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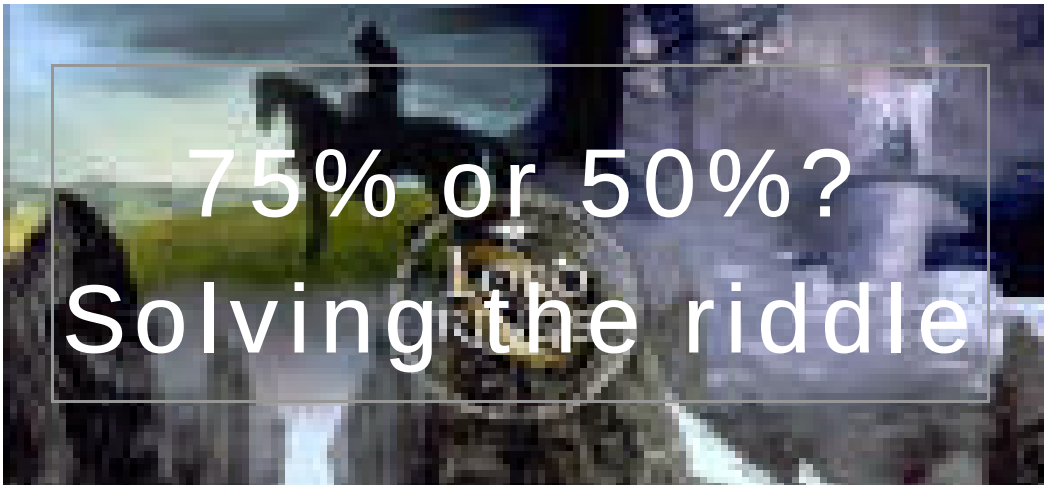
AMQ International

Strategic Asset Management



75% or 50%? Solving the riddle

Why engineers think one thing and accountants another

In the last issue on "Pretty Average", you will recall that I puzzled over why intelligent and well-informed engineers would intuitively argue that the written down replacement value of a portfolio should be maintained at around 75% when it can be easily be demonstrated that a well maintained portfolio, where every element of the infrastructure was replaced exactly to time and no later, would average out, over the long haul, to 50%.

The engineers I asked were unable to explain their gut feel, they just KNEW that to let the portfolio fall to 50% was asking for trouble. And they are not wrong! (cont. p. 695)

Contents

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A Word on "Street Cred"

For business the advice is:

Don't over-promise and under-deliver!

For asset management, it could be:

Don't over-threat and under-deliver!

In the early days of asset management there was a lot of 'over-threat'. We would say such things as "if you don't spend millions of dollars on your buildings, thousands will die of legionnaire's disease". Maybe you think I jest? I do not. These things *were* said.

Well, guess what? We didn't spend millions and thousands didn't die!

Is it then perhaps so surprising that our community and political credibility is, in some places, not so high?

History is history!

OK, so we were young and enthusiastic. Hopefully we are now older and wiser. But are you still trying to promote asset management by saying things such as:

"If you don't double your spending on [fill in asset of your choice] there will be major problems",

or, perhaps more positively – but no less an ambit claim

"If, as a result of this [new system / better data / change of approach] we are able to save just [1% / 5%] of our [capital / operating } budget, we will have covered our costs manyfold"

- without justifying how the 'new system/ better data, etc' is going to achieve the miracle?

"This will double our efficiency,"

- without (a) defining efficiency and (b) justifying the claim?

The honeymoon is over!

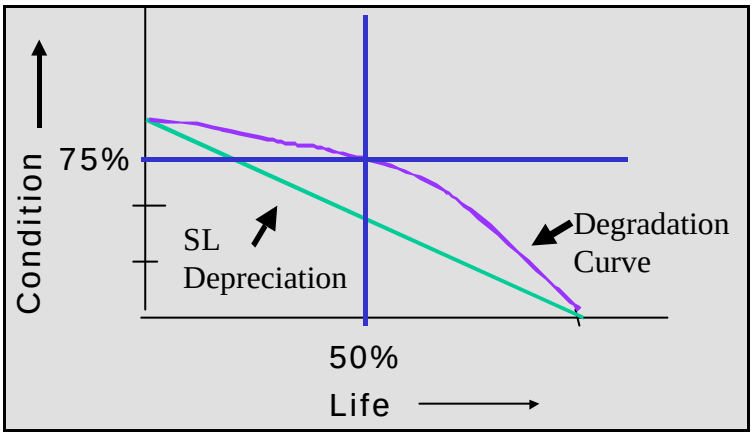
In the first half of the 90s, when effectively asset management had just been 'discovered' by many agencies, governments and CEOs were willing to commit money to asset management as 'a good thing'. By 1996, I was seeing signs that we were not taking advantage of this good fortune to document the good work that was being achieved. "The day is coming", I suggested, "when, in our current commercial focus even for the public sector, you will be asked to account for yourselves." To encourage agencies to do just that, we inaugurated the International Asset Management Competitions which rewarded the effort to document the work that was being done so that, at some later stage, when asked "are you worth it?" asset management units would be able to answer confidently in the affirmative.

Well, that time has now come! Are you prepared? **Do you document?**

75% or 50%? - Solving the Riddle

Accelerating rates of deterioration
Infrastructure condition deteriorates slowly at first, reaches a turning point and, if nothing is done, deteriorates quite quickly. This is pictured the **curved line** in the following graph

Constant rates of depreciation
Using straight-line depreciation, accountants assume a constant rate of depreciation over the asset's lifetime. This is shown as **the straight line** in the following graph.



Should the rate be accelerating or constant?

Both! The mistake that most of us make is to assume that we are talking about different ways of measuring the same thing here. But we are not! We are measuring different things for different purposes.

Accountants are measuring 'value' and this is a measure of the remaining service potential of the asset. In the diagram, the asset is 50% through its lifespan. If its total life was, say, 80 years, then at the 40 year mark, it would have 40 years of service potential remaining or half its total life, and the value of that service potential would, accordingly, be half of the total replacement cost. WDRV = 50%. **Engineers read off the vertical scale.**

Engineers are measuring 'condition' and this is a measure of the physical attributes of the asset. Take the same asset with a life of 80 years, it is quite likely that because of the characteristic pattern of infrastructure deterioration that at the 50% life mark, the condition will be around 75%. This is shown in the graph. **Accountants read off the horizontal scale.**

In other words, a value of 50% can be consistent with a condition of 75%

We are really operating in two paradigms.

The Two Paradigms

Engineers implicitly recognise that the life of infrastructure is indefinite – it can last as long as you want it to, simply by repairing or replacing elements as they fall due. Their task is to assess the costs and benefits of a range of options for ensuring the continued serviceability of the asset. And their objective is to implement the best option and so keep the asset operating.

Accountants explicitly require that infrastructure be given a definite life; this is essential if they are to carry out *their* task, which is to attribute a portion of the consumption of the asset to the current year's operation, and *their* purpose is to reflect the value of remaining service potential in the balance sheet.

	Accountants	***Engineers***
Asset life	Explicitly definite	Implicitly indefinite
Task	Attribute costs of consumption to the year of operations (evenly to all years so as not to unfairly discriminate) As an average over an entire class of assets so that	Assess the benefits and costs of different treatment options, recognising the accelerating nature of condition deterioration if unattended, and they do this As the need arises for each asset individually within the class so that
Purpose	They can represent the **value** of remaining service potential in the balance sheet	They can select the most cost effective way of preserving asset **condition** so that services will continue to be provided

The Two Paradigms

Take dams as an example:

Engineers may give the life as a nominal 100 years, but this has little bearing on the way they go about their maintenance and renewal tasks. For all practical purposes they act as if the dam is there to stay! Moreover treatments for each individual dam are assessed on their merits.

Accountants take the life as 100 years and use this figure in their task of establishing annual depreciation. They may depreciate each dam individually but according to the same 100 year protocol. For all practical purposes they act as if the dam will have no service potential when it reaches the life of 100 years.

The Altman Formula (SAM 137 p 692)

(or why increasing your asset stocks may not be such a good idea)

Dana Vanier, Senior Research Officer at the National Research Council of Canada's Institute for Research in Construction, and Adjunct Professor, University of British Columbia, was intrigued by the Altman formula and requested that I publish the formula in its entirety. So you will find it below. Dana also questioned whether the formula, with its commercial focus, would apply to the public sector.

Ken Harlow's response was: "I don't think the formula can be applied quantitatively to public agencies -- but that's not the point. The point is that a willy-nilly investment in assets without due concern for asset utilization, benefit to the customer, etc., might result in bankruptcy in the private sector -- but merely in ruinous costs to the public in the public sector". This is certainly the argument of the article from which the Altman extract was taken in the last issue. But do read the orginal at www.bcwaternews.com/AssetMgt/

ALTMAN MODEL (U.S. - 1968)

Edward I. Altman (1968) is the dean of insolvency predictors. He was the first person to successfully use step-wise multiple discriminate analysis to develop a prediction model with a high degree of accuracy. Using the sample of 66 companies, 33 failed and 33 successful, **Altman's model achieved an accuracy rate of 95.0%.** Altman's model takes the following form -:

$$Z = 1.2A + 1.4B + 3.3C + 0.6D + .999E$$
$$Z < 2.675; \text{ then the firm is classified as "failed"}$$

WHERE
A = Working Capital/**Total Assets**
B = Retained Earnings/**Total Assets**
C = Earnings before Interest and Taxes/**Total Assets**
D = Market Value of Equity/Book Value of Total Debt
E = Sales/**Total Assets**

SPRINGATE (CANADIAN - 1978)

This model was developed in 1978 at S.F.U. by Gordon L.V. Springate, following procedures developed by Altman in the U.S. Springate used step-wise multiple discriminate analysis to select four out of 19 popular financial ratios that best distinguished between sound business and those that actually failed. The Springate model takes the following form -:

$$Z = 1.03A + 3.07B + 0.66C + 0.4D$$
$$Z < 0.862; \text{ then the firm is classified as "failed"}$$

WHERE
A = Working Capital/**Total Assets**
B = Net Profit before Interest and Taxes/**Total Assets**
C = Net Profit before Taxes/Current Liabilities
D = Sales/**Total Assets**

(This is from: **http://www.bankruptcyaction.com/insolart1.**

Feedback

"Pretty Average" (SAM 137, pp 688-689)

Averages often conceal more than they reveal

Ken Harlow writes: 'A comment on your article on WDRC -- agree on 50% with your proviso, "If we assume there is a fairly even spread of age throughout the portfolio..."

Unfortunately this is not often the case with water and sewer infrastructure! An example: One of my clients is a city with a 400-mile sewer system, replacement value about $500 million. Three-quarters of this pipe was laid in three years in the early '50s. So essentially none of the pipe will be ready for replacement until the WDRC is maybe 15%. Then...bam!

The approach I use is long-range modelling of replacement costs based on best knowledge (often not too good) of the infrastructure, generating the famous Nessy curves, and then modelling funding strategies against the R&R needs. This over typically 30-50 years.

Typically, patterns of past investment have been too uneven for WDRC to serve as a reliable guide to reinvestment policy.

> Ed: This was one of a number of responses that pointed out that most infrastructure portfolios are not evenly distributed but, in fact, skewed to the right. Ken is right in pointing out that, in this more usual case, we will not be needing to do major replacement *until after the WDRC falls below 50%.* This only emphasizes my point that to aim at maintaining WDRC above 50% is a very wasteful strategy.
>
> However it also emphasizes the need to have an asset replacement funding strategy. The sooner you start, the easier the job is to manage!
>
> The only way to deal with both the funding and the technical asset management issues is to do as Ken suggests – and use long range models. Even if these are initially populated by quite poor data they can do two things
> (1) indicate the direction your strategy needs to take (even if they cannot quantify it) and
> (2) enable you to use sensitivity analysis to tell where to spend your data refining budget.

Beware the Jargon Trap!

As in our 'pretty average' example, it is easy for common usage to influence our own interpretation of technical jargon. But it is perhaps even easier for the community to put a common usage interpretation on technical uses! Chris Adam sends this salutary story.

"An engineer at a large water agency once made the comment in a public forum that the dam they managed was considered "High Risk". You could imagine what the press made of that - The poor guy was really hammered over it. For him, "High Risk" meant possible failure in about 1,000 years but to the general community "High Risk" is the next best thing to a dead certainty!! "

FEEDBACK

Modelling Footpaths (SAM 137, pp 690-691)

In the last issue, we looked at the problems of modelling footpaths. Graeme Fletcher, Assets Systems Officer with the Latrobe City Council, contributed this information to the www.amgi.com/forums website. You will recall that he said

> "I have found that by using existing condition assessments to give footpath segments an overall rating, then estimating remaining life based on weightings calculated from these ratings will give a generally effective estimate of overall network condition consistently and therefore be able to calculate a linear rate of deterioration over time based on current funding and maintenance practice".

In order to keep his web contribution to a reasonable length, Graeme did not go into details on his method, but in this issue he explains his method.

A method for estimating remaining life of footpaths

Each footpath segment was assigned an overall rating during the process of condition assessments, based on the extent and severity of defective path in that segment. This resulted initially in 9 condition grades, but 3 were related to assets in the first quarter of their life and provided little useful information for maintenance intervention and were found to be not worth the cost of collection, so we now use 6 condition grades. Discussions were held with staff responsible for maintenance of the footpaths, to discover how the grades could be used as an indicator of how much life is left in the footpath. Each alpha-numeric grading (eg M1 for moderate trip hazard and limited extent to X3 for severe trip hazard and large extent) was translated to a numerical score with a maximum of 60 for a path with little defects to a minimum weighting of 10 for paths with extensive defects. This weighting (score) was then used in the following formula:

$$\frac{\text{Footpath Score}}{60} \times \text{Useful Life}$$

Where the value for useful life varies, depending on the type of footpath, e.g. concrete, asphalt, pavers, etc. (These useful lives are best determined through discussions with staff responsible for maintaining them.)

These calculations illustrate a basic method for estimating a remaining life for footpath, and is therefore useful in asset valuations. If you are looking for an overall network condition indicator then all you need to do is sum up all of the Footpath scores for each segment in the network. These of course can be grouped according to path type or location to give an indication of relative condition.

Once you can begin collecting this condition data over time you can then use these condition indicators to determine how the overall network is performing. You can also determine if particular locations or path types are deteriorating quicker than others, and therefore set a reasonable target for increased maintenance or replacement. When you have this information you are able to draw conclusions about the adequacy of current maintenance levels or practices.

Modelling Footpaths—cont.

Note: I can't emphasise enough how important it is when modelling to hold discussions and workshops with routine maintenance staff. These are the people who have a vast knowledge of how your particular asset network behaves because they are working on it every day. There is also likely to be one or two staff members who have been around a long time and so have a very good knowledge of the asset's history as well. All of this is invaluable when you are looking to implement asset modelling, no matter how basic or sophisticated, that will reflect the reality of how the asset behaves as well as current maintenance practices. By going through such a modelling process for paths, or any asset, you will be able to identify invaluable information such as:

What the current condition is
What the useful lives are for varying forms of the asset
What are the major causes of defect / distress
Are particular types of path/ asset a higher risk than others

...and the list goes on. You will be amazed at how much information can be produced or discovered while carrying out modelling of an asset, whether it is a basic model such as the one for footpath or a sophisticated Road Pavement Model.

I would also like to note that in my posting to the discussion forums and the previous newsletter there was a typo. In point 3 regarding high cost I referred to "...external factors such as the amount of footpath adjacent to inappropriate footpath." This should have been "inappropriate trees".

Further information: Graeme Fletcher, telephone (03) 5176 3486, graemefl@latrobe.vic.gov.au

Time to be in the USA!

26-27 July 2004 SAN FRANCISCO, USA

1st IWA Leading Edge Conference on Strategic Asset Management

This is the first of the International Water Association's Leading-Edge Asset Management Conference to be held on the topic of Strategic Asset Management and also the first of IWA's Leading-Edge-Conferences to be held in North America.

Strategic Asset Management is achieving increasing prominence in the United States as a result of the introduction of new general accountancy procedures and a new report on asset management by the US Government Accounting Office.

More information is available from www.lea2004.iwa-conferences.org

Our forecast review of '**Beyond Budgeting' for Asset Managers** is deferred to a later issue