Asset management implementation is incremental and requires management discipline
- Modify plan along the way



State of New York

Challenges:

- Data issues
- Need for integrated goals
- Lack of technical tools
- Accountability



State of Montana

Definition:

AM is used to assess how successful the DOT's investments are in moving toward overall policy goals as measured by system performance

Performance Programming

Focus on Investment Analysis

Annual Incremental Changes

Respect for Engineering Judgement - a Glass Box not a Black Box



State of Montana

Three Modules:

- Policy

- Policy directions from statewide plan

- Investment analysis (funding plan)

- Performance objectives
- Resource allocation

- Program development

- Project nomination
- Project selection



State of Montana

Lessons Learned:

- Internal organization
- Accept incremental change
- Use the best, don't wait for the perfect
- Ensure underlying policy basis
- Be opportunistic



Canadian Experience

Driving Forces:

- Privatization (B.C., Alberta 1990s)
- Re-Organization
- Federal and provincial deficit and dept reduction
- Private sector thinking
- Performance measures
- Accountability



Move to integration and full scale Asset Management



Canadian Experience

Growing Awareness:

- Primer on asset management
- Development of capitalization procedures and accounting principles
- Network performance indicators and executive information systems
- AM training
- Economic analysis training and guidance

Canadian Experience

Issues and Questions:

- Deterioration = Depreciation?
- What valuation method to use for each asset?
 - Book Value
 - Written down replacement cost
 - Market value
 - Equivalent present worth
- How to account for assets that improve?
- How to deal with complex assets?



Summary

VALUATION

DATA

INTEGRATION

RESOURCES (Time and Money)

Top Management Support



Web Resources

CTRE's Website

<http://www.ctre.iastate.edu/GASB34>

GASB Website

<http://www.gasb.org>