

REAAA Roadshow, New Zealand
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Achieving Value for Money in Asset Management

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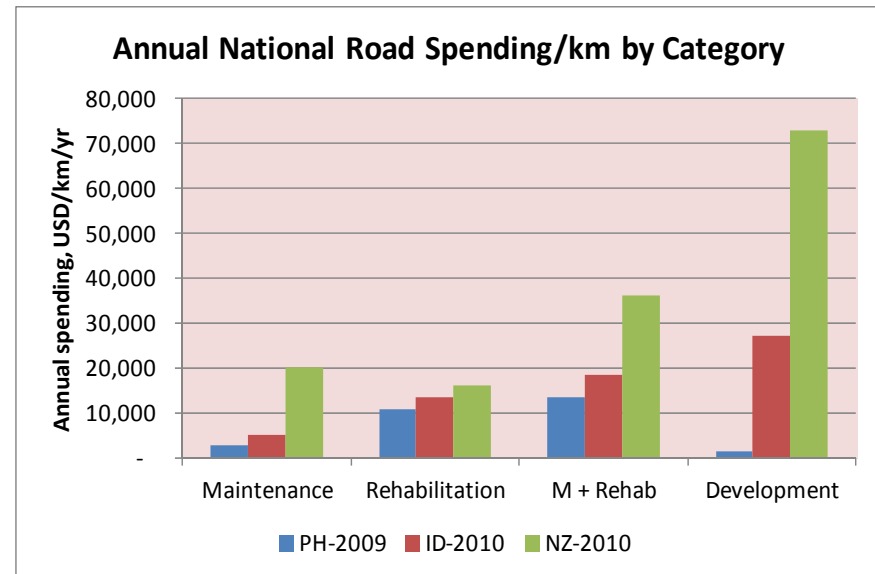
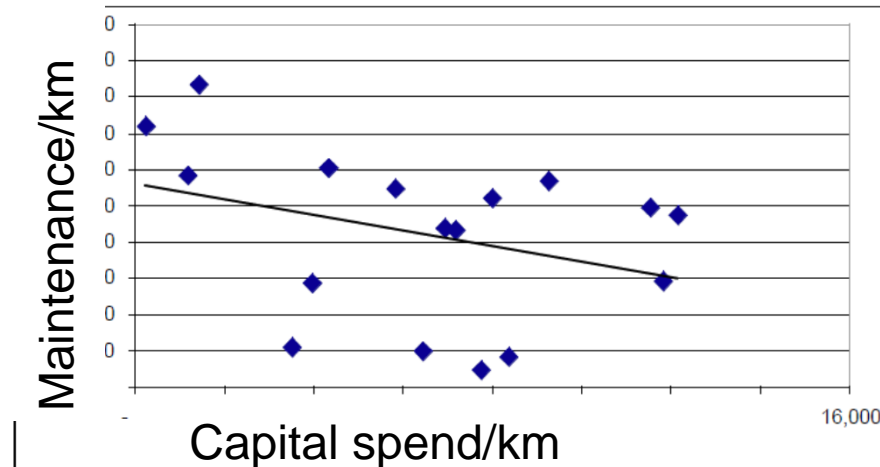
What's Ahead

- How do we achieve value for money? – for client and public
- The three key drivers of life-cycle costs
- The value for money framework and some indicators
- Over to the asset managers

Costs of Asset Management – to Whom?

- Road agency:
 - preservation v development
- Government:
 - spending on roads v. other sectors and policies
- User & taxpayer:
 - User charges and taxes
- How do we measure value for money in asset management?

Maintenance v Capital Spending per km in Africa
(AICD Fiscal Costs, 2008)



Budget Efficiency Measures:

Spending more prudently

The budget, over time, needs to cover the life-cycle of road works on all links of the network:

- *for construction and preservation*

The annualised lifecycle cost is:

- *equivalent to average annual budget needs for a road, and*
- *to the costs to be recovered from users or clients*

Life-cycle costs can be reduced through:

1. **Higher design standards** – longer design life lowers future maintenance
2. **Better quality** – ensuring road works survive for their full expected life
3. **Better prices** – improving procurement to keep costs low for good quality

Which is the most effective way of reducing life cycle costs and annual budget needs?

How would you rank the following in terms of reducing LCC and budget needs?

- from #1 Most effective to #3 Least effective

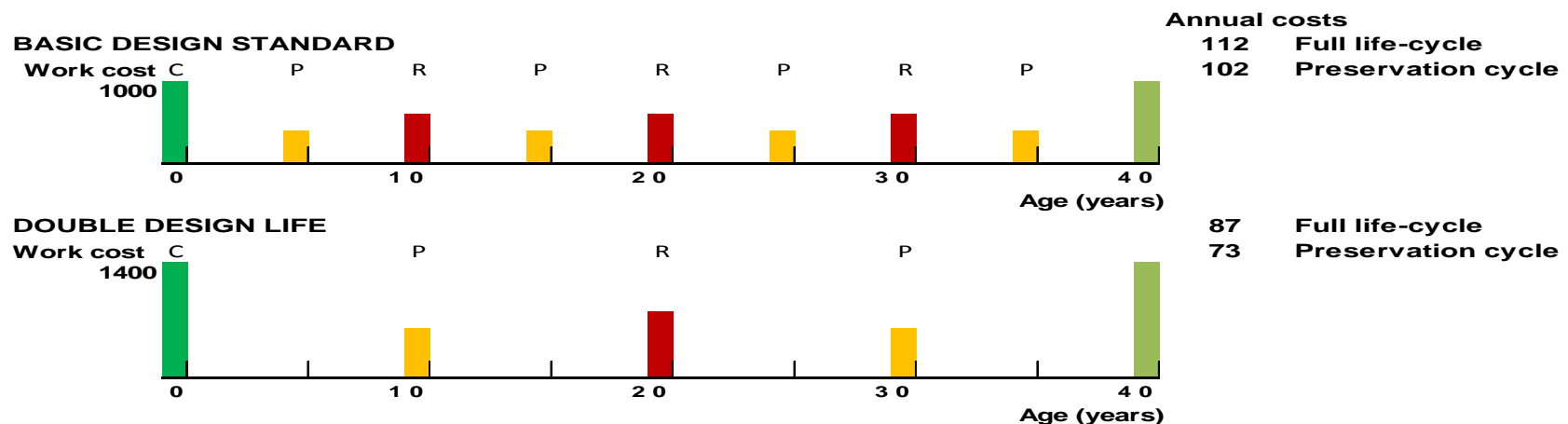
- A. Design life – spending more for longer life
- B. Improving quality and reliability – reaching the design life in practice
- C. Better prices for the work

Budget Efficiency Measures:

1. Higher design standards

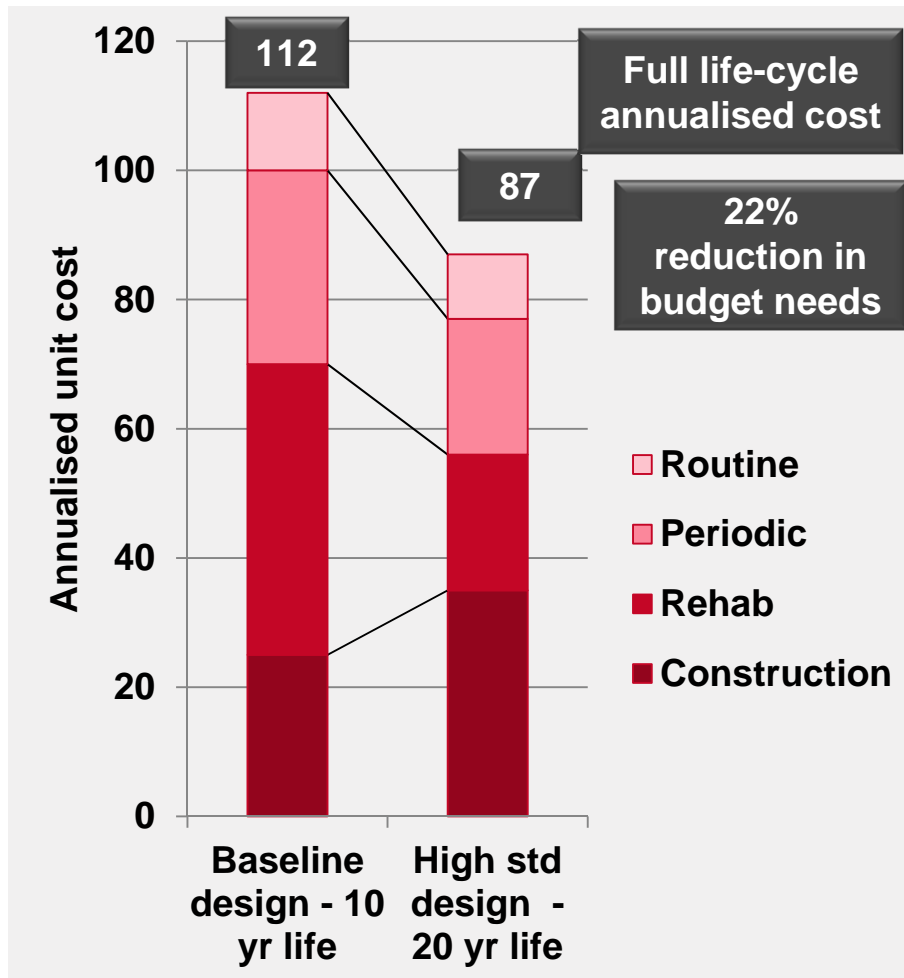
- Pavement structural design has significant benefits of scale: *e.g. 100% increase in structural capacity costs only 20-40% more, depending on structural type and other factors*
- *Agency life-cycle cost = 20-30 % lower*
- Longer design life = better condition, less maintenance, lower user costs

➤ **LOWER AGENCY COSTS & LOWER USER COSTS! = WIN-WIN!**

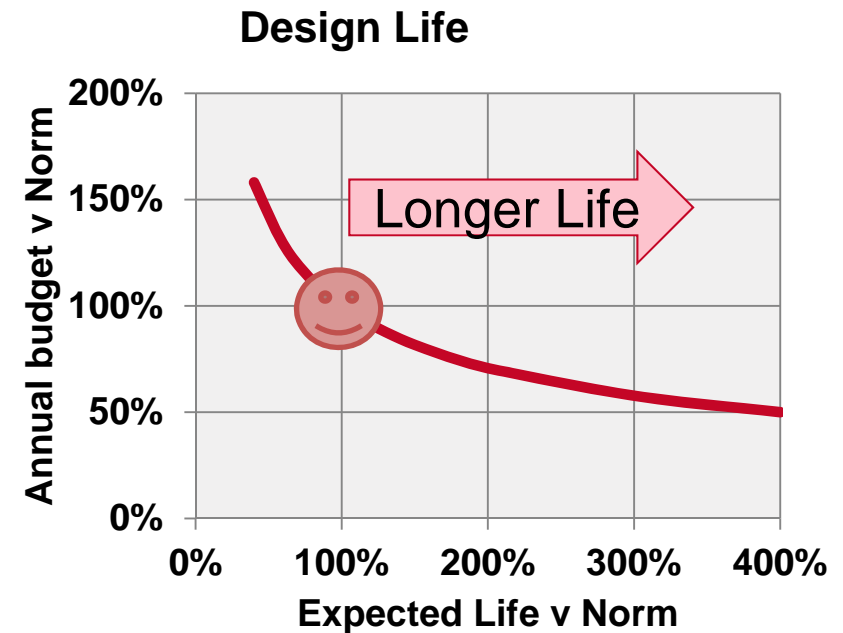


Budget Efficiency Measures:

1. Higher design standards – cost savings



Spending 40% more to double the design life can reduce the annual life cycle cost by 22%

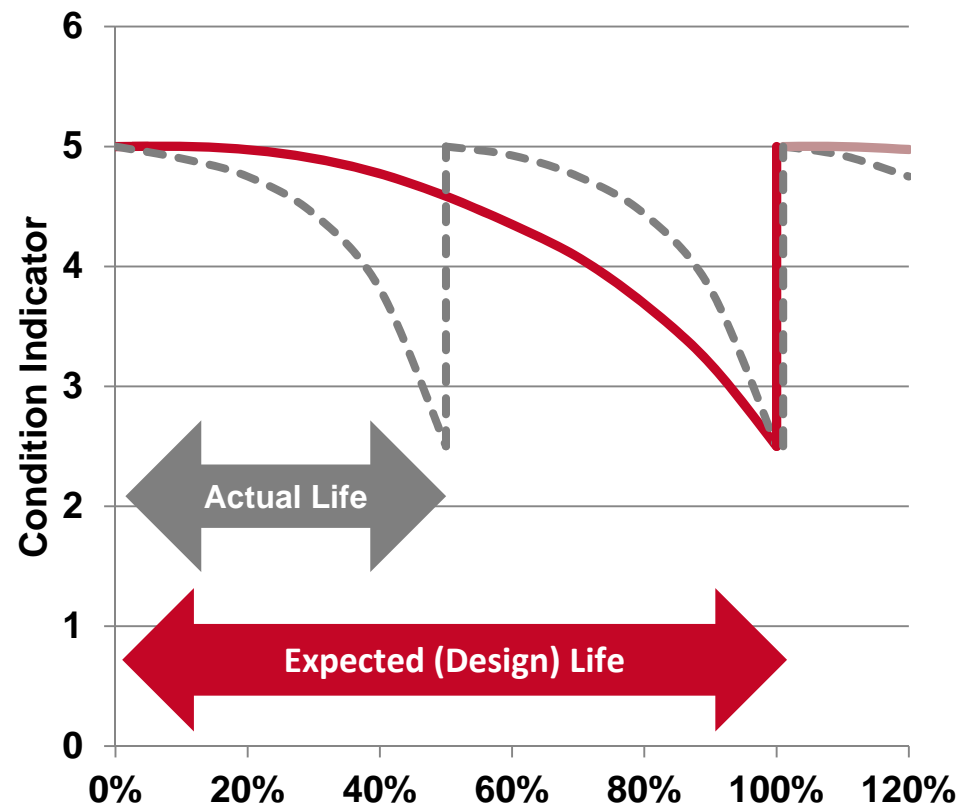


Budget Efficiency Measures: 2. Better Quality

Quality is complex and multi-dimensional in causes and effects.

Improving project quality involves each phase:

- *Engineering investigation*
- *Engineering design*
- *Contract specification*
- *Construction quality*
- *Construction supervision*
- *Field conditions, operating conditions & maintenance*



Budget Efficiency Measures:

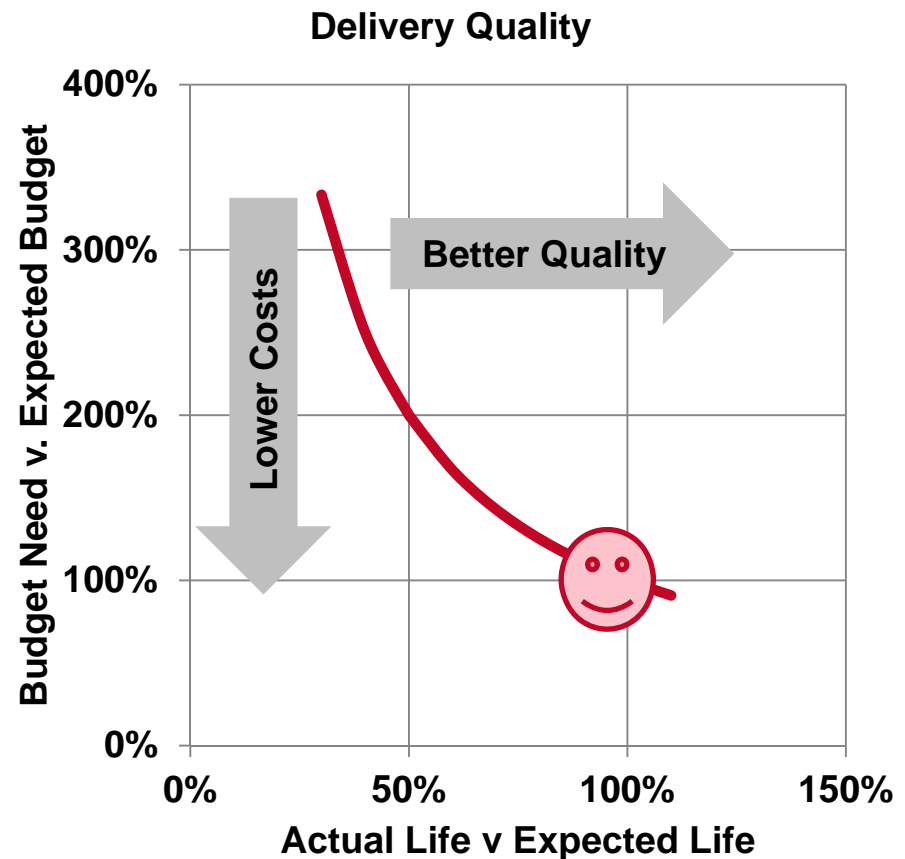
2. Better Quality – What it Saves

An all-encompassing performance measure:

Did the work reach its expected life?

$$\text{Quality} = \frac{\text{Actual life}}{\text{Expected life}} \%$$

$$\text{Budget need} = f(100\% / \text{Quality}) \%$$



Budget Efficiency Measures:

3. Better prices

Improving procurement involves:

- *Forms of contract to balance risk*
- *Improving Owner's Estimate*
- *Package size (better firm, more efficient delivery, less overhead)*
- *Adequate competition*
- *Curbing corruption*
- *Market expectations*
- *Timely payment, cash flow*

What is the “best price”?

Best price is the completion price achieving 100% quality

Completion price > award price, usually

Budget Efficiency Measures:

3. Better prices – What they save

Performance measures:

- *Completion price v Owner's estimate?*
- *Unit program, treatment costs?*

Cost margin =
$$\frac{\text{Completion price}}{\text{Owner's estimate}} \%$$

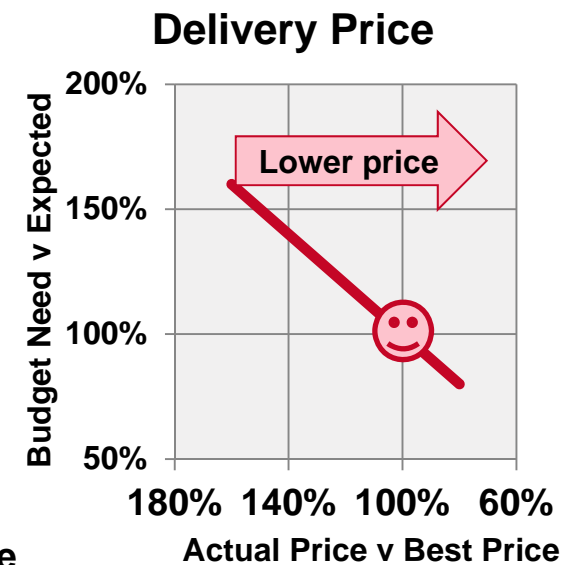
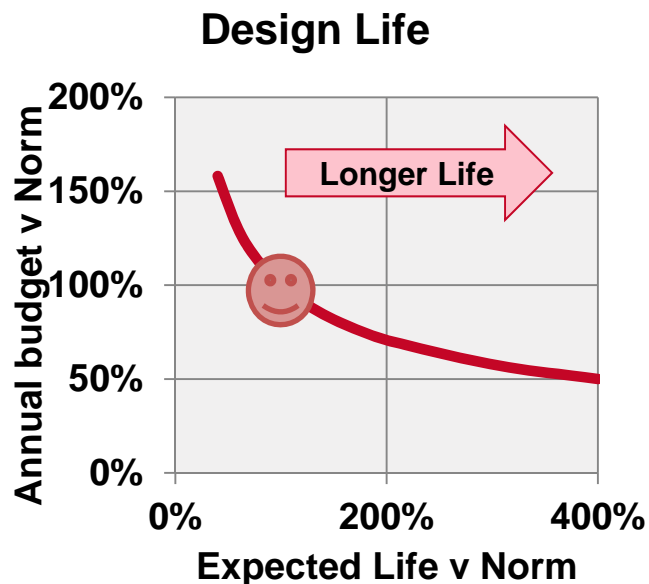
Budget need =
Cost margin, %



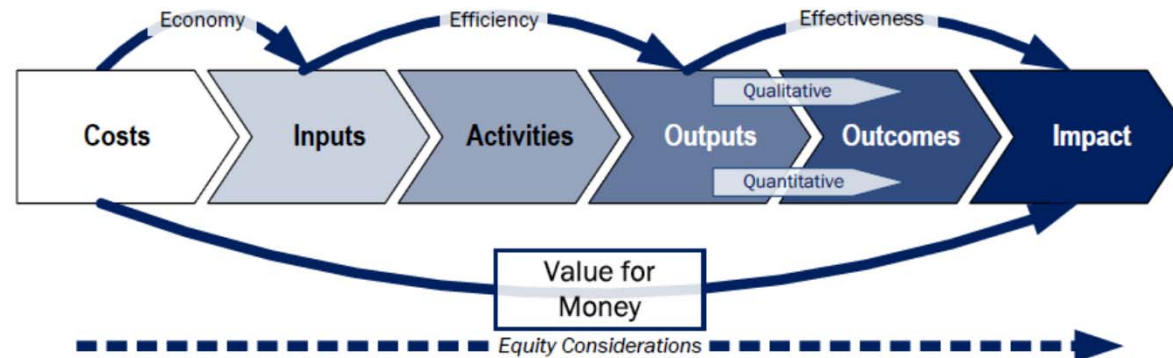
Budget Efficiency Measures: Summary

All three measures provide real ways in which better budget efficiency (annualised life-cycle costs) can be achieved:

- 10% longer design life: 2-3% saving
- 10% better quality: >10% saving
- 10% better price: 10% saving



Value for Money Framework



3-E framework:

- Economy** – how cost-effectively inputs and resources are chosen, utilised and acquired in an infrastructure intervention
- Efficiency** – how resourcefully inputs are converted to outputs and subsequent outcomes
- Effectiveness** – how successfully an intervention achieves its intended outcomes and subsequent impacts are realised

Overall value for money combines its Economy, Efficiency and Effectiveness

Value for money in asset management

1. **Economy** – producing expected life with lower annualised costs, or longer life from baseline costs
 - $U_{\text{life}} = [\text{Base Life} / \text{Expected Life}] ^{0.5}$
2. **Efficiency** – market efficiency in delivering final output cost relative to original design cost
 - $U_{\text{market}} = [\text{Completion cost} / \text{Design cost}]$
3. **Effectiveness** – actual achievement of expected life and benefits relative to intended levels
 - $U_{\text{quality}} = [\text{Expected life} / \text{Actual life}]$

Value for Money (wrt Base annualised costs)

$$= [U_{\text{life}} * U_{\text{market}} * U_{\text{quality}}]$$

Optimising the Asset Management Strategy: A Tip on Life-Cycle Costs

In conventional economic evaluation, a discounted present value can favour cheaper short life treatments over expensive long life treatments, if length is ignored.

Asset management deals with a closed system so the full length must be treated over the life cycle, e.g.

Discount rate for annualized cost:	0%	8%
Case A: 1000 km/10-yr life = 100 km/yr @ \$10/km =	\$1000/yr	\$490.90/yr
Case B: 1000 km/20-yr life = 50 km/yr @ \$14/km =	\$700/yr	\$343.65/yr

The long-life treatment is 30% lower in annual costs, independent of discount rate when length is taken into account.

For asset management strategies, handy to use undiscounted costs to calculate the annualized cost

- it equates directly to budget requirement in real terms (current dollars).

Challenges to Asset Managers

1. *How can we improve economy, innovating to produce longer expected life and lower annualised costs?*

– More durable materials or structures? Long-life, low-maintenance pavement options? Generating functions of cost v expected life?

- *Note: 50- to 100-yr life is typical for vertical infrastructure such as bridges, dams*
- *Plain concrete pavements have provided economical and long-life, low maintenance options in towns and rural settlements where erosion, dust and weak institutional capacity are factors*
- ❖ **Performance indicator – “Expected Life” of asset**
- *This will be the marker for planning budget provision for rehabilitation/renewal*

Challenges to Asset Managers (2)

2. *How can we improve efficiency – monitoring and controlling price rises during project implementation, improving market performance and limiting perverse behaviour?*

– improved procurement methods, bid evaluation and forms of contract?
Improved transparency and disclosure?

- *Performance-based contracts shift more risk to contractor, but what is the premium being paid in terms of final annualised costs?*
- ❖ **Performance indicator – Report “Cost margin” of asset intervention, from design to completion.**
- *This will be a marker for accountability in project management and procurement*

Challenges to Asset Managers (3)

3. *How can we improve effectiveness – i.e., improving actual achievement of full expected life of the asset in practice?*

– learning from statistics on achieved life and identifying significant factors as a basis for action? Improving feedback from performance and quality measures to design and supervision?

- *Defining and measuring actual life can be complicated and requires appropriate guidance*
- ❖ **Performance indicator – report “Actual life” and “Achieved life” (% of Expected life) at asset intervention.**
- *This will be a marker for management of quality of the asset over all phases of the life-cycle, from design through completion of an intervention, and through its entire life to the next intervention.*

The ultimate challenge and reward

Achieving and being able to demonstrate improved Value for Money in the management of pavement assets will be rewarded by:

Clients seeing reduction in real annual unit budget for the managed assets, and an identified value of the improvements

and

Taxpayers and users seeing their taxes and charges being reduced or held constant in real terms; and seeing greater transparency on asset performance in value terms

And now, it's over to you!

Thank you.