

Data Needed for Infrastructure Asset Management - How Much is Too Little – Too Much? The International Experience

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Data Challenges of Asset Management

Not Too Much or Too Little – Just Right for Now

Based on the International
Infrastructure Management Manual
(IIMM)

Website: www.ingenium.org.nz

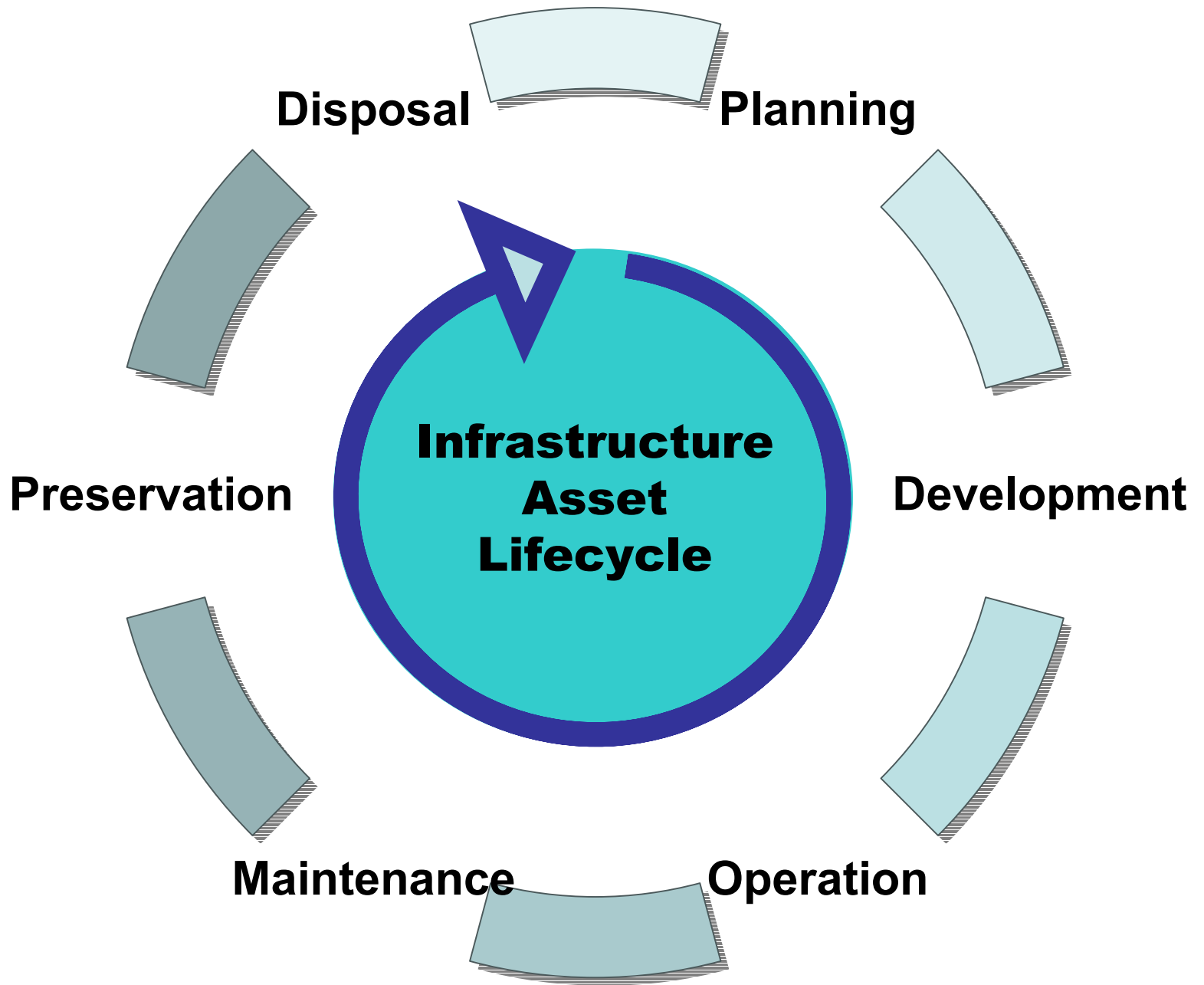
International Infrastructure Management Manual (IIMM)

- Developed to promote best management practices in for all infrastructure assets regardless of ownership (public/private sector) and country location
- First published in 2000 and updated in 2002 by the Association of Local Government Engineering New Zealand and the Institute of Public Works Engineering for Australia and others
- Based on the Australian National Asset Management Manual first released in 1994 and the New Zealand Infrastructure Asset Management Manual released in 1996
- Considered around the world as the “bible” on infrastructure management
- Country-specific versions developed for:
 - Australia/New Zealand - South Africa - England
 - United States (under development by Metcalf & Eddie)

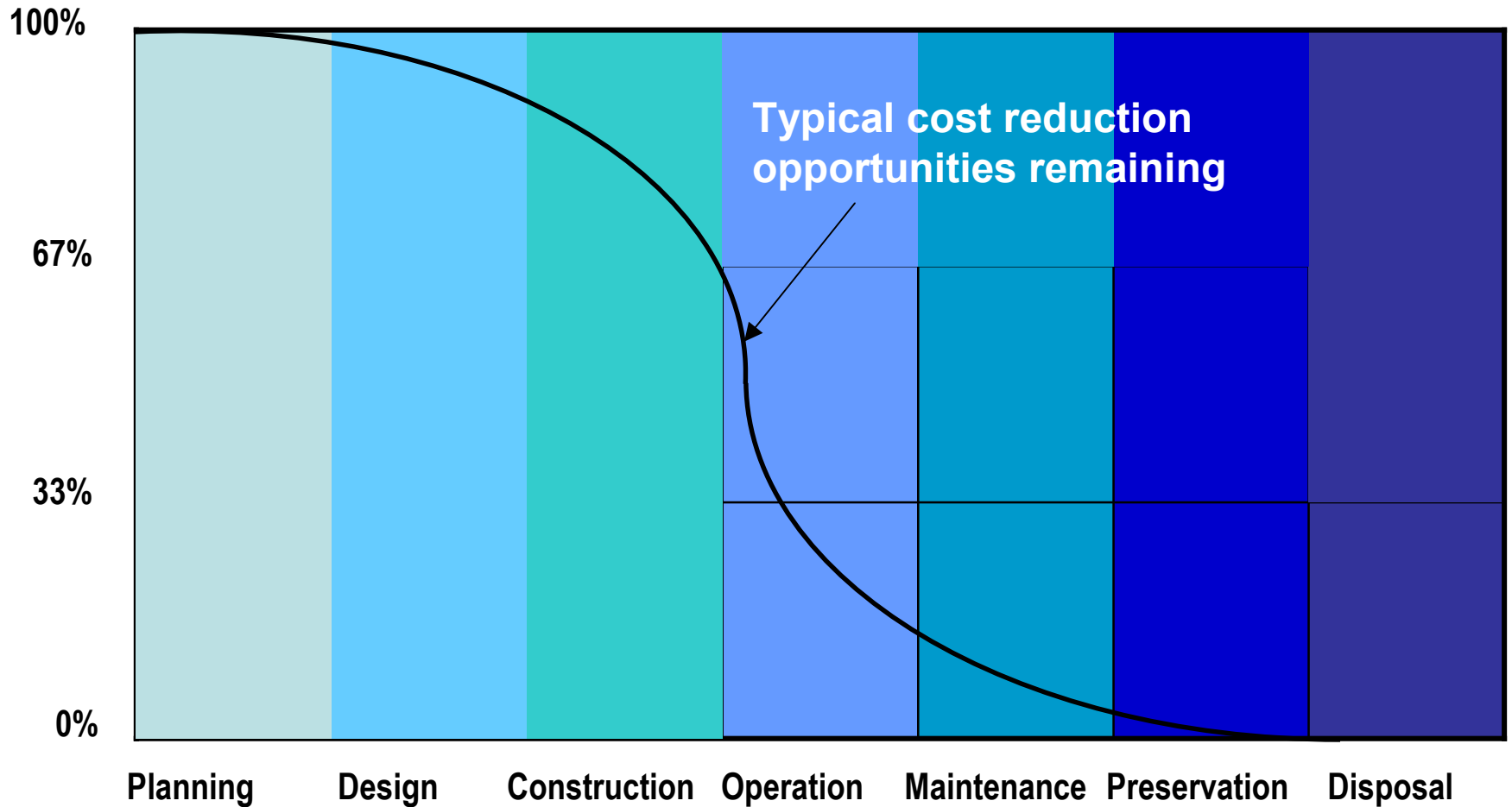
IIMM Definition of Asset Management (AM)

“The combination of management, financial, economic, engineering, and other practices applied over the full ***lifecycle*** of physical assets to provide the required ***level of service*** for present and future customers in the most ***cost-effective*** way.”

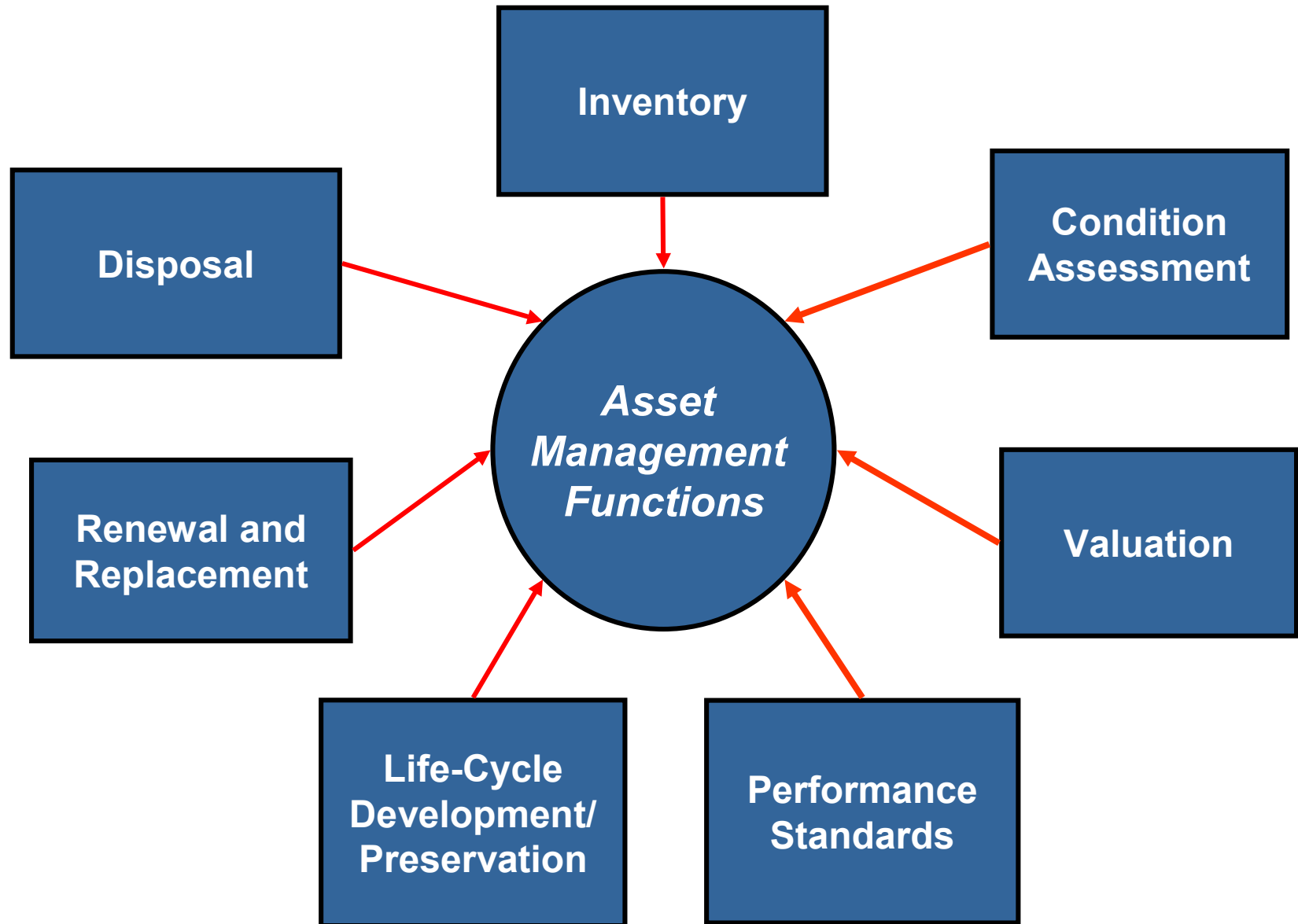
Cost-effective longevity of asset utility



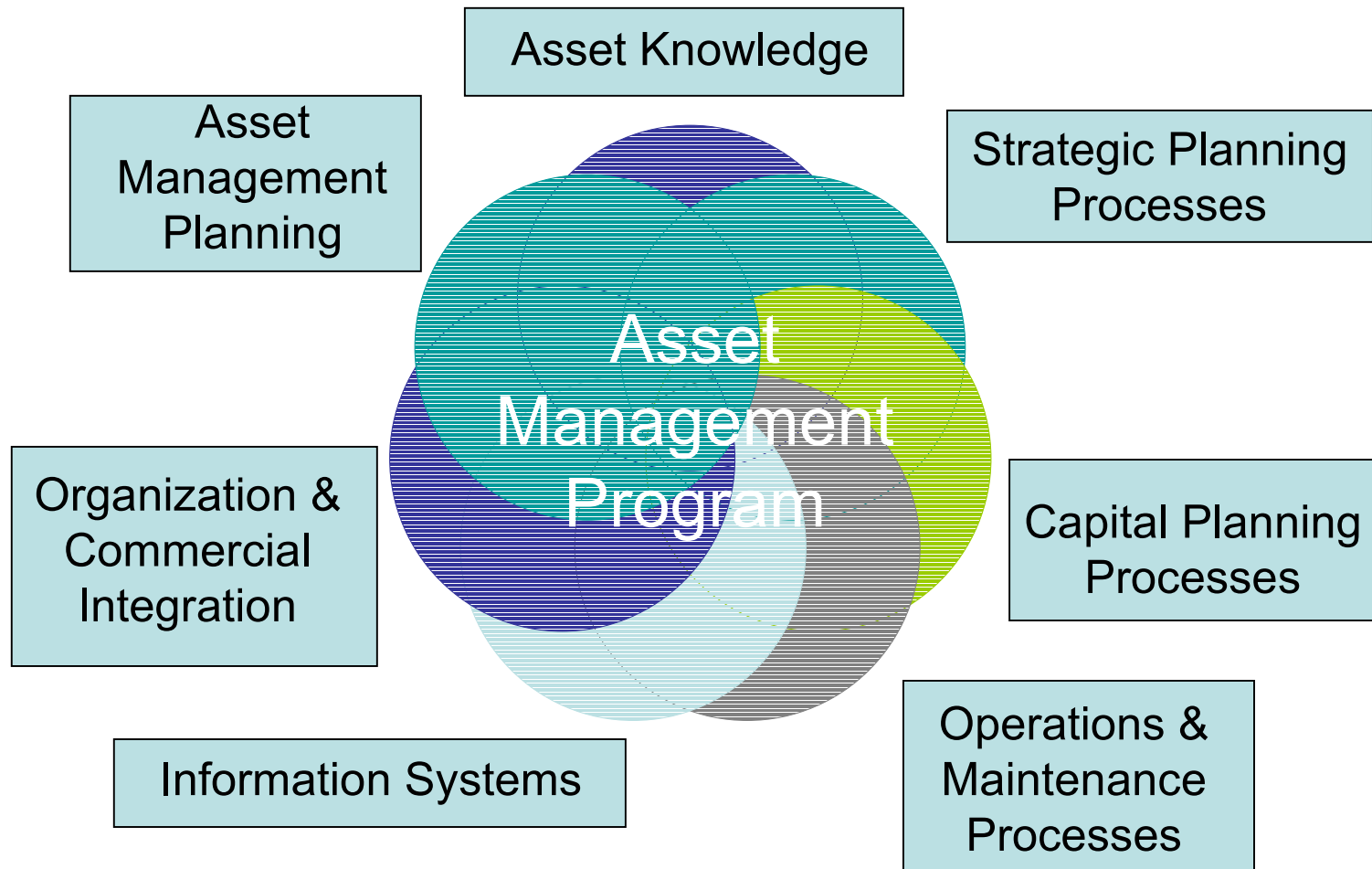
Cost Reduction Opportunities Along Asset Lifecycle



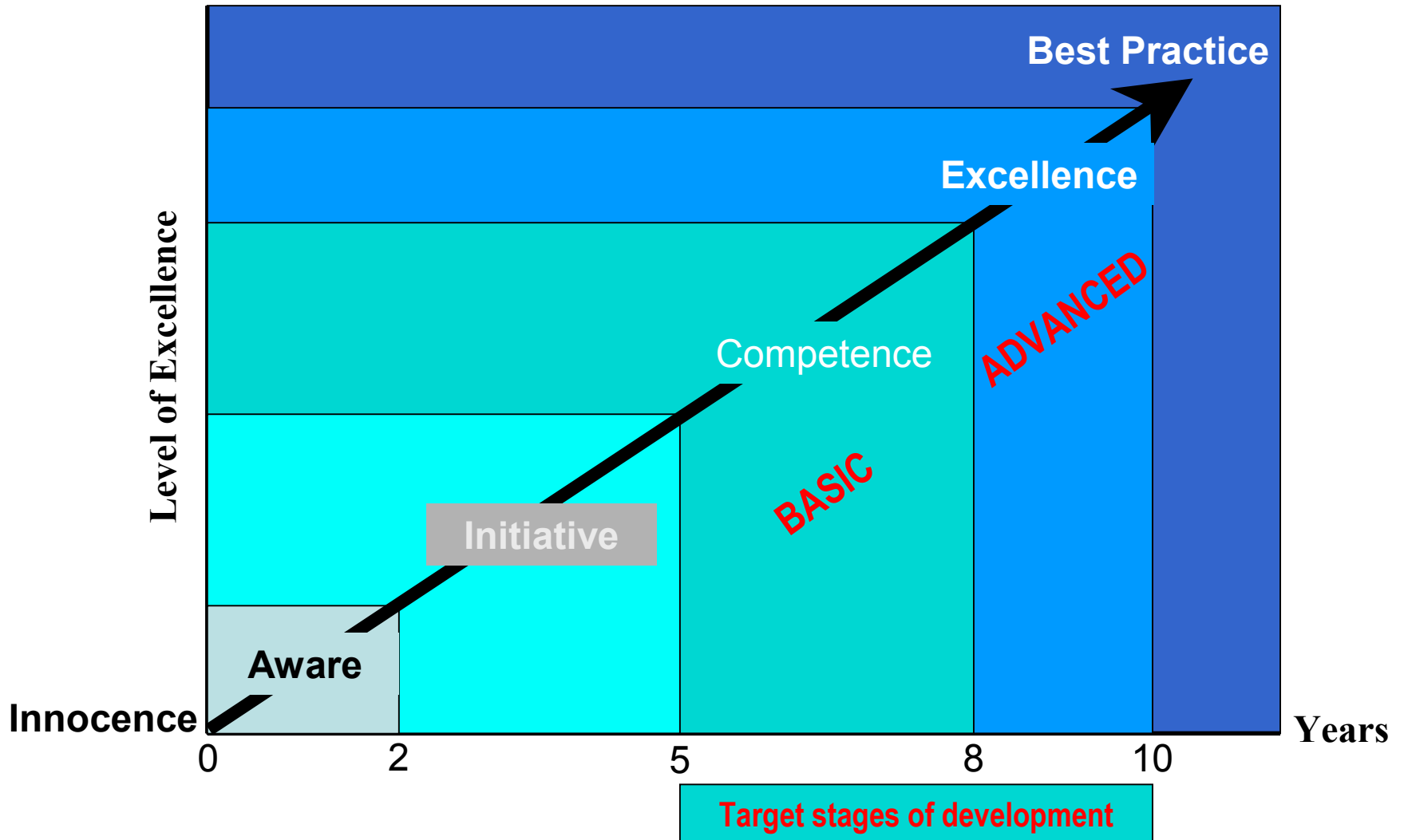
Asset Management Functions



Seven Components of Asset Management Program (IIMM)



AM Program Stages of Development



Rating AM Programs by Six Stages of Development

Infrastructured Management Program	Innocence		Awareness		Initiative				Competence						Excellence				Best Practice			
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	
Asset Management Program Target Levels	→								Basic →						Advanced →				Best Practice			
Asset Knowledge																						
Strategic Planning Process																						
Asset Capital Planning Processes																						
Operations & Maintenance Processes																						
Information Systems																						
Organizational & Commercial Integration																						
Asset Management Plan																						
Overall Rating																						

Data Needs for AM Program Start-Up

- User needs
- Goals, objectives, and scope of AM Plan
- Assets, components, and processes
- Focus on inventory, condition, and performance information
- Level of detail/sophistication
- Decision-making framework
- Resource requirements

Data Needs for AM Program Operation

- Lifecycle AM strategies
- Performance measures and standards
- Performance tracking
- Data storage and analysis
- Information reporting
- Application/use of AM program information

Key Components of AM Information Systems

Basic AM System

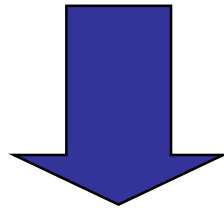
- Asset inventory
- Asset accounting
- Maintenance management
- Contract management
- Resource management
- Inventory control
- Condition monitoring

Advanced AM System

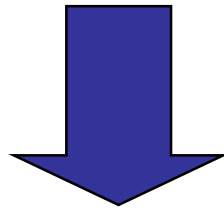
- Predictive modeling
- Risk assessment
- Treatment options and costs
- Lifecycle costing
- Works planning
- Optimized renewal decision-making (ORDM)
- Interface data import/export

Judging Data Usefulness

- Converting Data into Useful Information



- Converting Information into Pertinent Knowledge



- Converting Knowledge into Wisdom

Data Issues in Developing AM Programs

- What does AM do to data needs?
- What does AM do to data collection processes?
- How does AM data differ from traditional data used for reporting and decision-making?
- How can AM data support other organizational reporting and decision-making needs (linkage, synergy)?
- Cost of data collection, storage, processing, and reporting?
- Technical capability, experience, and availability of resources in or serving the organization?
- Functionality, integration, track record, sophistication, and cost of information systems?

Detail and Parameters of AM Data

Levels of Data Detail

1. Location
2. Fixture count
3. Feature details
4. Full details
5. Maintenance efforts
6. Resources
7. Lifecycle cost
8. Optimized data management

Asset Parameter Data

1. Asset identifiers
2. Detailed technical data
3. Condition data
4. Valuation data
5. Maintenance data
6. Performance data
7. Predictive data
8. Risk and lifecycle data
9. Optimized lifecycle data

Key Types of AM Performance Measures

1. **User Service** - average speed, capacity utilization, comfort, convenience, visual appeal, consistency/reliability of service
2. **User Costs** - toll level, delays, vehicle damage
3. **Lifecycle Costs** – of infrastructure asset
4. **Return on Investment** - to private sector financing entities
5. **Condition Ratings** - roadway, bridge, drainage, appurtenances
6. **Availability** - failure history, duration, and cost/service consequences

Key Types of AM Performance Measures

7. **Safety** - crashes, fatalities, injuries, property damage
8. **Timeliness/Responsiveness** - to incidents, outages, failures
9. **User Satisfaction** – complaints, perspectives
10. **Service Life** – longevity of asset utility
11. **Resource Productivity** – units and costs of provider activities
12. **Compliance** - regulations and standards

Data Considerations

- Nature of data needed
- Purpose of data – the need to know
- Refinement of data – data-information-knowledge-wisdom
- Users of refined data – relevance to senior/middle managers, others
- Providers of data – field staff, headquarters staff, middle managers
- Where data originates – field, district, division, headquarters

Data Considerations - continued

- Where data is processed - field, district, division, headquarters
- How data will be processed - manually, IT system, expert system
- Time to process data – from originator to user
- Timeframe of processed data – short-term or long-term
- Granularity (detail) of data needed
- Frequency of data collection – criticality and lifecycle status
- Sustainability of data collection and processing

Keeping AM Data Requirements Reasonable

- Data collection is largest workload component of AM programs – representing 80-95% of start-up costs
- Need to avoid unnecessary data or missing essential data to achieve short-term objectives and outputs
- Start modestly and build detail and complexity over time
- First data collection efforts should be at a high level of detail for selected asset parameters

Keeping AM Data Requirements Reasonable - continued

- Improve productivity by staging data collection and/or geographically segmenting effort
- Capture all new asset data – beware of lost data
- Incrementally increase detail and complexity over time as needs warrant and resources permit – building on prior efforts
- Enforce updating procedures for consistent database
- Keep focused on AM program objectives – short and long-term
- Maintain resource commitment to data collection effort through staff training and rotation

Rules to Keep AM Data Needs Reasonable

- Recognize why doing AM and determine minimum data needed to achieve these purposes:
 - Compliance (reporting)
 - Save money - improve service
 - Demonstrate asset stewardship (good management)
- Focus on only what is absolutely needed for reporting and decision-making:
 - Inventory – key attributes
 - Condition – key attributes relative to defined standards
 - Service/operating performance
 - Lifecycle costs and risks

Rules to Keep AM Data Needs Reasonable

continued

- Start modestly
 - Select key data elements
 - Begin on small geographic area basis
 - Minimum level of granularity based on basic reporting and decision-making needs and available funding – can increase later
- Build as you go – don't try to do everything at once – will bust budget and have nothing to implement