Infrastructure
Asset Management
WHICH IS IT?

Asset Management?

Infrastructure Management?

Facility Management?
Goals and Problems

- PMS sets example for the rest of the agency.
- Beware that all groups in your agency may not understand the existing concepts leading to a general system.
Integration

From MMS, PMS, and BMS to AMS
PMS as Role Model

- Success of PMS has led to mandates for other infrastructure management systems
- The future - Advanced integrated management systems
Pavement Management initiated systematic management of public investment in infrastructure

The Beginning of Asset Management
History of Pavement Management

The First Step: Systematic PM Processes in 1965 in NCHRP 1-10

- Other significant studies
  - Canada, S.Africa, States
- FHWA training courses
- Federal requirements / ISTEA Legislation
Common Elements

- PMS & BMS share data, analyses, & outputs
- These common elements are generally appropriate for many types of IMS
- Also appropriate for integrated AMS
Pavement Management

Is a coordinated systematic process for carrying out all activities related to providing pavements
Asset Management

Is a coordinated systematic process for carrying out all activities related to providing and managing assets.
What is Pavement Management Software

A set of **Tools** to **Assist** Decision-makers in **Preserving** your network **Pavement Assets**
What is an **Asset Management System**

A set of **Tools**
to **Assist**
Decision-makers
in **Preserving** a Set of
**Transportation Assets**
General Structure of Systematic Pavement Management:

Coordinated modules at several organizational levels accessing a common database
General Structure of Systematic Asset Management:

Coordinated modules at several organizational levels accessing a common database.
Essential Requirements of PMS

- Easily updated/modified as new information and models become available
- Considers alternative strategies - LCC
- Identifies optimum strategy - LCC
- Bases decisions on rational procedures with quantified attributes, criteria, constraints
- Uses feedback information regarding the consequences of decisions
Essential Requirements of AMS

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Pavement Management System

Rational procedures that provide optimum pavement strategies based on predicted pavement performance incorporating feedback regarding the various attributes, criteria, and constraints involved.
Optimizing asset strategies based on predicted asset performances incorporating feedback regarding the various attributes, criteria, and constraints involved.
Global Decisions

- Many elements in place in agencies but **not** coordinated in a systematic way
- Need to objectively evaluate and compare projects for all infrastructure
- Hard to give up control
Framework of Integrated Systems

- Strategic decision support
- Multiple criteria decisions
- Assessment of allowable tradeoffs
- Economic evaluation
- Common comparison
- Judgment of decision makers
Common Elements of Management Systems

- Central database
- Analysis / decision support tools
- Geographically based referencing
- User-friendly/consistent interface
- Compatible economic analyses
- Global consideration of resources
- Evaluation of maintenance vs. improvement
Implementation Issues

- Institutional issues are important
- Avoid repeating problems experienced in PMS & BMS
- Organizational influences makes effective implementation critical
Buzz Words

- Performance Management
- Performance Based Management
- Investment Tradeoff Analysis
- Asset Management
- Efficiency, effectiveness, productivity
- Benchmarking
- Investment preservation
- Integration
Asset Management

Functional Components

Asset Manager

Agency Budgets

Unified Planning, Implementation & Action

Agency Policies

Pavement Manager
Data & Analysis

Maintenance Manager
Data & Analysis

Bridge Manager
Data & Analysis

Equipment Manager
Data & Analysis

GASB 34 Asset Valuation
Asset Management Guide

- Legislative Role
- Agency Goals & Objectives
- Customer Needs

AM DECISION MAKING

- Procurement Types
- Funding Sources
- External Factors

Use of Performance Measures
1. Search available Performance Measures from Component Management Systems and literature
2. Define or develop best available Performance Measures
3. Framework for selecting Performance Measures
4. Framework for setting Performance Targets

Asset Management Tools

Strategic Decision Level (Guide Available)

Supporting Projects (in progress)

Action Implementation Level

Asset Management Performance Measures - Project 20-60

Panel State DOT Input

Vigorous Project Staff Work

FEEDBACK

ACTION PLANS & IMPLEMENTATION
Programs, Budget Allocation, Organization, Personnel, etc
2 Slices of the Matrix will illustrate the types of Measures Category which vary in Asset Category.
### Example for Pavement Performance

**Ratings:**
- 5 V. High
- 4 High
- 3 Fair
- 2 Poor
- 1 V. Poor

<table>
<thead>
<tr>
<th></th>
<th>Useful at Network, Corridor &amp; Project</th>
<th>Data Available</th>
<th>Cost to Obtain</th>
<th>Accuracy</th>
<th>Relevance</th>
<th>Objectivity</th>
<th>Independent</th>
<th>Mutually Exclusive</th>
<th>Communicates Well</th>
<th>etc.</th>
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Highway Asset Categories

- Pavements
- Bridges/Culverts
- Safety Structures
- Traffic Lights
- Signs
- Lighting
- Rest Areas
- Railway Crossings
- Right of Ways
- Buildings, Yards
- Equipment
- Materials
- Intermodal Terminals
- Etc

Level of Service Components (Users)

- **Travel Time**
  - Length of Road System
  - Speed
    - Congestion/Traffic
    - Roughness
    - Road Class
    - Speed Limit

- **Safety**
  - Congestion
  - Speed
  - Pavement
    - Friction
    - Geometrics
    - Weather
  - Safety Structures
  - Road Class

- **Comfort**
  - Roadway
    - Roughness
    - Rutting
    - Geometrics

- **Costs**
  - Delays
    - Congestion
    - (partial) closings
    - Vehicle repairs
  - Vehicle Repairs
  - Accidents
    - Vehicle Damage
    - Injuries occupants
    - Death

Performance Measures Components (Agency)

- **Costs**
  - Operations
    - Personnel
  - Equipment
  - Materials
  - Contracting Out
  - Training
  - Real Estate/Right of Way
  - Utilities
  - Lawsuits
  - Taxes

- **Resources**
  - Personnel
  - Highway Asset Evaluation
  - Budgets

- **Asset Values (Optimization)**
  - Quality Management
  - Purchase/Lease
  - Construction
  - Rehabilitation
  - Maintenance
  - Depreciation
  - Safety

- **Performance Measures**
  - Pavements, Bridges, etc.
  - Routine Maintenance
  - Rehabilitation, etc.

- **Other parameters**
  - Traffic, Load Spectrum
  - Construction Details, etc

Judgment Criteria

- Measurability
- Data availability
- Cost to obtain
- Reliability
- Applicability
- Relevance
- Level of Importance
- Complexity
- Understandable
- Practical
- Analyzable

Judgment

- Ranking
- Weighting
- Rating
- Number of States using

Other Stakeholders

- Legislature
- Contractors
- Materials Suppliers
- FHWA
- GASB34
- Etc
Asset Management Integration

- Current NCHRP Asset Management Efforts *Imply* Lack of Understanding of *Existing* Efforts by Top Managers
Asset Management Integration

- They imply that Existing Management Systems Don’t Consider Life Cycle Costs
- Not true
Asset Management Integration

- How Should You (We) Deal with AMS Efforts?
Address the Challenge

- Important to demonstrate value of PMS, MMS, BMS to Administrators
- Learn all capabilities - Super User
- Provide useful results quickly
- Explore interaction possibilities
- Discuss the needs of other agency groups
Solutions and Opportunities

- New technology in your PMS.
- Many existing capabilities and benefits
- Client / Server Architecture - Enterprise
- Share information with entire agency
- Interoperability with other systems
Infrastructure Versus Systems Engineering

- Infrastructure Engineering
  - Maintenance
  - Pavements
  - Bridges
  - Traffic Facilities

- Systems Engineering
  - Advanced Management Systems
  - Client/Server Solutions
  - Integrated SQL Relational Database Server Core
Better Infrastructure Asset Management

- Much new research is needed
- Integrated systems will mature
- More cost-effective management
- Continual improvement
- Optimum global investment strategies
Performance/LoS/Customer Satisfaction

- “Performance Based Management”
- Identify
  - performance criteria
  - objective measures of these
- Performance Reporting
  - to legislators (justify budgets/get more!)
  - to public
Asset Management needs Detailed Data

Asset Management can not be done without Data from Pavement Management, Bridge Management and Maintenance Management Systems
Asset Management Implementation

- **YOU Are** Asset Managers
- **We Must Try to Make That Clear to your Administrator**