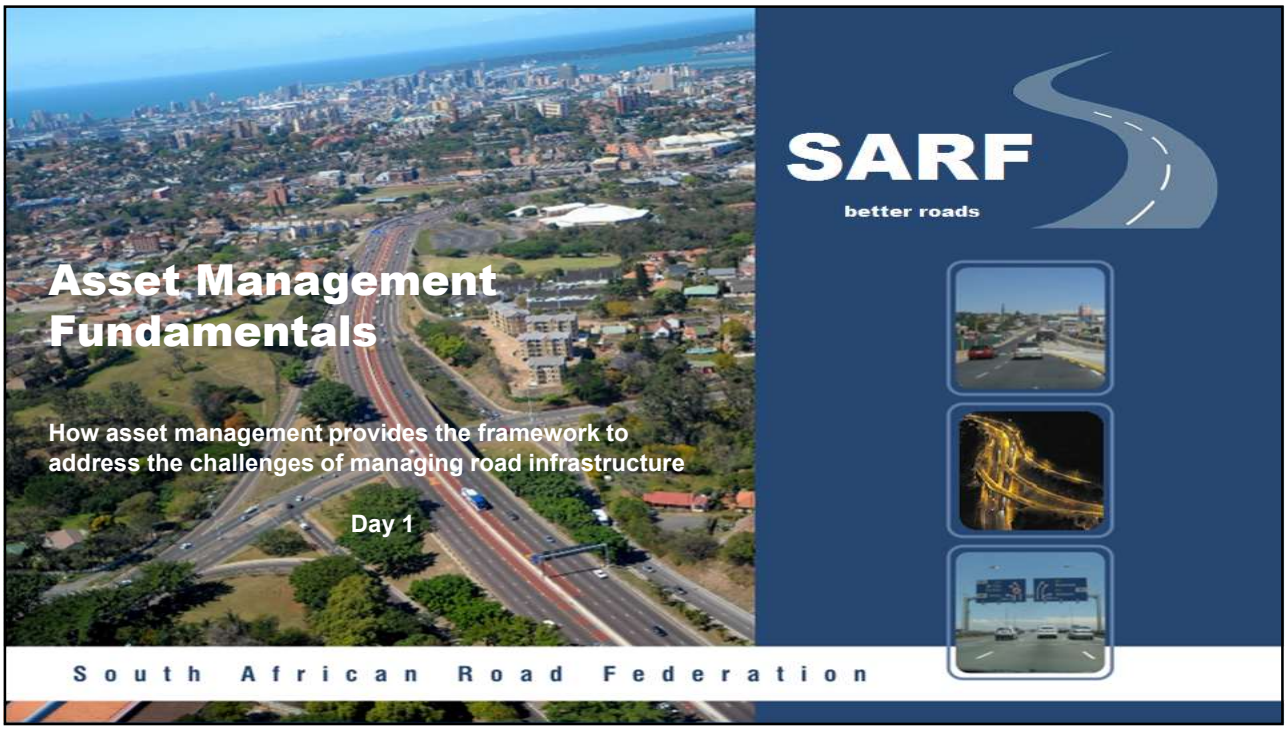

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Course Topics

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Topic		Theme and target audience
Title slide and topics page		Target: Management and practitioners Theme: Fundamentals
Some thoughts about change and excellence		
1. SA Context	Day 1	
2. Overview of Asset Management	Day 1	
3. Managing Asset Management	Day 2	
4. Scope of Asset Management	Day 2	
5. Case Study: AM & the Climate Emergency	Day 2	
About – sources, acronyms, course presenter		

2

Thoughts about change

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"You can't use an old map to explore a new world."
"We cannot solve our problems with the same thinking we used when we created them

— Albert Einstein —

"You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete."

— Buckminster Fuller —

American architect, systems theorist, author, designer, inventor, and futurist

"If the rate of change on the outside exceeds the rate of change in the inside, the end is near."

— Jack Welch —

CEO General Electric

About excellence

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Aristotle

Excellence is never an accident. It is always the result of high intention, sincere effort, and intelligent execution; it represents the wise choice of many alternatives - choice, not chance, determines your destiny.

AZ QUOTES

Aristotle 384 - 322 BC

South African Context

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- **Overview**
  - This section provides the context for the implementation of Asset Management in South Africa
- **The Road Maintenance Backlog in South Africa**
- **SABITA Roads Review 2020**
- **Challenges faced by road authorities**

The Road Maintenance Backlog in South Africa

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- **D Ross & M Townshend SATC 2019**
  - 'The estimated road maintenance backlogs are immense, particularly within the provincial and municipal networks.'
  - 'The consequences are provincial and municipal road rehabilitation backlogs that amount to more than 6 and 8 times what provinces and municipalities respectively spent on road maintenance in 2017/18'
  - 'The magnitude of these backlogs means they are unlikely to be addressed through national transfers and subsidies, especially given the National Treasury's commitment to fiscal consolidation, which in the continued absence of notable economic growth must be primarily realised through savings and efficiencies in departmental expenditure.'
  - '… it is unrealistic from a finance and resource perspective to alleviate a R416,6 billion maintenance backlog over a relatively short time horizon'
  - '… the NDOT's (2018) policy position that provinces and municipalities should absorb unproclaimed roads within their networks may exacerbate the road maintenance backlog by between R105,5 billion to R461,7 billion
  - '… many of the proposed and available funding mechanisms are not uniformly applicable across the road authorities, so either some authorities (most likely rural municipalities) must remain under-funded or complex ring-fencing and inter-governmental revenue sharing agreements are required

The Road Maintenance Backlog in South Africa

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- 'One of the obvious implications for road investment policy is that authorities are now forced to prioritise their road maintenance schedules'
- 'Within this context of severely limited resources, it is vital that authorities allocate their budgets towards roads that protect citizen's constitutional basic access rights and maximise potential economic growth'
- 'Without effective prioritisation, it is possible that one or even both objectives may be severely harmed'
- 'Authorities can also use prioritisation tools to identify and unproclaim unproductive roads, thus minimizing maintenance demand and limiting the contingent liability posed by unproclaimed roads'

- **The backlog has grown since 2018, and the COVID-19 crisis has made the funding situation significantly more challenging**
- **The only way of funding shortfalls is 'savings and efficiencies in departmental expenditure'**
- **Surely this is a clarion call for implementing good Asset Management?**

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SABITA Roads Review 2021

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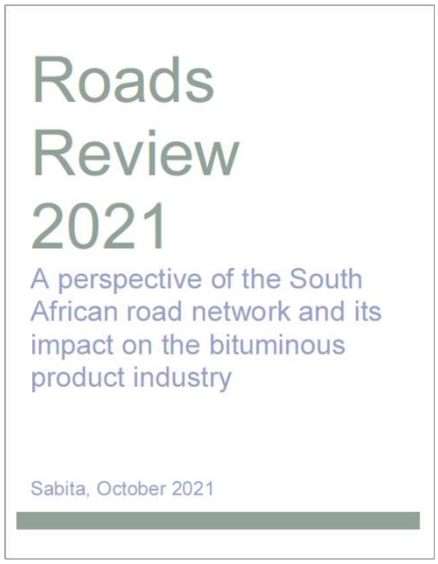
- **A perspective on revenues**
  - The Road Transport medium-term expenditure estimates are R34,166 billion for 2021/22, R43,363 for 2022/23 and R35,796 billion for 2023/24
- **SA road network**
  - The SA road network in 2018 is shown in the table (Ross)

The South African road network (km)

Authority	Paved	Gravel	Total
Provincial (9)	48 945	173 732	222 677
National	22 197	0	22 197
Metro (8)	51 682	14 461	66 143
Municipalities	40 648	266 416	307 064
Total proclaimed	163 472	454 609	618 081
Unproclaimed roads	-	131 919	131 919
TOTAL	163 472	586 528	750 000



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SABITA Roads Review 2021

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- **A perspective on road condition**
  - Since 1991, there has been a steady decline in the condition of the SA road network – especially at provincial and municipal level – for a number of reasons, ranging from curtailed allocations to roads in the past to ongoing shrinking capacity in the public sector resulting in inefficiencies in delivery
  - National roads
    - Compared to 2017/18, the pavement condition in 2020/21 shows a downward drift, with lower percentages in the good and very good categories
    - The proportion of roads in poor to very poor condition has increased steadily since 2017/18. In that year this proportion was 3.5% compared to 6.4% in 2019/20 – nearly double that value
  - In 2017, 32% of paved provincial fell within the poor or worse class – not near international norms
  - *The fact that this data has not been updated from 2017 is concerning (my comment)*
  - About half of the country's gravel road network was in poor or worse condition in 2017
    - It is evident that the upkeep of the provincial gravel road network poses challenges to the road authorities
- **A perspective on expenditure**
  - Expenditure on Provincial roads is likely to remain nearly static over the MTEF
  - Allocations to SANRAL are complex with cross – subsidisation from non-toll to the toll portfolio and compensation for reduced toll income
  - Estimated expenditure in all metros shows nominal growth in the region of 11% per annum during the MTEF, mainly as a result of a growth in capital works
    - It is noticeable that most of this increase came from one metro and is a jump from R255 million in 2021 to R6,757 billion in 2022 and R7 billion in 2023
    - Such a massive increase will not be possible to deliver

Implementing good Asset Management is vital for maintaining the road network

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Some challenges faced by road authorities

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Funding constraints	Available funding has been constrained over decades and the demands on the fiscus due to the COVID-19 pandemic has constrained funding even more
Capability constraints	Available, capable professional staff have been constrained over decades. Changes to Public Service rules enable appointment of professional staff with inadequate experience
Customer expectations	Communities continue to seek higher levels of service and unplanned failure of a system impacts on economic growth. As new products and new technology offer more services, such as Smart Phones, they expect more from their infrastructure providers. Community demand increased accountability for effective & efficient spending of public funds
New technology & services	Road infrastructure is becoming more sophisticated, more complex, and more dependent on technology. Advances in vehicle technology and expectations for new services, e.g. driverless cars
Increasing demand	The usage of road assets is increasing, combined with a greater demand for safety, reliability and value-for-money
Risk and resilience	The infrastructure continues to get older, posing a risk to life and safety, with reducing resilience to the effects of the environment, particularly the effects of climate change and natural disasters. Any form of asset deterioration represents the consumption of the economic capital invested in the assets and a higher risk of failure
Internally generated risks	Risks arising from decisions made when setting up and managing an organisation, or from the capabilities, behaviour, culture beliefs and relationships with the organisation
Conflicting priorities	The need to balance diverse and conflicting expectations and priorities of stakeholders
Crime	The rise of organised crime on construction sites with blackmailing, intimidation and demands for a percentage of the work impede and even could stop construction and maintenance projects

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An Overview of Asset Management

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- **Overview**
  - This section introduces Asset Management and describes the influences, drivers and key concepts
  - The abbreviation AM is used in place of Asset Management
  - A case study is provided
  - AM is like 'birds flying in formation'

Topics

- **What is Asset Management?**
- **Purpose of AM**
- **AM the movie**
- **What does AM do?**
- **Managing Assets in the context of Asset Management**
- **Some questions that AM addresses**
- **Who does AM?**
- **Fundamentals of AM**
- **Historical development of AM**
  - Industry standards
  - Publications, guidelines & requirements including South African legislation & manual

Topics

- **Core Business Model and Decision Support System**
- **Features of an AM business approach**
- **The Total Transportation AM Process**
- **The Need for AM**
  - Business case
  - Operational effectiveness
  - Risk management
  - Compliance
  - Integration
- **Typical benefits**
- **What does good AM look like?**
- **The right environment for AM to flourish**
- **Key AM Concepts**

What is Asset Management?

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- **ISO 55000 defines asset management (AM) generically as**
  - 'A coordinated activity of an organisation to realise value from assets'
- **2018 Austroads defines AM**
  - 'A systematic process of effectively maintaining, upgrading and operating assets, combining engineering principles with sound business practice and economic rationale, & providing the tools to facilitate a more organised and flexible approach to making decisions necessary to deliver optimal community benefits'
- **Other definitions, e.g., UK Roads Liaison Group, AASHTO, PAS 55, OECD, IIMM**
- **AM translates the organisation's objectives into asset-related decisions, plans & activities, using a risk-based approach**

- **AM is not**
  - The domain of a single department or group of people in an organisation that looks after maintenance
  - A 'one size fits all' approach
  - Just a tool or 'an end in itself'
- **AM is a 'whole-of-organisation' approach to creating & maintaining assets which deliver the services valued by the authority's customers in the most cost-effective & efficient manner**
- **AM processes are important in 'institutionalising' the focus on customers and reminding everyone involved that what they do supports the achievement of these outcomes**

Purpose of AM

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- **To provide the required levels of service at the lowest lifecycle cost to present and future road users and customers, using a 'whole-of-agency' approach to the acquisition and management of physical assets**
  - It is important to remember that the key focus should be on conducting AM well, i.e., as good business practice

What is Asset Management?

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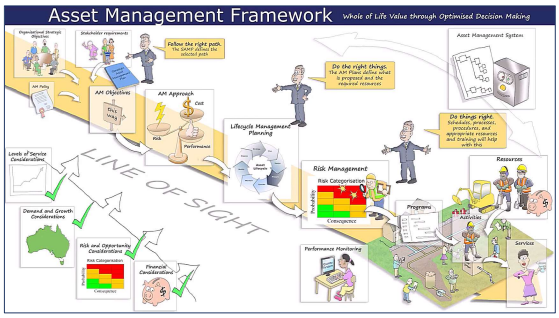
- **Institute of Asset Management video: click on [What is AM - YouTube]() to view**
- **Asset Management The Movie – next slide**



Asset Management - The Movie

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Click on the box to the right to activate the controls and then click on the button ▶ to start the video clip

YouTube link: https://www.youtube.com/watch?v=FNntwJ0jisw

Distributed free by Barnewell Infrastructure Management & Martin Coates https://barnewall.com.au/

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What does Asset Management do?

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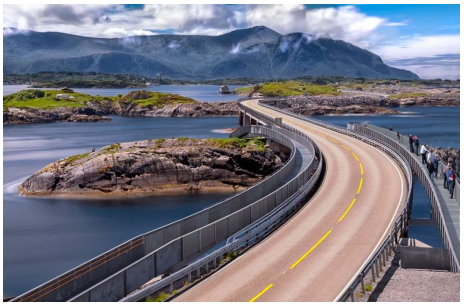
- **It converts the fundamental aims of the organisation into the practical implications for choosing, acquiring (or creating), utilising (operating) and looking after (maintaining) appropriate assets to deliver those aims**
- **It does so while seeking the best total value approach – the optimal combination of costs, risks, performance and sustainability**
- **AM gathers together the knowledge & tools an organisation needs to use for its assets to achieve the organisation's purpose**
- **These techniques & processes allow such an organisation to demonstrate that it is managing its assets optimally – often of great interest to many stakeholders, whether owners, customers, regulators, neighbours or the general public**



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Managing Assets in the context of Asset Management

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- ***'Do you mean Asset Management or Managing Assets?'***
  - ISO/TC 251 WG4 note that '*People and organisations have been caring for assets since mankind first invented tools. Over the years we have derived entire disciplines to help define the best ways to care for those assets through their lives and as such we have been Managing Assets for ever. With the advent of the formal discipline of Asset Management some 20 years ago there has been a development of structured approaches to assure stakeholders that those care activities are focused on deriving value for the organization and not just promoting 'gold-plated' care arrangements* [& vanity projects - MGH]. *In this pursuit Asset Management and Managing Assets are not alternatives.'*
- **Managing Assets (things you do to assets) can be done with or without a structured organisational strategy and context**
  - An organisation gains more value from Managing Assets within a context of organisational purpose and strategy that steers this activity (and AM)
- **A Managing Assets focus**
  - Lifecycle activities & asset care – availability, reliability, dependability & safety
  - Asset location, condition, life extension and/or interventions
  - Asset databases, systems & IT, & performance
  - People, skills and work management
  - Budgets & key performance indicators/ cost of maintenance & current performance

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Managing Assets in the context of Asset Management

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- **AM has a broader focus than Managing Assets, encompassing many organisational levels & applying to all functions**
  - The terms and concepts are explained in ISO 55000 'Asset Management', which shows how the application of broader Asset Management approaches can help you extract most value for stakeholders
- **An Asset Management Focus**
  - The purpose of your organisation and what assets does it need – and why
  - Value, purpose and long-term outcomes
  - Risk and context, e.g., markets / climate / regulation
  - Holistic approach to different funding streams, e.g., CAPEX and OPEX
  - Collaborative behaviours – breaking down silos
  - How assets contribute to organisational value

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Managing Assets in the context of Asset Management

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When you listen, what are others really focused on?	
Managing Assets	**Asset Management**
Your colleagues are focused on • Asset data, location and condition • Current KPIs • Departmental budget	**Your colleagues are focused on** • Information supported by decisions (strategic context and related to customer needs) • Strategies to select and exploit assets over their lifecycles to support business aims • Collaboration across departments to optimise resources allocated and activities

Managing Assets in the context of Asset Management

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Your stakeholders are focused on • Costs • Current performance • Response to failures/ maintaining function	**Your stakeholders are focused on** • Triple bottom line and value • Clarity of purpose of the organisation • Focus on impact of activities on organisation's objectives

Managing Assets in the context of Asset Management

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Your suppliers are focused on • Short term contracts and performance • Service level agreements are focussed on contract specifications	**Your suppliers are focused on** • Long term contracts &/ or partnering relationships in support of client value & objectives • Understanding client strategy and needs in 5-10 years

Some questions that AM addresses

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Perspective	Typical Questions
Organisation & governance	• How do I get my organisation to embrace asset management? • What is the value we get from strategic asset management? • How do I know that what you're telling me is best practice? • Can you demonstrate effective/efficient management of public assets?

Some questions that AM addresses

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Outcomes, objectives & KPIs	• Noting that KPIs are made up of: (a) performance measures, and (b) targets, how do I manage the different focus of 'achievable' vs 'aspirational' targets? • How does a performance framework cater for the different uses of KPIs such as assurance reporting, investment decision-making and performance monitoring? • How do I link objectives, KPIs and programme/ project planning to ensure a 'line of sight'? • How do I link outputs to outcomes?

Some questions that AM addresses

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Funding & prioritisation	• How should limited funding be distributed between asset types, regions, etc.? • What level of funding is required to maintain the network to a given Level of Service? • How will asset management help make portfolio-wide investment decisions? • Why do the roads elsewhere look better than ours?

Some questions that AM addresses

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Funding & prioritisation	• How should limited funding be distributed between asset types, regions, etc.? • What level of funding is required to maintain the network to a given Level of Service? • How will asset management help make portfolio-wide investment decisions? • Why do the roads elsewhere look better than ours?
More technical	• How should I use condition data to assist my decision-making? • Are there any practical examples of implementing theory? • Why don't people want to do what our work shows they should?

Who does AM?

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- **It's vital to remember that people do AM and therefore people, and their knowledge, competence, motivation and teamwork have a huge influence on AM outcomes**
- **Tools and technologies are important, but**
  - Engagement of the workforce
  - Clarity of leadership
  - Collaboration between different departments and functions are the real differentiators of a leading AM organisation
- **AM engages at multiple levels within organisations and their supply chains**
- **It requires people from different functions and disciplines to *work more closely* than they may have done**
- **It also includes contributors from across the organisation, such as**
  - Business strategy, risk & assurance, planning & analytics, engineering, design, construction, operations, maintenance, quality, finance, information systems, safety and security, and environmental awareness
- **As the inter-dependence between activities increases, teamwork & collaboration becomes critical for organisational effectiveness**

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Who does AM?

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- **AM is a team effort!**
  - The AM team requires executive sponsorship
- **At the enterprise or divisional level, the team concept provides a broad base of knowledge & skill to support AM, and it allows representation across the asset lifecycle and across the organisation**
  - No matter the size of the organisation, the team should be representative of the organisation and have executive sponsorship
- **The concept of 'line of sight' means that everyone who touches or influences what happens to an asset is involved in AM**
  - This brings into scope functional teams at the production level
  - It also means that teams often include members from outside the core of the organisation, including suppliers, consultants and in some cases customers
- **An AM system (AMS) can enable all those involved in AM activities to understand how their roles relate to those from other functions and/or levels that are covered by the AMS**

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Fundamentals of Asset Management

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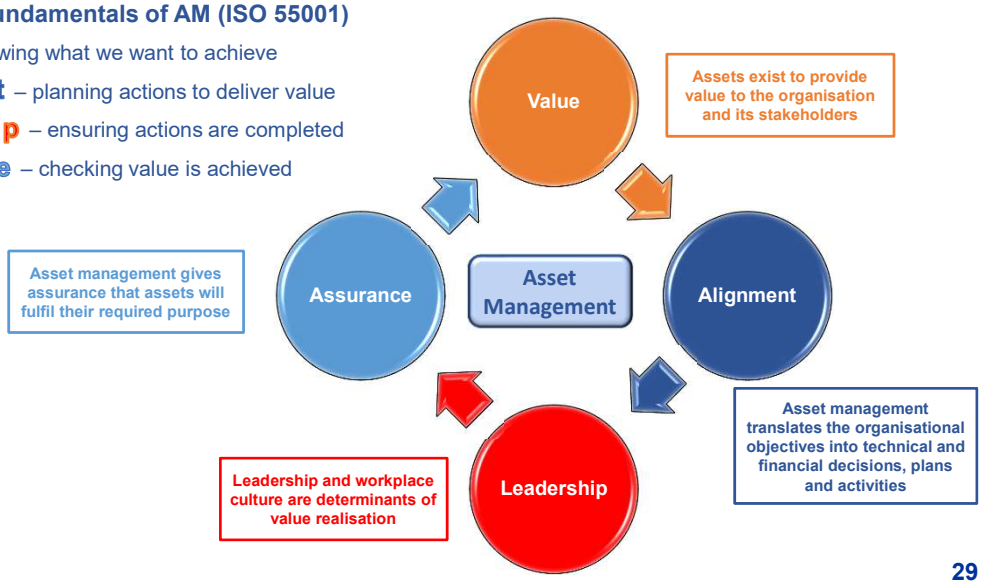
- **There are four fundamentals of AM (ISO 55001)**
  1. **Value** – knowing what we want to achieve
  2. **Alignment** – planning actions to deliver value
  3. **Leadership** – ensuring actions are completed
  4. **Assurance** – checking value is achieved



Fundamentals of Asset Management

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- **Value**
  - Means knowing what we want to achieve
  - Might be tangible & financial, or not
  - Is multi-faceted
  - Is a whole of life proposition
  - Must be understood to make good AM decisions
  - Is determined by internal & external stakeholders

Assets exist to provide value to the organisation and its stakeholders

- **Alignment**
  - Means planning to deliver value
  - Results in clear, achievable, resourced actions
  - Requires
    - Horizontal & vertical traceability of value
    - Information, decision tools & processes
    - Cross-functional integration & coordination

Asset management translates the organisational objectives into technical and financial decisions, plans and activities

- **Leadership**
  - Means ensuring the actions are completed
  - Starts at the very top
  - Drives the workplace culture over time
  - Requires
    - Commitment & discipline at all levels
    - An adequate, competent workforce
    - Clear roles/ responsibilities/ authorities

Leadership and workplace culture are determinants of value realisation

- **Assurance**
  - Means checking that value has been achieved
  - Covers
    - Action completion and effectiveness
    - Assets, AM and the AM system
  - Includes measures (KPIs, audit), analysis and continuous improvement

Asset management gives assurance that assets will fulfil their required purpose

- **More on these topics later…**

Fundamentals in action

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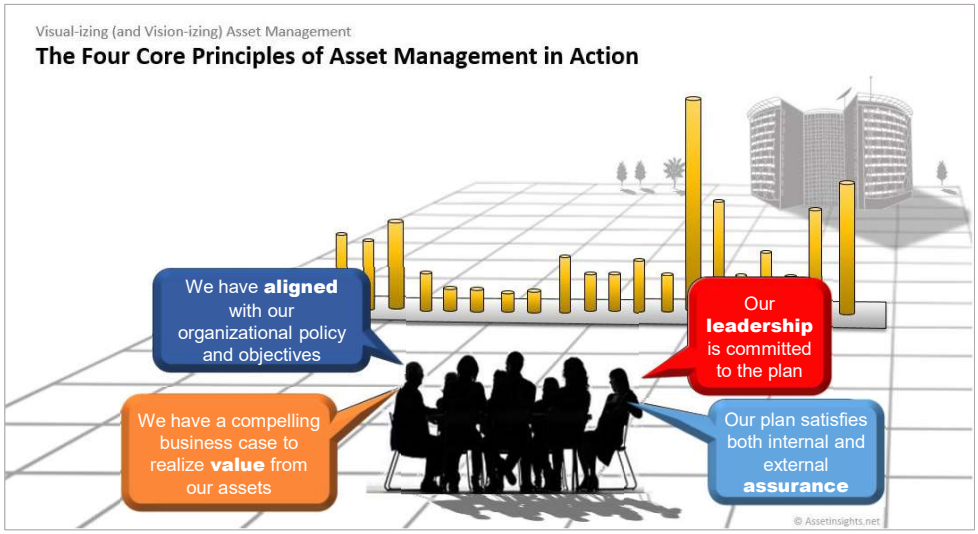

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Which path to value?

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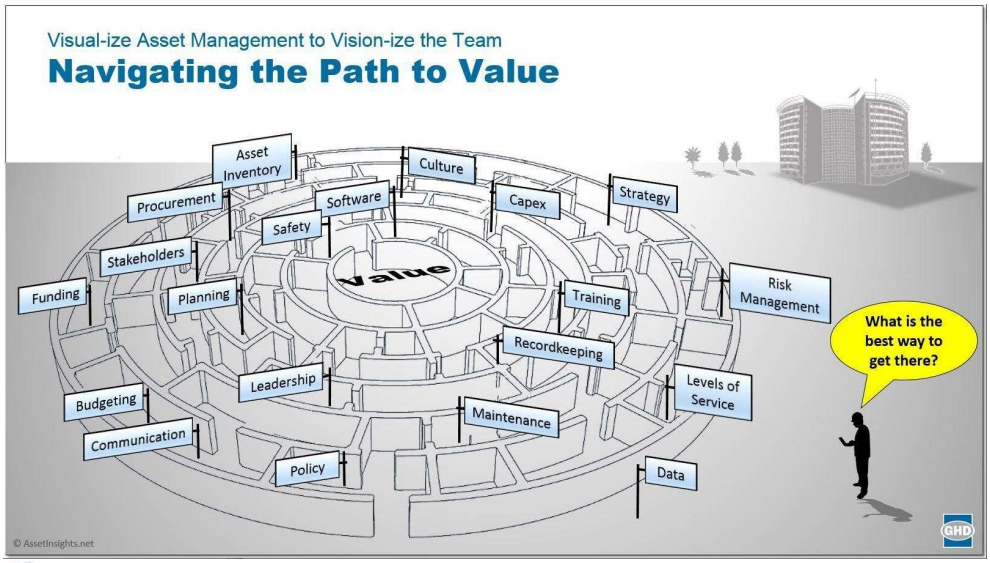

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3 Levels of Asset Management

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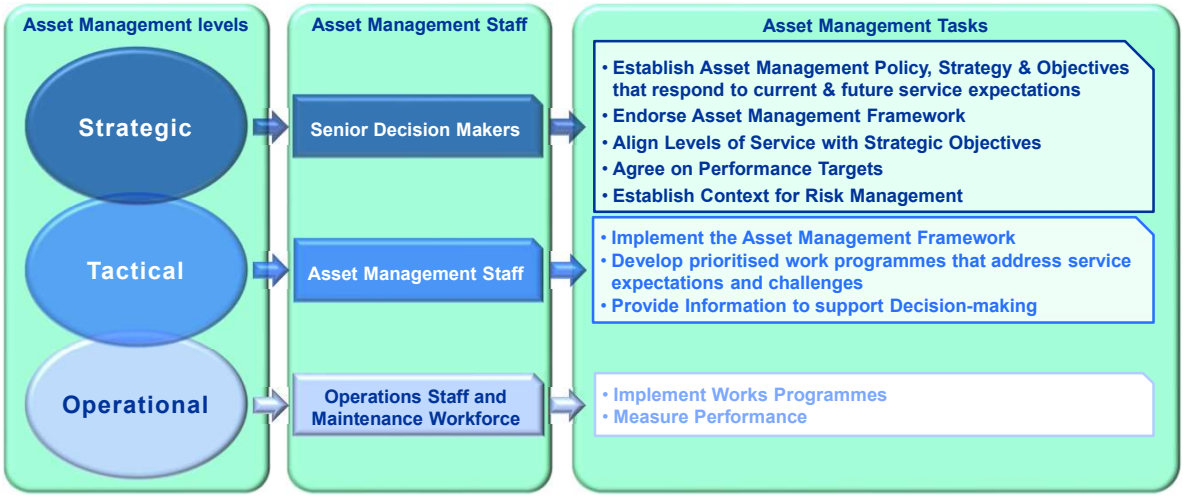

Adapted from Highway Infrastructure Asset Management Guidance Document Department for Transport, UK, 2013 and Austroads Guide to Asset Management - Overview Part 1: Introduction, 2018

Historical development of Asset Management

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- **Managing assets is not new**
  - People have been managing assets for thousands of years, sometimes not very successfully…
- **What has changed is the cumulative recognition of what good AM involves**
  - The optimisation of cost, risk performance, resources and benefits over the whole asset life (time), within any absolute constraints
- **AM has evolved over several decades and has learned from and incorporated other disciplines and techniques**
- **Although the beginnings stem from the industrial age, the realisation commenced in the 1970s that the effective management of assets involved more than simply reactive maintenance**
- **There was a gradual evolution of different corporate approaches to the management of the business, and the management systems and frameworks that have supported them**

Pont du Gard, Provence, France. Photo: ©MG Henderson

Saint-Bénézet Bridge, Avignon, France. Photo: ©MG Henderson

Evolution of Asset Management for 6+ decades

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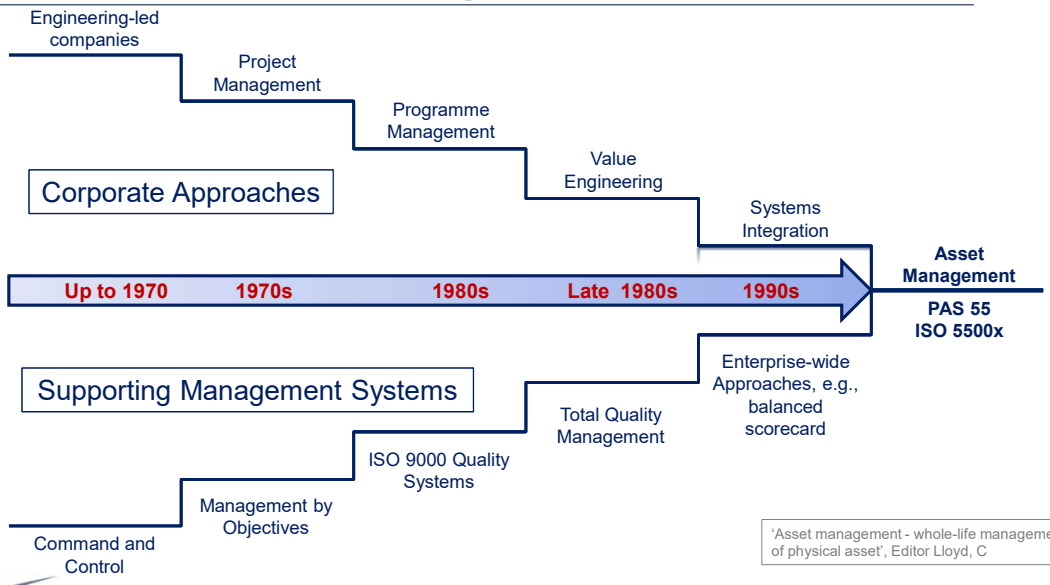

'Asset management - whole-life management of physical asset', Editor Lloyd, C

Early attempts in the UK, Australia & New Zealand

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- **1970 UK Department of Industry established the Committee for Terotechnology (from the Greek 'to care for')**
- **1975 The committee published 'Teratechnology. An introduction to the management of physical resources'**

  'A combination of management, financial, engineering, building and other practices applied to physical assets in pursuit of economic life cycle costs'
- **1977 BSI BS3843 'Guide to Terotechnology (the economic management of assets)'**
  - Last updated in 1992

- **1984-87 South Australian public sector 'True cost of services' & 'Cost and timing of asset replacement' resulting the 1st government task force on AM**
- **1988 Nick Geiner, new Premier of NSW, stated that 'the government should be run as efficiently as the private sector'**
  - 1st NSW Water Industry seminar on AM
  - 1993 1st NSW Public Sector 'Total Asset Management Manual'
  - 2006/2009 Austroads 'Asset Management Guide'
- **1995 New Zealand Asset Management Support Group established (NAMS)**
  - 2002 NAMS International Infrastructure Management Manual published

…and in North America

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- **1988 US National Council on Public Works 'Fragile Foundations' report**
  - 1999 US DoT 'Asset Management Primer'
  - 2000 ASTM Property Management Systems guidelines
  - 2002 AASHTO Asset Management Guide
  - 2011 AASHTO Asset Management Guide – A Focus on Implementation
- **Moving Ahead for Progress in the 21st Century (MAP-21)**
  - A streamlined, performance and outcome-based surface transportation programme
    - Asset management is a key enabler
    - Required to develop risk-based asset management plans; or federal funding cut

- **2004 Canadian NRCC publishes 1st 'Municipal Infrastructure Asset Management' guide**
- **2009 PSAB 3150 requirement of public assets' amortized valuation**
- **Canadian Asset Managers Network (CNAM) founded**

Industry Standards

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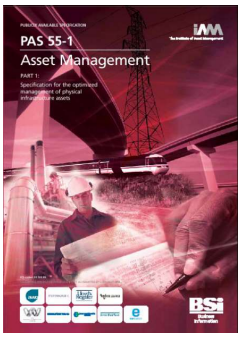
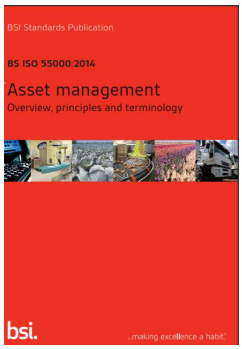
- **2004 BSI PAS 55 published '*Optimized management of physical assets*'**
  - Part 1: Requirements specification
  - Part 2: Implementation guidance
- **ISO 55000/1/2 published February 2014**
  - ISO 55000 Overview, principles and key terms in Asset Management
  - ISO 55001 Asset management: management systems - requirements
  - ISO 55002 Guidance for implementation of ISO55001, revised in 2018
  - Now SANS ISO 55000:2016 – Asset Management
- **ISO 17021 part 5 Asset Management competency requirements for auditors of ISO 55001**





Some publications, guidelines and requirements

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Nationalities	Publications, guidelines and requirements
Australasia	• Austroads Guide to Asset Management • Australian Transport Assessment and Planning (ATAP) Guidelines
South Africa	• TMH 22 – Road Asset Management Manual (draft) • Mandatory requirements of Government Immovable Asset Management Act 19 of 2007
United Kingdom	• Institute of Asset Management (IAM) publications • Transport Research Laboratory (TRL) publications • Mandatory requirements, in particular the Highways Maintenance Efficiency Programme (HMEP)
USA	• American Association of State Highway & Transportation Officials (AASHTO) Asset Management Guides • Federal Highway Administration (FHWA): various publications, guidelines and requirements • Transportation Research Board (TRB): various publications • Mandatory requirements, in particular the 2012 Re-Authorization Bill and Moving Ahead for Progress in the 21st Century (MAP-21)
Other international peak bodies	• World Road Association (PIARC) Asset Management Manual, publications and guidelines • Institute of Public Works Engineering Australia International Infrastructure Management Manual & other publications and guidelines • Global Forum on Maintenance and Asset Management (GFMAM) Asset Management Landscape • Asset Management Council, Australia: various publications

South African Asset Management Legislation

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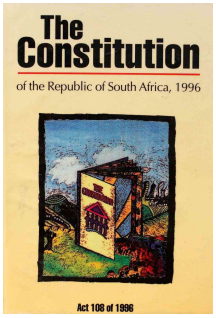
- **Constitutional mandate to manage the road network**
- **Government-wide immovable asset management (GIAM) policy**
  - Approved by Cabinet on 17 August 2005
  - The objective of the policy: to introduce a government-wide immovable asset management framework which will be implemented through the promulgation of the GIAM Act
  - Applicability of the policy, which includes provincial government departments
- **Conclusions**
  - Immovable assets have to be managed throughout their lifecycle within a framework of cost effectiveness, efficiency and reduced risk



SA Asset Management Legislation & TMH 22

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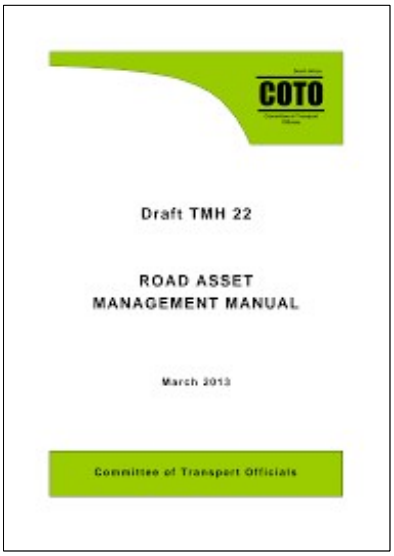
- **Government-wide immovable asset management Act covers**
  - Principles of immovable asset management
  - Immovable asset management plan, its contents and submission to Treasury, revision and amendment annually
  - Compliance, which is mandatory. A standard issued by the Minister in terms of this Act is compulsory. The Minister may incorporate any guideline issued in terms of this Act or any best practice or part thereof into that standard; and
  - Offences and penalties for non-compliance with the Act
- **Treasury adopted TMH 22: Road asset management manual (draft) as the best practice guideline for production of the strategic Road Asset Management Plan (RAMP)**
  - TMH 22 was informed by the draft ISO 55001 (2014) before it was published



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Approx. 10:00 am

Body break 5 minutes
Questions 10 min

AM as a Core Business Model & Decision Support System

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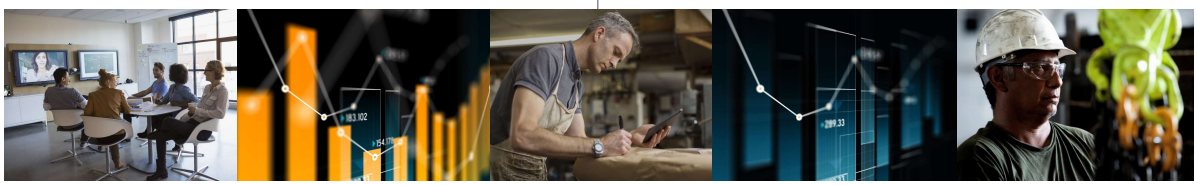
- **AM is a '<u>whole of organisation</u>' business approach configured to the needs of both the organisation and its customers, and which includes decision support systems and business processes**
- **AM processes are important in focussing on customers and reminding everyone involved that what they do supports the achievement of these outcomes**

- **Key concepts**
  - Recognises the needs of customers
  - Whole-of-organisation approach
  - Sequence of integrated business processes
  - Not a 'one size fits all' approach



Features of an AM business approach

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- **Recognising Customer Needs**
  - Road agencies provide services to a wide range of customers, many of whose needs and expectations differ or are in conflict
  - These groups typically include private motorists, tourists, commercial users, heavy vehicle drivers, cyclists, pedestrians, and utilities with their own infrastructure in the road corridor, etc.
- **Whole of Organisation Approach**
  - AM is a core business activity that involves most functions across an organisation, a theme that is emphasised in ISO 55001
  - Departments/ business functions that should be involved with AM include
    - Planning; Capital Projects; Operations and Maintenance; Finance; Human Resources; Information Technology; Customer Services; Risk and Quality

- **Sequence of Integrated Business Processes**
  - AM is a sequence of processes aimed at achieving a road agency's goals and objectives
    - These processes are termed an 'AM cycle' (IIMM Guide) and a 'conceptual model' (IAM). They are complementary and are further discussed in relation to roads assets
  - These processes are about
    - Understanding and defining what services the assets are to deliver – both now and within the future planning horizon
    - Determining which strategies will be the most effective in terms of delivering the services, considering both lifecycle costs and risk
    - Supporting capabilities, processes and tools to enable effective planning and decision-making

Features of an AM business approach

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- **AASHTO states an AM perspective**

  'involves the collection and integration of multiple practices into a coherent and managed whole, the establishment of new approaches to AM problems, and the linkage of business processes to measures of an agency's mission and goals'

- **Agencies vary widely in the effectiveness of business processes, particularly the ability to maximize the accomplishment of the agency mission using AM**
- **There is no 'one size fits all' AM solution for an agency**

- There are many reasons why the appropriate level of AM practice varies among/ within organisations
  - Agencies vary in their level of AM maturity, knowledge, experience, political and physical environment, & resources
  - Some aspects, such as consultation with customers over levels of service, may be new to an agency
  - Agencies may wish to integrate other aspects, such as demand forecasting, risk management, asset criticality, asset valuation, & cost optimisation
  - The characteristics of different transport networks vary considerably, for example
    - The needs of a sparsely populated rural area may differ significantly from those of a major metropolitan area or of an interprovincial system

The Total Transportation AM Process

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- **AASHTO suggests that the Transportation Asset Management (TAM) needs to be embedded in the <u>business planning processes</u> of an agency, from strategic through tactical to operational planning**
- **TAM includes the development of AM policy, an organisational statement that can establish the framework for securing alignment and providing direction for AM planning**
  - It extends through producing and using the TAMP to daily operation of facilities and reporting on the achievement of programmes and outcomes
  - TAM can be visualized as a sequence of integrated inputs, business processes, & outputs as illustrated in the figure in the next slide

- **TAM is therefore wider than a simple focus on maintaining or preserving assets**
  - TAM follows a path from the inception of the need for an asset to its creation, operation, maintenance, preservation, replacement, reconstruction, improvement, and possible eventual disposal
  - TAM is more than just tools, but rather, it represents the integration of tools with organisation, leadership, people, and business processes
  - It incorporates other important processes such as risk management and sustainability

The Total Transportation AM Process (AASHTO)

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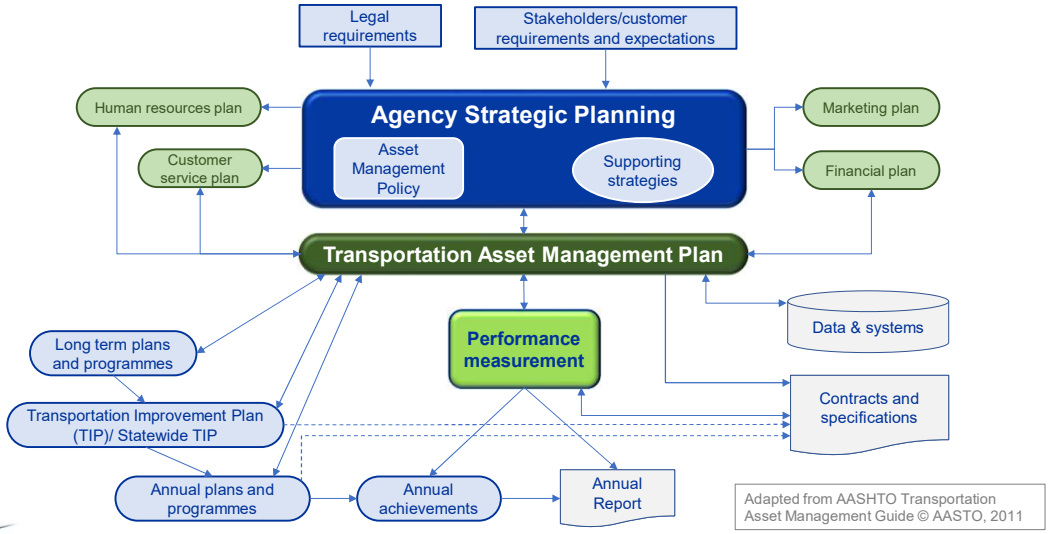
AM drivers and relationships



Adapted from AASHTO Transportation Asset Management Guide © AASTO, 2011

The need for Asset Management

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- **Roads and associated infrastructure are vital links in the chain of communications providing access & mobility for communities & industry**
- **Roads provide a means for safely and efficiently moving goods and services, enabling economic growth and prosperity**
- **The substantial investment in infrastructure justifies robust, long-term management practices**
- **Effective stewardship – the responsible planning and management of resources – is**
  - Essential to help ensure public safety
  - For retaining the value and serviceability of these assets for future generations, and
  - For providing best value to users and investors

The Business Case for Asset Management

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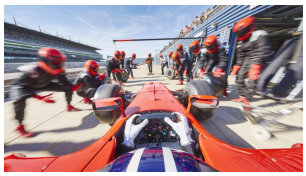
- **A traditional business case for AM focusses on cost savings through reduced operations & maintenance costs, along with improved productivity through increased reliability & availability**
- **Other elements that may prove equally important**
  - Effective management of value, risk and liability
  - Good governance & a good understanding & control of assets can improve stakeholder confidence
  - Effective AM improves both personal safety & process safety, reducing the risk of injury & catastrophic events
  - Assets contribute to the reputation & image of the organisation

  - Improved understanding of asset performance through improved data & analytics
  - The management of outsourced services is more effective with AM in place
  - The projected profit & loss account & cash flow statement
  - Safety, health & security programmes require current asset knowledge
- **A key role of AM is to assure the delivery of value, in line with**
  - Agreed performance
  - Return on investment and/ or Return on Net Assets
  - Required residual risk profile – safety, asset reliability, reputation, etc.



Organisational Effectiveness case for AM

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- **AM provides the means to improve aspects of organisational effectiveness**
  - Boards of Directors, and political office bearers will use it as a tool for assurance
  - Chief Executive Officers find it to be a powerful tool in resolving conflicts among divisions over resource allocation
  - Chief Financial Officers will use it as a source of data to improve integration and performance
  - Public Relations Officers expect to use it as a way to improve image & reduce or deflect exposure from incidents
  - Asset related managers see it as the way to improve their influence and budget
  - Operations & Maintenance workers expect it to help them improve working conditions & job satisfaction
  - The majority of employees favour sound environmental policies & practices related to asset maintenance

Improved Risk Management

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- **An organisation's assets are often the leading edge of its exposure to external risk**
  - Bridges and roads are exposed to environmental risks from weather and climate change
  - Road infrastructure is exposed to increasing safety and security risk
  - Resource depletion or constraints
  - Poor economic conditions
- **Risk also arises from internal circumstances, including the construction, operation, maintenance and disposal of assets**
- **AM's risk-based approach supports organisations in strengthening their resilience to external risks, enabling better control & mitigation of risks that can arise from the management and operation of assets**

- Where assets have been neglected, these can often be more appropriately managed by systematically assessing and taking account of their potential risk to the organisation
- This approach is particularly useful for assets nearing the end of their useful life

Photo: ©MG Henderson

Supporting compliance with Financial Reporting Obligations

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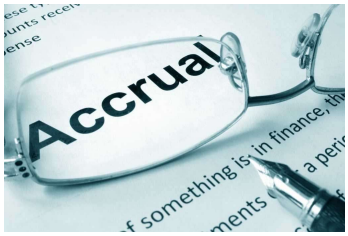
- **A technically and financially integrated AM system allows compliance with the general features of Generally Recognised Accounting Practices**
  - This enables organisations to meet their financial reporting objectives
- **Accrual accounting**
  - Requires organisations to understand the relationship between their operational and capital expenditures (related to physical assets) and the delivery of the required value to that organisation
  - Requires transactions to be recorded at the time they are agreed, rather than at the time that cash of equivalents change hands

- **Materiality and aggregation**
  - Every material class of similar items has to be presented separately
  - Component accounting is mandatory – if fixed assets comprise two or more major components with substantially different economic lives, each component should be accounted for separately for depreciation purposes



Source: Corporatefinanceinstitute.com

A Framework to integrate other standards

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- **An organisation may need to use and apply thousands of technical standards, codes, and industry guidelines**
  - These standards address the performance requirements and issues related to AM
- **AM does not replace other existing disciples, but provides a framework where these can be used more effectively to deliver value by helping to describe and communicate the context in which the other disciplines can be applied and integrated, e.g.**
  - Risk management (ISO 31000)
  - Systems engineering (ISO/IEC 15288)
  - Quality management (ISO 9001)
  - Reliability engineering (ISO 2394), etc.
  - Other internal business/ management systems, e.g. financial, health & safety or risk management

Case Study: Business Case for AM

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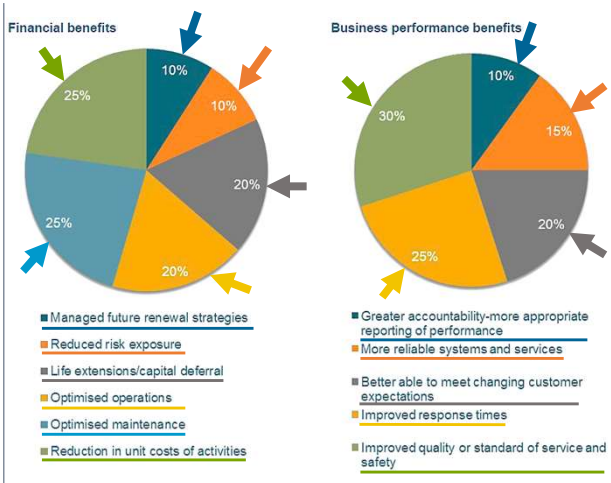
- **Water Services Association of Australia**
  - The following information is based on the outcomes of international surveys undertaken by GHD Pty Ltd from various sectors and recorded in GHD's corporate knowledge database (unpublished)
  - The nature of the financial and business performance benefits achieved through the implementation of AM programmes is shown in the pie charts on the right



'Effective implementation of an asset management improvement program', Teske, C, Proceedings of the ICOMS asset management conference, Gold Coast, Australia, 2011, paper 21, 12 pp

Typical benefits of AM according to ISO 55000

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Benefit	Examples
Improved financial performance	• Improving the return on investment and reducing cost, while preserving asset value and without sacrificing the short- or long-term realisation of organisational objectives

Typical benefits of AM according to ISO 55000

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Benefit	Examples
Improved financial performance	• Improving the return on investment and reducing cost, while preserving asset value and without sacrificing the short- or long-term realisation of organisational objectives
Informed asset investment decisions	• Using a consistent, documented, balanced-scorecard approach involving cost/benefit analysis on the lifecycle costs of both asset and non-asset solutions, including demand management • Having improved decision tools which consider costs and benefits of alternative solutions, prioritisation of investments and interventions. • Enabling the organisation to improve its decision-making and effectively balance costs, risk, opportunities and performance

Typical benefits of AM according to ISO 55000

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Better managed risk	• Reducing risk exposure through application of a structured risk mitigation framework for assessing, quantifying and mitigating risks related to AM and service delivery • Reducing financial losses, improving health and safety, good will and reputation, minimising environment and social impact, can result in reduce liabilities such as insurance premiums, fines and penalties

SARF better roads

Typical benefits of AM according to ISO 55000

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Benefit	Examples
Improved services & outputs	• Improving understanding of asset capabilities and their limitations in delivering or meeting service requirements • Assuring the performance of an asset can lead to improved services or products that consistently meet or exceed the expectations of customer and stakeholders

SARF better roads

Typical benefits of AM according to ISO 55000

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Benefit	Examples
Improved services & outputs	• Improving understanding of asset capabilities and their limitations in delivering or meeting service requirements • Assuring the performance of an asset can lead to improved services or products that consistently meet or exceed the expectations of customer and stakeholders
Demonstrated social responsibility	• Improving an organisation's ability to, for example, reduce emissions, conserve resources and adapt to climate change, enables it to demonstrate socially responsible and ethical practices and stewardship

Typical benefits of AM according to ISO 55000

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Demonstrated compliance	• Transparently conforming with legal, statutory & regulatory requirements, & adhering to industry 'best appropriate practice' in AM standards, policies & processes

Typical benefits of AM according to ISO 55000

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Benefit	Examples
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Enhanced reputation	• Gaining and enjoying an enhanced reputation by having the confidence of legal, statutory & regulatory authorities & the satisfaction of informed customers & stakeholders

Typical benefits of AM according to ISO 55000

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Enhanced reputation	• Gaining and enjoying an enhanced reputation by having the confidence of legal, statutory & regulatory authorities & the satisfaction of informed customers & stakeholders
Improved organisational sustainability	• Effectively managing short- and long-term assets maintenance and renewal requirements over the long term, including their expenditures and performance

Typical benefits of AM according to ISO 55000

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Enhanced reputation	• Gaining and enjoying an enhanced reputation by having the confidence of legal, statutory & regulatory authorities & the satisfaction of informed customers & stakeholders
Improved organisational sustainability	• Effectively managing short- and long-term assets maintenance and renewal requirements over the long term, including their expenditures and performance
Improved service efficiency & effectiveness	• Concentrating on understanding customer and stakeholder needs and desires. • Reviewing and improving processes, procedures and asset performance

What does good Asset Management look like?

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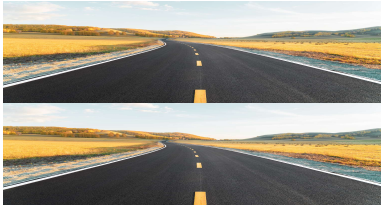
Sweating the assets?

Maintaining them?

Purchasing or creating the right assets?



Distinguishing characteristics of good AM

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- **Holistic and multi-disciplinary**
  - Looking at the whole picture, i.e. the combined implications of managing all aspects
  - AM crosses departmental & disciplinary boundaries & is focused on creating or increasing 'value' – whether this be tangible or intangible, financial or nonfinancial
- **Systematic**
  - A methodical approach, applied consistently and sustainably, promoting consistent, repeatable & auditable decisions & actions
- **Systemic**
  - Considering the assets in their systems context, and optimising the asset systems value
- **Risk-based**
  - Consideration of risks and liabilities is inherent in all decision-making
  - Focussing resources & expenditure & setting priorities, appropriate to the risks & associated costs & benefits
- **Optimal**
  - Seeking the best value compromise between competing factors, such as costs, risks, opportunities and performance over the asset lifecycle
- **Sustainable**
  - Considering the long term consequences of short term activities to ensure that adequate provision is made for the future requirements & obligations, e.g. economic or environmental sustainability, system performance, societal responsibility, etc.
- **Integrated**
  - At the heart of good AM lies the need to be joined-up
  - Recognising that interdependencies & combined effects are vital to success
  - This requires that a combination of all the above attributes are coordinated to deliver a joined-up approach & net value – the total jigsaw puzzle needs to work as a whole, & be more than the 'sum of the parts'

Distinguishing characteristics of good AM

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- **Integrated *continued***
  - Good AM is characterised by strong coordination vertically across the organisation, from strategic to operational level – figure on right shows
    - The connections run from strategic planning, though Service Levels to Tactical Planning and through Budgets, work strategies & programmes and performance targets to Operational & Service Delivery Planning
  - Equally important is coordination across organisational boundaries to enable sharing of AM resources and expertise & coordination of strategies & programmes
  - Strategic planners, financial managers & asset managers need to work closely in determining LOS & financial targets as these provide a key link between the strategic & tactical plans

Adapted from © IPWEA, 2015

AM answers many important questions

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- Do you understand the risk profile associated with your asset portfolio and how this will change over time?
- Can you demonstrate the business consequences of reducing – or increasing – your capital investment or maintenance budgets by 10% over the next 5 years?
- Can you justify your planned asset expenditures to external stakeholders?
- Can you easily identify which investment projects to defer when there are funding or cash flow constraints?
- Do you have the appropriate asset data and information to support your AM decision-making?
- Do you know if your people have the right competences and capabilities to manage your assets?
- Do you know which AM activities to outsource?

The right environment for AM to flourish

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- To flourish, AM must have the right environment
- Good leadership, competent people, & a suitable management system are vital, & supported by the following elements
  - Culture and common mental maps
  - Technology
  - Organisational structure
  - Business processes
  - Learning
  - Communication
  - Good relationships & positive emotions
  - An effective reward system
- These elements provide the foundation for good AM
- It is imperative that all these elements function together if the desired outcome is to be achieved

Key Asset Management Concepts

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- **Important contemporary AM concepts should be explicitly recognised in a road agency's policy and strategy and in the 'way the agency works' on a day-to-day basis**
- **These concepts are emphasised in ISO 55001, the IIMM and other international references**
  - Asset stewardship
  - Optimisation
  - Lifecycle agency costs vs total transport costs
  - Continuous improvement

Asset Stewardship

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- **Stewardship:** *'the careful and responsible management of something entrusted to one's care' (Mirriam-Webster dictionary)*
- **Effective stewardship is essential in retaining the value and serviceability of road assets for both current and future generations, & for providing best value to users & investors over the long term**
- **It can be demonstrated through the proper long-term financial management of assets**
- **The objectives of asset stewardship are shown in the table below**

Key objectives	Description
Make fair long-term decisions	Make decisions today that do not compromise the ability of future generations to enjoy similar transport services as current generations, putting aside changing technology
Fair and equitable pricing	Ensure that road users today and tomorrow pay a fair and equitable price for equivalent or similar levels of service and access to the road network
Effective management of lifecycle costs	Avoid work which may be a short-term quick fix, but which leads to significantly higher future costs or elevated risks that other road users have to bear

Asset Stewardship

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➢ **Characteristics of road networks that road agencies need to recognise to be effective stewards are shown below**

Key characteristics	Description
Roads are long life assets	• Stewardship is relevant to organisations responsible for managing road assets for both current and future generations of users • Stewardship has an organisational dimension as long-life assets such as bridges and pavements that typically outlive existing staff • Future managers and personnel will inherit the legacy of AM decisions made by today's managers and personnel
Roads are for communities	• Government regulatory bodies are aware of the need for demonstrated, sustainable management of long-life public infrastructure assets, particularly where originally funded by government grants • Treasury have required accounting for the whole-of-life costs of municipal public assets, using accrual accounting practices, valuation methodologies and consideration of depreciation in financial planning, but not for provincial long life assets which cannot be effectively managed without these practices in place

Asset Stewardship

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Key characteristics	Description
Roads are utility corridors	• Roads and associated infrastructure are also vital in providing corridors for other utilities which modern society depends on, e.g. electricity, gas, water and waste water, telecommunications • The space within road corridors in cities will often need to be carefully managed to ensure that all utilities can safely and efficiently construct and maintain their network infrastructure over the life of their assets • Utilities are important customers and stakeholders
Risk and resilience are important	• Roads must be able to provide hospital facilities, emergency services and other essential services with reliable access to deal with major events (e.g., sport), disasters (e.g., floods, fires, earthquakes, cyclones) & service disruptions (e.g., storms, blackouts) • A resilience approach that addresses physical and organisational dimensions is necessary to safeguard assets and ensure that the organisation can respond to hazards and continue to deliver safe accessibility • Resilience is also about ensuring that the organisation has the systems, processes, arrangements, and people in place so that it is able to quickly respond, adapt and recover should a major event occur

Optimisation

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- **Doing AM well means**
  - Having the right processes for investment planning and prioritisation
  - Making the right trade-offs between maintenance and capital expenditure
  - Being able to successfully balance the costs of providing the service against the risks to loss of service
- **Two approaches to optimisation are**
  - Making trade-offs across the three dimensions of service, risk and cost
  - A framework which 'values' the relative benefits that different solutions offer
- **Risk/ Cost/ Service balance**
  - AM addresses the issues of level of service (LoS), risk and cost in a coordinated and integrated way
  - E.g., when funding is constrained, what is the most important service to the customers?
  - What assets, if they failed or were no longer available, would have the greatest impact on customers?
  - What activities, works and programmes should be carried out first?
  - What impacts would there be if some assets were allowed to fail before they were replaced?
  - Is the agency fully aware of the long-term financial implications of the decisions they make?
  - AM is 'standards driven'. In order to optimise, there must be criteria or standards against which optimisation can be measured
    - Standards can relate to a level of service, a minimum condition or performance level of the asset, or an acceptable risk tolerance
    - The standard of work carried out on assets can also be described and is measurable

Optimisation - dimensions

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- **Explanation of dimensions**
  - **Levels of service** represents the service provided to road users: criteria such accessibility, journey reliability, safe journeys, etc., usually determined by
    - Customer expectations balanced with the price willing to be paid
    - Legislative requirements which may impose minimum standards & penalties for not meeting them
    - Internal strategic objectives, the availability of resources and financial constraints
  - **Risk**: represents the possible consequences arising from loss of service, including
    - Crashes
    - Impacts of hazard events such as storms, fire, etc.
    - Road/ bridge deterioration due to lack of maintenance or poor construction
    - Other service disruptions
  - **Cost**: represents the lifecycle costs needed to provide and maintain the assets
    - Capital investment costs
    - Operational and maintenance costs
    - Asset rehabilitation and renewal costs
    - Disposal costs
- **More on risk later…**
- **Factors for consideration if the correct balance between risk and financial budgets for agreed LoS is to be achieved**
  - If the agency has a low risk tolerance, then funding needed to maintain the same levels of service is likely to be greater
  - A higher risk tolerance means that the agency accepts an increased exposure and a higher level of adverse consequences to customers
  - Should funding be reduced then the level of risk to service continuity is likely to increase

Optimised trade-offs

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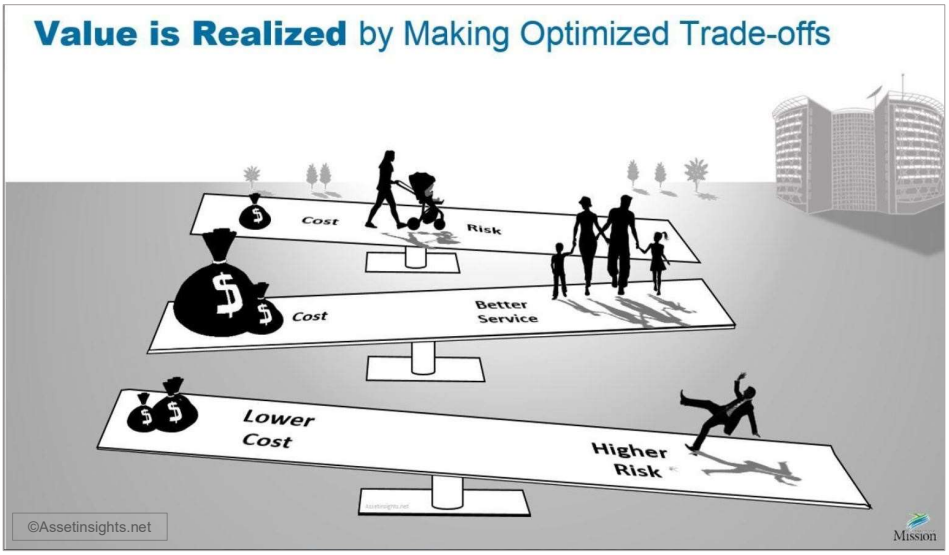

Optimisation - Risk-Cost-Service balance

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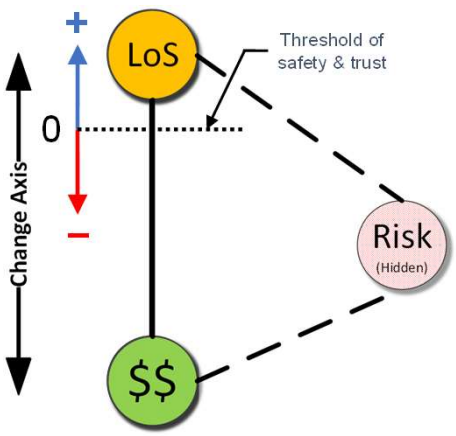
- Asset managers may choose to optimise against 1, 2 or all 3 criteria simultaneously, with increasing levels of analytical sophistication required
- Ideally, the optimisation process should address all three: ISO 55001 and the IIMM emphasise the importance of balancing the competing elements of service level-cost-risk diagram ►►►
- There is a threshold level of safety and trust below which it becomes dangerous and expensive to reinstate the safety
- **It is difficult to restore trust once it has been lost** ☹

Service level-cost-risk diagram



Ross Waugh, Deighton User Conference 2016

Two optimisation approaches

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- **Benefits approach to optimisation**
  - An alternative high level way to approach the question of optimisation is by determining the relative benefits that different programme and project scenarios offer
  - This approach offers a more qualitative means of establishing programme priorities than the more analytically focussed optimisation method
- **Lifecycle Costs vs Total Transport Costs**
  - Agency (lifecycle costs) are the direct costs that an agency incurs in planning for, developing, maintaining, renewing and eventually disposing of physical assets
  - The optimisation process should always address the question of lifecycle costs in determining the long-term funding needs of the asset
    - Asset managers need to ensure that lifecycle costs are minimised in providing a given level of service

- It is also important to consider the wider 'system or social costs' of transport
  - Total transport costs include the costs incurred by road users, such as vehicle operating costs, travel time & crash costs
- When making capital investment decisions, the benefits to road users need to be factored into the decision-making process
- These benefits can be quantified in monetary or economic terms and may include
  - Improved levels of service (e.g. road widening which delivers shorter or more reliable journey times) or
  - Reduced risk, e.g. crash barrier installation improving highway safety
- Maintenance activities can also have an effect on the LoS and risk to road users, e.g.
  - Resurfacing to improve carriageway smoothness and skid resistance offers economic benefit to all road users

Two optimisation approaches

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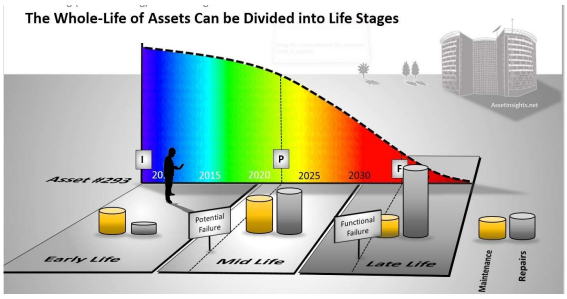
- **Lifecycle Costs vs Total Transport Costs** *Continued*
  - When considering costs, there are therefore two approaches which can be used depending on the type of decisions the agency wishes to make
    - For reasons of internal economic efficiency or
    - To maximise economic utility for both road users and the road agency



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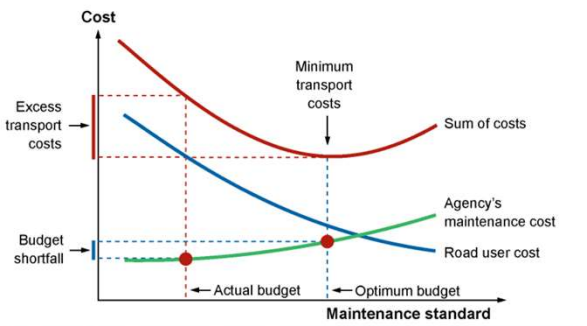

Figure 2.4.11.1 Comparaison of total cost streams against a minimum standard (HDM-4, 2004)

Asset Management Manual, ©PIARC 2019

Optimisation of Asset Lifecycle for AM decision making

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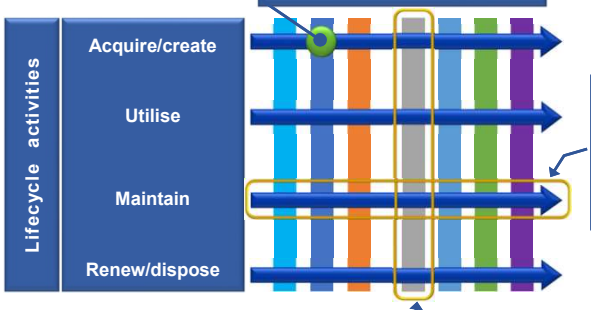
1. Specific intervention optimisation
Is it worth doing and, if so, when?
(cost/benefit/risk/timing)

Portfolio of assets & systems
(types, criticalities, condition, performance)



3. Activity programme optimisation
What is the best combination and timing of projects?
e.g. capital investment programmes, outage strategy
(cost/benefit/risk/timings)

2. Asset lifecycle optimisation
What is the best mix of investment, utilisation, maintenance, lifespan & risk?
(cost/benefit/risk/sustainability)
a. Individual assets (whole lifecycle)
b. Asset system integration level (performance sustainability)

'Asset management - whole-life management of physical asset', Editor Lloyd, C

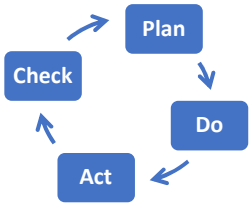
Implementation & continuous improvement

©Mervyn Henderson Consulting

- **Implementation & continuous improvement in AM practices**
  - Good AM establishes, implements, maintains and continually improves an AM system, including the processes needed and their interactions (ISO 55001:2014, Clause 4.4)
    - AM is a way of doing business in the broadest sense
      - It is not simply about implementing certain activities to achieve specified technical standards, nor is it primarily concerned with the application of modern software tools, although each has a role to play
    - AM is also about delivering better performance and results through appropriately targeted investment in the introduction and improvement of people skills, products and processes – the ultimate goal is to deliver benefits to all road transport stakeholders

- AM improvement is therefore different to asset improvement or managing assets
  - Asset improvement is about constructing new assets & improving existing assets to provide increased levels of service, and to gain benefits from improved service lives or from reduced operating and renewal costs
  - AM improvement is a continuous process of improving the way AM is conducted in an organisation and the skills of those at all levels conducting it
  - The difference between AM and managing assets has been dealt with earlier

Plan-Do-Act-Check continuous improvement cycle



Implementation & continuous improvement

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A great nation is like a great man: When he makes a mistake, he realizes it. Having realized it, he admits it. Having admitted it, he corrects it. He considers those who point out his faults as his most benevolent teachers.

Lao Tzu, 6th century BC

Shooting the messenger: South African culture?

©Mervyn Henderson Consulting

Approx. 11:15 am

Body break 5 minutes
Questions 10 min

Kubler-Dunning Curve

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- **The Dunning–Kruger effect is the cognitive bias whereby people overestimate their ability**
  - Some researchers also include in their definition the opposite effect for high performers: their tendency to underestimate their skills
- **People with low ability tend to overrate themselves because they do not see the qualitative difference between their performances and the performances of others**
  - This has also been termed the 'dual-burden account' since the lack of skill is paired with the ignorance of this lack
- **The Dunning–Kruger effect is relevant for various practical matters**
  - It can lead people to make bad decisions, such as choosing a career for which they are unfit or engaging in behaviour dangerous for themselves or others due to being unaware of lacking the necessary skills
  - It may also inhibit the affected from addressing their shortcomings to improve themselves
  - In some cases, the associated overconfidence may have positive side effects, like increasing motivation and energy (Wikipedia, accessed 15 March 2022)
- **I sincerely hope this course in AM will fill the gap so that people do not overestimate their ability to understand and implement AM**
- **If you are fortunate enough to be a high performer, I hope that others will recognise your skills and make good use of them!**

Kubler-Dunning Curve & AM training

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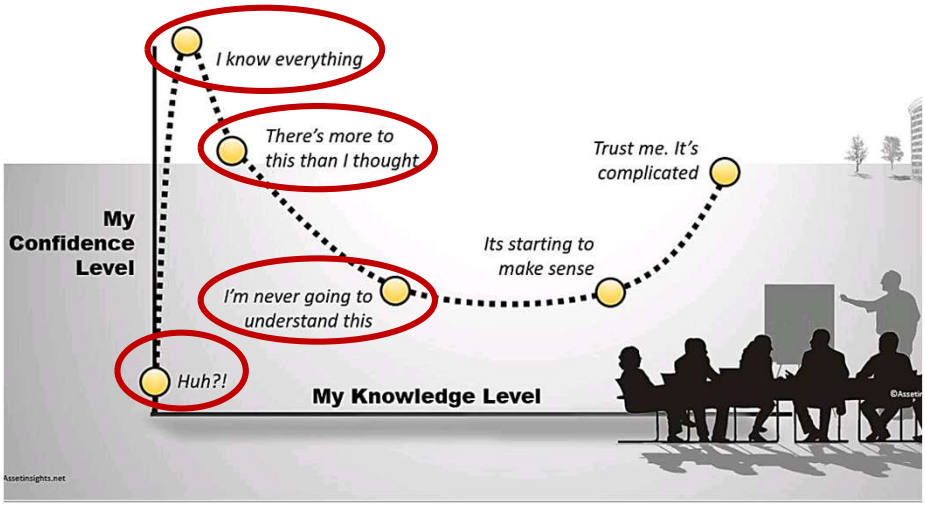

Case Study: AM in the New Zealand Transport Agency

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➢ **Learnings from 20 Years of AM evolution**

- NZTA was established in the late 1980s. Changes included the outsourcing of all physical works and most professional services. To protect its knowledge base and ensure it could remain a 'smart buyer' of externally provided activities, it invested in data, systems & processes and cultivated a 'community of interest' around the newly-defined AM discipline
- As well as legislation, a range of other factors has influenced the evolution of practice, including
  - Managing increasing costs in a constrained budget environment
  - Allocating funds nationally on an equitable basis (geographical equity)
  - Having a rational and objective approach, rather than one based on subjectivity or emotion & politics
  - Consistency and funding justification, from which has come national standards and levels of service
  - A wider approach to prioritisation than a purely economic one, which had sometimes resulted in assets not meeting customer expectations
- Over the last 20 years, AM practices have continued to develop within NZTA. The regions, suppliers and other divisions are taking part in the development of AM plans and long-term financial programmes
- With increasing constraints on expenditure for managing existing assets, AM as an organisation-wide business process has become much more important

Photo: Pascal Habermann on Unsplash

Case Study: AM in the New Zealand Transport Agency

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- Despite a rising trend of demand for more maintenance & renewal funding given an increasing capital asset base, a Government requirement for a restrained forward budget while maintaining levels of service has meant some tough decisions have had to be made, e.g.
  - 'Managing risk', allowing more assets to run to failure
  - 'Sweating' pavement assets (enabling pavement expenditure to be reduced from 65% to 50% as a proportion of all expenditure)
  - Changing the classification of some highways have all contributed to a bottom-line reduction in funding demand of around $160 million annually
  - Interventions must be 'at the right time'
- A key learning is the consequences or effects that these actions have, e.g.
  - What real changes have occurred in the pavement condition profile?
  - How have maintenance & lifecycle costs been affected?
  - What failures have occurred?
  - How have the customers been affected?
- Answering these questions with real data enables the validity of the original decisions to be tested & ratified
- Decision-makers are able to weigh up the consequences, & determine whether further changes are required
  - NZTA's AM planning process, State Highways Activity Management Plan and Life-cycle Asset Management Plans together provide the mechanism for this to happen

Case Study: AM in the New Zealand Transport Agency

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- **A common set of learnings is evident, with one of the most important continuing to be the need to collect good data**
  - A key priority for NZTA is making informed decisions means having timely access to high quality data

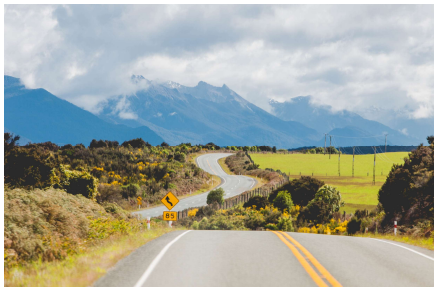

Photo: Munir Rani on Unsplash

- **Learnings**
  - A high level vision is critical: for NZTA today, this means providing value for money, defining an acceptable level of risk and delivering specific outcomes to customers
  - Buy-in is needed from the top: the vision needs to be shared, from governance to operational levels
  - Embed principles and objectives in planning and accountability documents: plans are aligned with the Government Policy Statement and Statement of Intent
  - AM is a normal part of NZTA's day-to-day business

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Case Study: AM in the New Zealand Transport Agency

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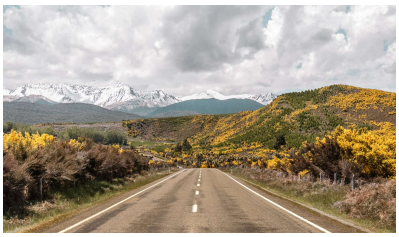
- **Learnings *continued***
  - Write it down: AM plans focus attention on the process and take a long-term view
  - Having champions grows commitment: it takes energy, enthusiasm, determination and focus
  - AM is a continuous improvement journey, tailored to the organisation
  - Do not expect a single 'silver bullet' solution to provide all the answers: multiple systems or a single Enterprise Resource Planning solution may be best
  - Meaningful performance measures provide a bridge between the required outcomes and what contractors do on the road



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Managing Asset Management

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- **Overview**
  - This section describes the 'management of asset management'
  - AM should be regarded as one of the most important functions of a road agency
    - It is vital to have commitment and direction from directors, senior management and staff throughout the organisation
    - Governance of AM should not be left to practitioners and those charged with service delivery; it should be a joint responsibility of senior management and the corporate governance levels of the organisation
  - Two cases studies are provided

Topics

- **Managing the fundamental principles of AM**
  - Leadership and culture
  - Value
  - Alignment
  - Assurance
- **Change management**
- **Understanding the strategic context**
- **Introducing SANS/ ISO 55000/1/2**
- **The AM System**
- **Whole of asset lifecycle activities**
- **AM Framework planning & implementation elements**
- **AM Policy, Objectives, Strategy, Plans, draft TMH 22 template for the Road AM Plan**
- **Achieving effective AM**
- **Organisational & individual AM Journeys**
- **Performance management**
- **Reporting organisational performance**

AM Leadership – Institute of AM

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- **If ever there was a time for better AM leadership – the time is now**
  (IAM White Paper on AM Leadership)
- **The 2020s will be seen by historians as the time humanity either marshalled its abilities to address the world of issues we face together… or didn't**
- **Dramatic changes in funding mechanisms, technology, sustainability goals, globalization, changes in climate, and more require bold and courageous leadership**
- **If many organisations in the world improve the use of their assets, the accumulated changes can have a global impact**
- **Over the last 3 decades, with the deterioration of assets such as railways, harbours, roads, electricity supply, etc., in South Africa, there would be a very positive outcome for the economy with good AM leadership**
  - E.g., at Cape Town harbour 4 out of 23 Rubber-Tyred Gantries are currently (1 Aug 2023) operational and 23 may not be enough (Andrew Pike, Head of Ports, Transport and Logistics at Bowmans)

The Institute of Asset Management

Asset Leadership Network

Leadership and culture

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- Leadership, organisational structure, and roles and responsibilities are all important enablers of effective AM
- Leaders need to determine, communicate and inspire direction in an organisation
- When it comes to managing change, people-based leadership skills matter, rather than 'command and control' management attributes
- Good leaders inspire others in the organisation to follow, to engage with the vision, and to do what it takes to achieve the goals & objectives
- Making a 'step-change' in what AM means to the organisation, and making it happen, needs leadership skills not only at the top but also throughout the organisation
- Leadership attributes are critical to successful change management, while management attributes are important in ensuring that an organisation consistently delivers its services in a stable and steady-state condition

IAM White paper on AM Leadership

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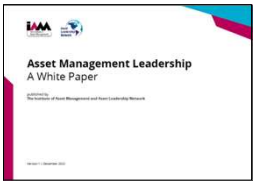
- ISO 55000 defines AM as the "coordinated activity of an organization to realize value from assets."
- Therefore, leadership of AM can be defined as coordinating the activity of an organisation to realize value from assets by
  - influencing and coaching continual improvement based on AM good practice
- Fatal failures of infrastructure, money wasted on poor construction, and a dire need for sustainable environmental outcomes desperately call for improved leadership in AM
- Leaders need clarity of purpose and certainty in outcomes to inform and coalesce a consensus of decisions
- For leaders seeking dramatic improvements to mission success, a structured approach to AM has proven effective
- Leadership can address the challenge of horizontal coordination by breaking down silos
- This can be facilitated by promoting the value chain in asset-intensive organisations and showing how each part of the organisation has crucial roles to play in delivering the overall goals by
  - Making sound decisions in a timely manner based on relevant information and critical analysis of facts



IAM White paper on AM Leadership

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- **Lifecycle management is a third dimension of coordination, which is temporal coordination**
- **To be highly effective, leaders require information from many sources to be rolled up into a single dashboard so that informed decisions can be made in real time and for the entire lifecycle of an asset, from planning to disposal**
- **Leaders exist at all levels**
  - Leadership is needed everywhere!
  - A mature organisation is one where the line between AM and organisational management disappears
  - A leader demonstrates excellence, inspires and helps colleagues, and makes decisions that create value by advocating for resources that drive efficient and effective activities aligned and well-coordinated with organisational goals
- **Top management**
  - Top management leaders do not have to come from a technical background or have experience "touching assets" to have a positive impact on AM at their organisation
  - A clear line-of-sight from top management to the activities on the ground and from asset performance back up is a result of effective leadership focused on organisational objectives and mission success
  - This requires engagement by the executive-level and is consistent with the fundamentals of ISO 55000 regarding commitment from management and consultation with employees and stakeholders regarding AM
  - Top management should understand the technology tools available, process optimisation, and how the coordination of activities, combined with the power of ISO 55000, results in transformative improvements

IAM White paper on AM Leadership

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- **Top management *continued…***
  - Top management will have a better chance of success if they understand that AM is not simply software
  - Appropriate software is just one component of a successful AM system that includes mission focus, culture, change, collaboration, adherence to performance measurements, a process of continual improvement and other factors listed in ISO 55000
  - Comprehensive and inclusive planning for extensive business and cultural improvements is necessary for coordinating organisational activity
  - Establishing an AM culture at the organisation is necessary to realize ongoing benefits
  - Top management inevitably changes, but an effective culture can be a constant
  - An organisation can reap benefits from a structured approach to business and technical operations despite leadership changes if an AM culture is well established
- **Management**
  - Managers need to identify the right leader to sponsor, approve, and execute an AM programme so that it can become embedded into organisational culture
  - Managers can prepare themselves, their leaders, and their operational staff for an AM initiative with sufficient education and training that aligns all levels of the organisation
- **AM Advocates**
  - AM advocates can be any stakeholder interested in driving efficient and effective results and outcomes at the organisation
  - Therefore, AM advocates provide an essential form of leadership, but may not have the authority to initiate a programme across the organisation, but they often play an important role as influencers
  - AM advocates keep colleagues focused on the big picture - organisational objectives, strategic plans, and the shared mission success that can come from a structured AM approach

AM Leadership

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- **Leadership and workplace culture are determinants of realisation of value, including**
  - Clearly defined roles, responsibilities & authorities
  - Ensuring that employees are aware, competent, & empowered
  - Consultation with employees and stakeholders regarding AM
- **Leadership & culture are critical, indispensable enablers for successful AM Leadership**
  - Acts as a translator of stakeholder requirements into organisational objectives
  - The driver to change behaviour & culture
  - Establishing the antecedents & consequences of behaviour, with a flow-on effect within the organisation and culture
  - Enables teamwork to be translated into planned results, potentially at the level of excellence
  - When there is no longer a single leader, all employees are guided by the values & culture of the organisation
- **Management and leadership are different**
  - They are both important and need to co-exist in large and complex modern organisations
  - The table lists the characteristics of managers and leaders

Managers typically	Leaders typically
Control complexity	Create change
Develop plans	Set new directions
Allocate resources	Create strategy
Organise and manage staff	Align people
Prevent negative outcomes	Promote positive outcomes
Control people & processes	Empower people & processes

AM Leadership

©Mervyn Henderson Consulting

- **Effective leaders understand the external and internal factors that may affect the organisation, or the transport networks it is managing**
  - Questions to be addressed in determining strategic direction and strategy cover a wide range of policy, social, environmental, financial and economic perspectives
  - Providing clear vision and direction is critical – giving people the context for what they are doing and why they are doing it
  - Good leaders inspire others in the organisation to follow, to engage with the vision, and to do what it takes to achieve the goals and objectives

- **Leaders need to take a nurturing role in establishing an environment where great cultures can develop and should model the behaviours they want from others**
  - Being consistent and authentic, 'walking the talk', is critical in building a positive culture
  - So, too, is holding people to account when they act in a way that is inconsistent with the cultural norms
- **Creating & encouraging the right organisational culture is an important leadership task & is integral to achieving the level of integration between functions that good AM requires**
- **Sustaining cultural change requires consistent leadership behaviours, continuous communication and reinforcement**

IAM White paper on AM Leadership

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- **What leaders can do**
  - Eliminate departmental bias and individual interests by creating a mission-focused culture
  - Staying mission-focused also acts as a bridge between technically oriented asset outcomes and business-oriented organizational objectives
  - Gain ISO 55000 understanding
  - A gap analysis can help leaders establish what an organisation does, what it does well, what it doesn't do, and what it can do better related to ISO 55000
  - Require training and certification of key staff
  - Establish an AM Culture in the organisation
  - Creating an AM governance committee is one way of ensuring a culture of AM remains entrenched over the long term
  - Encourage others to develop their AM skills and take steps to become leaders themselves to establish a culture that can be sustained

Top managers who encourage others to develop their asset management skills and take steps to become leaders themselves establish a culture that can be sustained

Culture & Asset Management

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- **Plans are done by people and for people**
  - Planning requires an appreciation and awareness of organisational culture
  - Culture is a foundation of good AM, and a key ingredient of its success, or failure
  - Culture refers to long-lived set of values, beliefs, attitudes and assumptions which affect behaviour and performance over the long term
    - 'The way things are done around here'
    - The concealed elements include the underlying values and assumptions shaping the organisation
  - Some of the visible elements of an organisation's culture are its artefacts (such as systems and procedures) & the behaviours of its staff
- **An organisation with a strong AM culture views AM as a shared responsibility crossing departmental boundaries – the 'whole of organisation' approach**
- **A strong AM culture also recognises**
  - The importance of the customer at the beginning of the AM business cycle
  - The significance of asset stewardship as an AM imperative
  - Continuous improvement as a core AM function
  - Innovation, which is needed in order to challenge the status quo, seeking better ways of achieving the goals

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What is a good AM culture?

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- **A good AM culture exhibits the following characteristics**
  - Customer focused
  - Stewardship of assets and resources
  - High level of motivation
  - Desire to learn and improve
  - Innovation
  - Proactive
  - Teamwork, and good understanding of one another's roles

'Leadership, emotions, culture and behaviours are invisible and intangible. Yet these are essential to an organisation…neither is an organisation merely a collection of assets and their plans and processes. Without the right leadership, culture & behaviours, an organisation cannot produce its desired outcomes, just as without the right soil, nutrient, environment and gardeners a tree cannot produce its fruit.'

Living Asset Management, Lafria, J & Hardwick, J, Engineers Media, 2013

Managing culture

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- **Managing cultural change represents one of the biggest challenges for the AM team**
- **It takes time as people become more familiar with the concepts & more experienced in working together on common goals & problems**
- **Shifting an organisational culture is a process and requires learning & adapting to derive new meaning**
- **Creating an appropriate culture is integral to achieving the level of integration between functions that good AM requires**
- **Culture cannot simply be imposed from the top down; rather, it is an organic process that relies on, and comes from, the whole organisation**
- **Culture connects with business processes, people and organisational structure**
- **There is no single correct organisational structure or culture for AM – senior management needs to ensure that structure & culture are conducive to what they want to achieve**

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Managing culture

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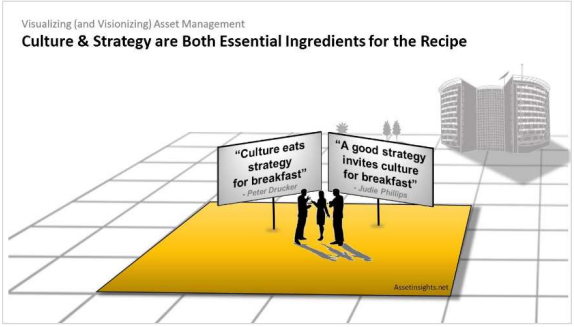
- **Sustaining cultural change requires consistent behaviours, especially from management, continuous communication and reinforcement**
- **Facilitating a culture shift can be a deliberate outcome or by-product of planning**
- **A management system, no matter how detailed and well implanted cannot specify, command or monitor all employee activities and actions – there is much that falls between the cracks, for which culture is the critical reference point**



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Value – the apex of AM

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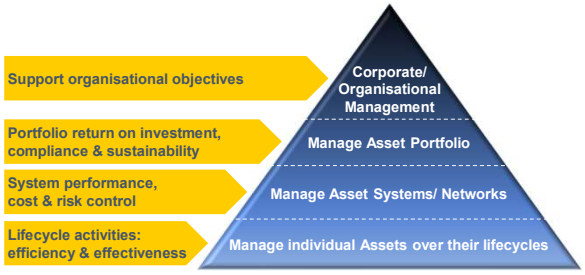
- **Assets exist to provide value to the organisation & stakeholders, including customers**
  - AM does not focus on the asset itself, but on the value that the asset can provide, which is determined by the organisation and its stakeholders, in accordance with organisational objectives, including
    - A clear statement of how AM objectives align with organisational objectives
    - The use of lifecycle management approach to realise value from assets
    - The establishment of decision-making process that reflect stakeholder needs and define value
  - Each organisation determines what constitutes value in relation to achieving its organisational objectives
    - These objectives will take account of the needs and expectations of its stakeholders, e.g., customers, regulators, employees, and local communities
    - This requires organisations to consider intangible elements of value, e.g., reputation, customer satisfaction or environmental responsibility

- It is important not to confuse an organisation's corporate 'values' with the customer value
- Usually, when assets are connected together as an asset system, e.g., a road network, that they generate value
  - Figure illustrates the contributions to value at various levels of an asset hierarchy
  - The 3 foundation layers represent the AM System



Adapted from Asset Management – an anatomy ©IAM 2015

Value – the Apex of AM

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- **Value realisation is central to AM, yet it is easy for value to be overlooked as operational decisions and financial drivers take centre stage in day-to-day & annual decision-making**
- **Value is a central concept in asset management, yet also a nebulous one often expressed fiscally**
  - Multiple considerations exist in defining and delivering value for the end customer
  - A visual pyramid framework helps define what value means for any application
  - Value is a central concept in asset management, yet also a nebulous one often expressed fiscally
  - Multiple considerations exist in defining and delivering value for the end customer
  - A visual pyramid framework helps define what value means for any application

- The organisation's measure of value should be consistent with the value expectations of its customers and other stakeholders
- However, this will require compromises and optimisation in balancing the interests of all stakeholders
- Although not everyone may benefit, the organisation needs to maximize the collective value

Value Pyramid Framework

Adapted from Value – the Apex of Asset Management Version 1 ©IAM 2023

Value – the Apex of AM

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- **An upward approach to building value**
  - The value pyramid illustrates the upward progression of value creation
  - Organisations use corporate policies, vision, and mission statements as a starting point to build and transform value into reality through their processes of planning, design, manufacturing, lifecycle servicing, delivering, or using infrastructure and other asset means
  - Value is shaped by quality control, regulatory compliance, and stakeholder engagement
  - The objective is to have the customer's experience at the apex validate the value statement derived from the engagement of the collective stakeholders
  - The point is that value is perceived differently, and an inclusive representation of diverse stakeholders must be engaged with the end customer as the focal point in the value pyramid

- **Value Statement**
  - A value statement lists the core principles that guide and direct an organisation and its culture
  - Value statements create a moral compass for the organisation and its employees
  - It guides decision-making and establishes a standard against which actions can be measured
  - Organisations can enable or drive value using corporate vision, mission and belief statements, and an AM Policy
  - The value statement must connect an organization's commitment to value delivered from front-line activity through a clear vertical 'line of sight'
  - A key priority of value statements is to maintain focus on the true meaning of value

Value – the Apex of AM

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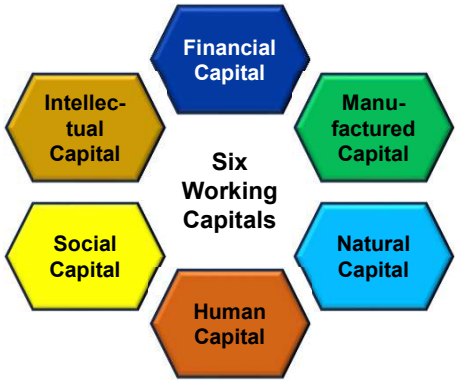
- **Value Framework**
  - Value frameworks capture broad and global context to interpreting and demonstrating an organisation's performance, positive or negative, on profit, people, and the planet
  - Value Frameworks should not be too unrealistic or unachievable
  - They can be used to establish an organisation's commitment to capital investment, decision-making, and performance against a larger context of social, economic & environmental themes or like the six capitals of an organisation's integrated performance reporting shown in the figure
  - Consideration should be carefully given to multiple value facets satisfying the needs, wants, and expectations of broad, diverse stakeholder groups



Six capitals for Integrated Reporting

Adapted from Value – the Apex of Asset Management Version 1 ©IAM 2023

Value – the Apex of AM

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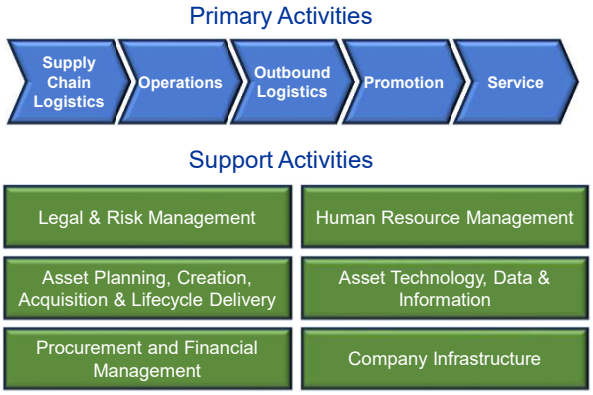
- **Organisational Value**
  - Organisations have a string of essential core functions linked together in a value chain which represents a mechanism for utilizing assets in delivering value from its products or services experienced by their consumers
  - Value chains (Figure) are supported by internal services and processes called value streams
  - A value chain is defined as the core functions by which a company adds value in its creation of an item, as in the major activities within planning, manufacturing, distribution, marketing, and the provision of after-sales service
  - Optimally, these internal processes play an important role in creating value from the organisation's assets
  - The value chain and value stream interdependency enable the realisation of asset value within various functional groups and management layers delivering to the customer



Value Chain Model

Adapted from Value – the Apex of Asset Management Version 1 ©IAM 2023

- A value chain enables organisations to evaluate value-creating steps in the production or servicing of assets

Value – the Apex of AM

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- **Rating non-profit organisations**
  - **Financial Health**: revenue growth, reserves, working capital ratio
  - **Programme Expenses**: administrative, fundraising, programme delivery
  - **Accountability and Transparency**: independent board, control of assets, audited financials
  - Ratings show governments
    - How efficiently an authority will use its resources today
    - How well it has sustained its programmes & services over time
    - Their level of commitment to being accountable and transparent

Value – the Apex of AM

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- **Stakeholder value**
  - Assets deliver value to stakeholders
  - Stakeholders can be internal or external to an organization and are a critical component of value definition in the entire life cycle of assets
  - Internal stakeholders may be any individuals who participate in, lead or advocate for the acquisition, production, delivery, or servicing of assets
  - They are most associated with the value chain, and value streams internal to the organisation
  - External stakeholders may be any person or organisation beyond the asset owner/operator, including
    - Regulatory agencies in the form of rules and compliance requirements, and international partnerships through instruments like treaties and agreements
    - These types of stakeholders are typically cognizant of safety, environmental, social, economic, and governance impacts that may have long-lasting value related to the public or natural surroundings
    - They tend to provide an objective viewpoint of the overall value of an asset
  - External stakeholders may also be advisory, participatory, or provide general oversight of a greater representation.
  - These groups can include members of the public or consumer groups, philanthropic organisations, public foundations, public-private partnerships, and private donors whose participation can assist in polishing and enhancing asset value
  - it is important to have a robust engagement process that identifies internal and external stakeholders, inclusive of the end customer

Value – the Apex of AM

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- **End Customer**
  - The end customer is the apex of the value pyramid
  - Value creation grows within every level of the pyramid culminating with the end customer
  - The end customer often will experience the value of the item produced when used or consumed, thus, subjectively experiencing an asset or asset system
  - Organisations can easily lose sight of the end customer whose subjective experience can be loudly expressed in their dissatisfaction
  - Each project or product development culminates in an asset with one or multiple asset users with various opinions of value

- **Summary**
  - AM provides a solid means for realising value from assets
  - Best practice shows that engaging stakeholders facilitates healthy dialogue to understand where both consensus and anomalies may exist to gain alignment for achieving strategic objectives
  - The value pyramid enables the asset manager to collect, recognize, and align potentially multiple value-based outcomes for the organisation to use as a focal point when constructing, delivering, or servicing assets to the end customer

Alignment of AM with organisational direction

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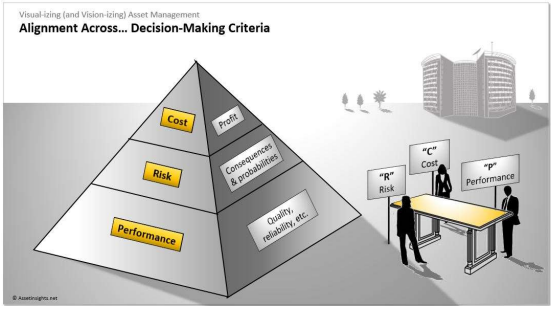
- **Alignment translates the organisational objectives into AM policy, strategy & objectives which cascade down into technical & financial decisions, plans & activities**
- **With effective leadership & a strong cross-organisational AM culture, aligning AM with the agency's goals & objectives becomes easier**
  - It is not a simple one-way process – aligning AM involves many parts of the organisation & it depends on two equally important and parallel sets of activities
    - Leadership must set the tone for the agency by creating a culture that supports AM and defines specific goals and communicates with people
      - Inside the agency to ensure alignment, support and understanding
      - With external stakeholders and decision-makers to develop understanding, support and accountability



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Alignment of AM with organisational direction

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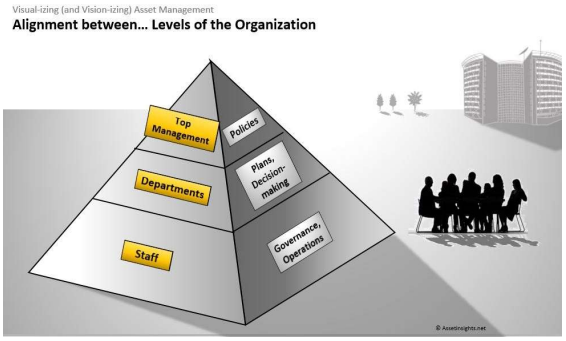
- Professional staff must support leadership efforts with robust information, analysis and implementation; simply put, leadership has to lead the effort & others have to support it
- It requires that senior management decisions, strategies and plans take account of bottom-up, fact-based realities, i.e. asset capabilities, performance, opportunities and constraints
- It is important for giving staff delivering AM activities direct visibility of the purpose of their work so that they understand why it is needed, not just when and how to do it

- **Alignment is an advantage in prioritisation and coordination and helps to stimulate creativity and innovation**
  - Staff who understand what & why it is important can identify new & better ways of achieving their goals



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Alignment of AM with organisational direction

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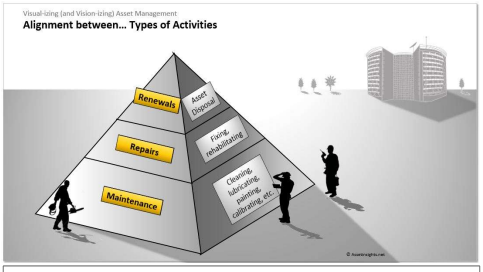
- **Alignment includes**
  - The implementation of risk-based, information-driven, planning and decision-making processes and activities that transform organisational objectives into AM plans
  - The integration of the AM processes with the functional management processes of the organisation, e.g., finance, HR, information systems, logistics and operations
  - The specification, design and implementation of a supporting AM system
- **A strong asset management culture – coupled with the right structure, well-designed business processes & robust goals and performance measures – can be very effective in aligning an organisation & improving its performance**



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South African Road Federation

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Asset Management System & Alignment

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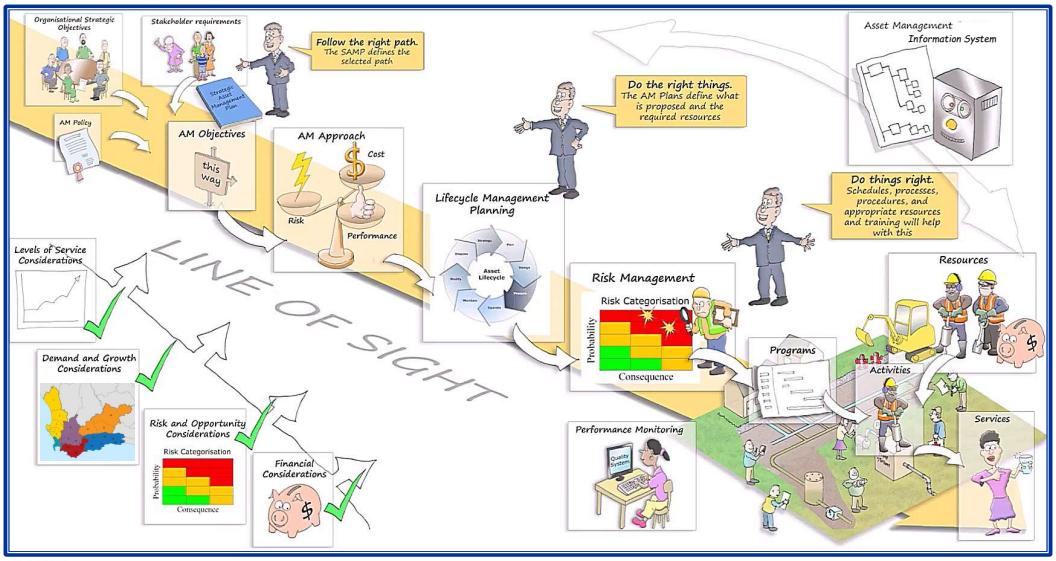

SARF better roads

South African Road Federation

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Asset Management System & Alignment

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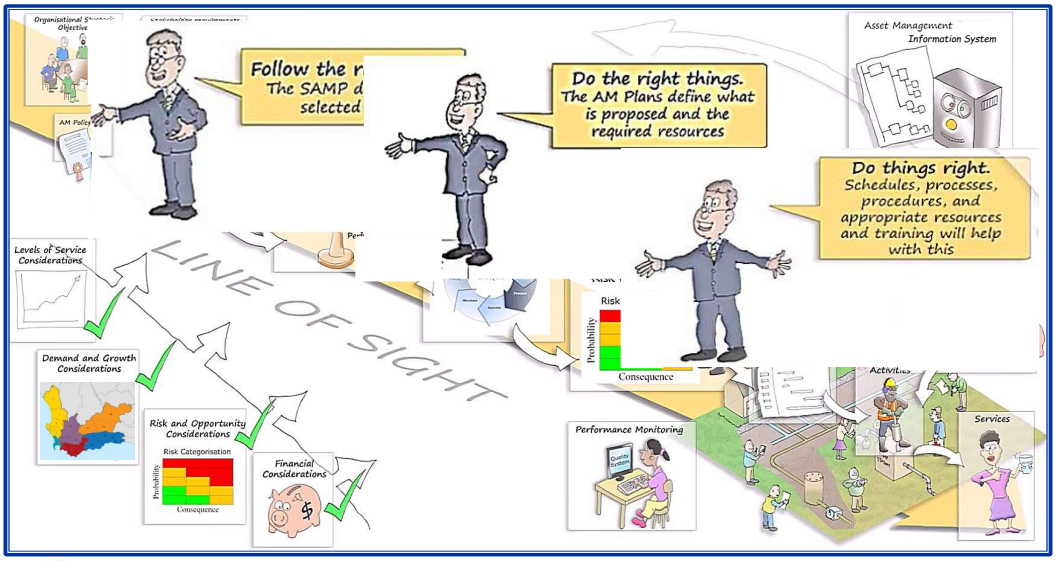

SARF better roads

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Asset Management System & Alignment

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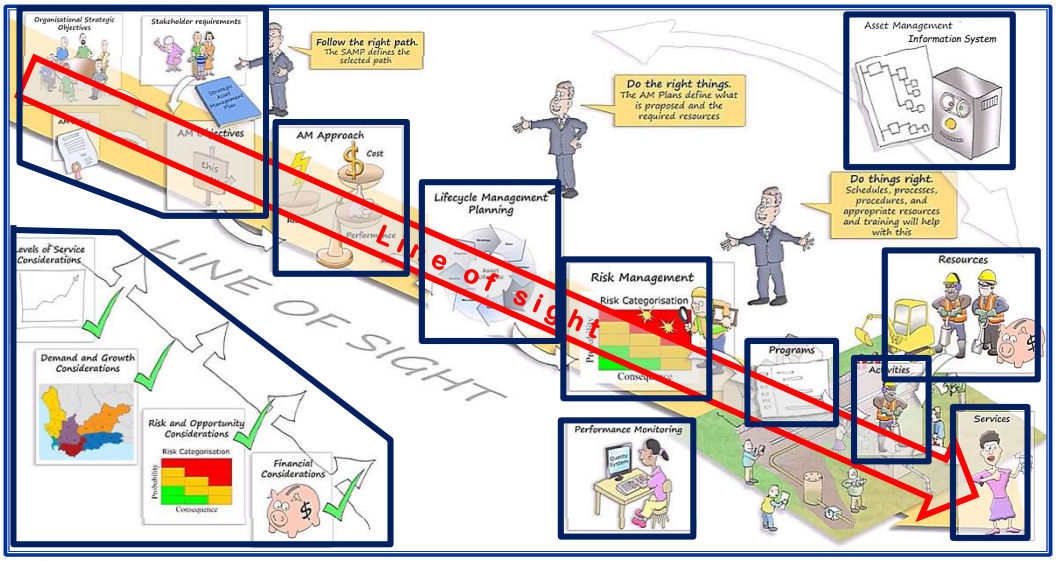

Aligning AM with organisational objectives

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- **A strong AM culture – coupled with the right structure, well-designed business processes and robust goals and performance measures – can be very effective in aligning an organisation and improving its performance**
  - The key steps in aligning AM with organisational objectives are presented in the table

Steps	Description
Establish the right organisational structure	• A structure that supports achievement of the AM objectives • Describe roles, responsibilities and competency requirements
Integrate AM in the agency's business processes	• AM business processes – levels of service, demand, programme development • Include financial, human resources, risk, quality, etc.
Develop a clear 'hierarchy' of goals, objectives and performance measures	• From agency-wide to operational delivery • Provides a means of aligning different functional areas • Provides a clear basis for communication and accountability

Alignment of AM with Financial Management

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- **The need for alignment of technical and financial management is because the technical management of assets cannot be optimised without linkage to the financial management system**
- **Likewise, the objectives of long term financial planning & the distribution of funding cannot be effectively achieved without linkage to operation & performance data of the AM system**
- **Alignment is a functional condition that allows access and visibility to information needed by operational experts and top management so they can base their decisions on knowledge that supports effective decision making**
- **Whatever the intent or motivation, unbalanced and misaligned approaches to managing assets have financial consequences**
  - Not having visibility to the consequence of those decisions is a fundamental problem
  - The impact of the problem is measured in huge avoidable costs
- **ISO 55010 – Guidance on the alignment of financial and non-financial functions in AM**
  - The specification helps all functions in an organisation to better align financial and non-financial issues coherently by providing guidance to bridge current gaps between the financial and non-financial worlds
  - This can encourage the breakdown of silos and improve cooperation, making better use of every department's expertise in achieving the organisational objectives as effectively and efficiently as possible

Assurance

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- **AM gives assurance that assets will fulfil their required purpose**
- **The need for assurance arises from the need to effectively govern an organisation**
- **It is the combination of monitoring & auditing of processes & outcomes to confirm the assets, systems & processes are operating as intended, & essential to provided assurance that**
  - Assets will fulfil their required purpose
  - AM activities will be delivered & AM objectives achieved consistently and sustainably

- **Assurance applies to assets, AM & the AM system – as defined later – including**
  - Developing and implementing processes that connect the required purposes and performance of the assets to the organisational objectives
  - Implementing processes for assurance of capability across all lifecycle stages
  - Implementing processes for monitoring and continual improvement
  - Providing the necessary resources and competent personnel for demonstration of assurance, by undertaking AM activities & operating the AM system
- **An assurance framework includes**
  - Policies, plans, business processes & information systems to give assurance that AM activities will be delivered
  - Competent resources to monitor & demonstrate assurance to the appropriate levels of management

Change management

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- **Given the wide range of external and internal challenges, or because of a gap analysis or assessment of AM practice organisations face ongoing drivers for change**
  - Internal strategic reviews, organisational restructuring, external events, or changes imposed on an agency all involve change management
  - Effective AM change cannot be left to chance – it is unlikely to succeed if efforts are inconsistent with the wider organisational direction and the AM objectives
  - A formal change management process should be followed whenever significant change is being considered
  - PIARC (Evaluating the transformation of Transport Administrations, 2019R21EN) provides a useful Framework of Change Management (section 5)
- **Aspects to consider in planning for change ►►**

Strong change leadership	Challenge 'business as usual' & 'appreciative enquiry' describe the outcomes & benefits to be obtained
Plan for change management	'What is the readiness for change?' 'Is education needed?' Develop a communication plan, consider the risks & how they can be mitigated; there will be barriers & setbacks along the way
Consider why the change may fail	E.g. poor communication, 'nothing in it' perception, complacency
Communicate the change	Ensure the message is clear, relevant, has integrity, is two-way
Gain commitment by raising awareness	Involving key players, provide resources, model behaviours & working hard with the unwilling
Monitor progress & reward success	Track progress, & set achievement goals, success is shared & rewarded

States of change

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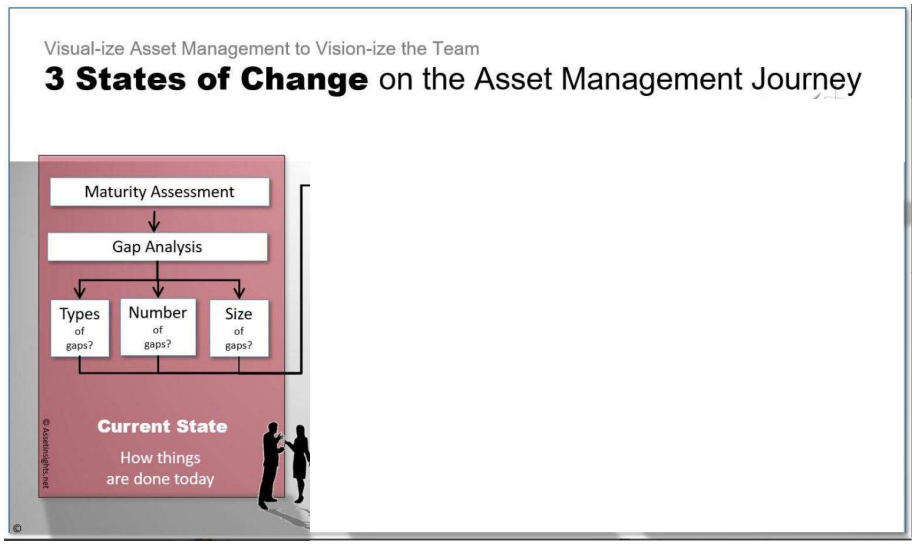

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States of change

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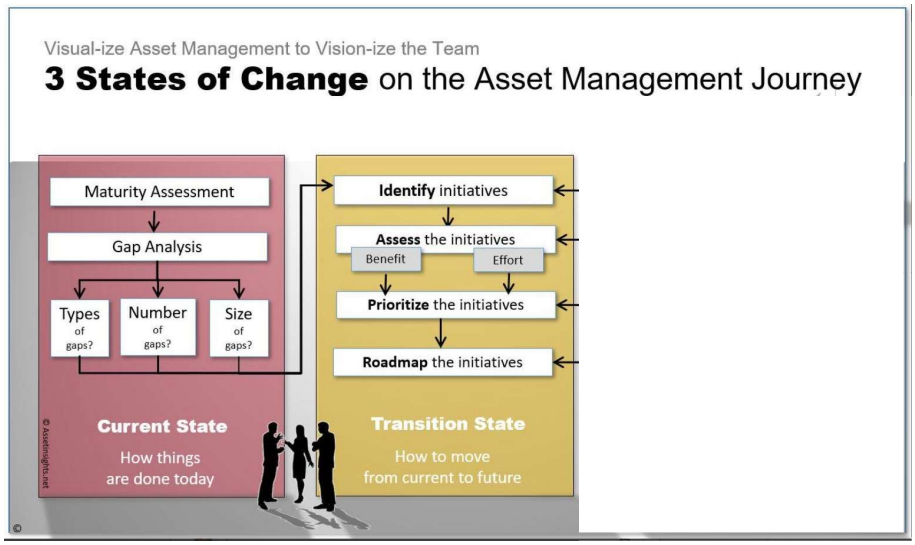

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States of change

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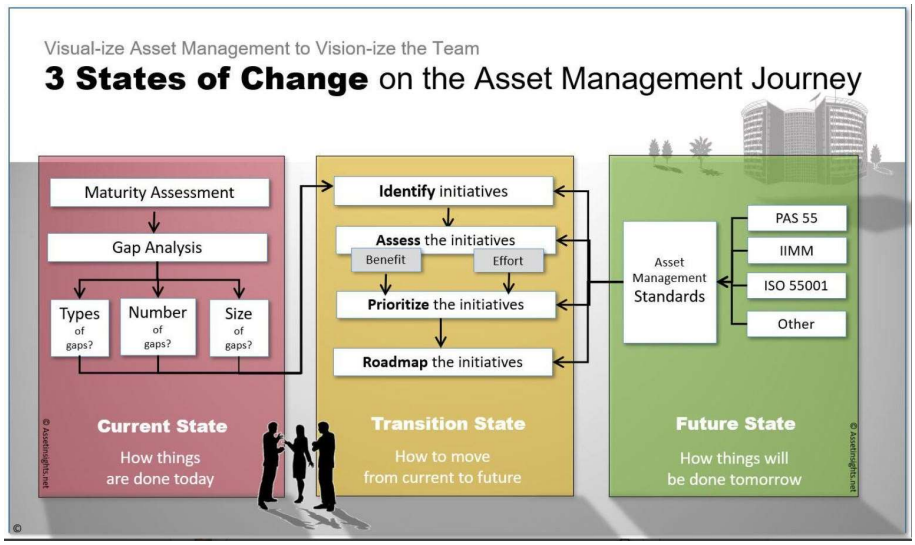

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Body break 5 minutes
Questions 10 min

Understanding the Strategic Context

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- **Creating strategy**
  - The previous section linked leadership with AM culture, the alignment of goals, and change management. In determining the AM objectives, and how an agency should respond, the internal and external contexts and challenges need to be assessed and understood
  - Creating the broader definition of organisational strategy, of which the AM strategy is a part, and deciding what is to be done, is an important leadership function as it helps to define clear direction
  - Questions to ask could include:
    - Which contexts, internal or external, are likely to be the most significant, in the short, medium or longer term?
    - What are the possible impacts and how should the agency respond?
    - Which contexts are changing rapidly, slowly or not at all?
    - What is expected by governments, funders, stakeholders and customers?

- Steps to create & implement an AM strategy
  1. Ask the right questions – to understand the context and challenges to be addressed
  2. Determine the strategy – how will the gaps between 'current' and 'desired' states be filled
  3. Identify key success factors – how do we get there? What will it look like? How will we know?
  4. Share the strategy – make sure it is communicated and understood
- With an understanding of context and the challenges facing the organisation, leaders need to determine the appropriate strategy and prioritise the responses
- Organisation strategy should be
  - Supported by, and aligned with, the AM policy, objectives and strategy
  - Informed by an assessment of current practice and an understanding of the appropriate level of AM maturity that the road agency aspires to
  - Creating different time horizons for action, with increasing flexibility and adaptability in the longer term

Understanding the Strategic Context

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- **Strategic context *continued***
  - Other external issues to consider include
    - Social, cultural, political, legal, regulatory, financial, technological, economic, commercial and natural environment issues, and whether they are local, regional, national or international, including
      - social changes
      - macro-economic factors such as growth and development
      - concerns about emissions to land, air or water, and noise issues
      - sustainability and resilience
      - availability of suitable resources
      - affordability of the services provided
    - Key drivers and trends having impacts on the objectives of the organisation
    - Growth and future demand, including the location, timing and type of growth, population growth and densities, demographics, and the changing demand from the population
    - Relationships with external stakeholders and customers, including their perceptions, values, and changing service expectations
    - Funding changes, e.g., the future balance between government funding, loans, public private partnership (PPP) investment, and revenue from customers

Understanding the Strategic Context

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- **Strategic context *continued***
- **Legislative, Mandatory and Government Policy Requirements concerning AM**
  - Road authorities are regulated through a range of Acts, Statutes & Legislative Instruments
  - In South African, the ones relevant to AM are
    - The Government-wide Immovable Asset Management Policy was approved by Cabinet on 17 August 2005
    - The Government Immovable Asset Management Act No. 19 of 2007
    - The Framework for Infrastructure Delivery & Procurement, Treasury, 2019
- **Standards**
  - National Immovable Asset Maintenance Management, Department of Public Works & CIDB, 2015

Understanding the Strategic Context

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- **Strategic context *continued***
- **Internal Business Focus/ Internal Context**
  - ISO 55002 Clause 4.1.2 suggests a range of issues to consider, including
    - Organisation policies, objectives and strategies
    - Corporate direction and structure: e.g., governance, organisational structure, roles, accountabilities, authorities and internal linkages
    - How AM is integrated within the organisation, and AM planning & project management procedures
    - Financial issues, e.g., constraints on expenditure, corporate expectations of maintenance optimisation, budget development and approval procedures
    - Capabilities: resources, staff knowledge & competencies
    - Information systems, information flow and decision-making processes
    - Relationships with internal stakeholders
    - Organisation culture
    - Standards, guidelines and models
    - Contractual relationships
    - Risk management plans
    - AM practices, systems, plans and processes
    - Condition and performance of the assets
    - Past asset failure data including incidents
    - Ability of the AM system to achieve intended outcomes
    - Self-assessments, audits, external reviews

Understanding the Strategic Context

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- **Creating strategy *continued***
  - In developing effective strategy, there are various key success factors, such as
    - The strategy is fully understood and shared by the organisation
    - It allows flexibility so that the direction of the organisation can be adapted to changing circumstances
    - It results from the varied input of a diverse group of thinkers – it helps to avoid Groupthink!
    - It follows a thorough analysis of both the external environment and the internal capabilities of the organisation
    - An effective strategy identifies areas of differentiation
  - For more on strategy and Groupthink, refer to http://www.strategybydesign.org/strategic-thinking-overview

- **Strategic context**
  - The IIMM (Section 1) and ISO 55001 (Clause 4.1.2) provide useful guidance on the external and internal factors to consider when analysing the contexts within which the agency must operate
  - PIARC (Evaluating the transformation of Transport Administrations, 2019R21EN) provides useful guidance on the external drivers (section 3.3)
  - Some of the challenges facing transport agencies were described in the 'Overview of AM'

Introducing ISO 55000/1/2 & SANS 55000/1/2

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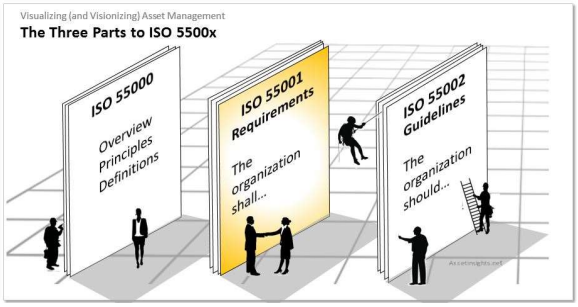
- **The ISO Standards were published in 2014 and effectively supersede PAS 55:2008**
- **ISO 55000: Asset management – Overview, principles and terminology (2014) Ed. 1**
  - SANS 55000: Asset management – Overview, principles and terminology (2015) Ed. 1
  - Identical to ISO 55000
  - Principles and definitions
- **ISO 55001: Asset management – Management systems – Requirements (2014) Ed. 1**
  - SANS 55001: Asset management – Management systems – Requirements (2015) Ed. 1
  - Identical to ISO 55001
  - The 'shall' statements that specify the system
- **ISO 55002: Asset management – Management systems – Guidelines for application of ISO 55001 (2018) Ed. 2**
  - SANS 55002: Asset management – Management systems – Guidelines for application of ISO 55001 (2020) Ed. 2
  - Identical to ISO 55002



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SANS/ ISO 55001

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- **SANS/ ISO 55001 is the most important of the 3 documents, defining the requirements for organisations considering certification or alignment**
- **Important ISO 55001 principles**
  - It has an explicit focus on the activities needed to deliver sustainable outputs valued by customers and funding providers at the lowest whole-of-life-cost, as opposed to prioritising work predominantly according to asset condition, thus enabling the achievement of AM objectives
  - It integrates across boundaries between organisational functions and asset disciplines, including customer services, human resources, finance, and information technology, and where relevant, between infrastructure managers and contracting organisations
  - It emphasises
    - Evidence-based decision-making,
    - Optimising maintenance and renewal interventions based on the knowledge of how assets degrade and the risk of their failure

SANS 55001:2015
ISO 55001:2014

SOUTH AFRICAN NATIONAL STANDARD

Asset management — Management systems — Requirements

WARNING
This document references other documents normatively.

SABS

SANS/ ISO 55001

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- **Like other ISO standards, such as ISO 9001 & ISO 14001, ISO 55001 takes a 'management systems' approach which involves the systematic control of AM activities, directed by policy and objectives and influenced through effective leadership**
- **ISO 55001 recognises that AM activity is conducted as part of an overall business activity, and that not all AM activities are necessarily controlled by the AM system**
  - An agency can be selective on which assets are to be included within the AM system
  - While important to achieving AM objectives, activities relating to leadership, culture, motivation and behaviour are typically managed outside the AM system

SANS 55001:2015
Edition 1
ISO 55001:2014
Edition 1

SOUTH AFRICAN NATIONAL STANDARD

Asset management — Management systems — Requirements

WARNING
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The hierarchy of assets in ISO 55001

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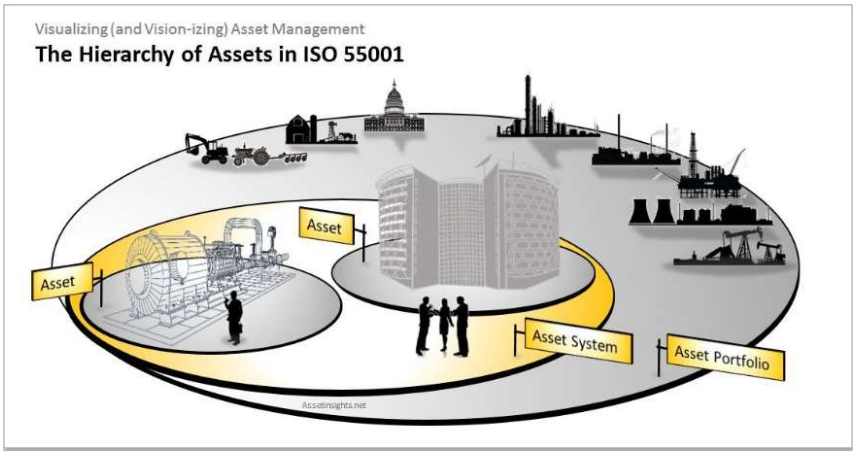
- **ISO 55001 contemplates a hierarchy of assets**
  - The detailed classification scheme and appropriate granularity is determined by the organisation's objectives and the nature of the assets in its portfolio



Hierarchy of assets

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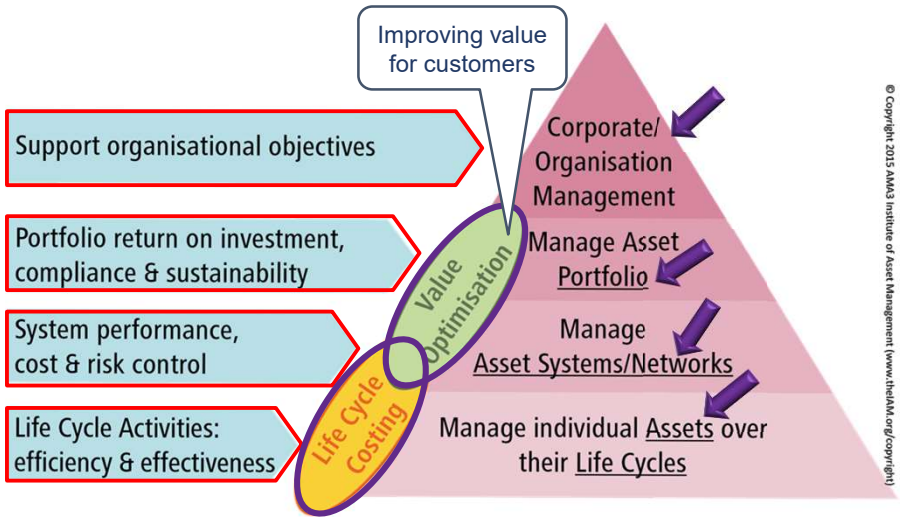
- **Hierarchy of assets within an integrated management system**



AM Relationships in ISO 5500x

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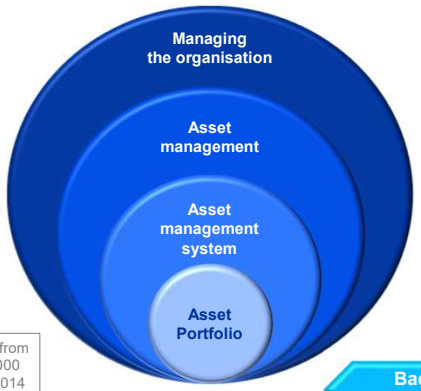
- **Managing the organisation – see figure**
  - This covers a wider set of business activities than AM, including financial management, human resource management and the provision of leadership direction



Adapted from ISO 55000 © ISO, 2014

Back to Assurance

- **Asset management**
  - All of the activities and business processes that together contribute to the achievement of AM objectives to provide road services to customers
- **Asset management system – a set of interrelated & interacting elements within the organisation**
  - Includes policies, plans, business processes and information systems integrated to give assurance that the AM activities will be delivered as intended
  - Provides a means for coordinating contributions from and interaction between different functions, both within the organisation and with its key suppliers
- **Asset portfolio**
  - Specific assets that are controlled through the AM system

AM Relationships & documents

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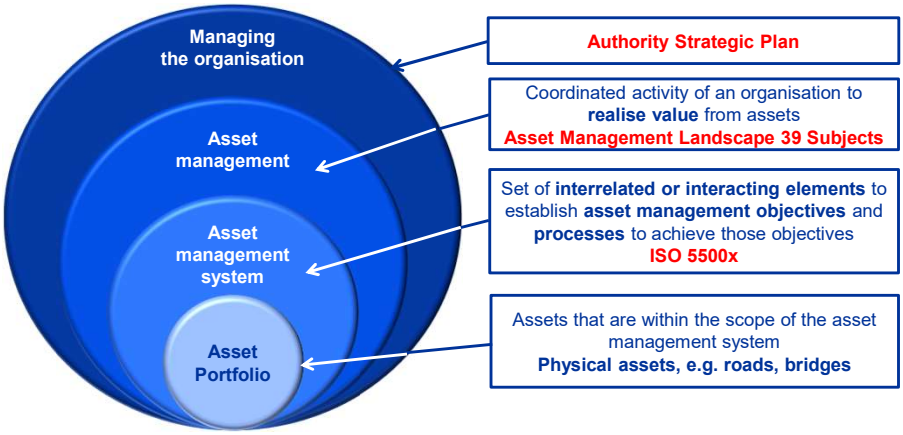
- The documents relevant to each part are shown in **red**



Adapted from ISO 55000 © ISO, 2014

Typical benefits of ISO 55001 alignment

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Benefit	Examples
Improved financial performance	• Improving the return on investment and reducing cost, while preserving asset value and without sacrificing the short- or long-term realisation of organisational objectives
Informed asset investment decisions	• Using a consistent, documented, balanced-scorecard approach involving cost/benefit analysis on the lifecycle costs of both asset and non-asset solutions, including demand management • Having improved decision tools which consider costs and benefits of alternative solutions, prioritisation of investments and interventions. • Enabling the organisation to improve its decision-making and effectively balance costs, risk, opportunities and performance
Better managed risk	• Reducing risk exposure through application of a structured risk mitigation framework for assessing, quantifying and mitigating risks related to AM and service delivery • Reducing financial losses, improving health and safety, good will and reputation, minimising environment and social impact, can result in reduce liabilities such as insurance premiums, fines and penalties

Typical benefits of ISO 55001 alignment

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Benefit	Examples
Improved services & outputs	• Improving understanding of asset capabilities and their limitations in delivering or meeting service requirements • Assuring the performance of an asset can lead to improved services or products that consistently meet or exceed the expectations of customer and stakeholders
Demonstrated social responsibility	• Improving an organisation's ability to, for example, reduce emissions, conserve resources and adapt to climate change, enables it to demonstrate socially responsible and ethical practices and stewardship
Demonstrated compliance	• Transparently conforming with legal, statutory & regulatory requirements, & adhering to industry 'best appropriate practice' in AM standards, policies & processes
Enhanced reputation	• Gaining and enjoying an enhanced reputation by having the confidence of legal, statutory & regulatory authorities & the satisfaction of informed customers & stakeholders
Improved organisational sustainability	• Effectively managing short- and long-term assets maintenance and renewal requirements over the long term, including their expenditures and performance
Improved service efficiency & effectiveness	• Concentrating on understanding customer and stakeholder needs and desires. • Reviewing and improving processes, procedures and asset performance

Relevance of ISO 55001 to a road/ transport agency

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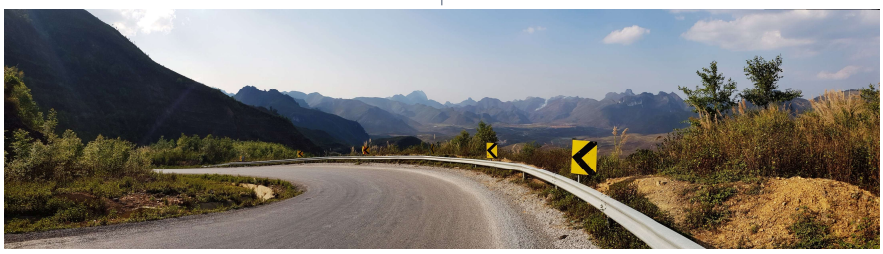
- **Why ISO 55001?**
  - Road & transport agencies need to consider is whether to align with, or become certified to, the ISO 55001 Asset Management Standard
- **A road or transport agency needs to understand what having an AM system means in practice**

- **Questions to be answered include**
  - What management processes need to be developed, or if they already exist, should they be documented?
  - What other management systems that could be used as a basis for the AM system already exist?
    - Organisations that are already certified to another ISO Standard, or have adopted a quality management systems approach, are likely to have documentation which can easily be modified for AM purposes



ISO 55001 integration of activities

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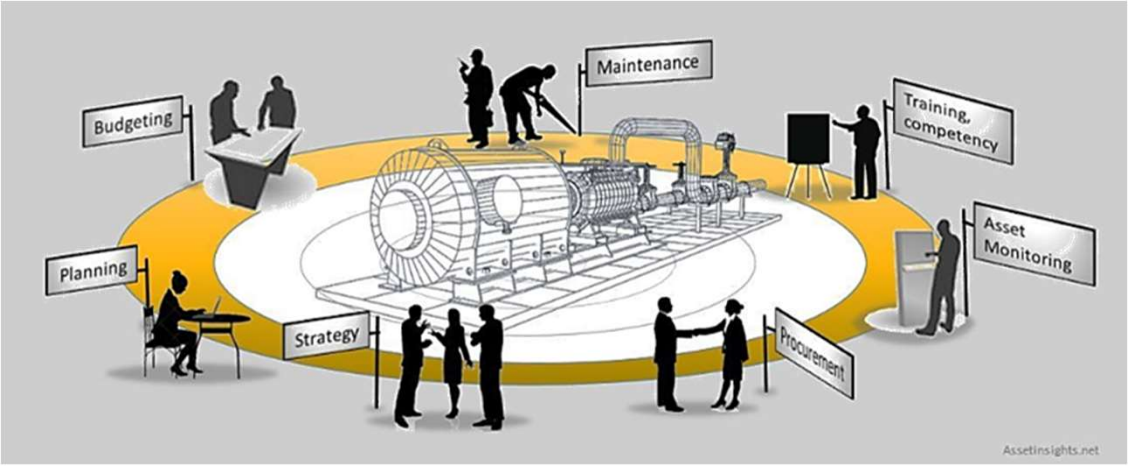
- **ISO 55001 includes many concepts that traverse multiple areas**
  - This reflects that fact that AM requires the integration of numerous activities in order to optimise value



AM integration

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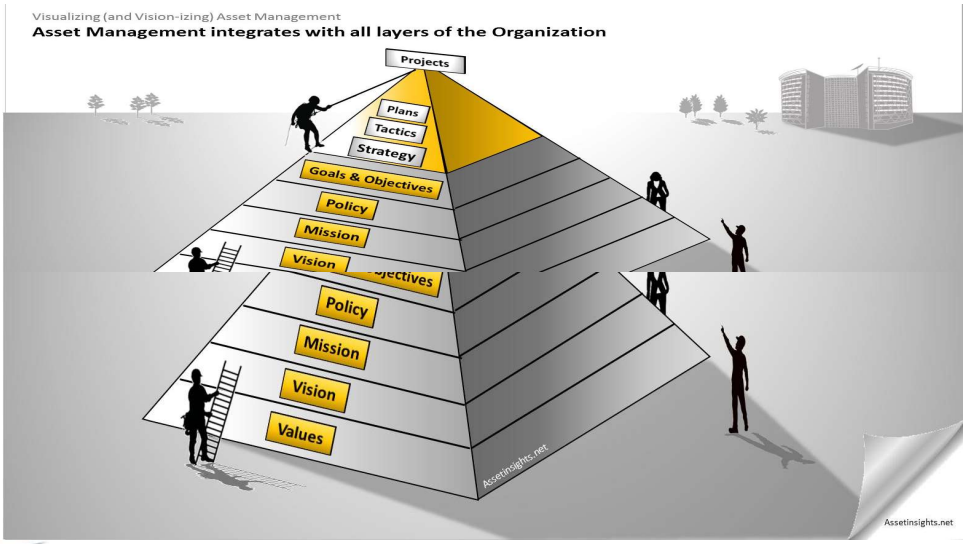

ISO 55001 AM system

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- **ISO 55001 AM system (AMS) – a 'set of interrelated or interacting elements to establish AM policy, AM objectives & processes to achieve those objectives' & all aspects of organisational performance & delivery in relation to AM, including**
  - **AM policy** – a statement of high level organisational commitment
  - **AM objectives** – a description of what AM is to achieve
  - **Strategic AM plan** (SAMP) or AM strategy – a high level document essentially describing how AM will be conducted
  - **AM plans** – documents which describe practices, tactics and long-term financial projections
    - These plans will typically follow the guidance provided in the International Infrastructure Management Manual
- **The AMS is not software but can include software if required to establish policy and objectives**
  - Think of the AMS as the system that helps the organisation determine what it wants to do and how it should do it
- **The AMS provides the structure by which to direct, coordinate & control AM activities & achieve an agency's vision & goals**
  - The relationship between the key elements of the AM system and the clauses in ISO 55001 is shown in the process diagram in the next slide

Relationship between key elements of an AM system & related clauses in ISO 55001

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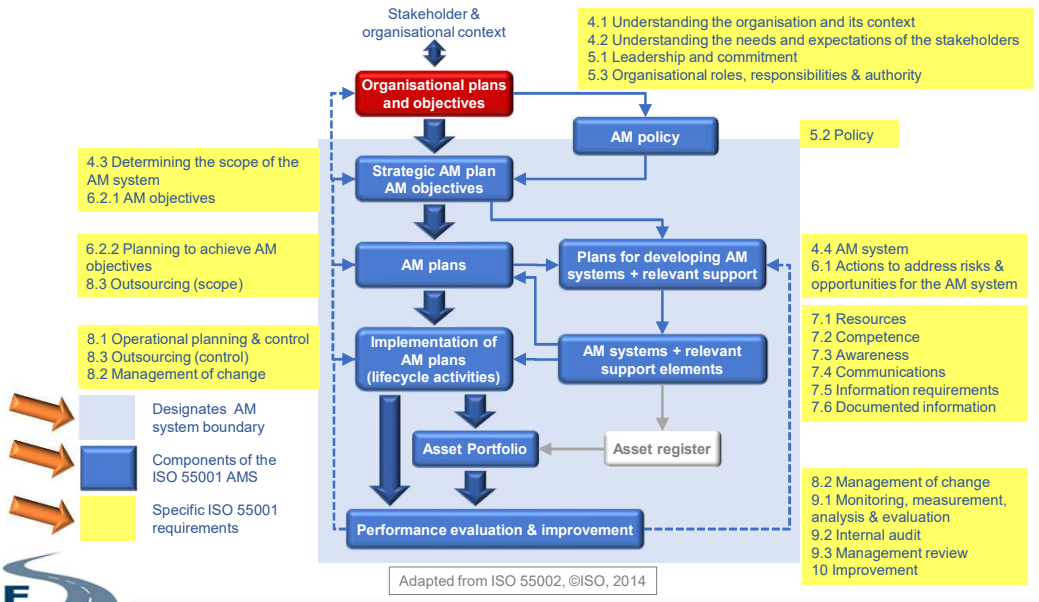

Adapted from ISO 55002, ©ISO, 2014

SANS/ ISO 55001 Elements & the Plan-Do-Check-Act model

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- **The Plan-Do-Check-Act (PDSA) approach for management systems illustrates how the ISO 55001 clauses align with the PDCA model**
- **Other approaches to management systems are also possible that do not follow the PDCA model, e.g.**
  - Lean
  - Six Sigma

Adapted from Asset Management – an anatomy ©IAM, 2015

What should an AM System contain?

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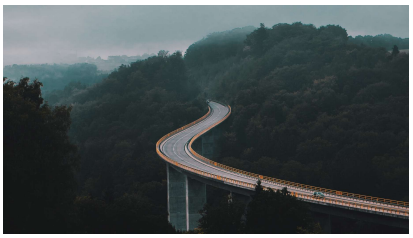
- **The AMS needs to contain the primary elements shown in figure 'Relationship between key elements of an AM system & related clauses in ISO 55001'**
- **ISO 55001 has specific requirements which an agency needs to consider, which can usually be demonstrated in two ways**
  - Documentary evidence showing that the agency has suitable business processes and practices in place
  - Evidence that these processes are being followed
- **Communication and awareness are particular areas to focus on, as these can be key issues, or barriers, within large organisations**



What should the AM System contain?

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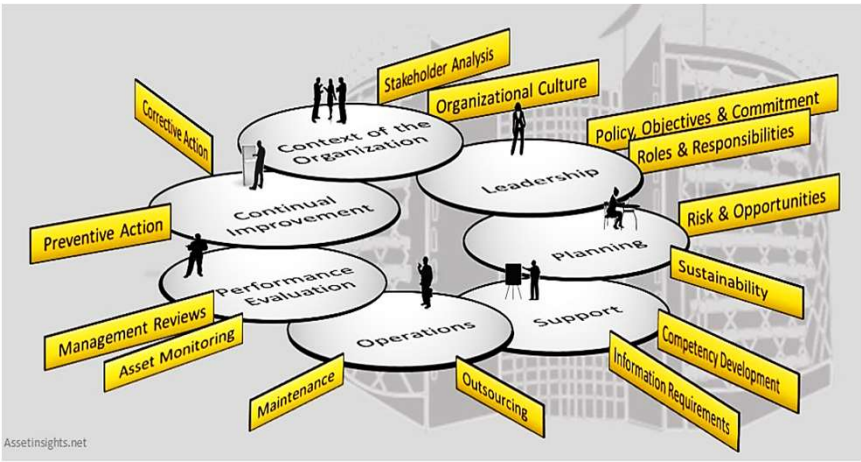
- For each requirement, from ISO 55001 Clause 4 (Context), through to Clause 10 (Improvement), the way in which each is interpreted from a road agency perspective is illustrated in the tables that follow



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ISO 55001 Organisational context requirements

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ISO 55001 Cl 4 Subsection	Specific requirements and relevance to a road agency
Understanding the organisation and its context	• The issues that could affect achievement of the AM objectives and the outcomes of the AM system need to be identified • Both internal and external contexts are often described in an agency's strategic plans, annual reports, AM plans and other documents • External context may include growth, economic development, social trends and environmental issues relating to transport • AM objectives aligned with the organisation's higher-level objectives should address these issues
Understanding the needs and expectations of stakeholders relevant to the AM system	• Stakeholders need to be identified and their requirements in financial and non-financial terms understood & decision-making criteria need to be identified • Stakeholders may include transport system funders, government and interest groups, while customers are typically users of the transport system • Stakeholders' and customers' needs and expectations are generally described in AM plans, and are identified through market research or consultation processes • The AM system should include reference to measurement of the levels of service delivered by the assets, and their comparison with expectations

ISO 55001 Organisational context requirements

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ISO 55001 Cl 4 Subsection	Specific requirements and relevance to a road agency
Determining the scope of the AM system	• The boundaries of the AM system within the organisation need to be defined, and the asset portfolios it includes made explicit • The scope is expected to cover all activities associated with the life-cycle of the assets • There will typically be interactions with other management systems & processes within the organisation
An AM system	• The approach to establishing, implementing, maintaining and improving the AM system needs to be clearly stated • This includes integration of AM processes, activities and data with other functions, and the development of a SAMP or AM strategy that documents the role of the AM system in supporting achievement of the AM objective

ISO 55001 Leadership requirements

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ISO 55001 Cl 5 Subsection	Specific requirements and relevance to a road agency
Leadership and commitment	• The organisation needs to demonstrate commitment to AM and leadership by top management • This can be achieved through a range of methods, including visible support and provision of resources through to actions and clearly articulated written statements to all people within the organisation
Policy	• An AM policy must provide a framework for establishing AM objectives, and should include commitments to satisfying applicable requirements and to continual improvement • While agencies will typically have a number of policies that are relevant, it is important for there to be a single high level overarching statement
Organisational roles, responsibilities and authorities	• The organisation needs to demonstrate that the responsibilities and authorities for relevant AM roles are assigned and communicated by top management • This is typically achieved through a clear organisational structure with well-defined roles and responsibilities described in job descriptions

ISO 55001 Planning requirements

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ISO 55001 Cl 6 Subsection	Specific requirements and relevance to a road agency
Actions to address risks and opportunities	• When describing the risks and opportunities in relation to achieving the AM objectives an organisation needs to consider external and internal issues and the needs and expectations of stakeholders • The causes, effects and likelihoods of adverse events occurring need to be understood so risks can be managed to an acceptable level, with an audit trail for the management of identified risks • An organisation needs to ensure that the AM system achieves its objectives, prevents or reduces undesirable effects, identifies opportunities, and achieves continual improvement • For a road agency, risk and safety management processes must be included here
Objectives and planning to achieve them	• AM plans are the mechanism for demonstrating how the AM objectives will be achieved utilising road assets • Plans to achieve the AM objectives must be established, documented and maintained, aligning the plans with the AM policy and SAMP and taking into account relevant requirements external to the AM system • AM plans need to cover all road services and assets defined within the scope of the AM system

ISO 55001 Support requirements

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ISO 55001 Cl 7 Subsection	Specific requirements and relevance to a road agency
Resources	• Determine and provide sufficient resources for the establishment, implementation, maintenance and continual improvement of the AM system, for meeting the AM objectives, and for implementing the activities described in AM plans • Whether the activity is carried out in-house or by consultants and contractors, this typically involves identifying or mapping the resource needs for each AM function. Where there is private sector involvement, ensure that the appropriate resources will be available to the agency where and when required. Resource needs may be human and non-human
Competence	• Determine the competence levels required for AM throughout the organisation, not just for 'AM specialists', and ensure that the education, training or experience of people carrying out work that could affect the performance of the assets, AM or AM system reflects the competence levels required. This includes processes for making sure that external competences and capabilities are appropriate to the tasks required
Communication	• Determine the need for internal and external communication relevant to the assets, AM and the AM system and deliver those levels of communication • The need should cover the information requirements of stakeholders and information required and provided during consultation processes, such as on road projects

ISO 55001 Support requirements

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ISO 55001 Cl 7 Subsection	Specific requirements and relevance to a road agency
Awareness	• Ensure that people carrying out work under the organisation's control, who can affect the achievement or otherwise of the AM objectives, are aware of: – the AM policy – their contribution to AM system effectiveness and the benefits of improved AM performance – the risks and opportunities relating to their work activities – the implications of not conforming to the AM system • This grouping includes staff, contractors and consultants carrying out any activity under the AM system or on the assets themselves
Information requirements	• Information requirements to support the achievement of AM objectives need to be described, including – specifying, implementing and maintaining processes for managing the information – ensuring alignment of financial and non-financial terminology, and consistency and traceability of asset and financial data • While road agencies typically hold large volumes of asset data, for which processes are documented, it is important to note that information requirements cover a much greater range across the AM cycle

ISO 55001 Support requirements

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ISO 55001 Cl 7 Subsection	Specific requirements and relevance to a road agency
Documented information	• Information that must be controlled under normal ISO processes is subject to specific requirements and is known as 'documented information'. • This includes legal and regulatory requirements as well as some external documents. • Road agencies must ensure that this information is available and suitable for use where and when needed, and is adequately protected

ISO 55001 Operation of the AM System requirements

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ISO 55001 Cl 8 Subsection	Specific requirements and relevance to a road agency
Operational planning and control	• Plan, implement and control the processes established to: meet the requirements, implement the actions associated with the identified risks and opportunities, implement the AM plans, and implement corrective and preventive actions • This covers the operational planning and control processes for both AM and the AM system • While this should include the operational management of road assets, it is much wider than that. It includes establishing criteria, implementing process control, maintaining documentation, and managing operational risk across all activity associated with the AM system
Management of change	• Ensure that the risks associated with any planned change that may affect achievement of the AM objectives are managed in accordance with the provisions of Clause 6 (Planning) • Control planned changes, review unintended consequences & take action to mitigate adverse effects • Change may be needed to improve AM maturity, or procurement or structural change in the agency
Outsourcing of AM activities	• Assess the risks of and control any outsourced activities or processes that could effect on achievement of the AM objectives or performance of the assets • Document how the activities will be controlled and integrated into the AM system – all outsourced activities must meet all of the same requirements as those applying internally. This applies particularly to physical works contracts, such as network maintenance, capital works and professional services, all being part of the AM cycle

ISO 55001 Performance evaluation requirements

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ISO 55001 Cl 9 Subsection	Specific requirements and relevance to a road agency
Monitoring, measurement, analysis and evaluation	• Determine what needs to be monitored and measured, including how, when and where. Control and maintain documented evidence • This covers the performance of the agency in carrying out AM activity, the performance of the assets and the effectiveness of the AM system in achieving the AM objectives • An agency should establish a hierarchy of performance measures to cover all of these attributes
Internal audit	• Define audit criteria and their scope, plan, establish and maintain an internal audit programme • The purpose of internal audits is to test conformance, implementation and maintenance of the AM system • This may lead to the identification of changes or improvements • Note that this does not replace the regular external ISO audit processes to assess whether the agency can continue to be ISO 55001 certified • This could be linked to other audit procedures, such as safety audit
Management review	• Plan and carry out regular top-management reviews of the AM system to ensure its continuing suitability, adequacy and effectiveness. Identify opportunities for continual improvement and retain documented evidence of the audits and the opportunities

ISO 55001 Improvement requirements

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ISO 55001 Cl 10 Subsection	Specific requirements and relevance to a road agency
Non-conformity and corrective action	• Specify requirements for responding to any non-conformity or incident and taking action to control and correct it. This includes criteria to address: – the possibility of future occurrences – implementation of actions – review of effectiveness of actions • The requirements also include procedures for managing activities such as reactive maintenance, emergency responses, etc. on road networks
Preventive and predictive action	• Establish processes to address the root causes of asset failures and AM system failures. These causes may include: – sources of information – identification of potential failures – recording changes in processes – updating am plans – documenting actions • The requirements include procedures for managing activities such as planned maintenance, condition monitoring, predictive modelling, etc., on road networks

ISO 55001 Improvement requirements

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ISO 55001 Cl 10 Subsection	Specific requirements and relevance to a road agency
Continual improvement	• Continually improve the suitability, adequacy and effectiveness of AM and the AM system • This includes processes such as gap analyses and maturity level assessments, and the establishment and monitoring of continuous improvement action plans • These activities are typically already carried out by most agencies. An important point is that continuous improvement of the AM system is also required

Photo by bert brrr on Unsplash

What does an ISO 55000 AM system look like?

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- **An ISO 55000 AM system is a holistic programme for directing and controlling all aspects of physical AM**
  - It unites organisational goals and structure with process, data, technology, and auditing tools to create an effective operation
- **Process is the foundation for AM and ISO 55000 is all about process**
- **It brings together the whole organisation**
  - An ISO 55000 AM system spans multiple business functions, including project management, maintenance, operations, storerooms, procurement, and accounting
  - It lays out clear responsibilities, procedures, and goals for the whole operation
  - By doing so, it breaks down silos and gets the whole organisation working together to accomplish AM objectives
- **It encompasses the whole asset lifecycle**
  - An ISO 55000 AM system governs the whole lifecycle of physical assets – from planning and acquisition to decommission and disposal
  - Because of this long-term approach, an ISO 55000 AMS is an exceptional tool for reducing total cost of ownership & increasing the return on assets

Lifecycle of physical assets

What does an ISO 55000 AM system look like?

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- **The AMS aligns the whole operation from executives to technicians**
  - An ISO 55000 AM system establishes an executive mandate for how the organisation's assets will be managed
  - It then works out exactly what this mandate means in terms of specific objectives, processes, and performance measures
  - This top-down approach makes AM a team player in helping the organisation deliver on its business goals

AM top-down approach

Adapted from SwainSmith, Inc. https://swainsmith.com/iso-55000-iiot-and-eam-solving-the-asset-management-puzzle/

What does an ISO 55000 AM system look like?

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- **Bringing in technology**
  - Once the foundation of AM is laid, it's time to become more efficient and bring in information systems that collect, monitor, store, analyse, and report AM data
  - There are two layers of information technology, i.e.
    - An upper layer of 'Enterprise' AM software system, which is the main repository for AM data
    - A lower layer that consists of monitoring devices and critical supporting applications that connect to the 'Enterprise' AM system to share data
- **Putting together the pieces: ISO 55000 and technology**
  - ISO 55000 AM systems and technology systems perform different but complementary functions
    - They target the same objective but address it from two different directions
- **The key is that AM systems and technology systems come together, integrate, and work in a unified manner**
  - Management systems bring the **process** and technology systems bring the tool set to execute it
  - AM systems and asset technology systems are better together than apart
  - Process creates data & technology systems deliver it – you need both to achieve success
  - Working together, the whole becomes greater than the sum of the parts

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What does an ISO 55000 AM system look like?

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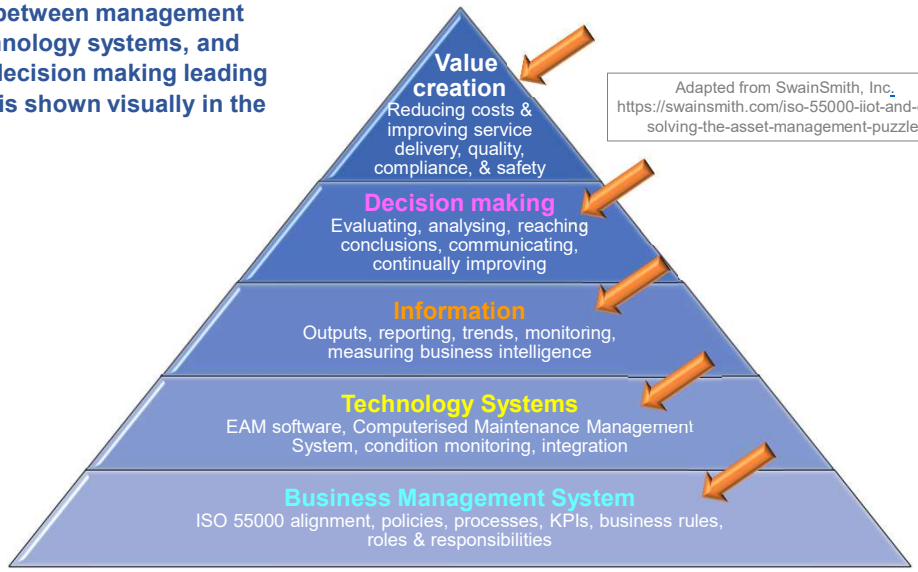
- **The relationship between management systems and technology systems, and information and decision making leading to value creation is shown visually in the pyramid graphic**



Adapted from SwainSmith, Inc. https://swainsmith.com/iso-55000-iiot-and-eam-solving-the-asset-management-puzzle/

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What does an ISO 55000 AM system look like?

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- **To have long-term and sustainable value creation you need both management systems and technology systems, but which comes 1st ?**
- **Process rules the roost – it identifies who does what, and when, where, and why**
  - Technology and EAM should be implemented to support that, not to define it – technology is only as good as the process driving it
- **As the graphic indicates, business management systems come first**
  - Technology should be a product of the process, not the other way around
  - When technology systems get in front of management systems, you're in for trouble – the wrong captain is driving the boat
  - Implementing a technology system without fully defining your management system (business processes) will leave you operating without direction
- **Configuring software as you go is a potentially risky and very costly endeavour**
  - Once the AM system is in place, then bring in technology systems to streamline it
  - Technology is a requirement for success – but only after you have fully defined how you are going to conduct business
  - Management systems make you effective, while technology systems make you efficient
- **Effective and efficient AM is what the organisation is after!**

Steps to developing an AM System

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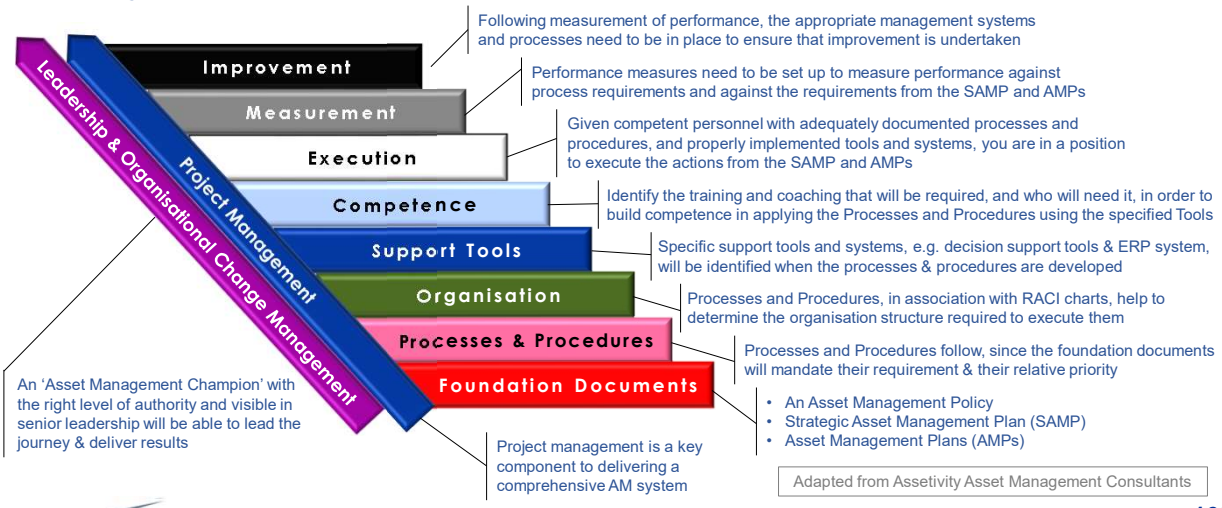
- **Set the foundation first – the figure shows a logical sequence of how the building blocks of an AM System can be established**



Adapted from Assetivity Asset Management Consultants

ISO 55001 AM system plans

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- **Plans by time frame**
  - **Strategic Plan** – This plan takes a long-range view of the needs of the organisation, typically looking forward 20-30 years into the future. Strategic plans try to give a "big picture" view of things
  - **Tactical Plan** – This plan occupies a position somewhere between the strategic plan and the operational plan and consider a 3-year, 5-year or 10-year window into the future
  - **Operational Plan** – This plan is focused on one single fiscal year or calendar year
- **Functional plans – several are identified in the process diagram**
  - **Risk Management Plan** – provides a register of all the different types of risks facing the organisation, their likelihood and their impact if they occur. The plan develops a series of treatments to address each risk
  - **Safety Plan** – identifies all the potential safety hazards on the site, in and around the buildings that are owned and/or operated by the organisation. The safety plan is closely tied to the risk management plan
  - **Sustainability Plan** – identifies
    - How the organisation will find the optimal balance across the triple bottom line of people (community), planet (environment) and profit (financial viability) and across the triad of risk, cost and performance
    - It identifies the types of inevitable trade-offs that the organisation may sometimes need to make in order to meets its objectives
  - **Change Management Plan** – identifies
    - The gaps in the organisation's existing processes and how the organisation will implement changes over time
    - The five milestones an individual must achieve for change to be successful: awareness, desire, knowledge, ability, reinforcement

ISO 55001 AM system plans

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- **Functional plans *continued***
  - **Resourcing Plan** – identifies the number of staff and type of staff that are required to meet the organisation's objectives. It also considers the appropriate balance between internal resources (staff) and external resources (such as contractors)
  - **Expenditure Plan** – identifies the timing of CAPEX and OPEX
  - **Maintenance Plan** – identifies all the organisation's physical assets and the maintenance tasks that are required to ensure the ongoing performance of the assets
  - **Capital Plan** – identifies the lifespans of the different assets and the forecasted replacement costs at the end of their useful life.
    - This information is presented in the form of cash flow table that enables the organisation to make informed decisions on how much money should be set aside each fiscal year in preparation for future projects
  - **Information & Technology Plan** – identifies the types of information that the organisation needs to collect in order to achieve its objectives, the requirements for storage of information, hardware and the use of different software applications to empower staff
  - **Stakeholder Plan** – identifies the different types of stakeholders (both internal and external) that have an interest in and an influence over the organisation. It identifies the resources and activities that are necessary to manage positive relations with the different stakeholders
  - **Communications Plan** – processes and procedures to interact with stakeholders to ensure alignment with stakeholder needs, requirements, perceptions, and improve the quality of decision making, reduce conflict, etc.

Alignment or Certification to ISO 55001?

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- **The benefits described may be realised by aligning the organisation with ISO 55001**
- **Before deciding on whether to become certified to ISO 55001, an agency should consider the options, including**
  - Limited certification – for a particular asset group/portfolio/sub-network
  - Alignment without certification
  - Partial alignment – for a particular asset group/ portfolio/ sub-network or particular requirements considered important to the agency
  - Taking no action
- **Whether or not an agency should seek certification is a matter for an individual agency to determine. This will depend on factors, such as**
  - Stakeholder expectations, including customers, road user groups, statutory bodies (e.g., state governments), asset owners, funders or investors
  - Costs and benefits associated with the certification process, both initial and on-going costs to maintain certification

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Questions 10 min
End of Day 1

About sources

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➢ **Major reference materials used**

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- Asset Management Policy, Strategy and Plans, IAM, 2015
- Climate Emergency Action Planning – Guidance for asset owning organisations IAM 2021
- Asset Management Leadership – A White Paper, IAM 2022
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- Ask the experts Asset Management Webinar June 2016 - Levels of Service-Cost-Risk and Asset Management Plan, Inframanage, accessed July 2021 at https://inframanage.com/inframanage-blog/,
- Asset Management: Whole-life management of physical assets, Editor Chris Lloyd 2010

About acronyms for organisations

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- AASHTO – American Association of State Highway and Transportation Officials
- BS – British Standard
- BSI – British Standards Institution
- CNAM – Canadian Network of Asset Managers
- FHWA – Federal Highway Administration (USA)
- GFMAM – Global Forum on Maintenance and Asset Management
- IAM – Institute of Asset Management UK
- IPCC – Intergovernmental Panel for Climate Change
- IPWEA – Institute of Public Works Engineering Australasia
- ISO – International Organization for Standardization
- NDOT – National Department of Transport, South Africa
- NRCC – National Research Council of Canada
- NZ – New Zealand
- NZTA – New Zealand Transport Authority
- OECD – Organisation for Economic Co-operation and Development
- PIARC – World Road Association
- PSAB – Canadian Public Sector Accounting Handbook
- RMS – Roads & Maritime Services (New South Wales)
- SA – South Africa
- TRB – Transportation Research Board (USA)
- TRL – Transport Research Laboratory (UK)
- UK – United Kingdom
- UN – United Nations
- US – United States
- US DoT – United States Department of Transportation

About acronyms for asset management & other

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- AM – Asset Management
- AMP – Asset Management Plan
- AMS – Asset management system
- BS – British Standard
- BSI – British Standards Institution
- CAPEX – Capital expenditure
- CIDMT – Cities Infrastructure Delivery Management Toolkit KPI – Key Performance Indicator
- CLoS – Customer-focussed level of service
- CNAM – Canadian Network of Asset Managers
- FWP – Forward work programme
- GHG – Green house gases
- GIAM – Government-wide immovable asset management
- GIAM – Government-wide immovable asset management act

- GPS – Government Policy Statement (NZ)
- HMEP – Highways Maintenance Efficiency Programme
- HR – Human resources
- IT – Information technology
- KRA – Key Result Area
- LoS – Level of Service
- LTFP – Long Term Financial Plan
- MAP-21 – Moving Ahead for Progress in the 21st Century
- ONRC – One Network Road Classification (NZTA)
- OPEX – Operational expenditure
- PAS – Publicly available standard
- PDCA – Plan-Do-Check-Act
- PRMG – Provincial Road Maintenance Grant
- PSAB – Canadian Public Sector Accounting Handbook
- RAMP – Road Asset Management Plan

About acronyms for asset management & other

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- SAMP – Strategic Asset Management Plan
- SHAMP – State Highway Activity Management Plan (NZTA)
- SHIP – State Highway Investment Proposal (NZTA)
- SPE – Statement of Performance Expectations (NZ)
- TAM – Transportation Asset Management
- TIP – Transportation Improvement Plan
- TMH – Technical Methods for Highways

About Synonyms

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- **'Agency' is used synonymously with 'authority' and are used in a generic sense and not to designate a particular organisational type**
-

About the course compiler

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- Mervyn Henderson Pr Eng
- Career - 44 years in the roads industry, South Africa & Australia
  - Consultant – Asset Management Services, Western Cape
  - Specialist Engineer, Roads Branch, Western Cape (RBWC)
  - Team Leader Asset Management, ARRB Group, Queensland, Australia
  - Program Manager – Strategic Investment and Network Performance, Brisbane Office, Metropolitan Region, Assets & Operations, Queensland Department of Transport and Main Roads, Australia (TMR)
  - Acting Director: Road System Governance, Engineering & Technology Division, TMR
  - Head: Pavement Materials and Rehabilitation. Roads and Stormwater Department, City of Cape Town
  - Chief Engineer: Pavement Engineering, Roads Branch, Western Cape
- Qualifications
  - MSc Engineering (Civil)
  - (Post) Graduate Diploma in Engineering (Civil)
  - Graduate Diploma of Management (Technology Management)
- Some achievements in asset management
  - Compiled the Western Cape Road Asset Management Plan (RBWC)
  - Compilation of an AM policy, AM strategies & AM plans (RBWC)
  - Development of integrated business processes all road projects and routine maintenance (RBWC)
  - Best Practical Paper Award for the paper "*Management of unpaved roads: Developing a strategy and refining models*", South African Transportation Conference, Pretoria, July 2017
  - Coordination of the implementation of Asset Management Elements in the Metropolitan Region of TMR
  - Implementation of dTIMS in 2012/13 for the $300 million 5 year TMR Road Asset Management Contract for Southeast Queensland (ARRB)
  - Development and establishment of new management systems: Gravel Management System, Pavement Quality Management System, Project Management System (RPM), the Seal Planning & Design System (RBWC)
  - Implementation of the Deighton Total Infrastructure Management System (dTIMS) (RBWC)
  - Development of programmes for rehabilitation, programmed maintenance, upgrading and regravel in the Western Cape and co-author of *'A Strategic analysis for optimal fund allocation and budget level'* (RBWC)
  - Planning and leading strategic planning sessions for the Western Cape Roads Branch and development of the 1st Business Plan (RBWC)
  - Editor and coordinator for Materials Manual (RBWC)