Road Asset Management (RAM) Training

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Session 3-2: Asset Valuation

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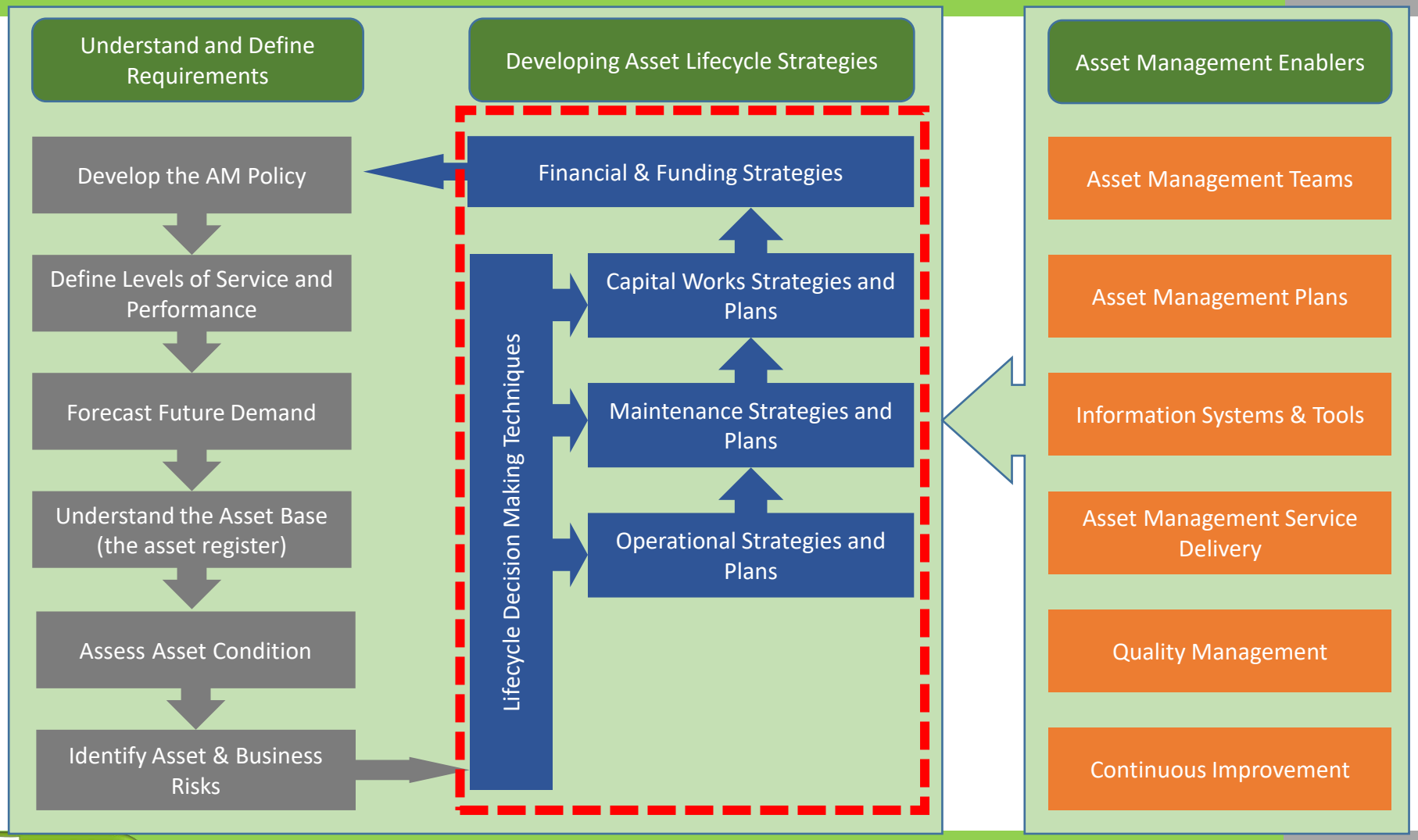
Training Sessions

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

International Infrastructure Management Manual (IIMM) AM Process



Agenda

- Introductions
- Why asset valuation
- Integration with asset management
- Infrastructure valuation (concepts, methodologies, standards)
- Valuation inputs (quantities, costs, optimisation, expected & remaining life, depreciation, data)
- PSAB 3150
- Improving the accuracy
- Wrap-up

"It is implicit that any Asset Management regime should have as a starting point a valuation of the asset involved … some approximate quantification of highway network value will be important to identify the relative scale of the different authority assets potentially competing for the Single Capital Pot."

UK Code of Practice for Maintenance Management

"asset valuation is not an end in itself. It is a means to ensure better asset management, better accountability to stakeholders and, of course, better decision making by those who manage those assets."

NZ Infrastructure Asset Valuation Guidelines

Asset Management provides answers to many questions:

- What do we need to do to it?
- What do we want it to do?
- What do we have?
- What condition is it in?
- What is it worth?
- When do we need to do it?
- How much will it cost?
- How will we deliver it?

Valuation is a key component of the Asset Management Process

Reasons for Knowing the Value

- Infrastructure becomes recognised as economic asset with ongoing value
  - not just as a sunk cost
- Government bodies find it harder to deny requests for maintenance/renewals
- Consequential loss in value when maintenance is denied is often politically unacceptable

Note: With long life assets, the associated incremental drop in service level is often harder to quantify

Valuation – What is it & Why do we do it?

- Asset Valuation is a process of estimating the financial worth of an asset
- Required by legislation in many countries, based on a recognised need
  - for significant reform of Financial Management in the public service, and
  - to regulate monopoly businesses
    - e.g. airports, ports, telecommunications, energy companies etc.
- The aim of asset valuation legislation is to improve:
  - Stewardship of assets
  - Efficiency in delivery of services
  - Accountability of asset managers
  - Decision making in the planning, creation, management and disposal of assets
  - Financial understanding
  - Equitable pricing of services (including intergenerational equity)

Valuation : The Crucial Link

Asset Management

- Inventory data
- Demand
- LOS/Cost Tradeoff
- Risk Management
- Lifecycle Analysis
- Condition & Deterioration
- Performance Assessment
- Maintenance Management
- Optimised Decision Making
- Benchmarking

Financial Management

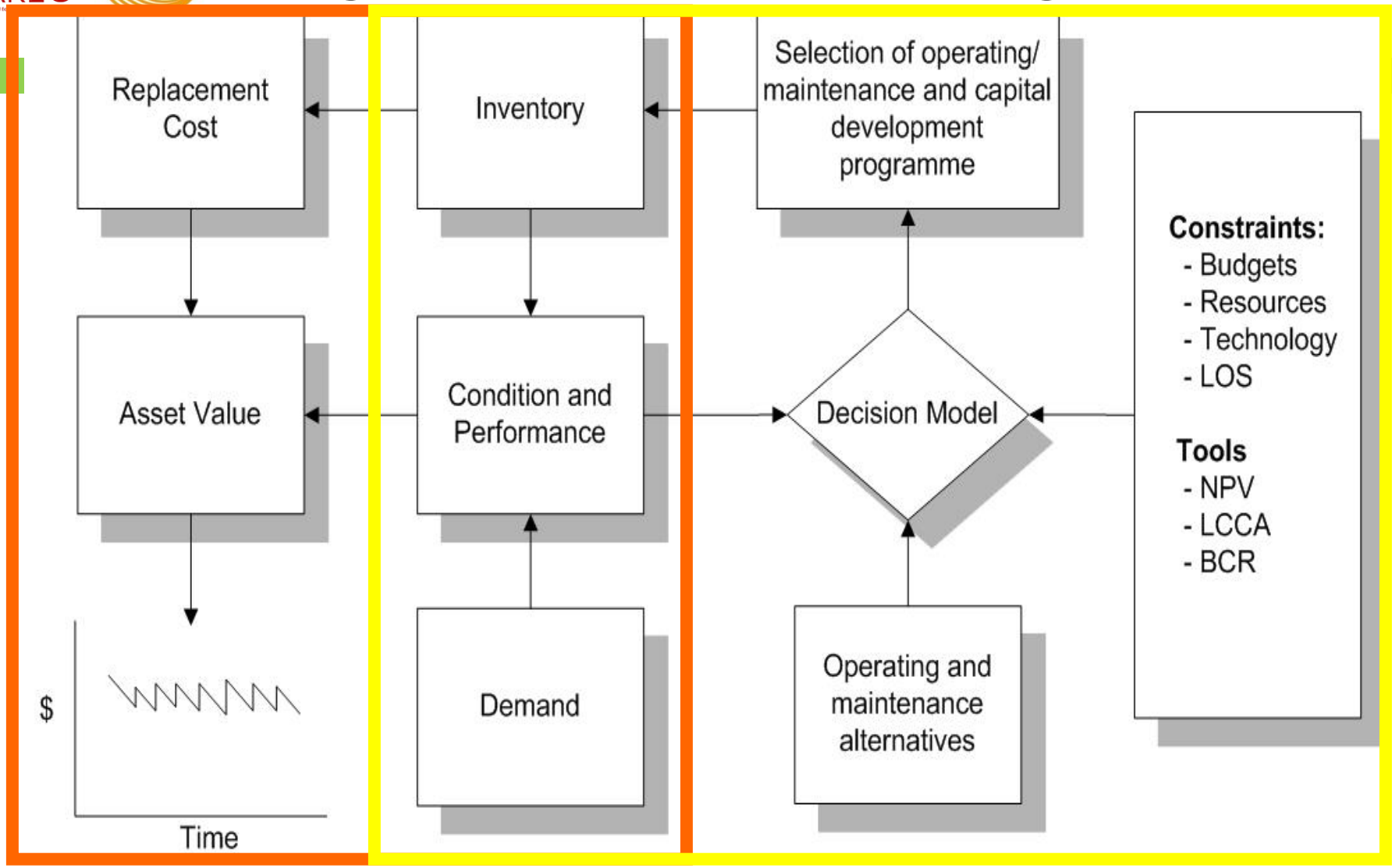
- LT Financial Strategy
- Balance Sheet
- Cost & Revenue Flows
- Financial Reporting
- Price Setting
- Loans & Financing
- Insurance
- Taxation
- Due Diligence
- Determination of Equity

Same Thing, Different Day (or terminology)

- Asset Management
  - Current condition of assets
  - Deterioration
  - Complete FWP
  - Average annual investment to maintain assets
- Valuation
  - Current value of the assets
  - Depreciation
  - Investment in renewals
  - Average annual depreciation of the assets

Valuation enables staff from different departments, or different government ministries to talk a common language – a major benefit.

Integrated Valuation/Asset Mgmt

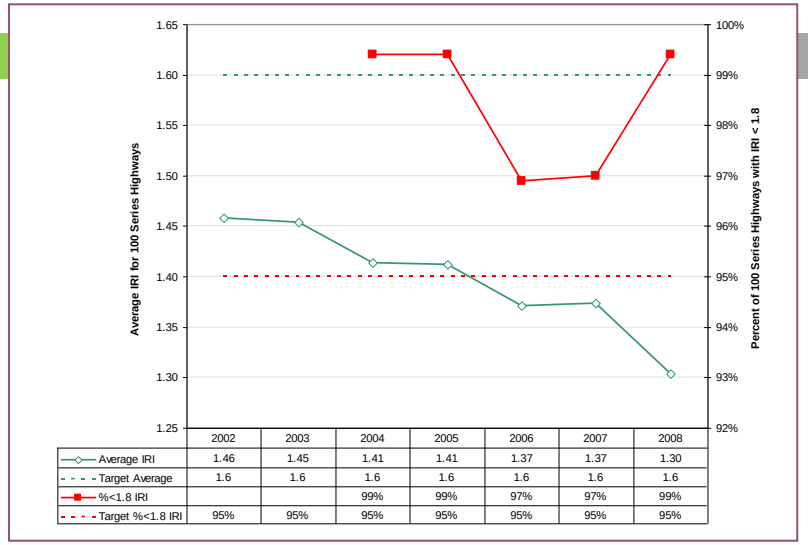


AM versus Valuation

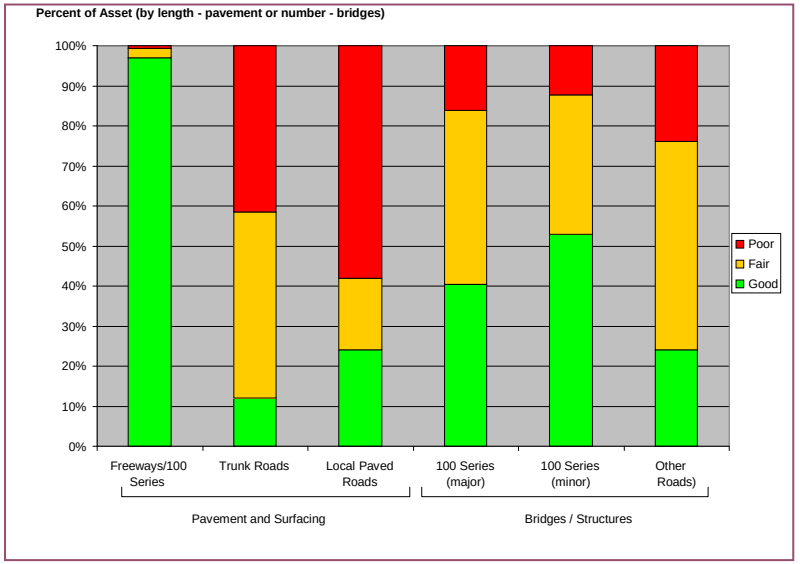
Example of making a funding case using asset valuation

- $12B replacement cost (versus $700M book value)
- $126M / year annual depreciation
- $1.9B of immediate need to address assets in a poor state of repair
  - Bridges with load restrictions
  - Roads with severe surface distress

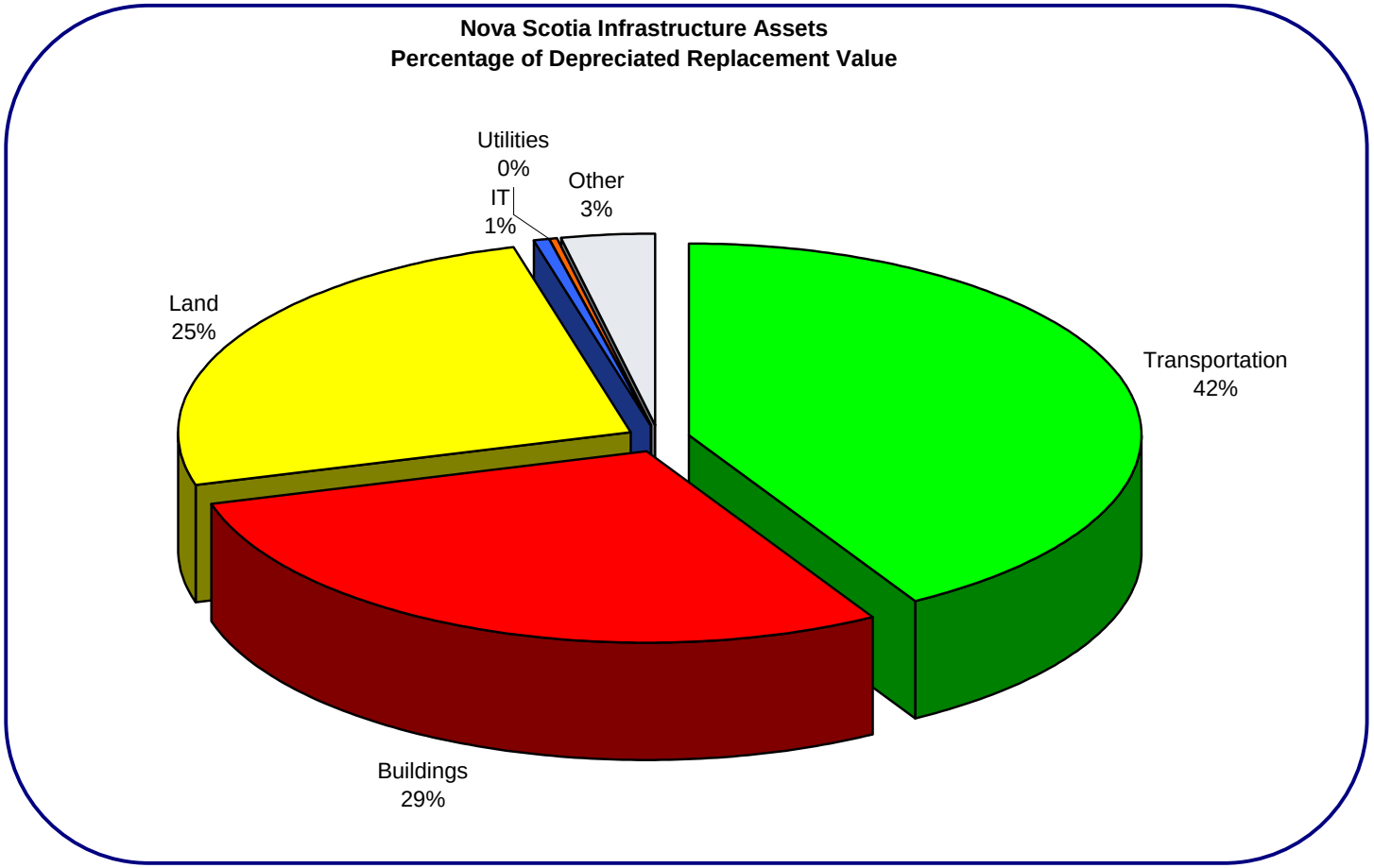
- Actual spend over past 3 years of $148M/yr
- Addressed $66M of the $1.9B backlog of works



	2002	2003	2004	2005	2006	2007	2008
Average IRI	1.46	1.45	1.41	1.41	1.37	1.37	1.30
Target Average	1.6	1.6	1.6	1.6	1.6	1.6	1.6
%<1.8 IRI			99%	99%	97%	97%	99%
Target %<1.8 IRI	95%	95%	95%	95%	95%	95%	95%



Portfolio Comparisons



Performance Measures Around Valuation

- Depreciated replacement cost of the asset
  - Akin to average condition reporting
- Annual depreciation value
  - Akin to annual renewal / replacement budget
- Sustainable Funding Index: Ratio of renewal funding to annual depreciation
  - If less than 1, then assets are losing value
- Ratio of current depreciated value to replacement cost
  - How far through the expected life are the assets on average?
  - Is there a bow-wave of work coming?

Valuer's Role

- Valuer's opinion of value is reached as a result of the exercise of his/her professional skill and judgement
- That professional skill and judgement is exercised at two stages, in determining:
  - (i) which valuation methodologies are appropriate for the valuation of the asset in question, and in respect of each valuation methodology
  - (ii) the amounts and/or rates to which that particular methodology will be applied in order to derive the value of the asset.

Valuer's Qualifications

- An understanding of the asset, its function and its environment
- Knowledge of the specification required for a MEA in the current market and the cost of procurement or acquisition of the asset
- Sufficient knowledge of the asset and its market place to determine the remaining physical and economic lives of assets; and
- Sufficient knowledge of the sector to assess functional, technical or economic obsolescence

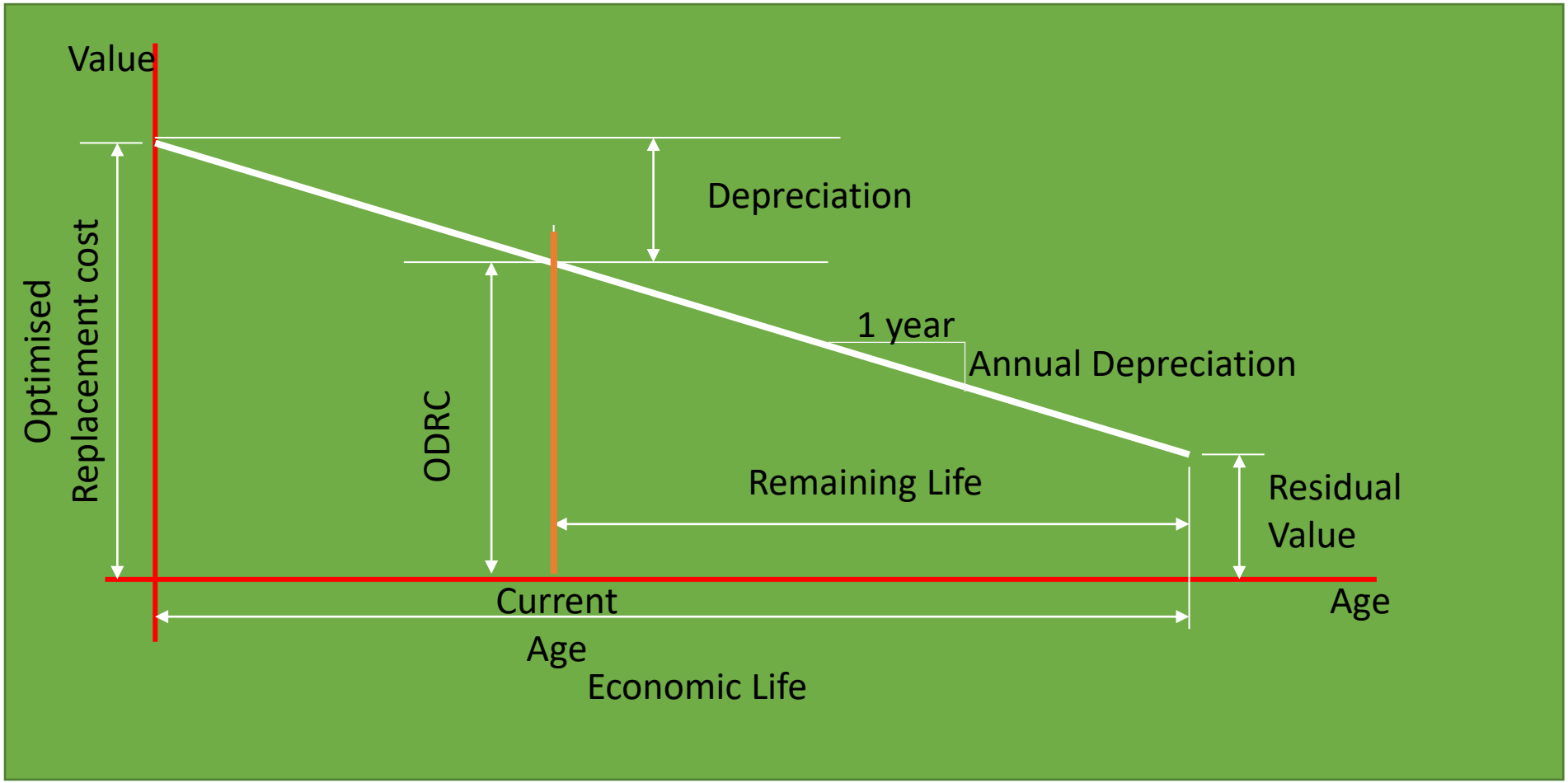
- Asset valuation is more an asset managers task than a financial managers task
  - Finance team should lay down the rules for the organization

The Valuation Process involves:

- Inventory development
- Componentisation
- Determining Replacement Cost of Modern Equivalent Assets
- Optimisation
- Remaining Life Expectancy
- Depreciation

Most of these issues require significant engineering input

The Key Elements of Cost Based Valuations



Valuation Equations

ORC = Quantity x Unit Cost x Other Cost Factor

D = (ORC – Res Value) x Age/Life

ODRC = ORC – Depreciation, or

= (ORC- Res Value) x Rem Life/Life + Res Value

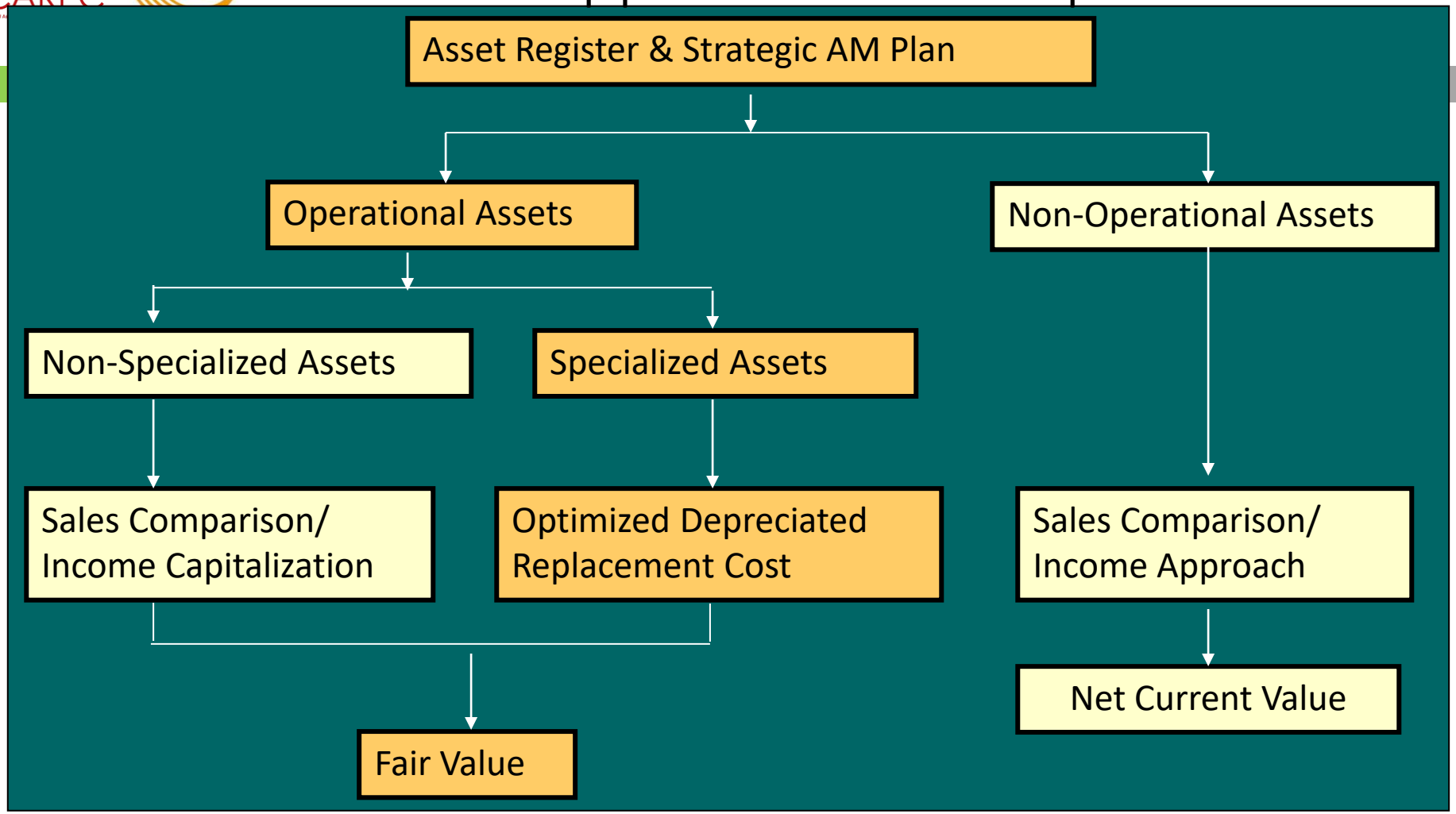
AD = (ORC- Res Value)/Life, or

= (ODRC – Res Value)/Remaining Life

Valuation Methods

- There are 3 basic methods
  - Sales Comparison – based on observable competitive market prices for same or comparable asset .e.g. real estate
  - Income Capitalization – based on capitalized discounted net cash flows
  - Cost Approach – based on cost of modern equivalent replacement, depreciated to reflect its current state (ODRC)

Valuation Approach & Concept



Specialised Assets – Most Infrastructure

- Specialised – no alternative use, no competitive market
- Networks (pipes, roads, electricity grids)
- Complex facilities (hospital, power station, terminal)
- Other characteristics
  - Comprise a large number of components having different lives
  - Each component is essential for operation of the overall system
  - Provide essential services
  - Immovable and have long lives
  - Essentially renewable rather than replaceable

Modern Equivalent Asset

- MEA is defined by its comparative performance and output e.g.
  - a MEA for traffic signal management unit must still be able to phase the signals
- MEA is NOT defined by its physical characteristics
- Built using modern materials, techniques and design
- Underlying theory - a potential buyer would pay no more than the cost of an equivalent new one.

Asset Quantities

- Develop asset inventory
- Accurate inventories are essential not just for valuation, but for all facets of asset management and financial management
- Disaggregate to a level that components have:
  - Individual replacement cycles, or
  - Provide benefits in different patterns
  - Material impact on depreciation expense

Component Level for Roads

- For roads, this may be dictated by significant changes in any of the following factors:
  - intersection to intersection (residential areas)
  - treatment length
  - surface type (sealed/unsealed, chipseal/AC)
  - pavement layer (subbase, basecourse, surface)
  - traffic volume
  - traffic mix (%HCVs)
  - width (extra lanes)
  - topography (flat/rolling/mountainous)
  - location (urban/rural, coastal/inland)
  - foundation strength (swamp/peat/clays/gravels)
  - environment (rainfall/temperature, high water table)
  - ownership

Greenfield vs Brownfield

- Greenfield's optimisation ignores the existing configuration and focuses on optimising the network as if starting from scratch. It assumes the capacity to build an entirely new optimal network. This would be rarely feasible for infrastructural assets given the historical constraints which may have applied and the requirement to retain existing customer access.
- Brownfield's optimisation assumes development occurs as a series of progressive increments that match the normal growth in demand but retains the historical configuration. It recognises that network optimisation is limited to some extent by that historic development.

- Brownfield's optimisation is appropriate for the valuation of infrastructure assets

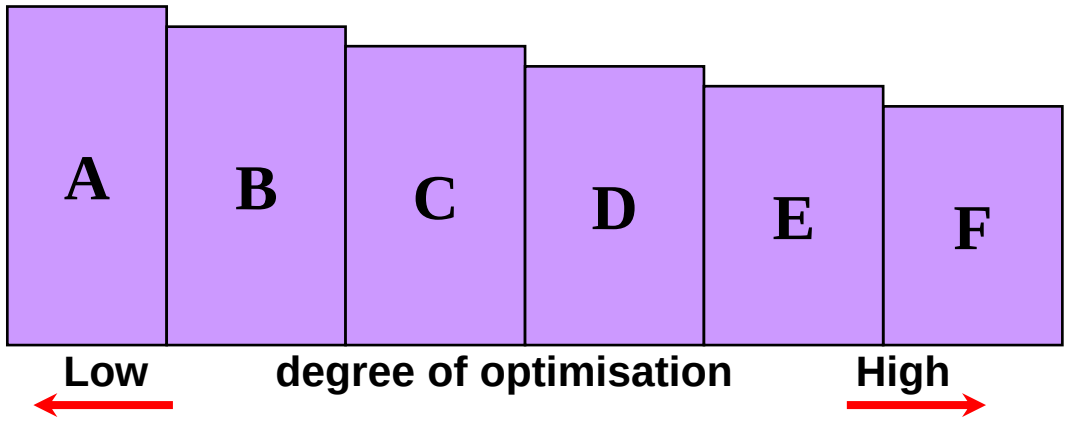
On-Costs

- On-costs are all the other costs on top of the construction cost, directly attributable to bringing the asset to working condition for it's intended use. These include:
  - professional fees (architects, engineers, planners, lawyers)
  - contractors margins
  - survey cost and freight charges
  - costs for commissioning and testing
  - some corporate management costs
  - capitalised financing costs
- Doesn't include expenditure incurred in deciding whether the item should be acquired or constructed. For example feasibility costs, general administration and selling overheads. The general rule is 'include only when costs would have been avoided if there had been no expenditure on the asset".

Optimisation

- Optimisation is about replicating the service potential embodied in the assets in the most efficient way practical.
- Mostly down, rarely up
- Reflects most probable use of the asset that is
  - physically possible and readily available
  - appropriately justified and financially viable
  - legally permissible
- Eliminates over design, surplus capacity and obsolescence
- Recognises renewal occurs in a brownfield (built) environment
- Recognises infrastructure growth is an incremental process

Optimisation Cont.



- A = reproduction of existing assets
- B = surplus assets eliminated (over-build)
- C = obsolescence eliminated
- D = excess capacity eliminated (over-design)
- E = site reconfiguration
- F = changed location

Asset Life Expectancy

- Physical Deterioration
  - Wear and tear from use or from the elements
  - Inadequate maintenance or negligent care
  - Damage from moisture, breakage, fire, etc.
- Functional Obsolescence
  - Poor design
  - Functional inadequacy due to size, style, age etc
  - Technological innovation
  - Change in industry techniques or customer tastes, demands
- External Factors
  - Adverse economic conditions
  - Passage of restrictive legislation
  - Loss of material or labour sources

Asset Life Assessment

- There are 4 primary methods for assessing asset life/remaining life expectancy
  - Fixed life assumed for all asset group. Remaining Life = (fixed life – age). Where age unknown, judgement used to assign proportion through life.
  - Statistical analysis of a representative sample to calculate the lives for subgroups in different operating environments.
  - Take account of condition, performance, risk etc
    - NAMS Valuation & Depreciation Guidelines
  - More advanced predictive methods include computerised deterioration models (HDM-4 etc)

Life Cycle Modelling

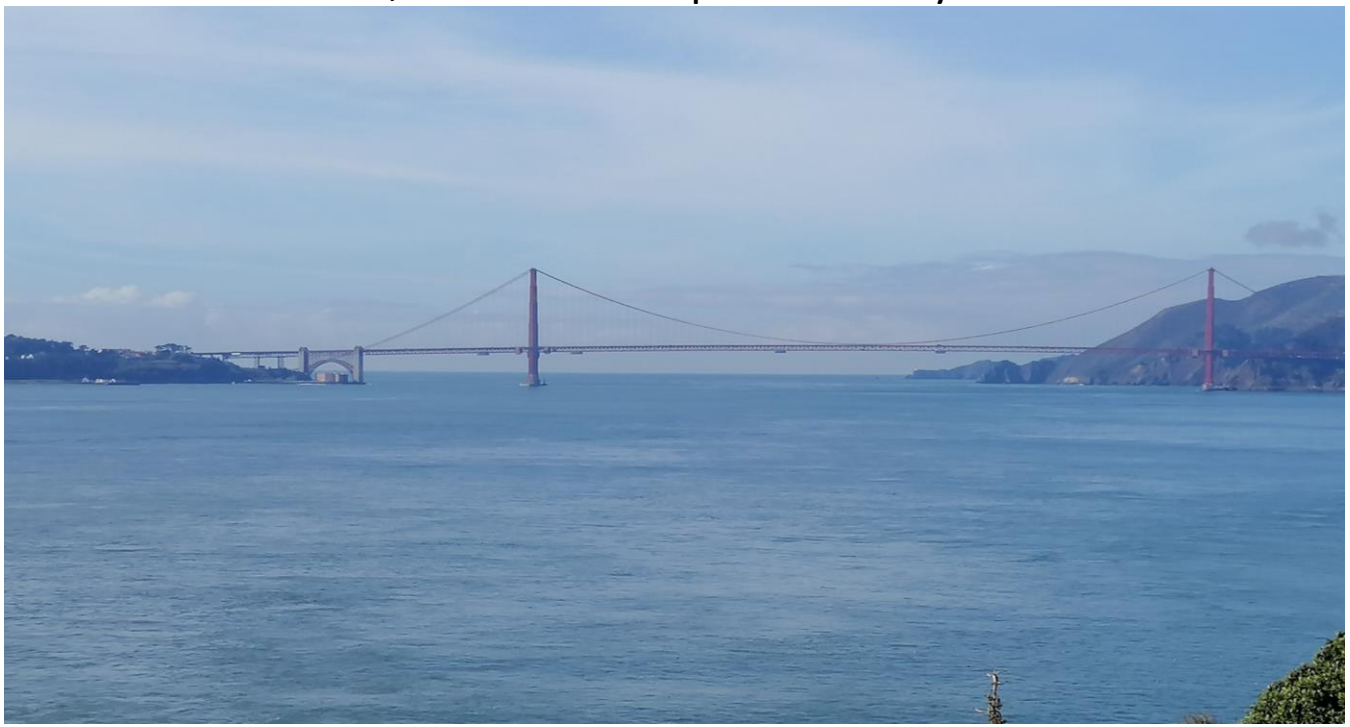
- Full life cycle modelling provides the best approach, but high input requirements to generate appropriate results
- Can directly illustrate the impact on the assets value of differing levels of maintenance costs (i.e. optimise the forward works programme for a set budget)
- They are developed and calibrated to fit individual characteristics of a particular network, taking into account a range of factors such as:
  - Roads: (eg HDM-4) AADT, %HCVs, traffic growth, SNC, roughness, cracking, rutting, shoving etc

Life Expectancy Review

- Asset lives are required to be reviewed annually
- Don't apply methods blindly
- Test the reality of parameters used
- Use the lesser of economic and physical life
- Check for consistency with Asset Management Plans, specifically Life Cycle Management Techniques, Maintenance Plans and Forward Work Plans
- Look for interdependencies with other asset classes
  - Surfacing versus base of road life cycles
- Consider the impact that the overall development strategy might have on asset lives.
  - (eg traffic pattern, bypass etc…)

Historical Cost is Not Suitable for RAM

- Depreciation based on actual cost paid is only suitable for short life assets, where the cost to replace is not greatly impacted by inflation impacts
  - Vehicles, furniture etc
- There is little benefit in knowing that 80 years ago it cost $35m to build the Golden Gate Bridge, when it would cost $2.3billion to replace it today



Cost Based Valuations

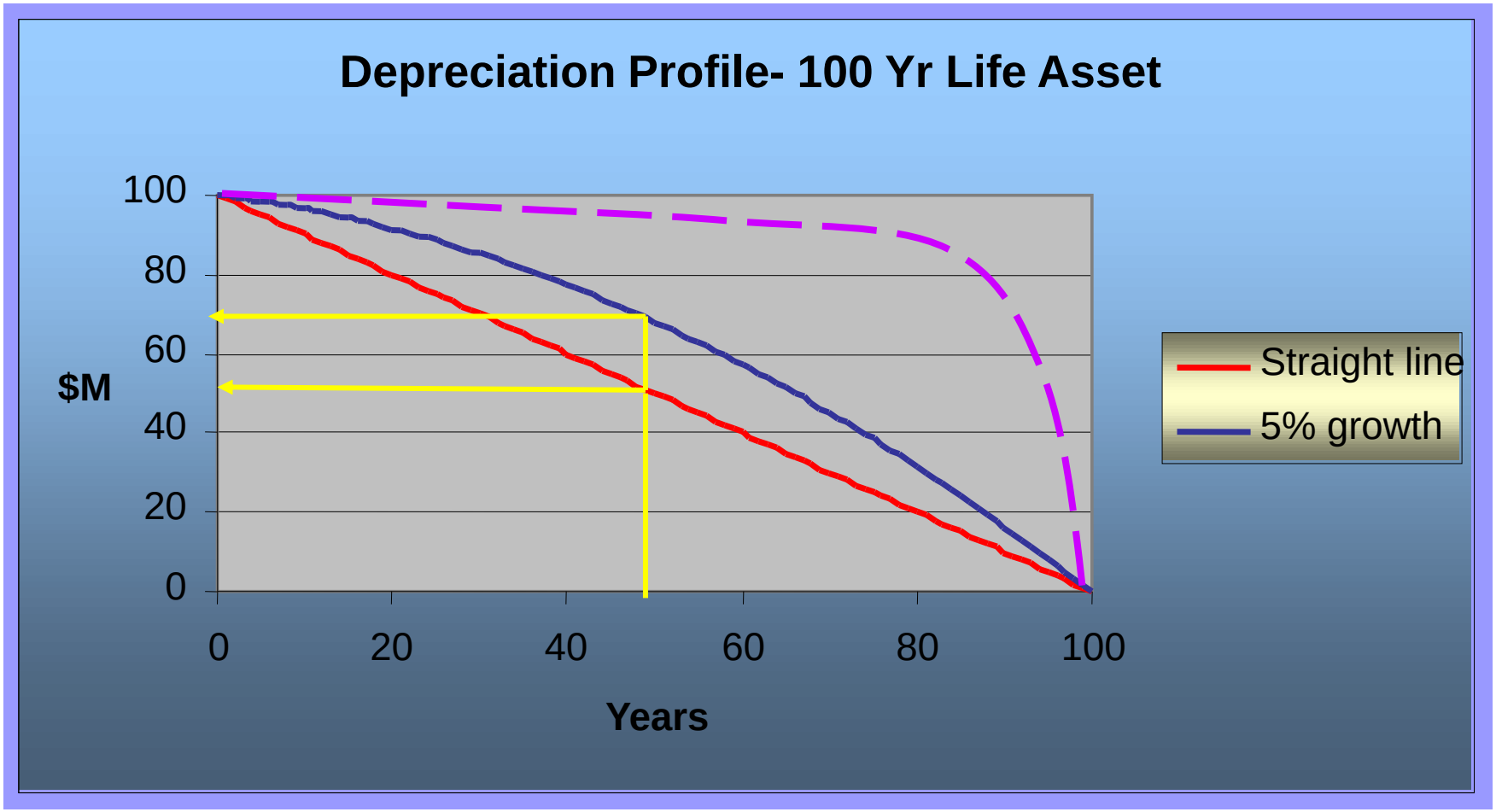
- There are four key aspects to consider:
  - Optimised replacement cost
  - Economic life and remaining life (lifecycle analysis)
  - Residual value (re-useable portion or scrap value)
  - Depreciation method (pattern of $ write down – straight line or nonlinear)

Rate of Depreciation

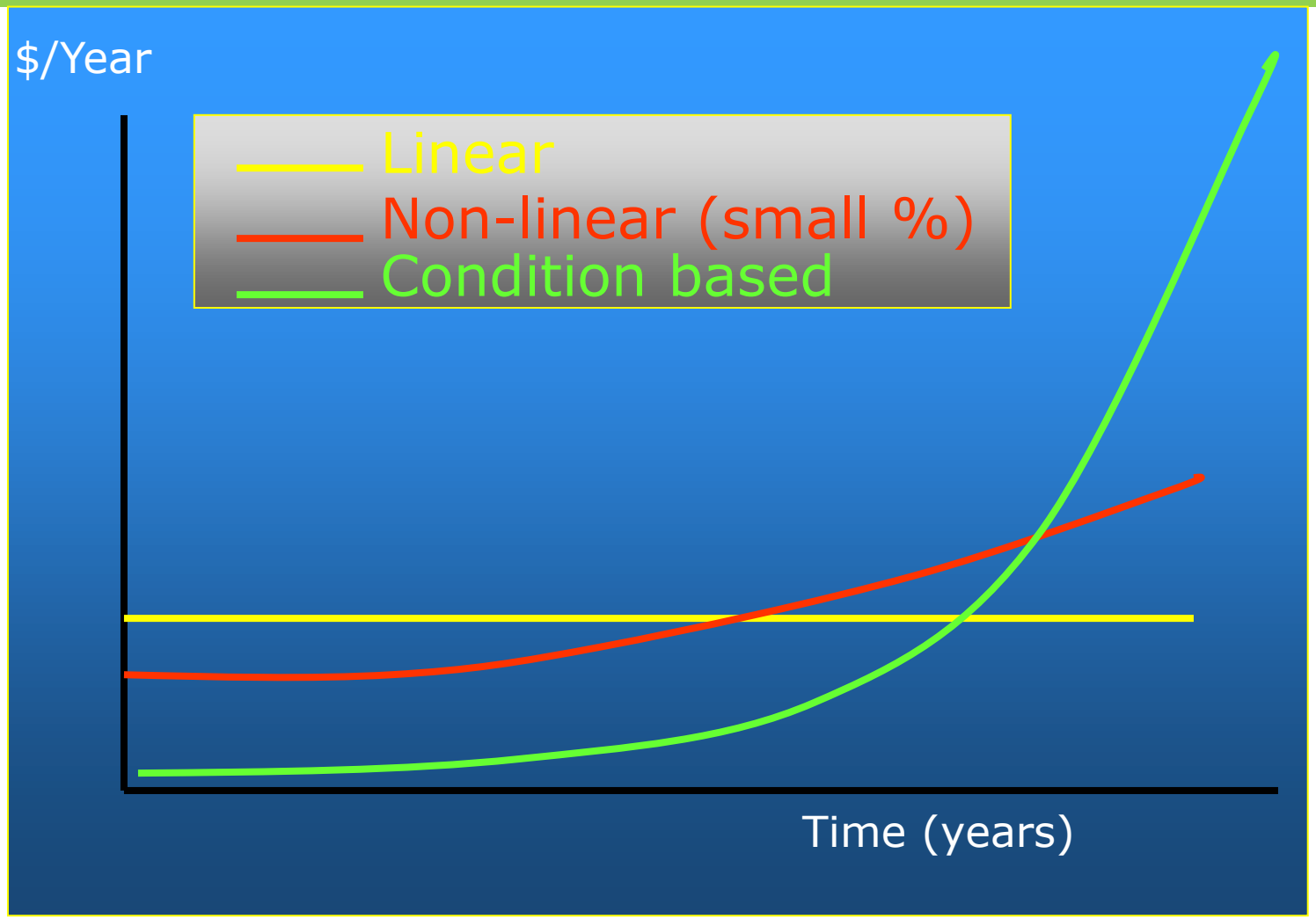
- To ensure equitable cost recovery (pricing of services) the profile should reflect the use or pattern of benefits consumed, the rate of depreciation should not follow the rate of deterioration

- Concept is similar to a toll, wherein all users pay the same toll, not higher tolls as the asset wears out.

Linear vs Non-linear Depreciation

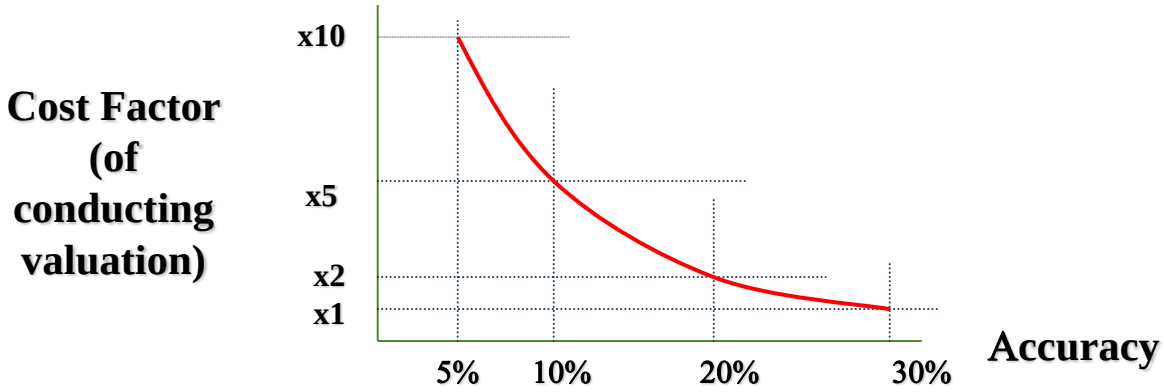


Annual Depreciation



Valuation Accuracy

- Improving accuracy is usually a staged evolution.
  - Stage 1 + 30%: using readily available data and basic methods
  - Stage 2 + 20%: increasing improvement in asset data/detail
  - Stage 3 + 10%: more sophistication of methods/models



- As infrastructure assets involve high $ there is scope for large movements in value. It is therefore important to have definitive guidelines in order to reduce inconsistency and variability.

Improving Accuracy

- Valuations usually start at a basic level with improvements progressively implemented during subsequent updates/revaluations. A typical sequence of steps would be:
  - Assets reported at aggregate level and valued using average fixed rates/assumptions (lives, costs, ages, % depreciated)
  - Assets are componentised and valued using variable rates assumptions for different component groups.
  - Further categorisation/componentisation where assets are valued at individual level
  - Increasing sophistication in deriving cost rates and life expectancies

Confidence Ratings

Knowing the accuracy of the valuation outputs is very important to the

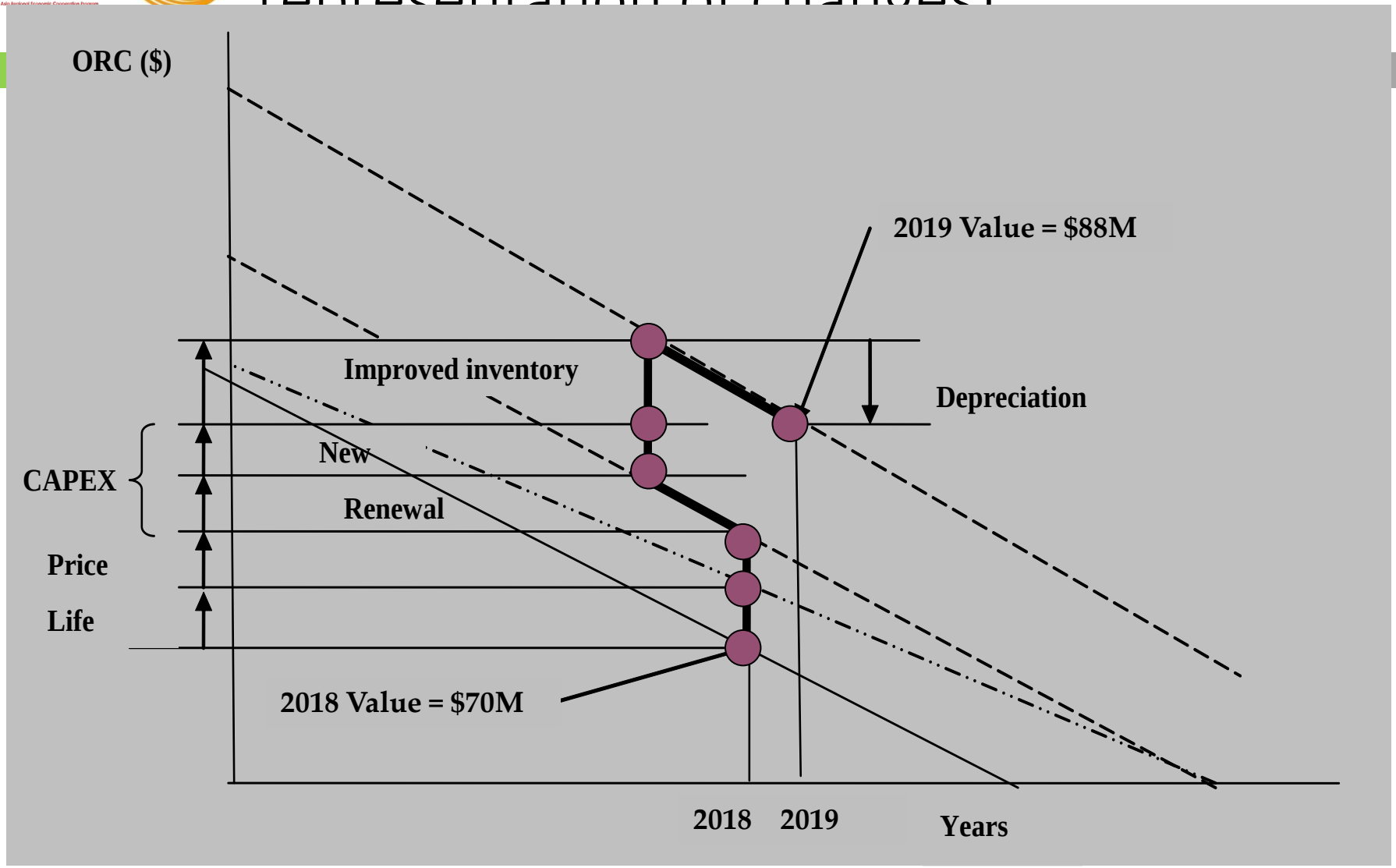
A) Highly Reliable (Accurate)	**Data based on sound records and detailed analysis**	**± 5%**
B) Reliable (Minor inaccuracies)	**Data is old and partially supported by documentation**	**± 15%**
C) Uncertain (% of data estimated)	**Limited analysis, data extrapolated from small sample**	**± 30%**
D) Very Uncertain (all estimated)	**Data unconfirmed. Based on verbal information and cursory inspection**	**± 40%**

Valuation Updates

- Generally occurs annually for the period between revaluations, and a comparison must be made with the previous valuation and explanation provided for any changes in the valuation results
- The previous years valuation is adjusted for any:
  - additions (capital works) (A)
  - renewals (capital works) (R)
  - disposals (S)
  - corrections (C)
  - price movement (P)
  - Depreciation (D)

- $ODRC_{n+1} = ODRC_n + A + R - S + C + P - D$
- $ORC_{n+1} = ORC_n + A - S + C + P$

Example Change in Value (Diagramatic representation of changes)



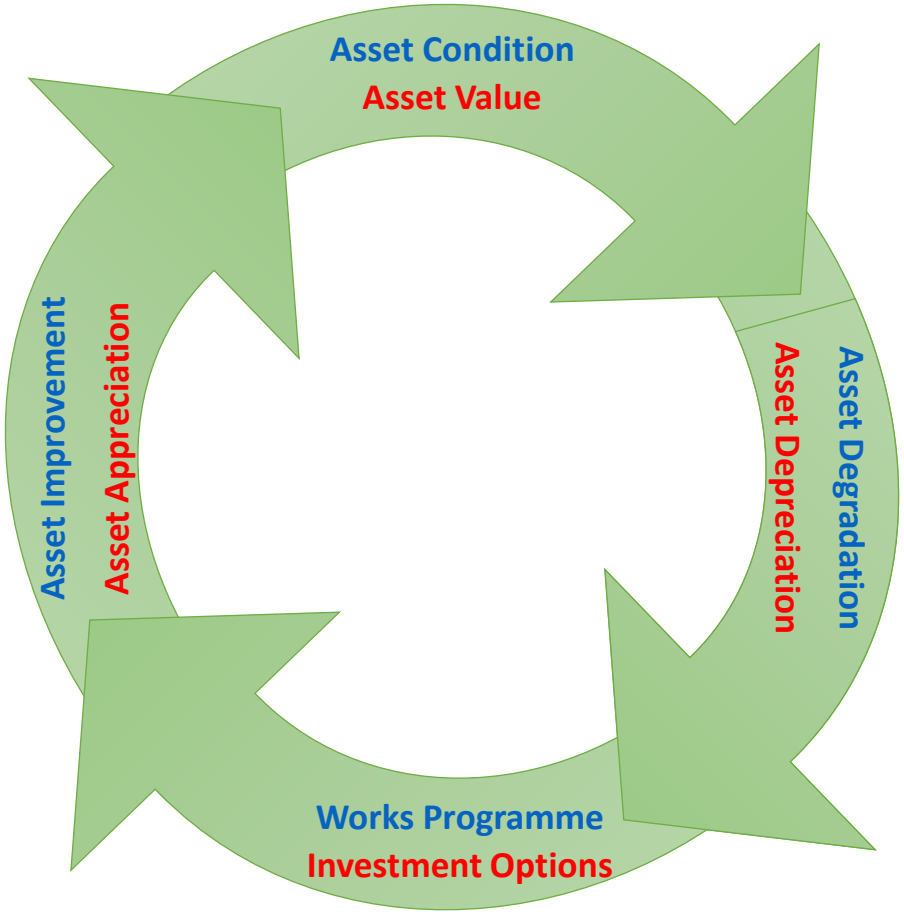
Summary of Valuation Process

- Define purpose of valuation
- Determine methodology for each asset class
- Develop valuation schedule
- Classify and componentize assets
- Develop valuation parameters and assumptions
- Carry out field inspections
- Make optimisation adjustments
- Determine asset life expectancy
- Decide on method of depreciation
- Calculate valuation outputs
- Compare with previous valuation
- Prepare valuation report

Summary of Key Points

- Not stand alone exercise but integrated with RAM
- Asset classification dictates valuation method
- Fair value of infrastructure assets is given by ODRC
- Useful life is lesser of physical and economic life
- Depreciation should reflect the pattern of benefit
- Regular updates/revaluations are necessary to keep the $ current and meaningful
- Guidelines necessary to ensure consistency, reliability and repeatability
- Need balance (individual/network, average/specific)
- Start basic and prioritise improvements
- Is an asset management function, not a financial management one

Circle of Life



Summary

- Asset valuation is an important part of the asset management cycle
  - Ideally depreciation should be an operational cost
- It is something the accountants understand
- It is a relatively simple calculation to perform
  - Much easier than predicting network deterioration

Questions?