

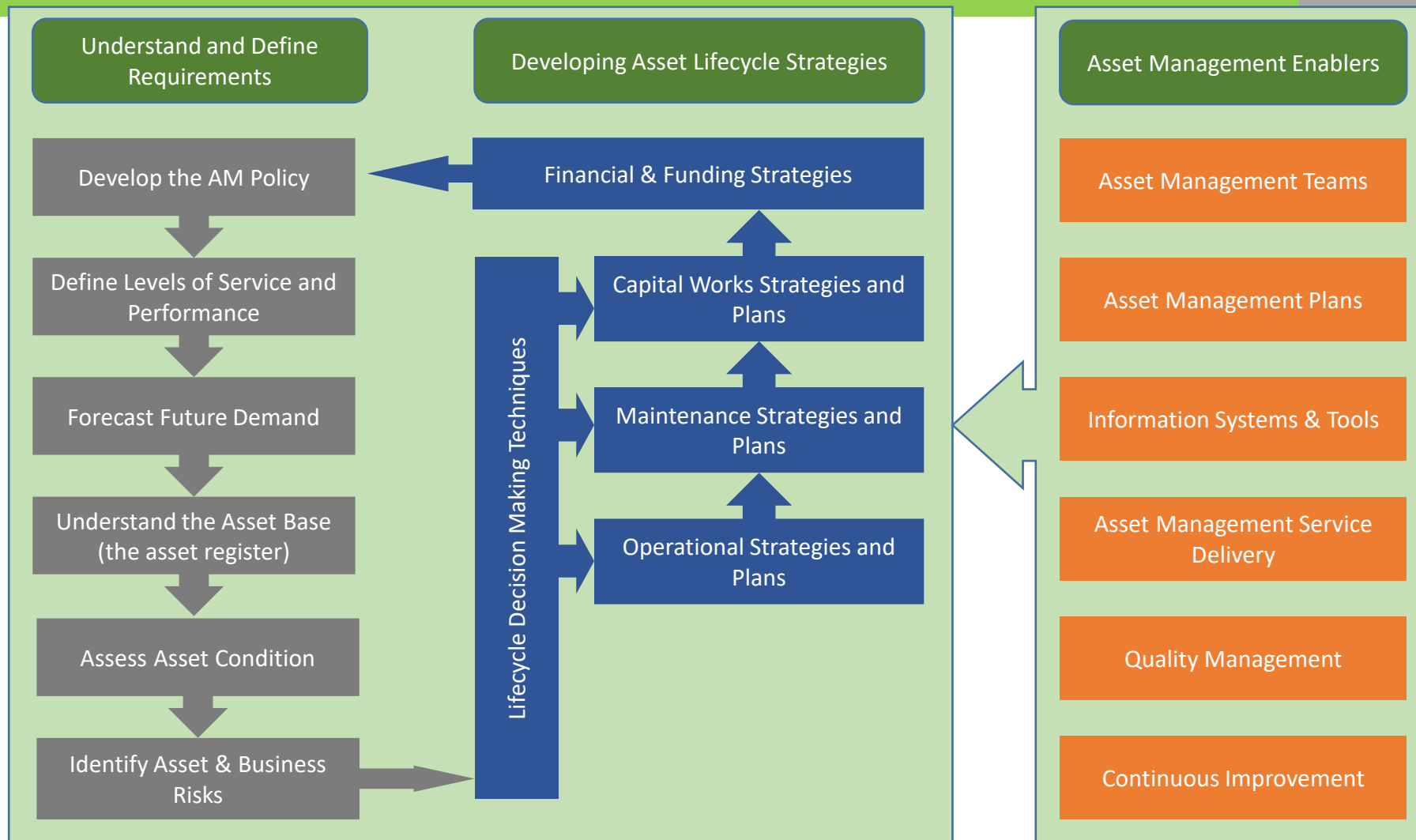
Road Asset Management (RAM) Training

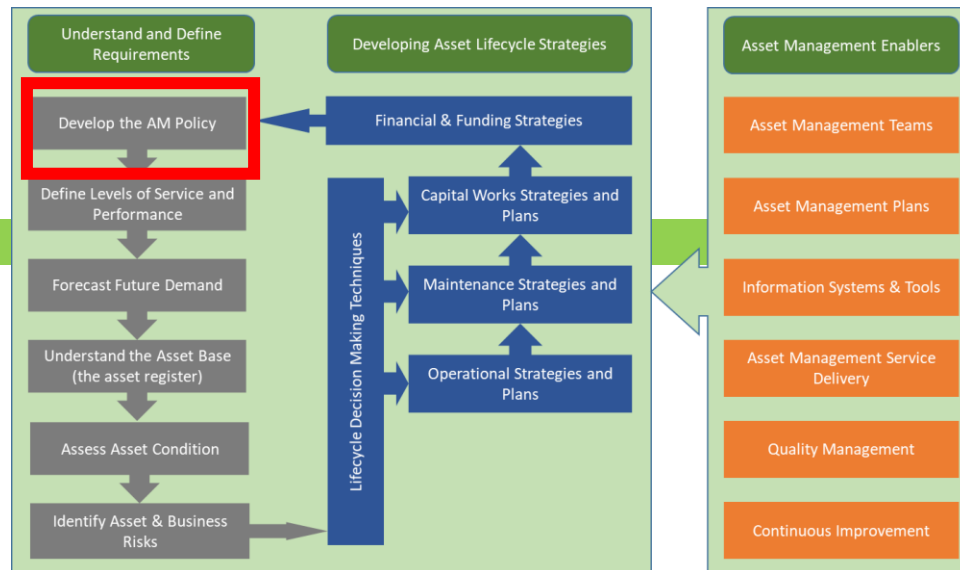
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Session 2: Components of RAM

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International Infrastructure Management Manual (IIMM) AM Process





- The AM Policy provides the governing authority to implement all aspects of the RAM program

- Example from Australia

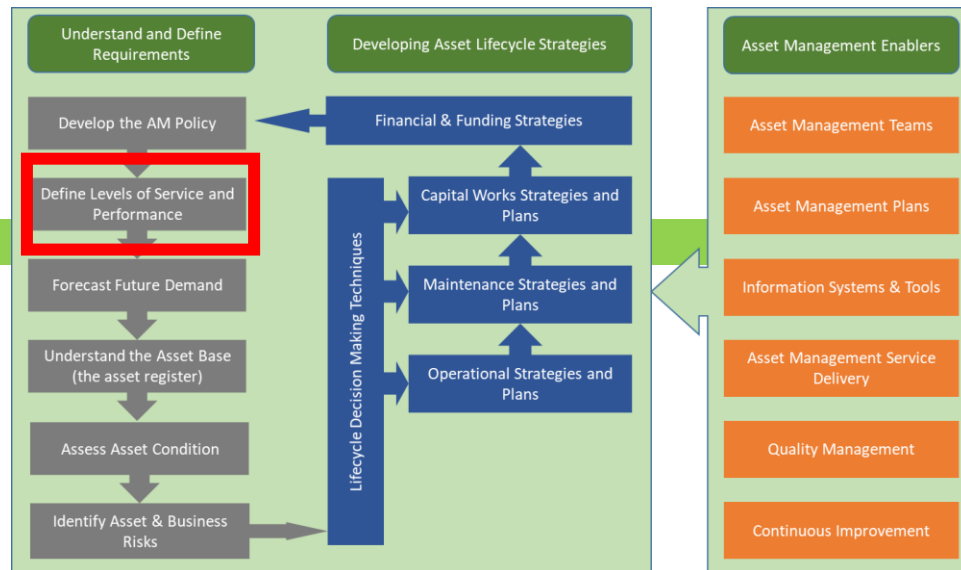
- https://www.transport.tas.gov.au/_data/assets/pdf_file/0004/114439/Road_Management_Infrastructure_Asset_Management_Policy.pdf

- Easy to write, easy to approve, challenge is in delivering on the policy

Typical Policy

- Short document – a few pages, or even a single page
 - Scope of assets covered
 - Commitment to implementing RAM
 - Maybe commitment to achieving ISO55000
 - Commitment to life cycle costing principles
 - Level of service based
 - Management of risks
 - Customer focused
-
- Authorised by highest level of authority – e.g. government minister

Service Levels



- Define what it is that you are trying to deliver, in words that the customer understands
- We don't build roads, rehabilitate roads, or maintain roads for the fun of it, we do that to deliver a service level (whether explicitly stated or not)
- Service levels are about more than just the condition of the road
 - Most authorities mention Efficient, Safe, Informed, Cost-effective in their service level statements

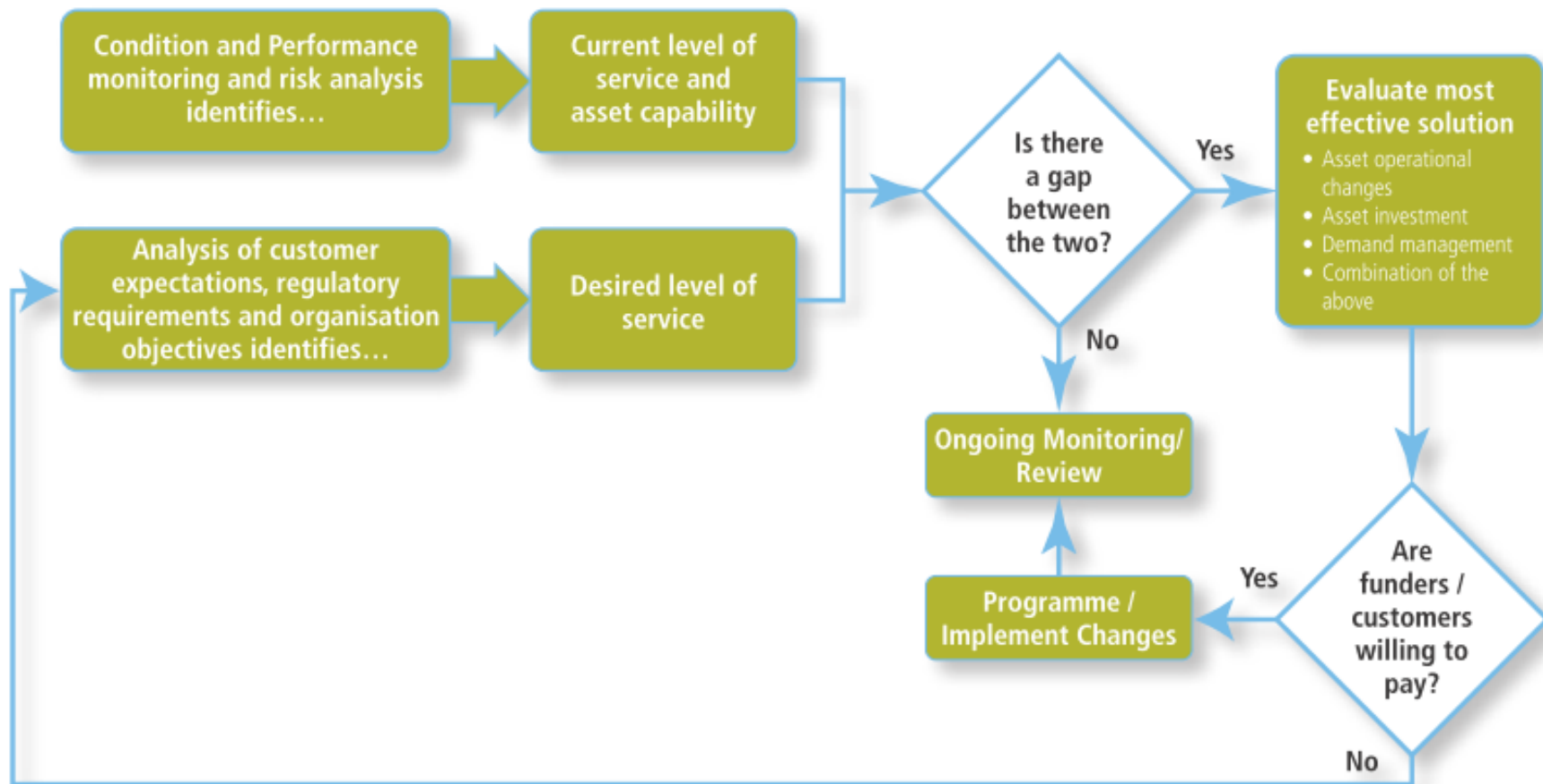
Defining the Level of Service is Critical



One size doesn't fit all – its all about affordability & risk



It may called asset management, but assets are only there to deliver a service



Some key definitions

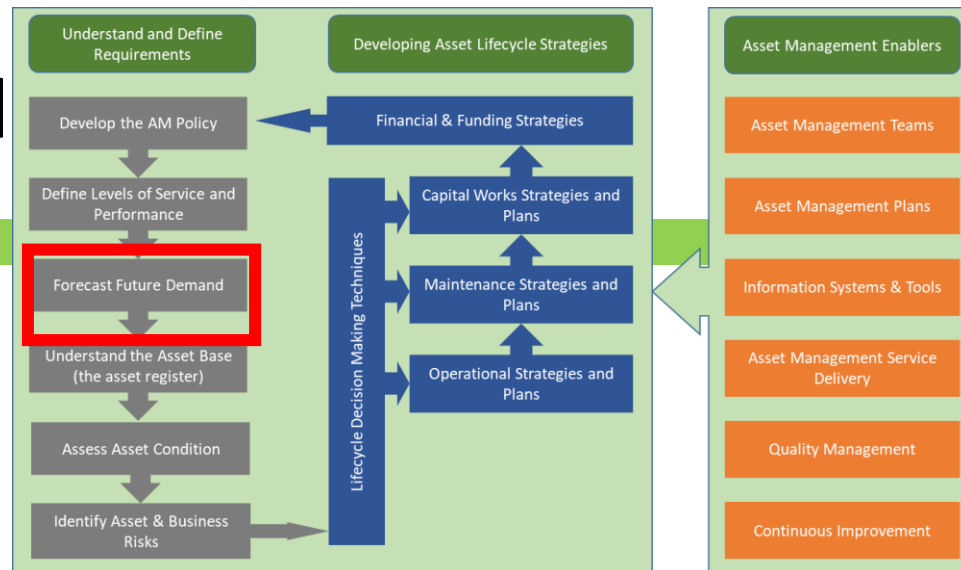
- **Levels of Service**
 - What the organisation intends to deliver. Levels of service describe one or more attributes of the service from a customer point of view
 - Example: Provide a network that connects communities.
- **Performance Measure (also termed Performance Indicator)**
 - A qualitative or quantitative measure of a service or activity used to indicate how the organisation is doing in relation to delivering levels of service
 - Example: % of communities > 500 habitats serviced by an all weather road.

New Zealand One Road Network Classification

- <https://www.nzta.govt.nz/assets/Road-Efficiency-Group-2/docs/customer-levels-of-service.pdf>

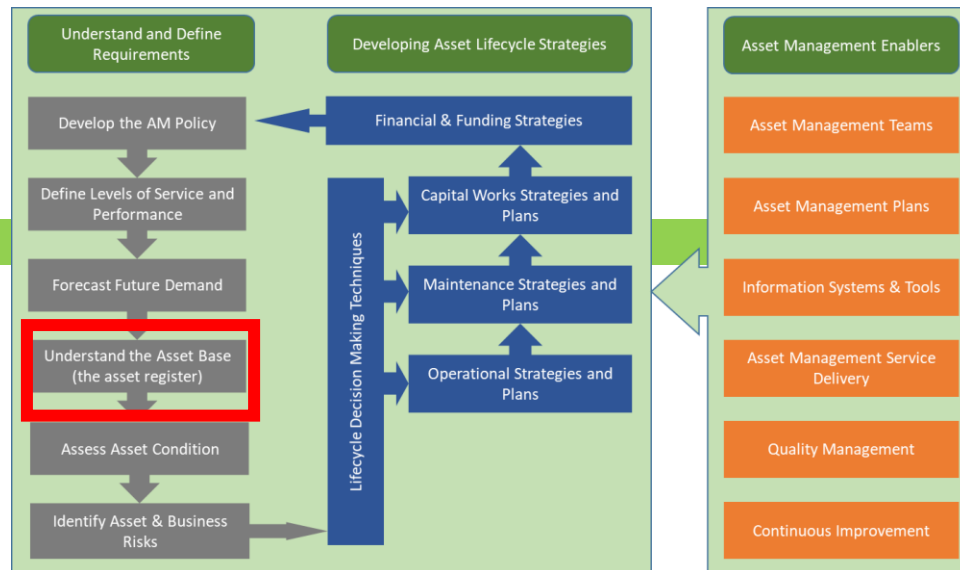
Road categories	Mobility			Safety	Amenity	Accessibility
	Travel time reliability	Resilience	Optimal speeds (safety and efficiency)			
National (high volume)	The majority of road users experience consistent travel times with some exceptions in major urban centres.	Route or viable alternative is always available. Very rapid restoration of route affecting normal operating conditions. Road users are advised well in advance of issues affecting network performance and availability.	Higher speeds on KiwiRAP ¹ 4-star dual carriageway roads, or lower or variable speeds where required to support network safety or productivity. [Priority users (buses and freight) provided with separate facilities where appropriate].	Mostly forgiving roads and roadsides, equivalent to KiwiRAP 4-Star standard. User hazards absent or mitigated including head on risk. Active road users generally do not have access - if present, they are provided with separate space or are physically separated. Form of road provides road user guidance.	High level of comfort, no discernable roughness. Aesthetics of adjacent road environment reflects journey experience needs of higher numbers of through traffic users. Character of scenic/tourist routes protected and enhanced.	Landuse access for road users rare and highly engineered, usually only to highway service centres. Strategic network connectivity for road users due to infrequent connections, generally only to National high volume roads. High volume traffic will be unimpeded by other traffic at junctions. [Mainly express bus services]. Active road users generally do not have access - if present, they are provided with network access and journey continuity by a separate space or are physically separated. Provision of quality information relevant to national road user needs.
National	The majority of road users experience consistent travel times with some exceptions in urban heavy peak, holiday or during major events.	Route is always available during major weather or emergency events and viable alternatives exist. Rapid clearance of incidents affecting road users. Road users are generally advised in advance of issues and incidents	Higher speeds depending on assessed level of risk. Lower if mixed use, high intersection density, schools, shopping, concentrations of active road users. [Priority users (buses and freight) provided with separate facilities where appropriate.]	A high KiwiRAP 3 or 4-star standard, or equivalent, with consistent and predictable alignment. User hazards mostly mitigated. Active road users (if present) are mostly provided with separate space or are physically separated. Some lower standards and/or winding sections may require lower speeds and extra care. High level of road user safety guidance provided.	High level of comfort, infrequent roughness. Aesthetics of adjacent road environment reflects journey experience needs of higher numbers of through traffic users. Character of scenic/tourist routes protected and enhanced.	Landuse access for road users infrequent and highly restricted in rural areas, and often restricted in urban areas. Mainly strategic network connectivity for road users due to infrequent connections, generally only to other equal and higher category roads. [Mainly express bus services.] Network access and journey continuity for active road users (if present) mostly provided by separate space or physical separation. Easy navigation at intersections, with National road traffic given priority, unless joining with equal or higher category roads. Provision of quality information relevant to national road user needs.
Regional	The majority of road users experience consistent travel times with some exceptions in urban heavy peak, holidays, during major events or during severe weather events.	Route is always available except during major extreme weather or emergency events and viable alternatives nearly always exist. Rapid clearance of incidents affecting road users. Road users may be advised in advance of issues and incidents	Higher speeds depending on assessed level of risk. Lower if mixed use, high intersection density, schools, shopping, concentrations of active road users. [Priority users (buses and freight) provided with separate facilities where appropriate.]	Mostly KiwiRAP 3-star equivalent or better. Active road users are mostly provided with additional space in urban areas and in some rural areas. Some lower standards and/or winding sections may require lower speeds and extra care. High level of road user safety guidance provided.	High level of comfort, infrequent roughness. Aesthetics of adjacent road environment reflects journey experience needs of both through traffic and active road users. Character of scenic/tourist routes protected and enhanced. Amenity outcomes of active road users are mostly provided with additional space in urban areas and in some rural areas. Clean and secure [lighting, park and ride and cycle park facilities, weather protection for PT users].	Landuse access for road users in rural areas often restricted, and some restrictions in urban areas. Limited road user connections to other National roads and Arterials, with priority over lower category road users. [Numerous bustops with high frequency services to key destinations and interchanges.] Network access and journey continuity for active road users are mostly provided with additional space in urban areas and in some rural areas. [Parking for all modes, and facilities for mobility impaired at activity centres with some shared spaces.] Extra care required around activity centres due to mixed use, including goods vehicles. Provision of quality information relevant to regional road user needs.
Arterial	Generally road users experience consistent travel times with some exceptions in urban heavy peak, holidays, during major events or during moderate weather events.	Route is nearly always available except in major weather events or emergency event and where no other alternatives are likely to exist. Clearance of incidents affecting road users will have a high priority. Road users may be advised of issues and incidents	Higher speeds depending on assessed level of risk. Lower if mixed use, high intersection density, schools, shopping, concentrations of active road users. In urban areas travel speeds depend on assessed level of risk and recognise mixed use, schools, shopping strips and concentrations of active road users	Variable road standards, lower speeds and extra care required on some roads/sections particularly depending on topography, access, density and use. Road user safety guidance provided at high risk locations. Some separation of road space for active road users in urban areas	Good level of comfort, occasional areas of roughness. Aesthetics of adjacent road environment reflects journey experience needs of both road users and land use. Urban arterials reflect urban fabric and contribute to local character. Some separation of road space for active road users for amenity outcomes in urban areas. Clean and secure [lighting, good PT and cycle numbers, including park and ride and cycle park facilities, and weather protection for PT users]	Some landuse access restrictions for road users, both urban and rural. Road user connection at junctions with National, Arterial or Collector roads, and some restrictions may apply in urban areas to promote Arterials. Traffic on higher classified roads generally has priority over lower order roads. [Numerous bustops with high frequency services to key destinations and interchanges.] Some separation of road space for active road users in urban areas to provide network access and journey continuity. [Parking for all modes and facilities for mobility impaired at activity centres, and some shared spaces.] Extra care required around activity centres due to mixed use, including goods vehicles. Provision of

Future Demand



- Helps identify when expansion works will be required, along with future loading on the existing infrastructure.
- For simple networks can be a regression of past growth patterns.
- For complex and congested networks will involve full traffic models, linking land use development to traffic demand.
- Minimum forecast period of:
 - At least 20years for pavement and surfacing decisions
 - 20+ years for expansion projects

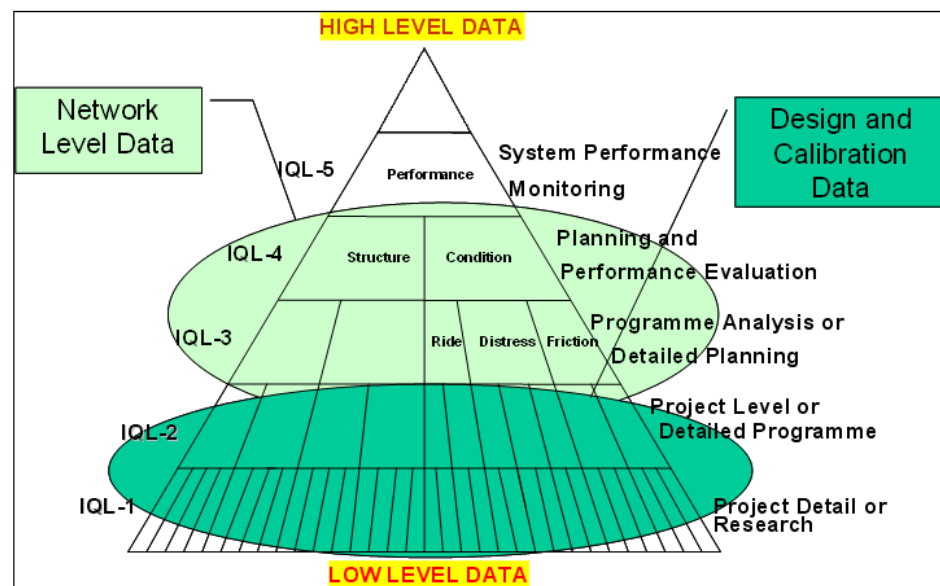
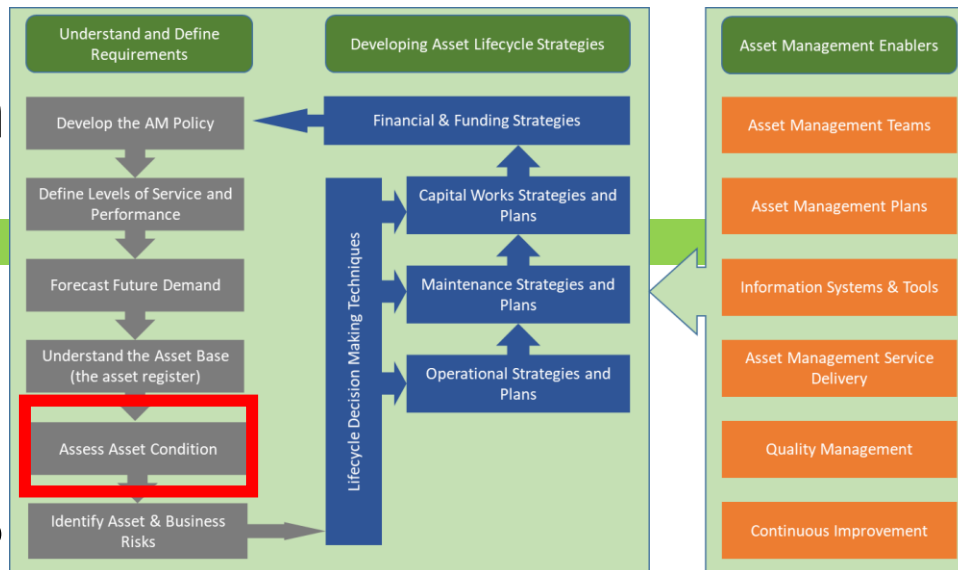
Asset Register

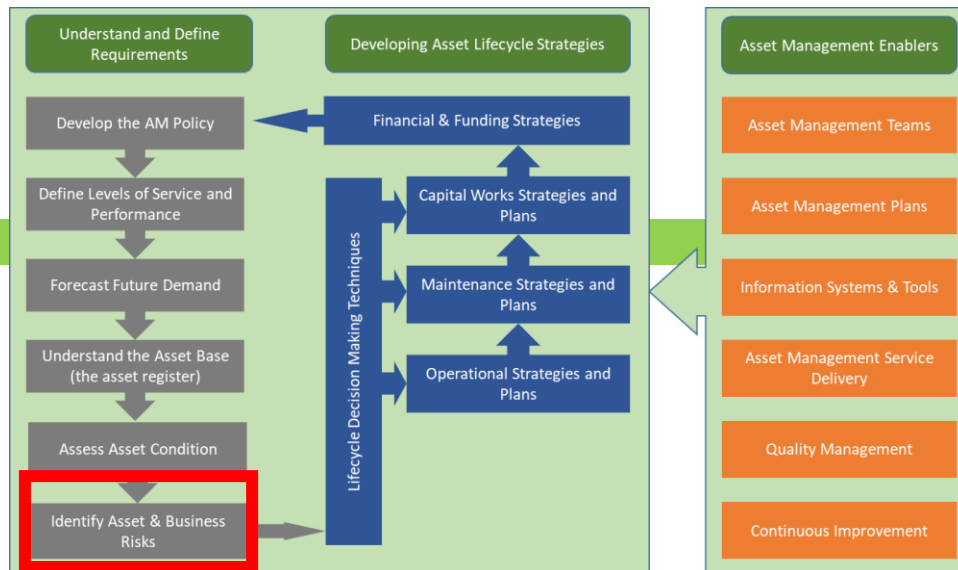


- List of the physical assets you have
- At an appropriate level of detail / componentisation
- May start out being stored in a spreadsheet or simple database, then transition to full Asset Management Information System in the future
- Need a process to keep it up to date

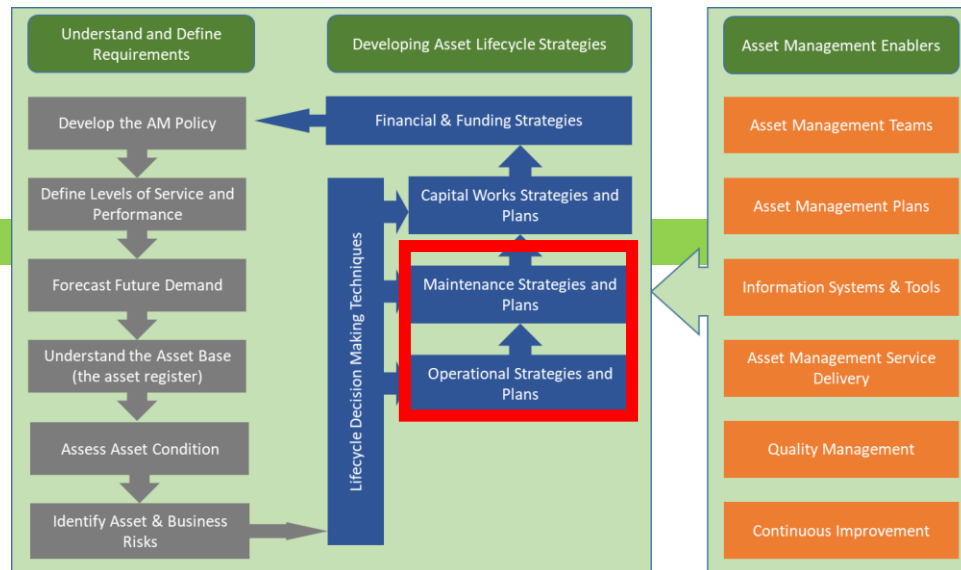
Asset Condition

- Physical measure of the asset condition
- What to measure, how often, and to what level of accuracy?
- Not everything needs to be inspected every year
 - Risk based inspection regimes
- Consider the Information Quality Level (IQL) when designing your data collection program





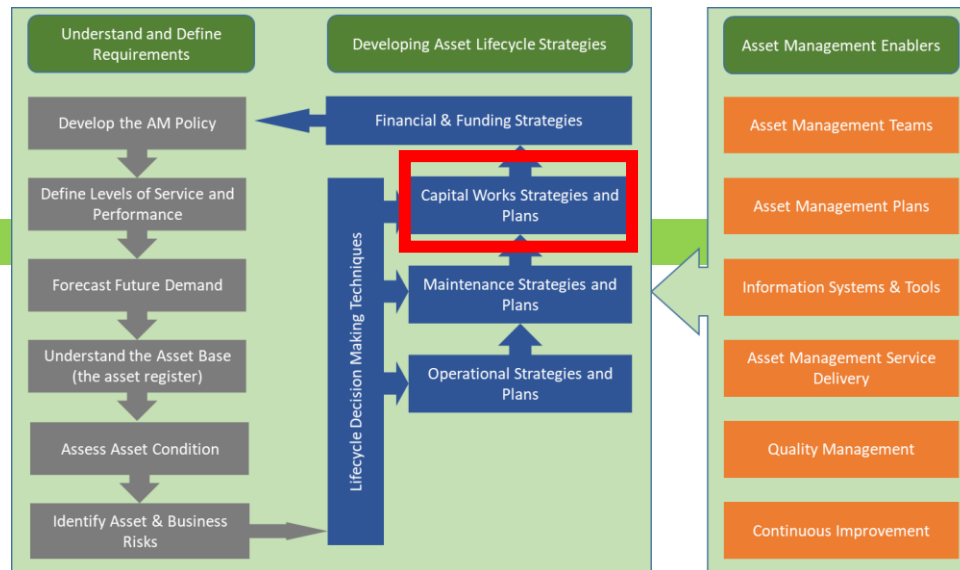
- Depends heavily on the nature of your road network
- Most authorities have an understanding of the risk, although it may not be in a formal process
- A good guidance document for physical risks is:
 - Road Geohazard Risk Management Handbook
 - <https://www.gfdrr.org/en/road-geohazard-handbook>



- Operations and Maintenance (O&M) covers the day-to-day activities

- Operations: e.g. Ramp signalling, peak hour pricing
- Maintenance: Filling potholes, cleaning drains, sealing cracks

- O&M is closest to what the road user experiences when travelling around the network
- Maintenance can be reactive or proactive (scheduled)
- Maintenance strategy should link to the overall plan for the road section
 - e.g. Don't do expensive repairs on a road that is due for reconstruction soon



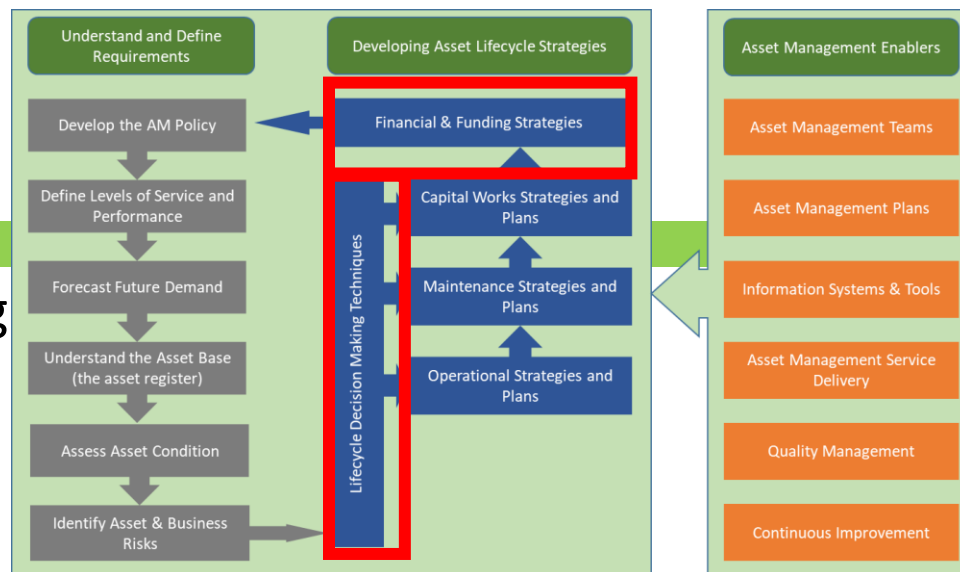
- Typically two aspects:

- Renewals
- Expansion works

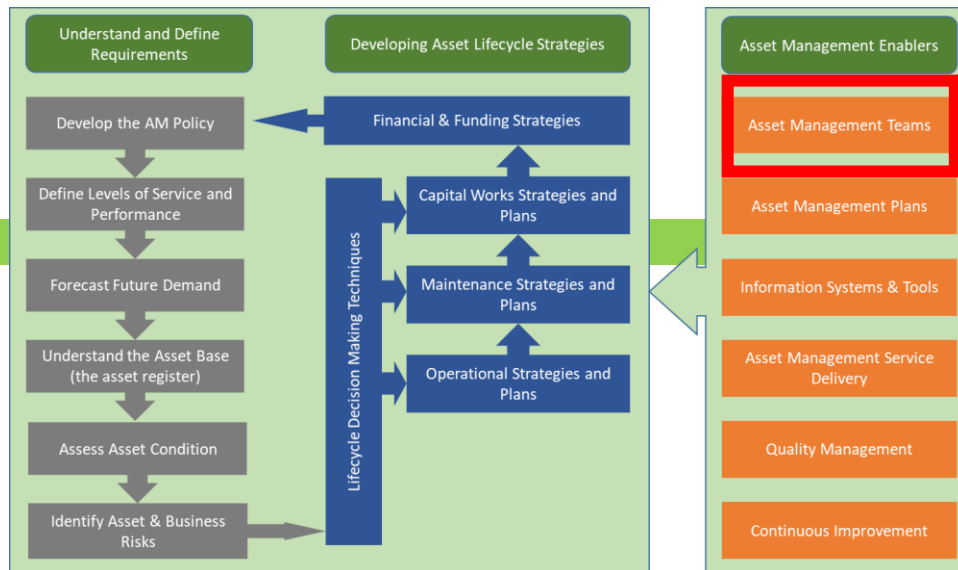
- Typically two aspects:

- Renewals
 - Quantity estimated through a combination of predictive modelling (HDM-4), historic records, and asset valuation parameters
 - While impacting on the long term durability of the network, many renewals (especially resurfacings) do not impact significantly on the road users experience
- Expansion works
 - From traffic modelling, road safety investigations or similar

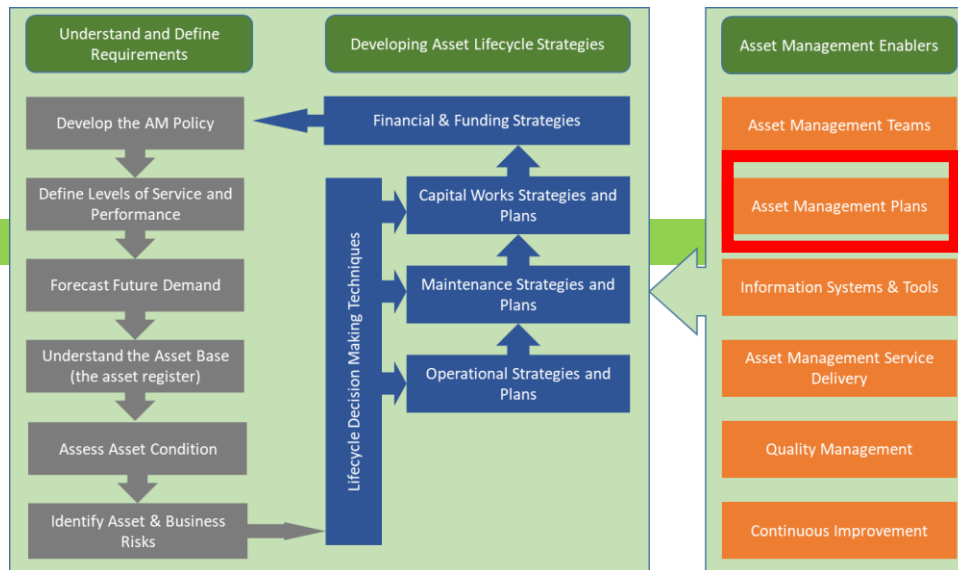
Lifecycle Decision Making & Funding



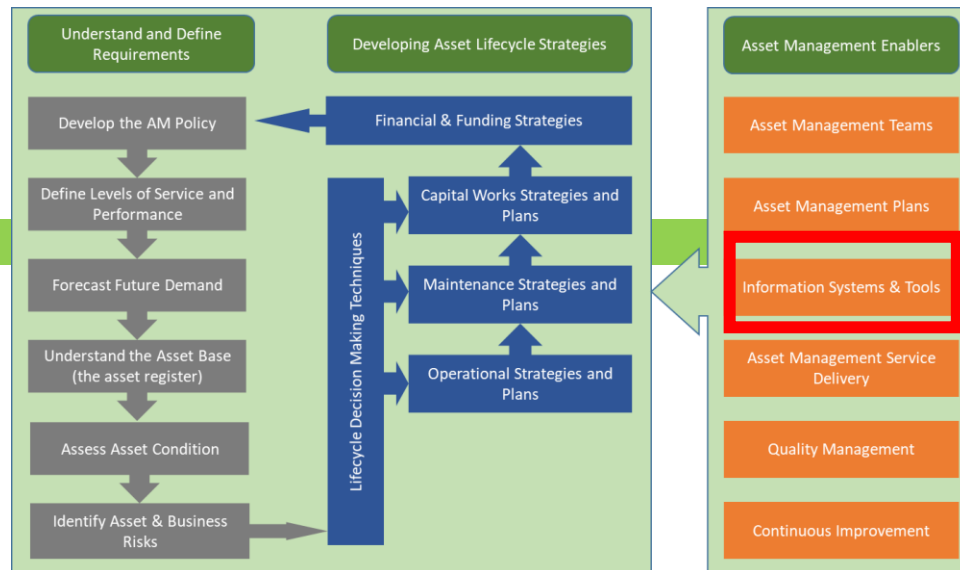
- Need an agreed decision making framework
 - Net Present Value (NPV)
 - Benefit Cost Ratio (BCR)
 - Multi-Criteria Analysis (MCA)
- What is the optimal balance of investment between operations, maintenance and capital works to deliver the agreed levels of service?
- How should that cost be funded?
- If not affordable, then where will the budget constraints do the least harm?
- HDM-4 and similar decision support tools often used at this stage.



- Who is in charge of making sure compliance with the RAM Policy is occurring?
- While RAM requires an organisational wide approach, it takes a small team to oversee it
- To be effective the RAM Team needs to be able to influence the budget allocation process
 - Otherwise necessary change will not occur
- Various models for the RAM Team exist
 - Important to have a direct to the senior decision makers in the road authority

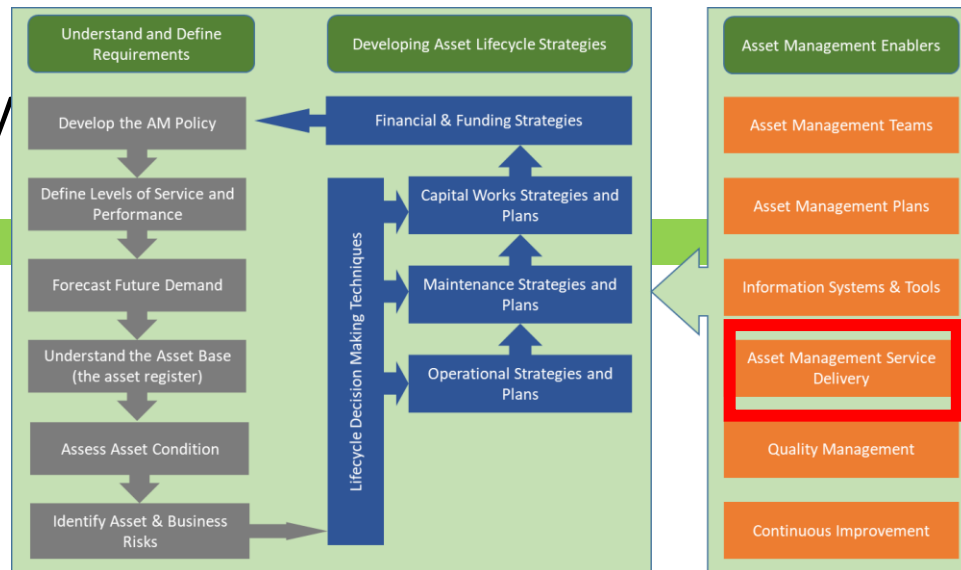


- The AMP is a document that records past achievements and identifies future activities both in relation to investment in the assets, but also in the way they are managed
- Should provide summary information on each step of the process
- Ideally written in non-technical language
 - The AMP should be the easy read justification for the level of investment you are asking for
- Covers at least a 10 year forward projection of condition, funding needs, service level achievements etc.



- RAM involves a lot of data, so need an appropriate Asset Management Information System (AMIS)
- Most modern AMIS
 - GIS interface
 - Web based
 - Multi-asset (pavement, bridges, signs etc)
 - Modular
- Also need some form of Decision Support Tool (DST)
 - Can be simple decision tree that does prioritisation
 - Or complex optimisation tool such as HDM-4

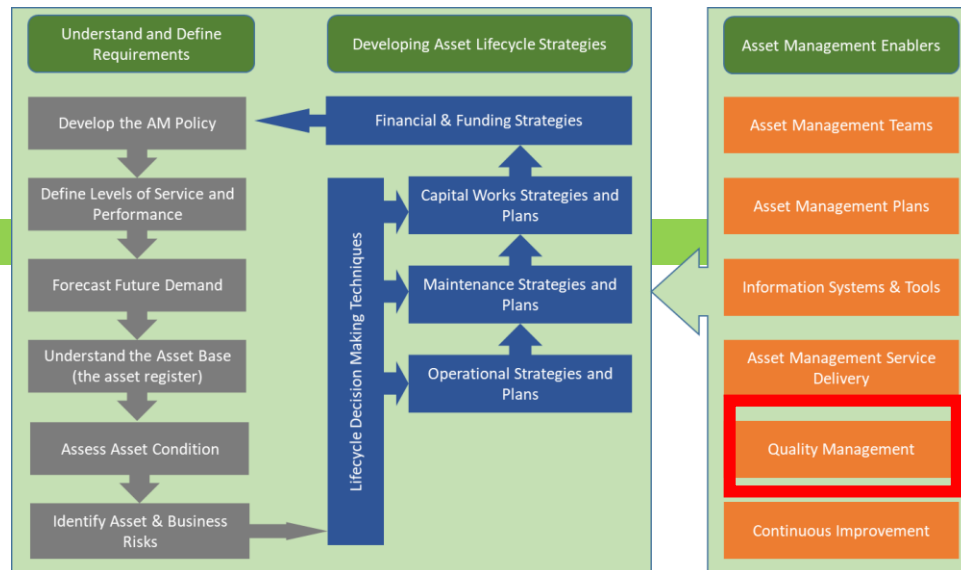
Service Delivery



- How will you deliver the asset management and physical works?
 - In-house, or external?
- How will you deliver the asset management and physical works?
 - In-house, or external?
 - Strategic activities should be kept in-house, while lower level activities can benefit from full or partial outsourcing.
- Some contractual models (e.g. performance based maintenance contracts) have been shown to drive RAM initiatives.

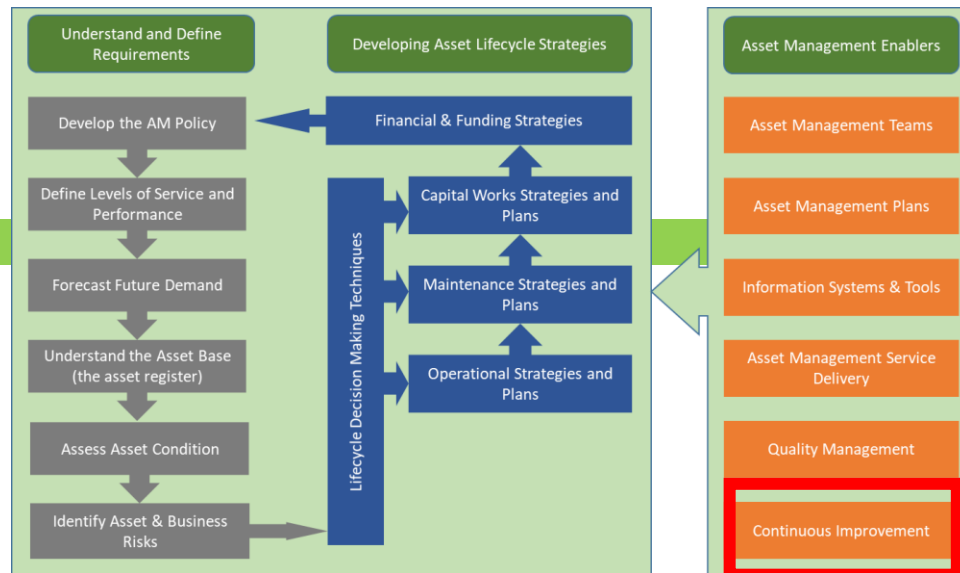


Quality Management



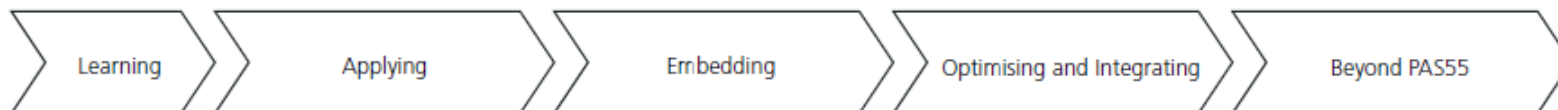
- As with any other aspects of activity, a quality management oversight is required to ensure compliance with the RAM processes
- One of the biggest causes for failure of RAM is where sound processes are bypassed for budget allocation and works program generation
 - Results in an undermining of all aspects of RAM

Improvement Plans



- Start simple, with the data you have, then improve
 - 5-10 years to become competent at RAM
- Don't delay starting RAM owing to any deficiencies in data or systems
 - Start and bring those improvements into the RAM processes
 - Use Maturity Assessments to help identify gaps
- Improvement actions should be prioritised and funded, and managed as a program in its own right
 - Assigned to the AM Team to deliver, but often using resources from across the road authority

IAM Maturity Rating Levels



Maturity Level 0

The elements required by PAS55 are not in place. The organisation is in the process of developing an understanding of PAS55.

Maturity Level 1

The organisation has a basic understanding of the requirements of PAS55. It is in the process of deciding how the elements of PAS55 will be applied and has started to apply them.

Maturity Level 2

The organisation has a good understanding of PAS55. It has decided how the elements of PAS55 will be applied and work is progressing on implementation.

Maturity Level 3

All elements of PAS55 are in place and are being applied and are integrated. Only minor inconsistencies may exist.

Maturity Level 4

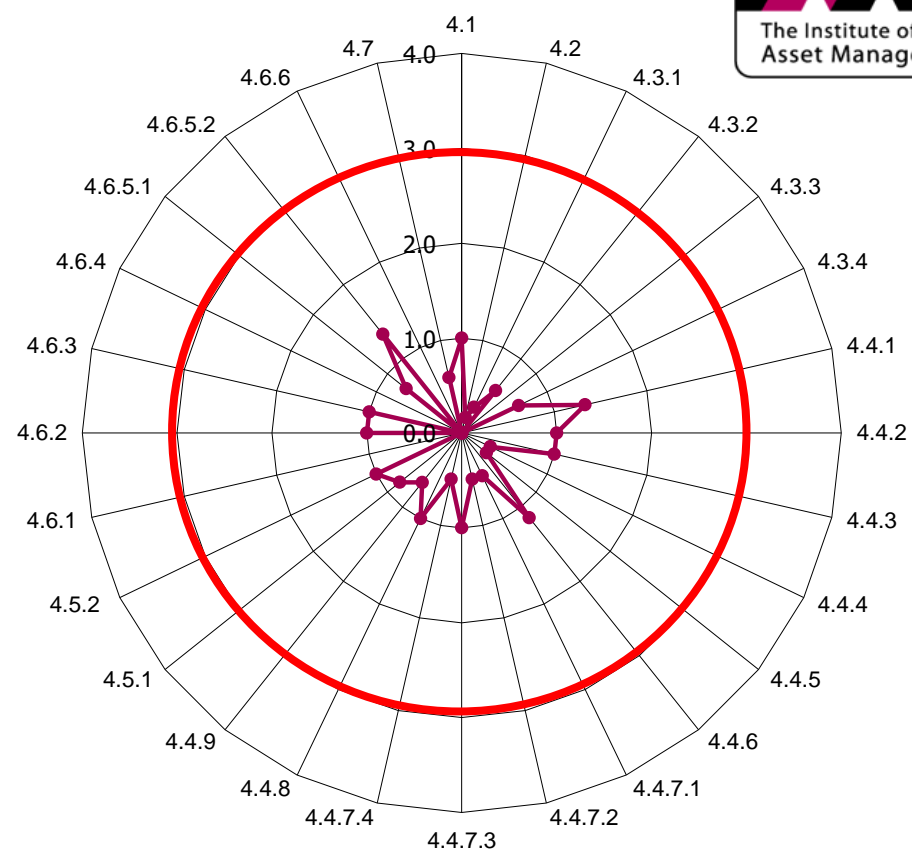
Using processes and approaches that go beyond the requirements of PAS55. Pushing the boundaries of Asset Management development to develop new concepts and ideas.

Figure 1 Maturity Scale

And a road agency in the developing world just starting the AM journey

No.	Clauses
4.1	General requirements
4.2	Asset management policy
4.3.1	Asset management strategy
4.3.2	Asset management objectives
4.3.3	Asset management plan(s)
4.3.4	Contingency planning
4.4.1	Structure, authority and responsibilities
4.4.2	Outsourcing of asset management activities
4.4.3	Training, awareness and competence
4.4.4	Consultation, participation and communication
4.4.5	Asset Management System documentation
4.4.6	Information management
4.4.7.1	Risk management process(es)
4.4.7.2	Risk management methodology
4.4.7.3	Risk identification and assessment
4.4.7.4	Use and maintenance of asset risk information
4.4.8	Legal and other requirements
4.4.9	Management of Change
4.5.1	Life Cycle Activities
4.5.2	Tools, facilities and equipment
4.6.1	Performance and condition monitoring
4.6.2	Investigation of asset-related failures, incidents and nonconformities
4.6.3	Evaluation of compliance
4.6.4	Audit
4.6.5.1	Corrective & Preventative action
4.6.5.2	Continual Improvement
4.6.6	Records
4.7	Management review

Assessment Page



The RADAR chart shows the average score range per clause

Questions?