Road Asset Management (RAM) Training
10-13 August 2020

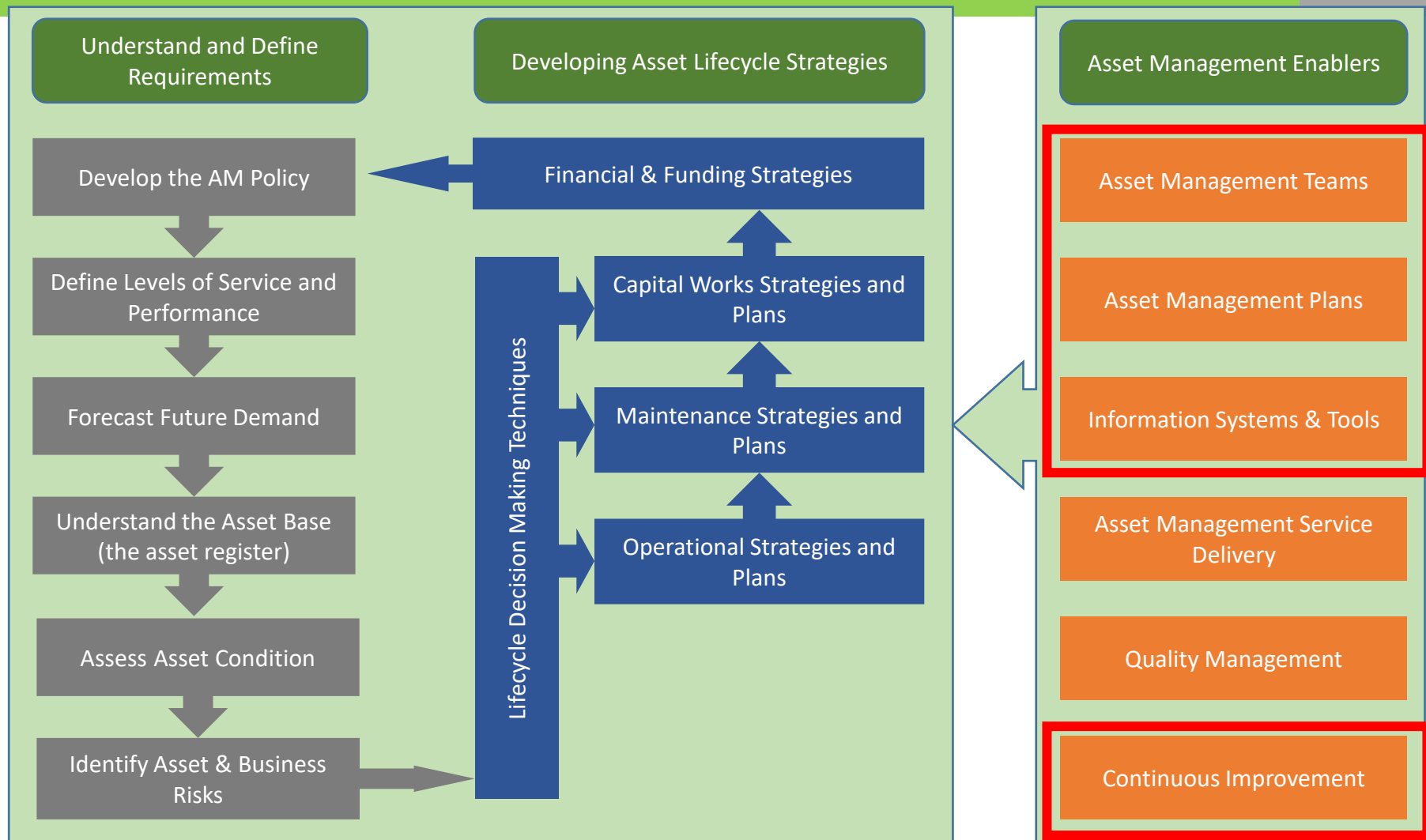# Session 4-1: Asset Management Manual, Plans, Teams and Tools

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1. Introduction to Road Asset Management

2. Overview of the Components of RAM

3. Levels of Service and Performance Measures

4. Inventory and Condition Data

5. Lifecycle Decisions Making and Funding

6. Asset Valuation

7. **Asset Management Plans, Teams and Tools**

8. Contracting Models and Impact on RAM

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International Infrastructure Management Manual (IIMM) AM Process

Understand and Define Requirements

Developing Asset Lifecycle Strategies

Asset Management Enablers

Develop the AM Policy

Define Levels of Service and Performance

Forecast Future Demand

Understand the Asset Base (the asset register)

Assess Asset Condition

Identify Asset & Business Risks

Lifecycle Decision Making Techniques

Financial & Funding Strategies

Capital Works Strategies and Plans

Maintenance Strategies and Plans

Operational Strategies and Plans

Asset Management Teams

Asset Management Plans

Information Systems & Tools

Asset Management Service Delivery

Quality Management

Continuous Improvement

Asset Management Manual

Setting the Scene

- Some food for thought?
  - If you like the food, ask for a copy of the recipe
  - Hard to recreate just by taking a slice of the cake home

- The AM equivalent
  - People take a copy of someone else's AMP, but then have no idea how to recreate it
  - AM is rushed as a critical deadline (often around funding) approaches, only to find the inputs are not available
  - An organisation with good AM suddenly falters (or fails) when the "champion" moves on.

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What is an AM Manual (or Framework)?

- The recipe for successful AM in an organisation
- Like food, every location has its own local flavour
  - Local legislation
  - Local funding cycles
  - Local weather that impacts on data collection and physical works
- Having an AMM is not the same as having a good AMP or good assets
- An AMM is the glue that holds all the AM components together
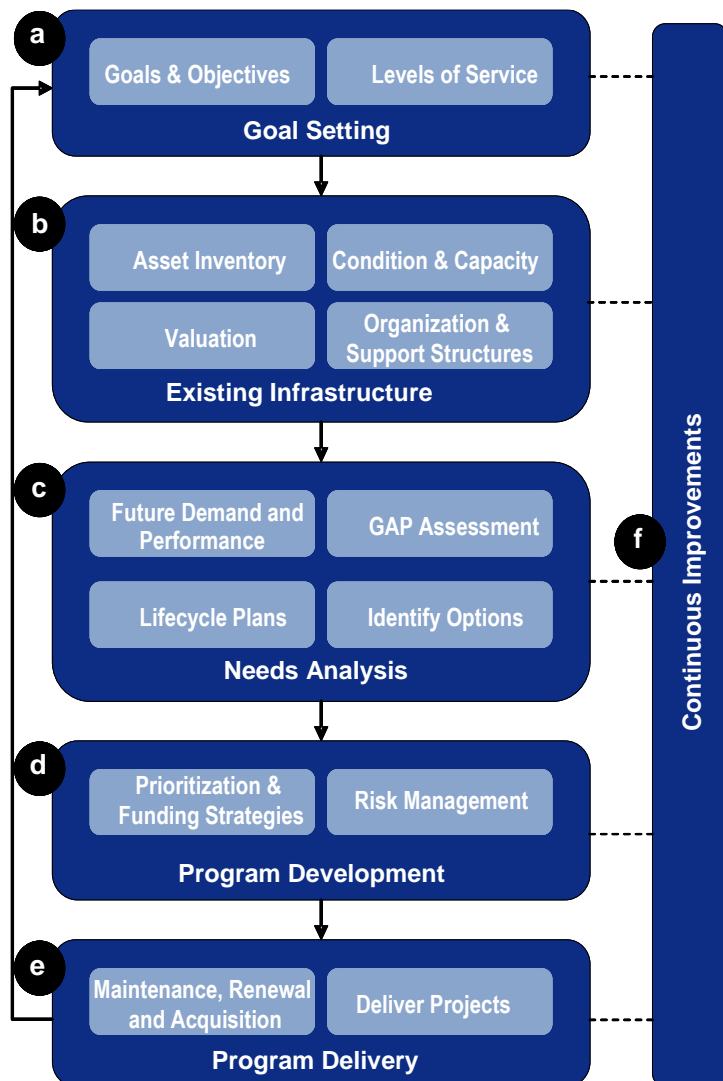 - Makes the whole greater than the sum of the parts

- Managed workflow

- Consistency of delivery of AM functions

- Reduces reliance on key individuals

- Assists in developing a common language across asset borders.

Components

- Covers all facets of AM planning
  - Details the processes that will be used to make sure the AMP and the Assets will be a success

- Specifies the "who" "what" and "when" not just the "how"
  - This sets an AMM apart from an AM textbook
  - Creates ownership

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Typical AM Process

a. Goal Setting — Goals & Objectives, Levels of Service — What do we want it to do?

b. Existing Infrastructure — Asset Inventory, Condition & Capacity, Valuation, Organization & Support Structures — What do we have? What condition is it in? What is it worth?

c. Needs Analysis — Future Demand and Performance, GAP Assessment, Lifecycle Plans, Identify Options — What do we need to do to it?

d. Program Development — Prioritization & Funding Strategies, Risk Management — When do we need to it? How much will it cost?

e. Program Delivery — Maintenance, Renewal and Acquisition, Deliver Projects — How will we deliver it?

f. Continuous Improvements

Who Needs One

- Anyone with an asset
  - Not all AMM's are created equal

- History would suggest those with:
  - Diverse assets to manage
  - Timing and human resourcing issues
  - Significant infrastructure failures or challenges
  - Key individuals that are about to (or have) moved on

  ...benefit the most from having one in place

- Pretty well sums up all levels of government
  - And most private sector infrastructure owners as well!

- Like a recipe book
  - Coffee stained
  - Used
  - Dog eared
  - Guiding
  - Edited and enhanced
  - Living

- CUDGEL
  - n. short thick stick used as a weapon.

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What Does it Really Look Like?

- Personalises AM to the organisation
  - Identifies specific roles that tasks are owned by
  - Identifies who else is involved
  - Defines what success looks like, not just failure
  - Levels the playing field of decision making
  - Ensures all decision makers have the information they need, at the time they need it, in the format they require, <u>at the level of detail they should have</u>

- An AMM cannot be substituted by a software solution
  - An AMIS should automate the processes within your AMM

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Asset Management Plan

- Pull the whole picture together

- Gives organization a clearer picture of future

- Is your tool for demonstrating that you are delivering the right level of service in a cost-effective way for present and future customers.

- Enables organization and customers to focus on future service problems and cost drivers

- Highlights weaknesses

AM Plans typically cover

- Levels of service and performance measures – past/current/future, including drivers (customer wants, legislative, strategic)

- Future growth, demand and how you will manage that demand

- An overview of the assets, value, condition, performance

- Lifecycle strategies for delivering on levels of service and meeting future growth – Strategies and projections for O&M/condition and performance monitoring, Renewal, New Works, Disposal

- Financial summary, including policies, significant assumptions

- Analysis of AM Practices (strengths/weaknesses)

- Improvement Plan

AMP is a Function of the Entire Organisation
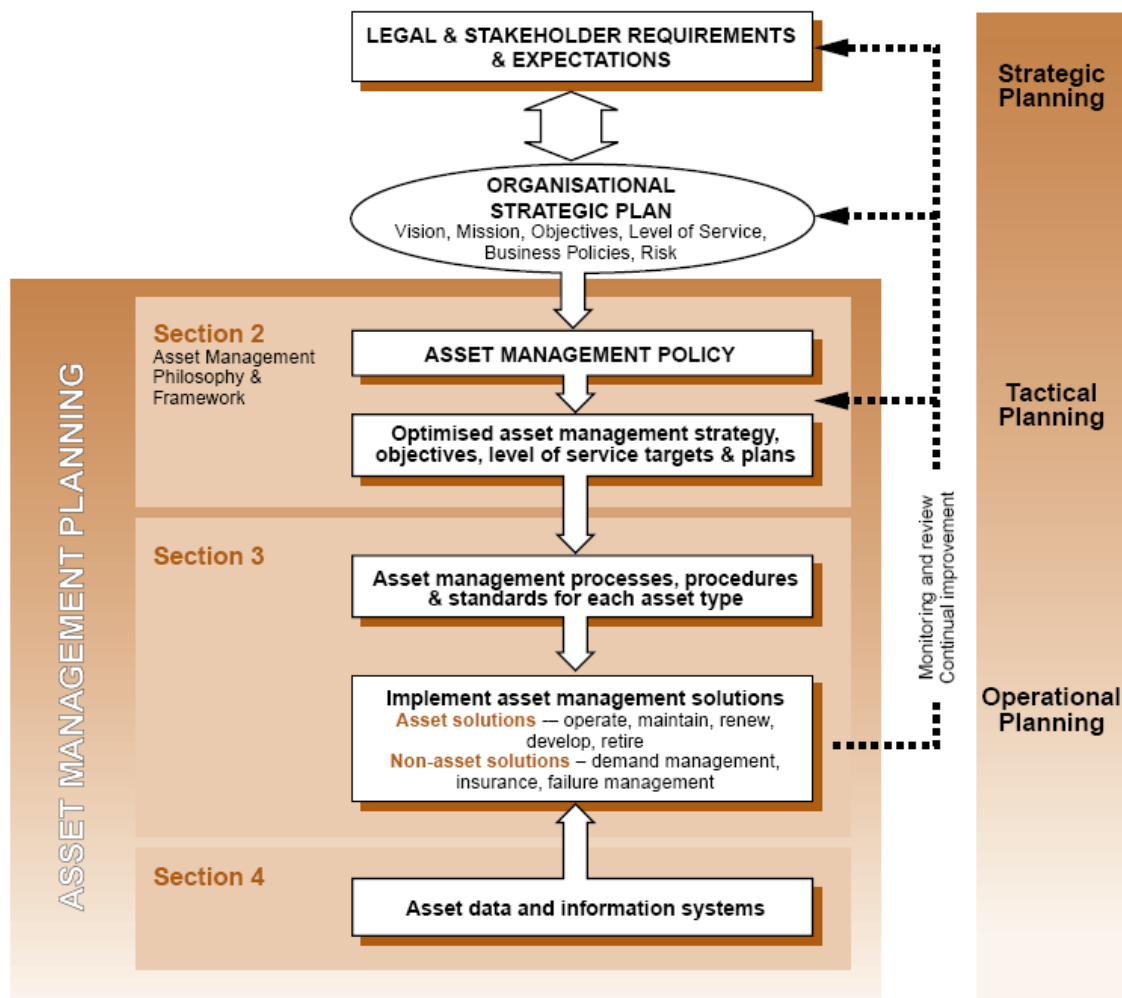
The Story the AMP Tells

- If written in right order, AMPs should take the author (and the reader) through the process of thinking about:
    - What services are being provided
    - Intended level of service incl. performance targets and measures
    - What assets do we have
    - Changes to demand for / consumption of services
    - Changes to service provision levels and standards
    - Estimate of additional capacity
    - How it will be provided and cost
    - How cost will be funded
    - How assets will be maintained /renewed /replaced

AMP Structure and Content

- There is no single correct methodology

- It is dependent on the organisation and the outcome they are seeking from their asset management plans

- If you use external resources, maintain ownership and close involvement

- While called an Asset Management Plan it is important to consider non-Asset solutions.

Basic elements are the same

- Service/activity description
- Asset description (condition/performance/value)
- Levels of service (current/future)
- Growth and demand (demand drivers, demand mgt)
- Lifecycle plans – operational/renewal/capital (growth/LOS)
- Financial forecasts – (expenditure/funding)
- Management practices (outsourcing strategies, etc)
- Improvement plan

- Risk management, ongoing improvement, assumptions, confidence levels (what-ifs) should filter through all sections.
- Sustainability is sometimes dealt with as a separate section, or an integral part of the whole document.

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- Levels of service defined?
  - Measured?
  - Future targets?
- Demand drivers understood?
  - Applied to demand projections?
- Works required to meet growth/future LOS defined and costed?
- Critical assets understood?
  - Documented?
  - Strategies prepared?
- Risk register?
- Robust condition assessment
- Asset lives understood?
  - Reflected in AMP?
  - Valuation?
- Management practices – current and future understood?
- Improvement plan will close the gap on RAM practices
- Confidence in budget projections – operations? Renewal? Capital?

Common Problems Where the AMP is not of a Good Standard

- Inability to express outcome of renewals programme for key assets
  - Can only talk in terms of km of works completed etc.
- Information about area assets held in many places and not readily able to provide a cohesive and consistent set of data
- Work programmes identified as lists of discrete projects rather than a programme
- Insufficient contextual information provided to inform internal decisions about funding
  - Leaves Ministry of Finance to interpret how km of work relates to what the community wants

Common to Have an AMP Heirarchy

National AM Plan
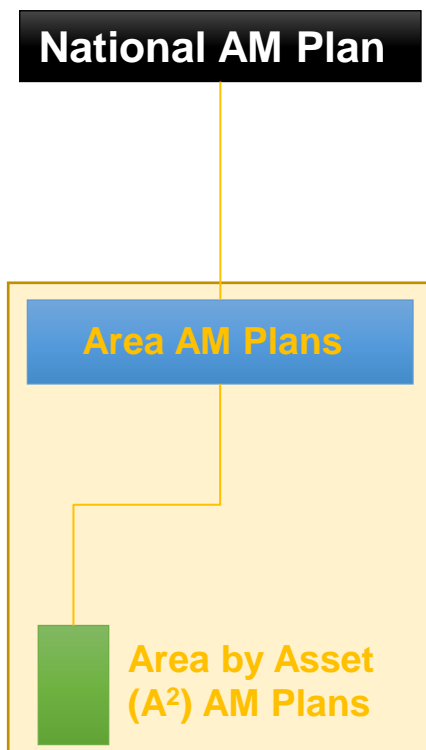
- Comprehensive central document
- Summarises the Area plans (feeding upwards)

- -

Area AM Plans

- Comprehensive Area plan document setting out information relating to all asset types within the Area
- Asset-specific data tables are given in the main body of the plan with summary comments

- -

Area by Asset (A²) AM Plans

- Slim asset-specific document to provide supplementary information to the Area AM plan
  - Could be appended to Area AM plan
  - These are often in place as address a specific problem

Audience for the AMP

- National AMP
  - Road authority directors / Secretaries
  - Ministry of Finance
  - Public
- Area AMP
  - Area/Regional Teams
  - Contractors involved in maintaining the road network
- Area by Asset (A^2) Plans
  - Asset specialist leads

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Example – New Zealand

- https://www.nzta.govt.nz/roads-and-rail/management-and-maintenance/management-and-delivery-plans/state-highway-asset-management-plan/

"The State Highway Asset Management Plan (SHAMP) provides a greater focus on the needs of New Zealand from the state highway network, embeds our customer first approach within state highways, and shows how maintenance, operations, and improvements together provide services to customers.

It provides internal guidance on how the state highway network can be best developed and managed to achieve the government's objectives and meet our customers' needs, while balancing the competing demands on available funding over the period.

- *Read the State Highway Asset Management Plan"*

Example – New Zealand

- 10 year plan
- 3 year funding cycle
- The AMP is about thinking longer term than today or tomorrow
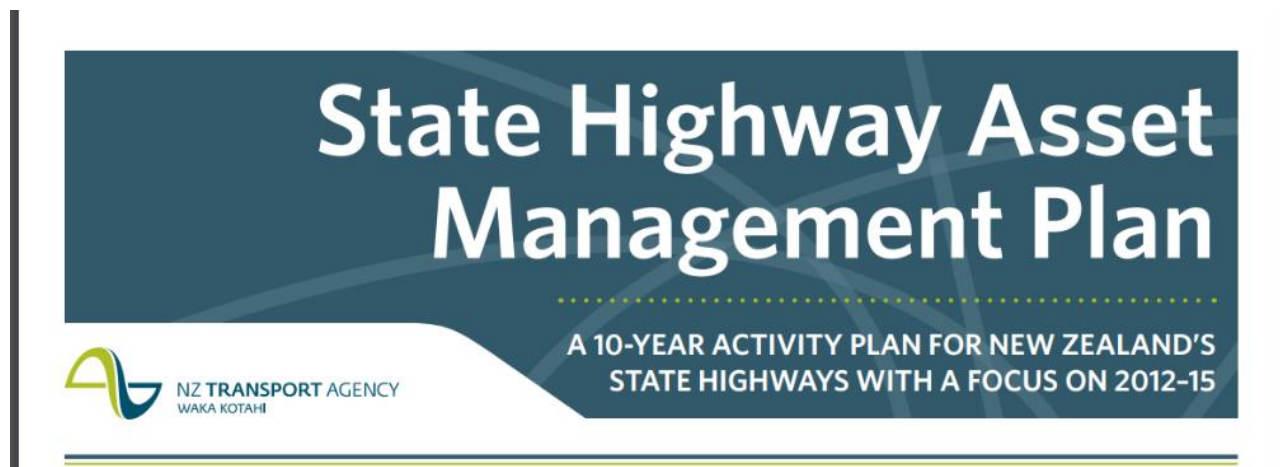
Example

What it provides

The SHAMP provides:

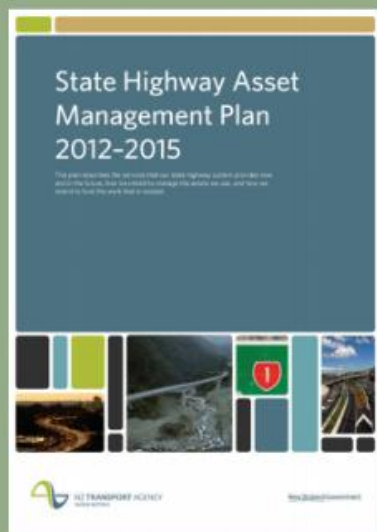- a greater focus on the state highway needs of New Zealand

- a plan with the customer in mind

- a plan that shows how maintenance, operations and improvements together provide services to customers.

State Highway Asset Management Plan 2012–2015

Three key roles

The State Highway Asset Management Plan (SHAMP) plays three key roles for the NZTA:

- it is a route map showing how we plan, invest and deliver for the future

- it links state highway investment to our Customer First focus, setting service targets

- it is a business case for activities (maintenance, renewals, operations and improvements) required to enable the NZTA to deliver its services to customers.

A route map for the future

The SHAMP describes the programme of activities we will be doing to deliver the impacts sought.

It also provides the logic, reasoning and context behind how we propose to maintain, renew, operate and improve the state highway asset over a 10-year period and what we hope to achieve during this timeframe.

Linking state highway investment to Customer First focus, setting service targets

By combining our customer values and impact areas, we translate national needs into specific service targets that cover all aspects of network performance. The Customer First strategy map is one of the key tools for us to do this.
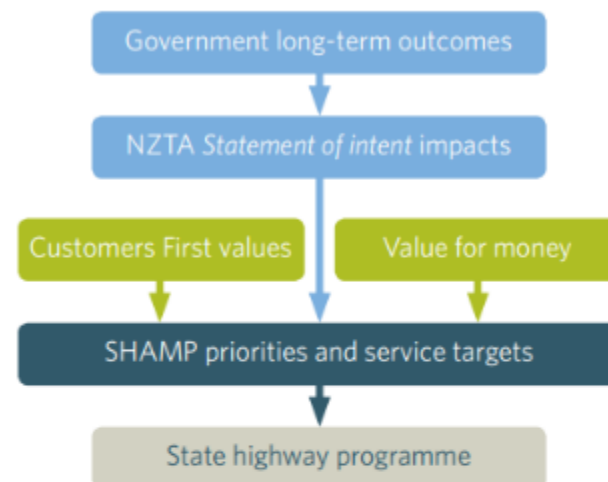
A business case for activities

The SHAMP provides a business case for the activities (maintenance, renewals, operations and improvements) required to deliver the services outlined, based on demonstrating a clear need for works, the effectiveness of our proposed solutions and the efficiency of our execution.

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Example

- Is the link between government and the actual programme of physical works

Linking SHAMP to long-term impacts

Government long-term outcomes

↓

NZTA *Statement of intent* impacts

↓

Customers First values		Value for money

↓

SHAMP priorities and service targets

↓

State highway programme

Types of works

Maintenance and renewal

Operations

Essential infrastructure

Optimisation

Roads of national significance

High-productivity motor vehicles

Safety

Other

Impacts

A resilient and secure transport nework

Better use of existing transport capacity

Ease severe congestion

Journey time reliability

More efficient freight demand chains

Fewer deaths and serious injuries

More transport mode choices

Fewer adverse effects from land transport

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Example – NZTA Document Structure

- 106 pages long

Figure 1.1 The NZTA's State Highway Asset Management Plan

Asset Management Team

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RAM Does Need People

- Essential to have senior level leadership on RAM
  - Ideally with strong ability to influence funding allocation decisions
- Requires a small team to be the leaders and ensure processes are being followed, improvement plans actioned, AMP produced etc.
  - As a minimum suggest 2-5 staff focussed on RAM
  - With a committee drawn from across the road authority chaired by the senior level leader
  - Use external consultants for tasks that are not business-as-usual or to get over initial peak workload, but make as much as possible part of the 'new normal'

- RAM is ultimately an organisation wide process and like road safety or quality assurance, it cannot be delivered by one or two working in isolation from the whole road authority
  - RAM Team may manage the AMIS, but the users and suppliers of data will be from across the authority
  - RAM Team prioritise the improvement actions, but they are delivered within the relevant parts of the authority

- Asset management is a function of the organisation, not of a single person or team

Tools

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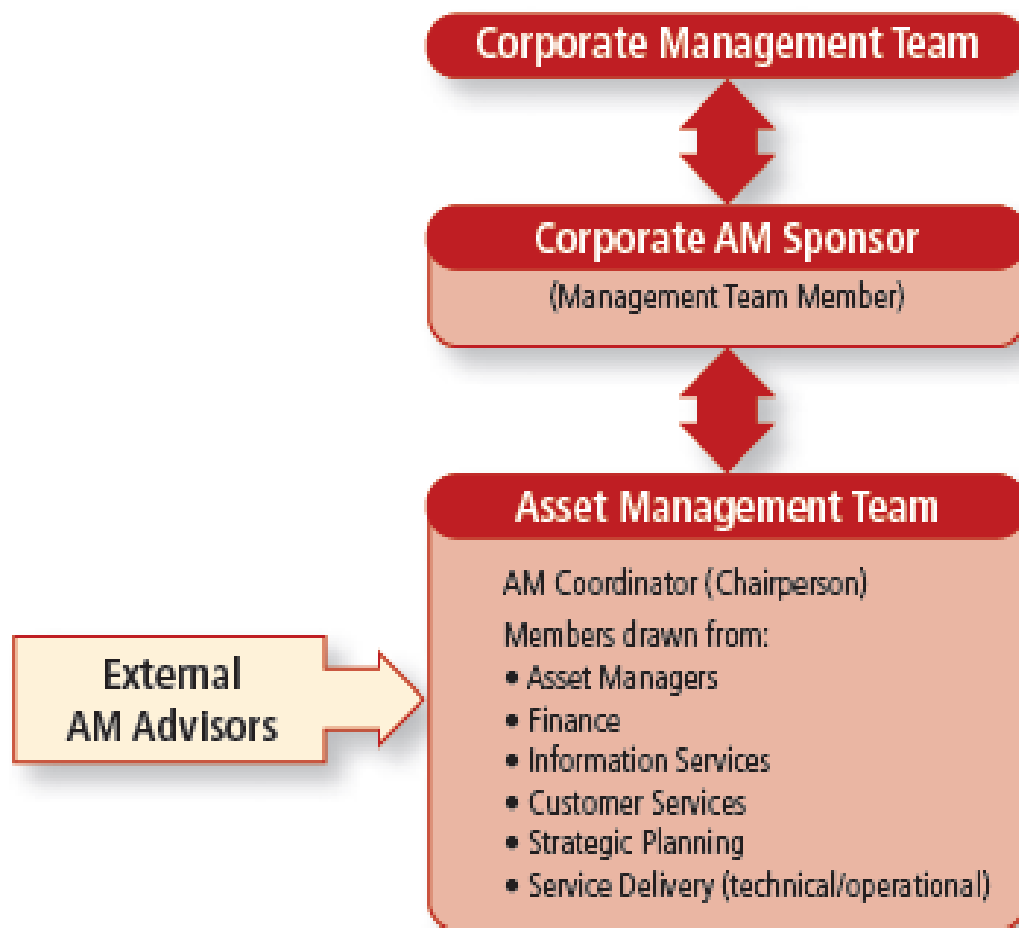
Asset Management Information Systems (AMIS)

- An AMIS is not AM
  - <u>Never has been, never will be</u>
- But AM involves lots of data, so a good AMIS is essential if you are going to do AM well
- Many systems in use around the world
  - Experience is generally in favour of Commercial Off The Shelf (COTS) systems over custom built in-house systems

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AMIS System Integration

- Traditionally
  - Pavement Mgt System
  - Bridge Mgt System
  - Maintenance Mgt System
  - Safety Mgt System
  - …..
  - <u>Highways Agency in England had 17 such systems!</u>

  - Nowadays focus is on one or two integrated systems, with GIS and web access.

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Process Based Systems

- Integrating the business processes from the AMM into the AMIS helps ensures data is updated and valid

- Keep both the business processes and the AMIS as simple as possible to ensure sustainability

  - Many a system has failed after 2 or 3 years because the cost of operating the system was beyond the capability of the road authority to sustain.

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Core AMIS Functionality

- Asset register (inventory)
  - Hierarchy, material, dimensions, age etc.
- Condition / performance
- Traffic data
- Maintenance management
- GIS
- Prioritizaton capability

Advanced

- Accident management
- Risk management
- Predictive modelling (HDM-4)
- Optimized decision making
- Works planning and scheduling
- Contract management
- Resource management

Decision Support Tools (DST)

- Exist at multiple levels
  - Corporate level to trade off investments between operations, maintenance, renewals and expansion projects, including between asset types (bridges vs pavements etc.)
    - Some form of Multicriteria Analysis
  - Optimisation of the maintenance and renewals budget to create a draft works program
    - HDM-4 or similar
  - Scheme level DST to help select the optimal design detail
    - Often built into a template in Microsoft Excel or similar

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Condition Distribution
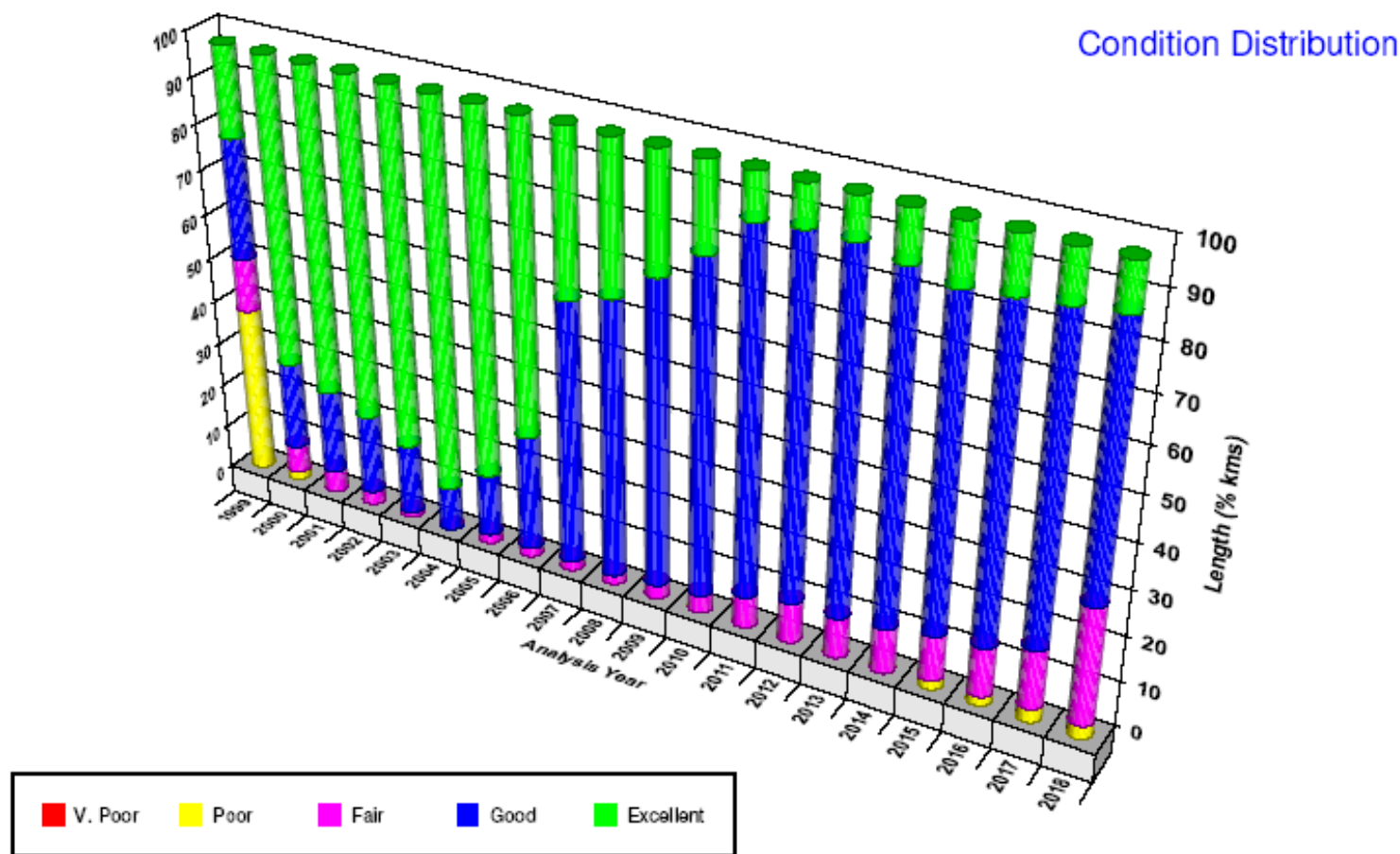
Budget Impact on Condition
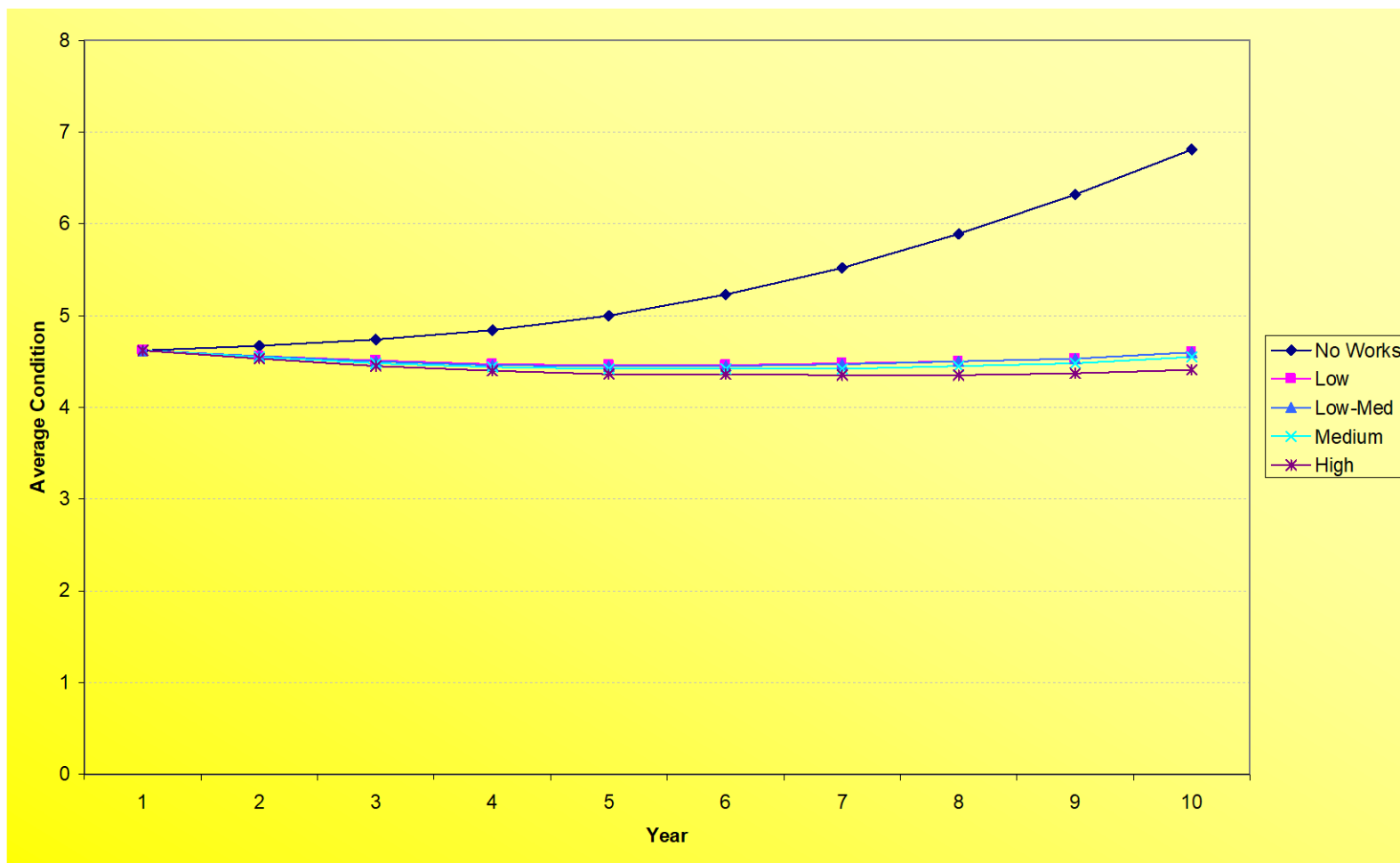
10 Year Forward Work Programme (FWP)

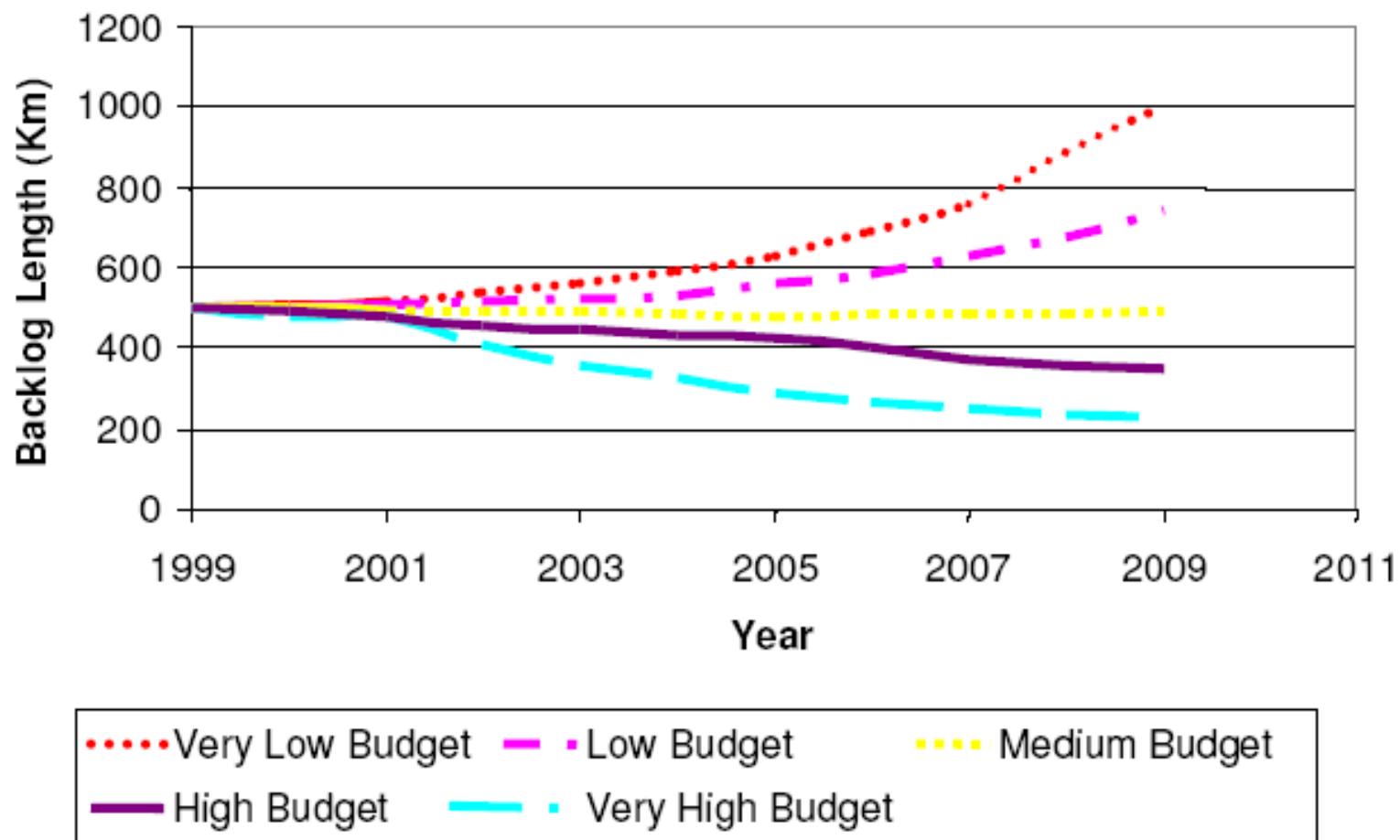| Road	Ward	ROAD_ID	FOFFFROM	FOFFTO	length	Start Name	End Name	Year01	Year02	Year03	Year04	Year05	Year06	Year07	Year08	Year09	Year10	Year11	Year12	Year
MAYBECK R	EDEN-	4066	0	108	108	NEW	7/9		RS						RS					
MAYBECK R	EDEN-	4066	108	214	106	7/9	ASQUITH		RS						RS					
MAYBURY S	TAMAKI-	882	0	159	159	LINE RD	17/19		SM			RS								
MAYBURY S	TAMAKI-	882	159	300	141	17/19	DALTON		SM			RS								
MAYBURY S	TAMAKI-	882	300	511	211	DALTON	64/66		SM			RS								
MAYBURY S	TAMAKI-	882	511	703	192	64/66	83/85		SM			RS								
MAYBURY S	TAMAKI-	882	703	852	149	83/85	ELSTREE		SM			RS								
MAYN AVE	AVONDA	4067	0	164	164	GIFFORD	END OF					SM			RS					
MAYORAL D	HOBSON	884	0	250	250	WELLESL	COOK ST		AC								AC			
MAYORAL D	HOBSON	884	250	459	209	COOK ST	GREYS		AC											AC
MAYORAL D	HOBSON	884	459	592	133	GREYS	QUEEN	AC												
MAYORAL D	HOBSON	884	592	761	169	QUEEN ST	WAKEFIE		AC							AC				
MAYORAL D	HOBSON	884	761	1001	240	WAKEFIEL	WELLESL		AC									AC		
MAYS RD	TAMAKI-	4069	0	135	135	MT SMART	ALFRED		AC											
MAYS RD	TAMAKI-	4069	135	407	272	ALFRED	CURZON	RS											AC	
MAYS RD	TAMAKI-	4069	407	701	294	CURZON	CAPTAIN			AC							AC			
MAYS RD	TAMAKI-	4069	701	858	157	CAPTAIN	FELIX ST	RS						AC						AC
MAYS RD	TAMAKI-	4069	858	1030	172	FELIX ST	RAILWAY	RS						ST						
MAYS RD	TAMAKI-	4069	1030	1234	204	RAILWAY	CHURCH	ST												
MCARTHUR	EASTER	817	0	164	164	VALE RD	16/18		RS						RS					
MCARTHUR	EASTER	817	164	303	139	16/18	END OF		RS						RS					
MCCOLL ST	HOBSON	3986	0	125	125	KHYBER	ROXBURG					SM			RS					
MCCRACKEN	TAMAKI-	3988	0	183	183	BARRACK	END OF	RS										RS		
MCCULLOCH	TAMAKI-	3989	0	198	198	STEWART	19/21			SM			RS							
MCCULLOCH	TAMAKI-	3989	198	378	180	19/21	39/41			SM			RS							
MCCULLOCH	TAMAKI-	3989	378	497	119	39/41	HOBSON			SM			RS							
MCCULLOUG	AVONDA	3990	0	96	96	MT	SMALLFIE					SM			RS					

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Continual Improvement

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IAM Maturity Rating Levels
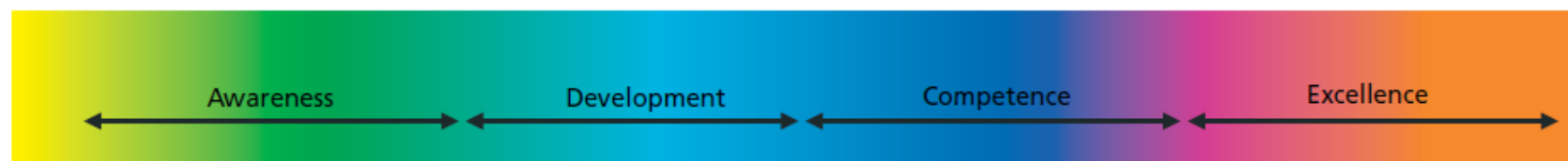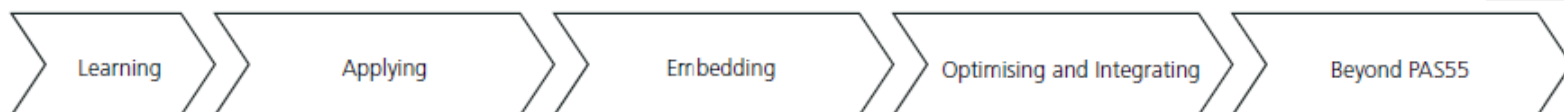
Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
The elements required by PAS55 are not in place. The organisation is in the process of developing an understanding of PAS55.	The organisation has a basic understanding of the requirements of PAS55. It is in the process of deciding how the elements of PAS55 will be applied and has started to apply them.	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.	All elements of PAS55 are in place and are being applied and are integrated. Only minor inconsistencies may exist.	Using processes and approaches that go beyond the requirements of PAS55. Pushing the boundaries of Asset Management devlopment to develop new concepts and ideas.

Figure 1   Maturity Scale

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Lack of AM Maturity Doesn't Prevent Having Good Assets!

Level of Service

Cost of Service

AM Maturity

Authorities that are better at RAM can leverage more value from each dollar of input.
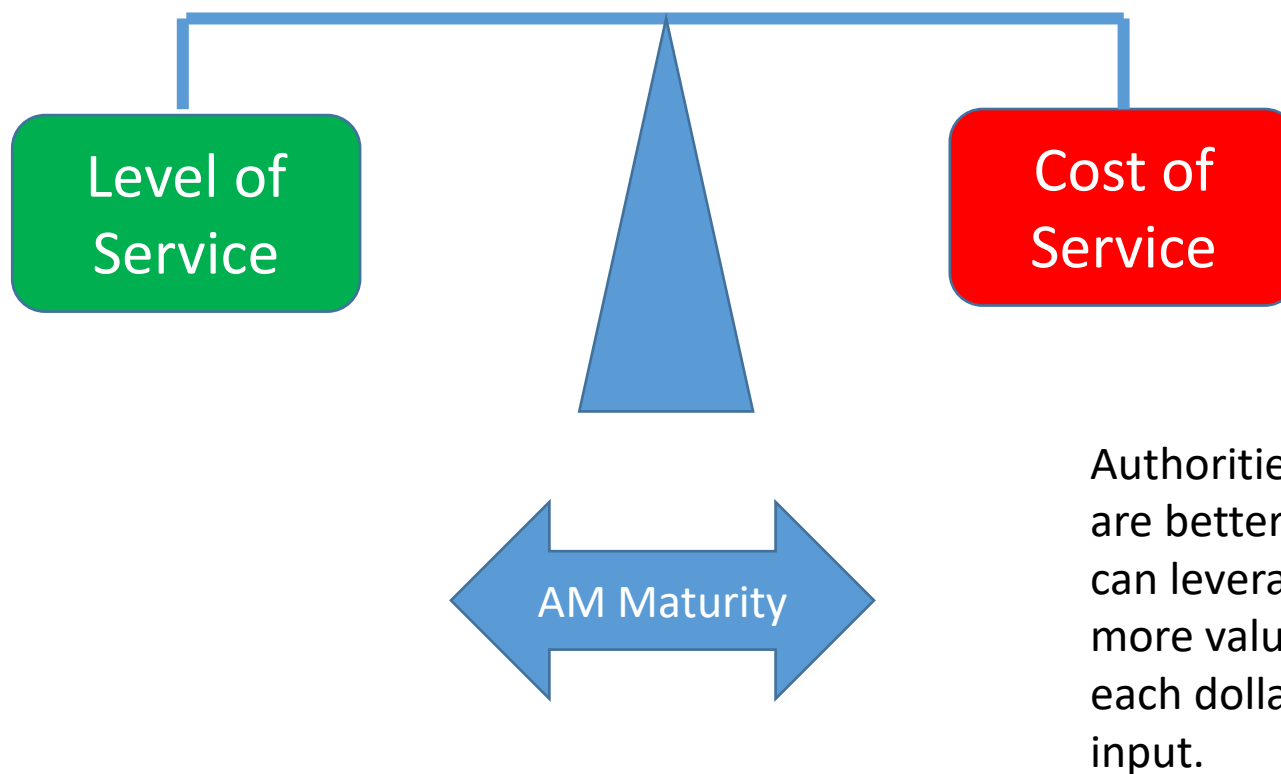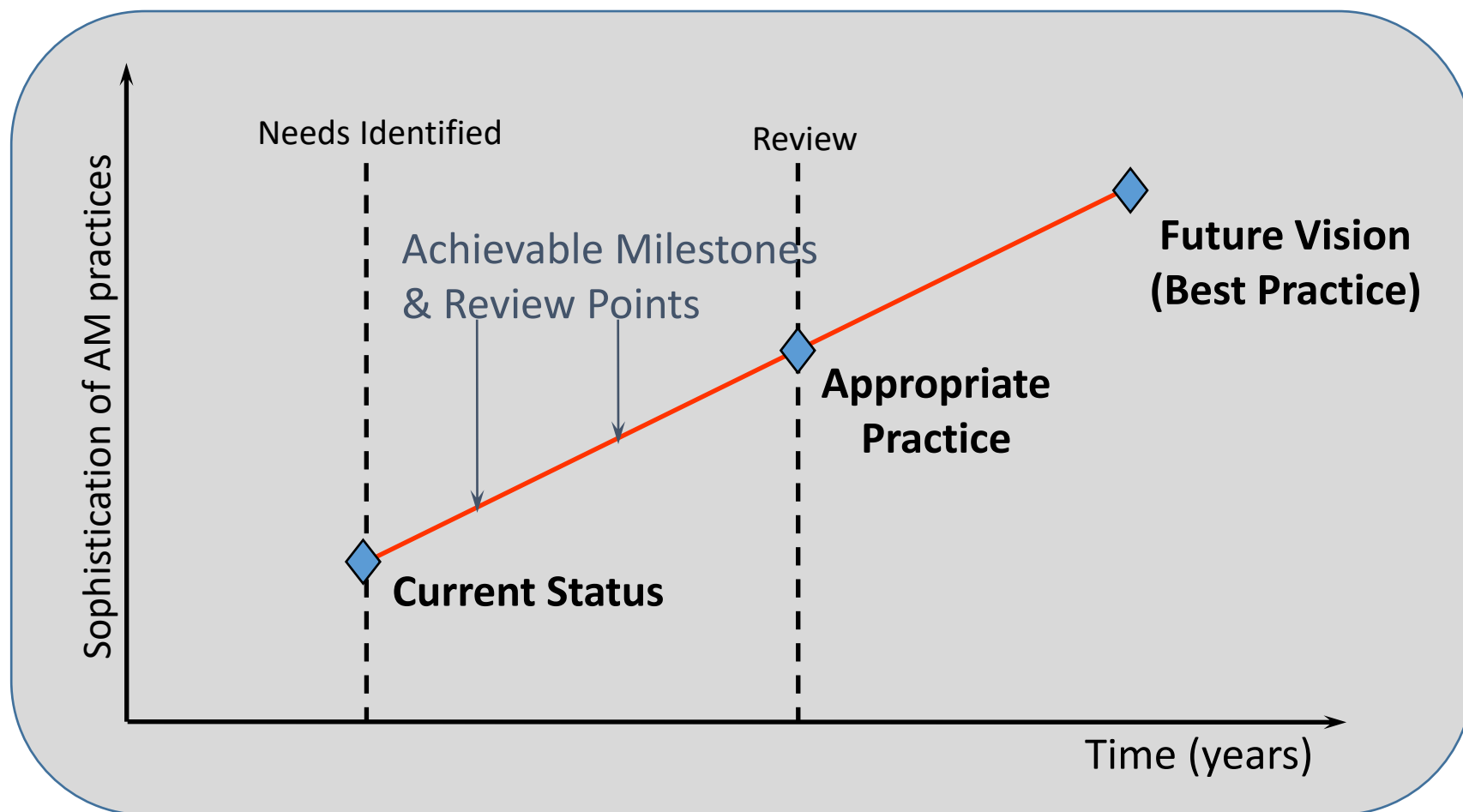
AM Maturity Assessments

- Very good way to benchmark current RAM practice

- Assist in developing the improvement plan

- Formally monitor progress
  - RAM has historically suffered from not been able to demonstrate the benefits (or even progress) from investment in RAM

- Many different assessment processes available, some public and some via commercial entities
  - Strongly recommend the use of assessment processes that are independent of a commercial consulting firm.

- Improvement Projects are identified to close the 'gap'.

- Improvement projects are prioritised and the improvement plan developed

Approach to improvement planning

Sophistication of AM practices (y-axis)
Time (years) (x-axis)

- Needs Identified
- Review
- Achievable Milestones & Review Points
- Current Status
- Appropriate Practice
- **Future Vision (Best Practice)**

The gap analysis takes many forms

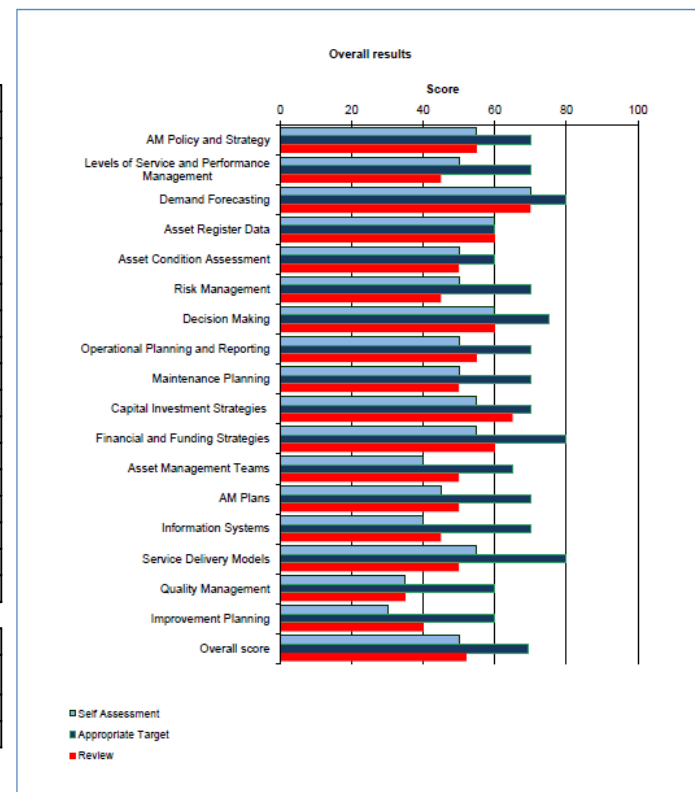|	Minimum	Core	Intermediate	Advanced
AM Policy Development	←————————————————→			
Demand Forecasting	←————→			
Levels of Service			←————————→	
Asset Register Data		←————→		
Asset Condition Assessment	←————→			
Risk Management	←————→			
Decision Making		←————————————→		
Operational Planning		←————————→		
Maintenance Planning		←————————→		
Capital Works Planning				
Financial Management		←————→		
AM Teams and Capability		←————————→		
AM Plans		←————————→		
Information Systems	←————→			
Service Delivery Mechanisms		←————————→		
Quality Management	←————→			
Improvement Planning				→

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- Relatively simple.
- 17 questions with guidance on how to score each

Summary results

Reference	Question	Summary Results	Self Assessment	Review	Appropriate Target	Difference
IIMM 2.1	1	AM Policy and Strategy	55	55	70	15
IIMM 2.2	2	Levels of Service and Performance Management	50	45	70	20
IIMM 2.3	3	Demand Forecasting	70	70	80	10
IIMM 2.4	4	Asset Register Data	60	60	60	0
IIMM 2.5	5	Asset Condition Assessment	50	50	60	10
IIMM 2.6	6	Risk Management	50	45	70	20
IIMM 3.1	7	Decision Making	60	60	75	15
IIMM 3.2	8	Operational Planning and Reporting	50	55	70	20
IIMM 3.3	9	Maintenance Planning	50	50	70	20
IIMM 3.4	10	Capital Investment Strategies	55	65	70	15
IIMM 3.5	11	Financial and Funding Strategies	55	60	80	25
IIMM 4.1	12	Asset Management Teams	40	50	65	25
IIMM 4.2	13	AM Plans	45	50	70	25
IIMM 4.3	14	Information Systems	40	45	70	30
IIMM 4.4	15	Service Delivery Models	55	50	80	25
IIMM 4.5	16	Quality Management	35	35	60	25
IIMM 4.6	17	Improvement Planning	30	40	60	30
		Overall score	50	52	69	19

Summary Results

	Self Assessment		Appropriate Target	Difference
2 Understanding and Defining requirements	56		68	13
3 Developing Asset Management Lifecycle Strategies	54		73	19
4 Asset Management Enablers	41		68	27
Total	50		69	19
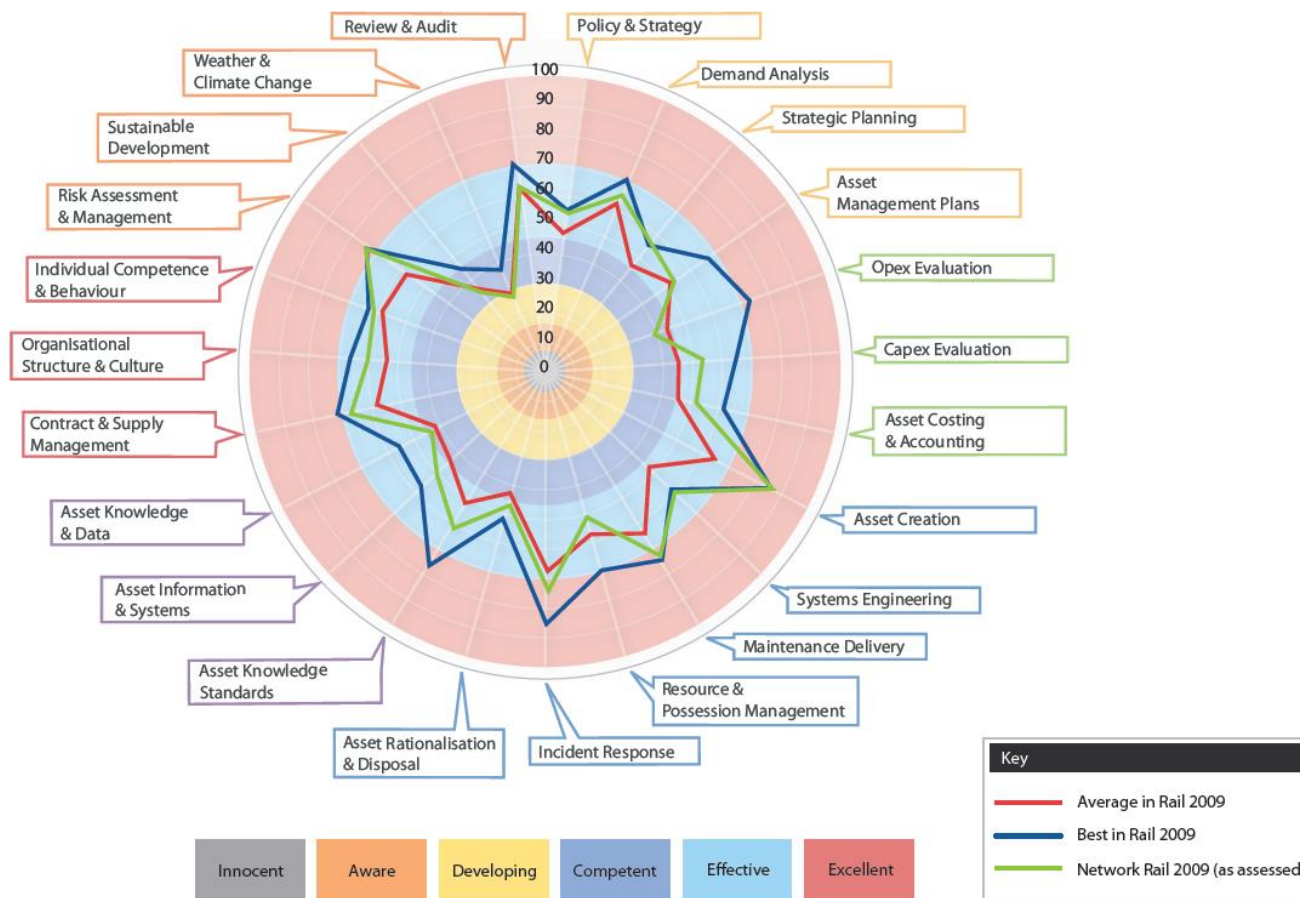
Diagram 4. Comparison of Network Rail to Average and Best in Rail

And a road agency in the developing world just starting the RAM journey
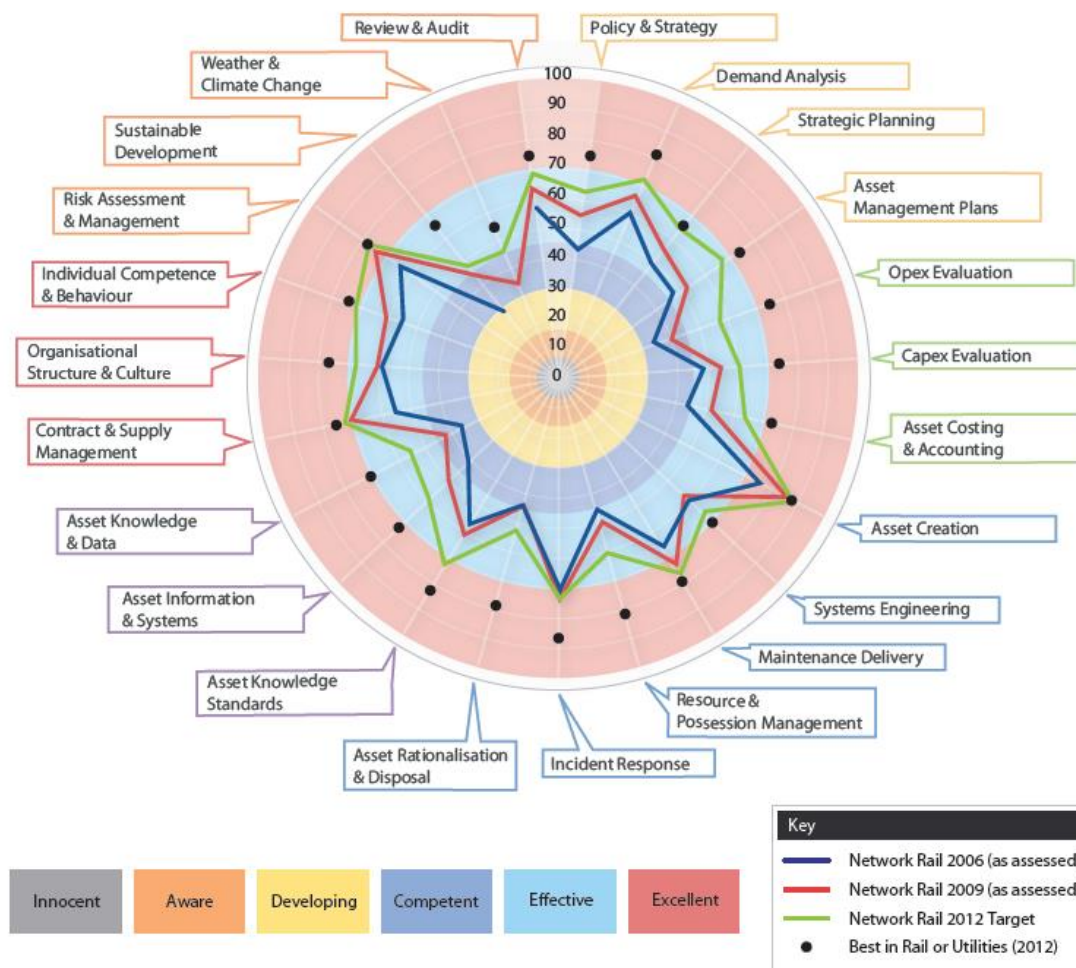
No.	Clauses
4.1	General requirements
4.2	Asset management policy
4.3.1	Asset management strategy
4.3.2	Asset management objectives
4.3.3	Asset management plan(s)
4.3.4	Contingency planning
4.4.1	Structure, authority and responsibilities
4.4.2	Outsourcing of asset management activities
4.4.3	Training, 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
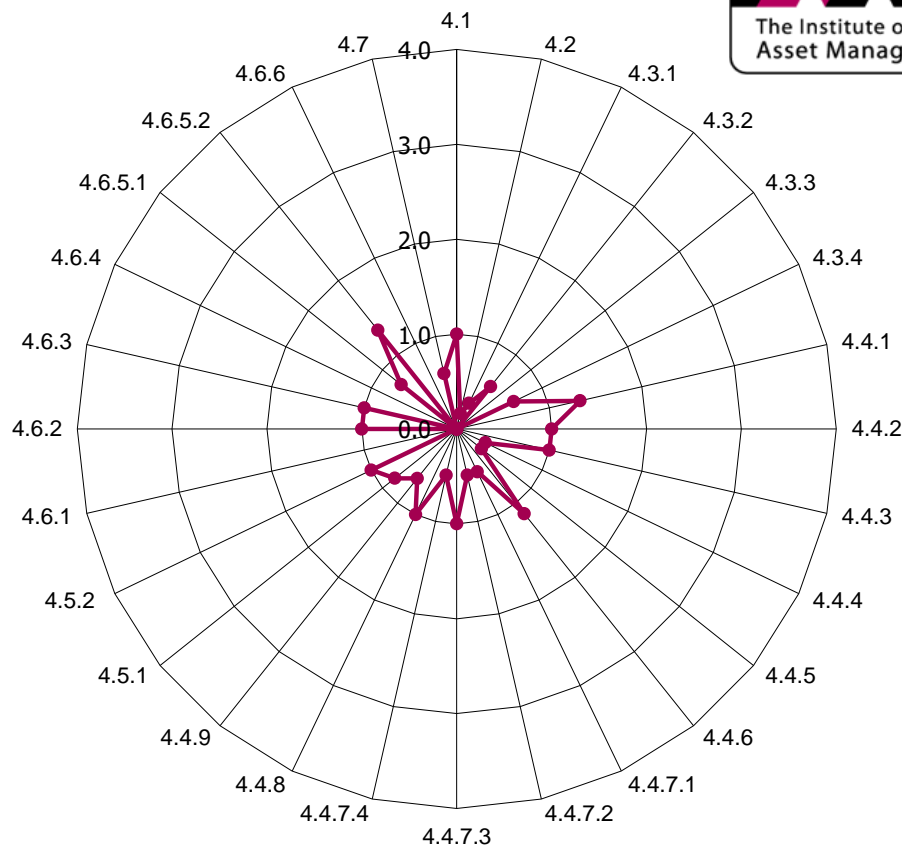
The RADAR chart shows the average score range per clause

Assessment Page

The Institute of Asset Management
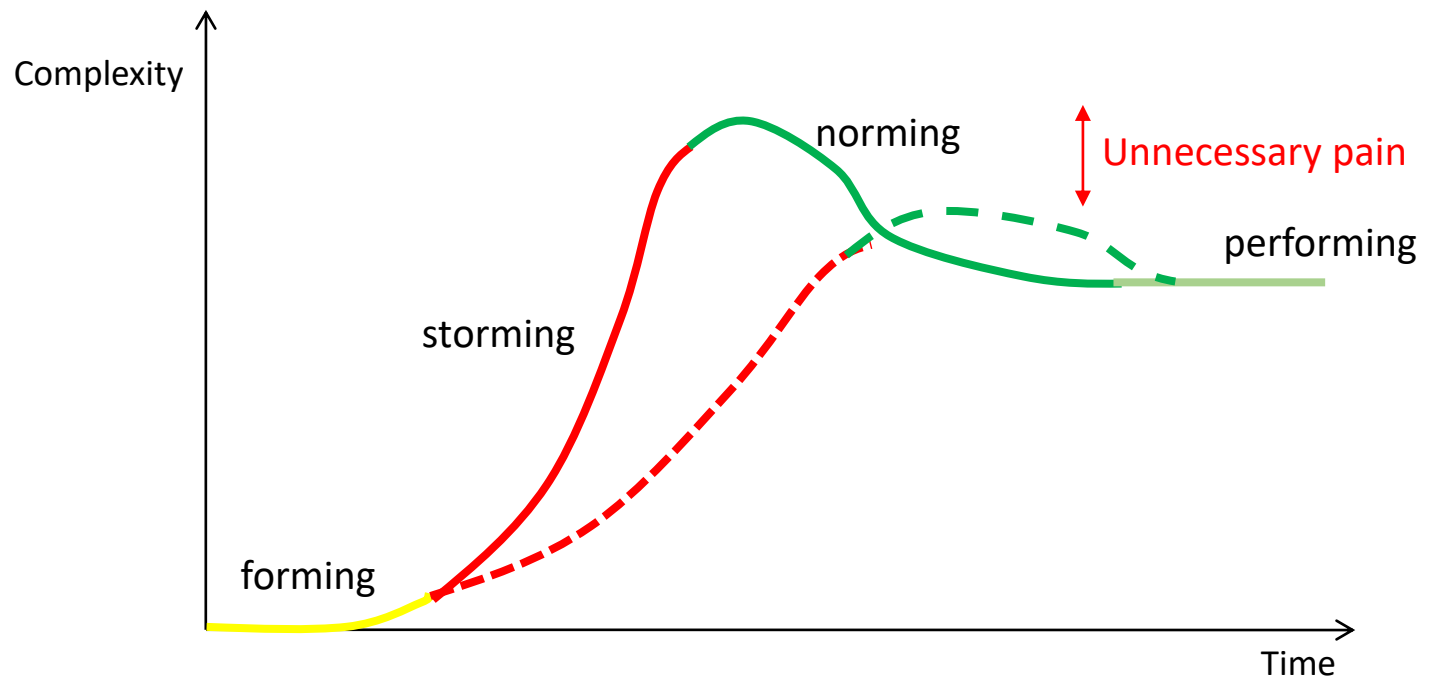
- Like good wine, asset management takes time to mature
  - Need to lay vintage before any improvement can start
  - Start now!
  - Write down your assumptions
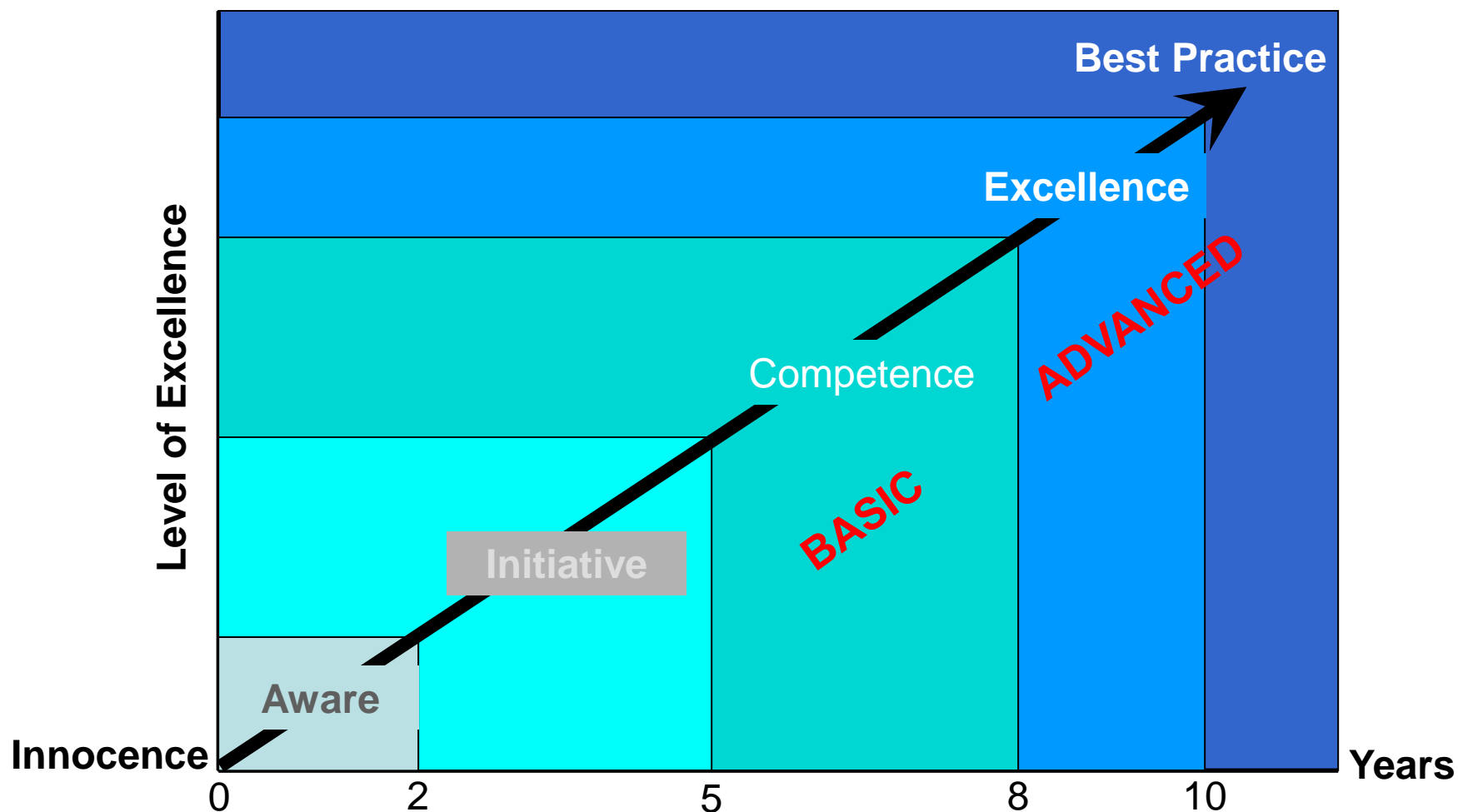 - Next year's plans will definitely be better

- Avoid being over complicated and over use of excessive temporary resources
  - Make RAM your 'business as usual'
  - Avoid unnecessary pain

- The enablers play a key role in the delivery of a successful RAM programme

- But they are not RAM in their own right
  - You can have a team, right a plan, have fancy IT systems, but without the overall processes in place you are still not doing RAM

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Questions?

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