Economic and Engineering Considerations: Policy, Planning, Financing and Revenue
International Scan on Asset Management:

Australia, Canada, England, and New Zealand
NCHRP 20-68, Domestic Scan Pilot Program

Best Practices in Transportation Asset Management
Asset Management as a Decision Support Tool
Asset management can be viewed as a set of business principles and best practice methods for improving resource allocation and utilization decisions:

- Policy-Driven
- Performance-Based
- Analysis-Oriented
- Information-Informed
- Accountability and Feedback

--Federal Highway Administration
In England....

“Asset Management is a strategic approach that identifies the optimal allocation of resources for the management, operation, preservation and enhancement of the highway infrastructure that meets the needs of current and future customers.”
In Victoria, asset management is....

“A systematic process of maintaining, upgrading, and operating physical assets cost-effectively, that...

combines engineering principles with sound business practices and economic theory, and that...

provides tools to facilitate a more organized, logical approach to decision-making, and that...

represents a framework for handling both short- and long-range planning.”
In New Zealand, asset management is....

“To plan, create, acquire, maintain, operate, rehabilitate, replace, and dispose of assets in the most cost effective (sustainable) manner required to meet present and future corporate objectives and demands for service levels.”
What Were the Drivers for Adopting Asset Management Approaches?

• Limited resources
• Increasing demands on and use of existing infrastructure
• Desire for credibility with elected officials and the public, that is, linking funding to system performance
• Where private provision of services was used, asset management was a way of providing strategic oversight
• Natural evolution in the development of individual infrastructure management systems

• Desire to evolve to a system that allows trade-offs among different asset categories and between asset strategies

• Legislative or governmental mandate, e.g.,
  – Road Management Act in Victoria
  – Local Transport Plan 2 guidance in England
  – Local Government Act in New Zealand
  – And in New South Wales…..
Asset management was integrated into many corporate or agency planning and policy documents, and thus related to decision making in different levels of an organization for example....
Infrastructure Management Approach in Edmonton

City Council

Corporate decision-making authority

Senior Management Team

Integrate budget and infrastructure planning at a strategic level

Capital Infrastructure Committee

Implement infrastructure strategy

Office of Infrastructure

Stakeholders advise on implementation of Infrastructure Strategy

Infrastructure Technical Advisory Committee

Ad hoc Working Groups

Implement Infrastructure Strategy decisions as required
Use of Asset Information in London

- Best value performance indicators (BVPI & BCI)
- Project prioritization
- Modelling for business planning and asset maintenance
- Fund redistribution
- Valuation of assets
Descriptive Framework of Asset Management at England’s Highways Agency

- **Strategic Plans (3-5 yr horizon)**
  - Public Service Agreement (PSA) Targets
  - Ministerial/DfT/HA
  - Requirements/Commitments/Priorities

- **Budget Rounds (top down)**

- **Databases**
  - HAPMS
  - SMIS
  - HAGDMS
  - NOMAD
  - HA-ES
  - HATRIS

- **Forward Plans**
  - Route Management Strategies
  - Feasibility Assessment
  - Project Development
  - Constraints

- **VM Process/Budget Allocation (Prioritisation)**

- **National/Route Condition Assessment**
  - TRACS etc

- **Programme Delivery**

- **Network Performance**
  - (journey time, accidents, flows)
Program Governance in New South Wales: Infrastructure Assets

- Customer Needs
- Maintenance Level of Service
- Network Performance Measures
- Network Performance Indicators
- Resource Allocation
- Program Budgets
- Government Policies
- Total Asset Management
- Community Attitude
- Surveys
- Stakeholder Opinion (via Customer Councils)
- Resource Constraints
- Risk Management
- Negligence Law
- Economic Analysis
- Standards & Specifications
- Usage & Environment
- Contractor’s Outputs/Services
- RTA Project & Contract Management
- RTA Asset Management Planning Systems and Procedures (includes Project Selection Criteria, Value Management, Risk Analysis, Whole of Life)
Queensland’s Business

Decision-making Needs—Corporate level

- Road condition performance reporting
- Network asset investment studies
- Corridor planning
- Asset valuation

![Graph showing consumption of economic benefit curve](chart1.1)

- Based on ESA’s growing at 5% per annum and terminal value of 21%.
- Depreciable Component = 79%.
- Terminal Value 21%.
- RUL = 16.5 years.
Aligned Decision Making in Queensland

Performance - Strategic Fit, Affordability, Fit For Purpose

PHASE 1
Direction

PHASE 2
Road System Perform. Plan
20 years

PHASE 3
Road Corridor Manage. Plans
10 years

PHASE 4
Roads Implement. Program
2+4 years

Expectations Choices

Output Vision Targets

Corridor Solutions
Road System Performance Plan

Meeting gov’t outcomes
- Strategic financing plan
- Priority network plan
- Strategic asset metrics
- Strategic delivery metrics
- Network safety analysis

Phase 2 Road System Performance Plan

Maximizing level of service

Output Vision Targets

20 years

$ LOS
Road Corridor Management Plan

- Output vision targets
- Link strategy
- Road corridor envt’l. assess
- Cultural recognition
- Corridor studies
- Target road surface index
- Risk, slope stability

Phase 3 Road Corridor Management Plans
Deficiencies to Solutions
10 years

Statement of Intent

Fit for purpose solutions
Corridor Solutions
Road Improvement Program (RIP)

- Ranked solutions
- Work elements
- Employment
- Economy of scale
- Political commitments

Doing the right it!

Phase 4 Road Improvement Program

- Ranking

Packaging

2 + 4 years

Project Concepts Operation Charters
Co-ordination of Program, Project & Works Management

Performance - Strategic Fit, Affordability, Fit For Purpose

Phase 5
Tactical Analysis Report
Roads Implementation Program
Operations Projects
Doing it right!

Phase 6
Completed Operations
Completed Works
Learn from doing

Phase 7
Audit of work carried out
Proof we got it right

Doing it right! Learn from doing Proof we got it right

<table>
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<th></th>
<th>Charter</th>
<th>Ongoing</th>
<th>Finalization</th>
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<tbody>
<tr>
<td>Concept</td>
<td>Development</td>
<td>Implementation</td>
<td>Finalization</td>
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</table>

Proof we got it right
Information Reporting Hierarchy in Victoria

Example of Reports
- Performance indicators; condition and performance
- Program delivery; project monitoring
- Alternatives/strategies selection; asset preserve
- Performance indicators by program and asset type
- Corridor and site-specific analysis reports

Purpose of Reports
- Performance monitoring against org'el goals
- Operational performance monitoring
- Integration of planning and programming
- Asset condition and maintenance report
- Asset physical condition reporting
- Performance monitoring against org'l goals
- Operational performance monitoring
- Integration of planning and programming
- Asset condition and maintenance report
- Asset physical condition reporting
- Performance indicators by program and asset type
- Corridor and site-specific analysis reports

## Strategic Direction 1: Safeguarding What Exists

<table>
<thead>
<tr>
<th>Statewide Plan Policies</th>
<th>HSOP Performance Categories and Measures</th>
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<tbody>
<tr>
<td>Preservation</td>
<td>Infrastructure Maintenance and Preservation</td>
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<tr>
<td>Preserve</td>
<td>1. Bridge preventive maintenance</td>
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<tr>
<td>Essential Elements of</td>
<td>2. Pavement preventive maintenance</td>
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<tr>
<td>Existing Transportation Systems</td>
<td>3. Pavement patching</td>
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<td></td>
<td>4. Signal and lighting maintenance</td>
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<td>Supporting Infrastructure Management</td>
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<tr>
<td></td>
<td>1. Building functional adequacy</td>
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<td>2. Fleet management life-cycle utilization</td>
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<td></td>
<td>3. Building maintenance</td>
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<td>4. Electronic communication coverage</td>
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<td></td>
<td>5. Electronic communications management</td>
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<td>6. IT infrastructure preservation</td>
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</tbody>
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Performance Measures

• Three Key Measures
  – Condition
  – Utilization
  – Functionality

• Common Framework Across Infrastructure Types

• Ministries Develop Specific Measures
Project Prioritization

Infrastructure Requirements

- Provincial Highways
- Health Facilities/Equip.
- School Facilities/Equip.
- Post-Secondary Facilities
- Water and Wastewater
- Community Facilities
- Housing
- Other Infrastructure

Prioritization Criteria

- Program Delivery
- Infrastructure Performance
- Economic Benefits
- Cost Avoidance/Saving
- Cost-Effectiveness
- Strategic Alignment

Cross-government Priorities

Prioritized Project List
In those sites visited, experience showed clear relationship between asset management as a decision support tool and the securing of funding for transport investment.
Developing Investment Strategies
Pavement Condition: Michigan DOT

System Condition 1996-2012

- Freeway (Actual)
- Non-Freeway (Actual)
- 95% Goal (Freeway)
- 85% Goal (Non-Freeway)
- Freeway (Projected)
- Non-Freeway (Projected)
Developing Investment Strategies
Bridge Condition: Michigan

Statewide - Bridge Condition

Goal - 95% of Freeway Bridges in Good/Fair Condition
Goal - 85% of Non-Freeway Bridges in Good/Fair Condition

Year

Percent Bridges Good/Fair Condition

- Freeway Measured
- Non-Freeway Measured
- Freeway Forecast
- Non-Freeway Forecast
“Maintain 2003/04 Standard Out to 10 Years” Scenario--Brisbane
“Maintain 2005/06 Funding Level Out to 10 Years” Scenario--Brisbane
With respect to a research agenda....
<table>
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<tr>
<th>Decision Context</th>
<th>Example Research Questions</th>
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<tr>
<td>Creating Institutional Responsibility</td>
<td>Influence of Different Org’l Structures and Decision Making Contexts?</td>
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<td>Role of (and in) Concessions?</td>
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<tr>
<td>Establishing Performance Goals/ Targets</td>
<td>Trade-offs of Different Performance Levels Information Needs?</td>
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<td></td>
<td>Level of Certainty of Performance Levels?</td>
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<td>Operations Priority Setting</td>
<td>Use in Rehabilitation and Maintenance?</td>
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<td>Relationship to Other Org’l Goals?</td>
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<td>Level of Analysis Sophistication?</td>
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<tr>
<td>Capital Investment Priority Setting</td>
<td>Trade-offs among Asset Categories Risk Assessment Tools?</td>
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<tr>
<td></td>
<td>Total Asset Portfolio Assessment?</td>
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<tr>
<td>Systems Feedback</td>
<td>Type and Level of Information Needed?</td>
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<tr>
<td></td>
<td>Evidence of Performance Change?</td>
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</table>
Some form of risk assessment was used by all of the agencies in their asset management program.
RTA (New South Wales) Program

Governance

Tactical risk management for small scale projects & services

- Australian / New Zealand standard for risk management
- Use of corporate risk evaluation criteria
- Network-wide deficiency analyses
- Possible event scenarios of customer/service interactions
- Modernise network to safety standards for safe access – excluding mobility & economic development

Strategic risk management balance between safe access, mobility & economic development
The institutional learning experience with public/private partnership (P3) projects has led to more careful incorporation of strong asset management principles in P3 agreements and concessionaire deeds.
Asset Management

PERFORMANCE REQUIREMENTS
- Corporate Business Objectives
- Levels of Service
- Customer Service Obligations
- Performance Standards
- Demand Forecasts

ASSET KNOWLEDGE
- Location
- Physical attributes
- Utilisation
- Capacity
- Condition
- Value
- Maint. history
- Performance

DECISION SUPPORT TOOLS
- Risk Management
- RCM
- Predictive Modeling
- Optimised Decision Making

Identify Optimal Life Cycle Solution → Asset Management Plan (Concession Period) → Renewals & Replacement → New Capital Investments → Capital Program (5 year and 1 Year) → Operations & Maintenance

Funding/Pricing Strategy, Regulatory Submissions, Customer Consultation → Implementation and Performance Monitoring
In the final analysis, value depends on the benefits (perceived and real) associated with the use of asset management tools and principles.
Benefits as Defined in Brisbane

- Provides a strategic direction and a corporately consistent planning framework for the City’s physical asset and property management
- Ensures that facilities and assets are adequate to meet assessed needs (community service expectations)
- Improves utilization of the Council’s asset portfolio
- Optimizes preservation of all retained assets at the lowest life cycle cost
- Identifies surplus assets and maximizes the return, in both revenue and benefit, from the disposal process.
Thank You