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# STRATEGIC ASSET MANAGEMENT

Understanding and interpreting renewal models

## In this issue

### Understanding and Interpreting Renewal Models, pp 2-5



In a “Back to Basics” article, we look at some of the mistaken claims that are being made as a result of misinterpreting the nature of renewal models. These mistakes have the potential to bring asset management into disrepute as a meaningful guide to action as well as creating poor morale in the workforce so it is worth trying to come to grips with what renewal models actually do, what we think they do, and what they can't do.

### AM Plans - What is your focus, the process or the plan? p. 6

Both answers are valid! It depends where you are in your AM development. But the answer you give will imply a different course of action to follow.

### A Cautionary Tale - the rise and demise of Corporate Planning in the Public Sector pp 7-9



Corporate Planning was for me, and for many others, an introduction to asset management. Why did it rise - and why did it fall? What can we learn from this story to avoid our own demise in AM?



### All WHY questions are strategic questions pp 9-10

It is possible to ask strategic questions at any level in an organisation, not just at the top ‘systems’ level, but right through the organisation. Doing so, is the way to improvement if we stick with the questions long enough to get an actionable answer.

*Please consider and enjoy!*

*Penny*

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**HOW BIG IS YOUR INFRASTRUCTURE RENEWAL GAP?**  
**: Or, how to safely interpret renewal models**

I came across a council the other day that declared that a renewal model had shown that its buildings were 60% overdue for replacement. This came as a surprise to the council.

Yet, if true, one would have imagined that there would be many visible signs of major deterioration - non-habitable buildings boarded up for safety, signs of breakdown in buildings still in use (e.g. lifts, plumbing or HVAC not working), union demonstrations, protest movements, etc. If true, this should not have been a surprise to council, their own use experience would have validated it.

**So what is happening here?**

To answer this, we need to understand how to interpret renewal models and we need to understand both the mathematical and the practical nature of economic lives.

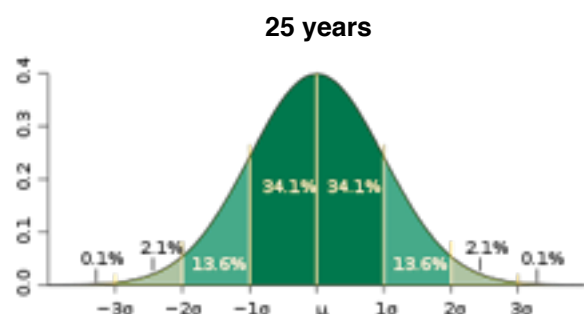
**Renewal Models**

Renewal models use the age of assets and the assumed useful life to predict the time when they will most likely need renewal. Thus, for assets currently aged 10 years and with a useful life of 25 years, the model will predict the need for renewal in 15 years time based on the number of assets currently aged 10 years and the cost of renewal.

**The mathematical nature of “Useful” or “Economic” Lives**

When we say that an asset, or an asset component, has a useful life of 25 years, what is really to be understood is that assets of this type may fail at 15 years or even earlier and perhaps as late as 40 years or more *but that when we take them as a whole, their useful lives will average out to about 25 years.*

Fig 1. Asset Lives, normal distribution



Because 25 is an average (and assuming we have a normal distribution and not one that is severely skewed) then we can expect that half of these assets will fail before the age of 25 and *half will fail after the age of 25*, as shown in Fig 1. Thus we cannot assume that just because an asset is greater than 25 years that it is 'due for replacement'.

Renewal modelling does not predict **which** assets are due for renewal only that on average, when we take into account those that will fail early (those on the left hand side of the distribution above) and those that fail late (those on the right hand side of the distribution) there is the probability that we will need to renew a certain number of this particular type of asset.

**So the first lesson is that renewal predictions are useful for forward financial planning but are not so useful to determine *where and when* to intervene for renewal.**

This is readily recognised in road maintenance where the predictions of the pavement renewal models are used only as a guide and no maintenance supervisor worth his salt would consider renewal based only on the predictions and not an examination of the actual road condition.

**The second is that renewal models help us see the future, NOT the present.**

In practice, most assets or components are replaced *when they fail*, whether they have reached their nominal 'useful life' or not. If the failure means that the function can no longer be carried out and that function is still required and is important enough, the asset will be replaced when it fails. We wouldn't wait around and say that it cannot be replaced because it hasn't yet reached its useful life! Equally we can't say that an asset is due for renewal because it has. If it is still functioning well - and look again at figure 1 above, for the nature of the normal distribution and a median point for the useful life means that 50% of all assets *will* still be functioning well - we would be foolish to replace.

### **The Law of Large Numbers**

Renewal models are based on the assumption that the actual failures of components are distributed about their mean in a normal distribution. So common are our uses of normal distributions that we sometimes forget that the reason that they are so popular, apart from their mathematical tractability, is that it can be shown that when we have large enough populations that the means of any subsets will describe a normal distribution. In other words, the use of such models depends on having large numbers of observations. **If we only have a limited number of observations, the models are unreliable.** So we have to be careful.

We laugh at the story of the Minister of Health who responded, when told that the model suggested the State's hospitals would need to renew about 15 boilers over the next 5 years, "That is no use to me, tell me when the boiler in St Andrews (*in his electorate*) will need to be replaced". Instinctively we know that the mistake he is making is to fail to recognise the need for large numbers to make any renewal model reliable.

## **Some things to know about Economic Lives** *(before we take them for gospel)*

**1. Economic or useful lives are all guesswork**, hopefully informed and intelligent guesswork, but still guesswork.

**2. Economic lives are often decided when we know the least.** Whereas the accounting standards require us to review useful lives on a regular, 3 or 5 year basis, this is very hard to do. We normally have only a few observations of asset failure in this period and it can be difficult to determine whether the failure in any particular case was due to normal wear and tear or to something else (accidental damage, poor usage practices, change in functional directions of management, etc). Such records are rarely kept. As a result the economic life assumptions we started with (generally when our knowledge of AM and the behaviour of the asset was at its lowest) remain the life assumptions throughout.

**3. Life estimates can vary substantially between estimators.** For example, manufacturers encourage renewal because this helps their profits, they have a tendency to understate, and as all maintenance personnel are aware, 'design lives' are considerably shorter than actual lives in practice. In a study of health assets that I did some years ago (see SAM 127, November 2003, available in Archives) those who had to use the assets consistently estimated the useful lives as much longer than those who had to maintain or manage them.

### **With so much variance does a 'true' economic life even exist?**

Yes, an asset has reached its economic life when the per service costs of acquiring and maintaining a replacement asset are less than the per service costs of maintaining the existing asset.

It follows from this that the argument to replace any asset is an investment decision like any other and needs to be justified by costs and benefits and not by the statement that 'its time is up'.

### **When it comes to validating economic lives, not all assets are created equal.**

It is much easier to determine the lives of plant and machinery assets because they fail. Moreover they have relatively short lives providing more observation points. Civil infrastructure, such as roads, is much harder because the roads generally do not become unusable but simply give a lower level of service. For plant and machinery assets, too, it may be that they reach their economic lives before they fail completely. This will be indicated by an increasing number of breakdowns with resultant outages that can be valued by lost production. Much civil infrastructure, again such as roads, or in the case we are considering here, buildings, does not have the easy option of measuring loss in dollar terms to weigh against the cost of renewal.

## With Buildings it is difficult to untangle renewal and upgrade

Where building elements are renewed for reasons of aesthetics or fashion there is a wide range of useful lives that could be adopted. This is easier to see by comparing your own decisions to renew the living room curtains or the fridge. When times are good and you are flush with funds, these may get renewed quite frequently, and in the case of the curtains for no other reason than you want a change. When times are not so good and money is a problem, the curtains will not be changed and the fridge will last another many years. What is the 'life' of the curtains or the fridge? It is largely undeterminable. The newer model fridges come with iced water dispensers in the door saving you the trouble of opening the door. It would be nice to have, but not essential.

When it comes to buildings, many elements are like the fridge, a newer model or replacement would be nice, but not essential. New paintwork, new carpets, up to date fit-outs, all of these are eminently postponable. While the air conditioning may fail and need renewal, the passive civil structures will simply give a lower level of service. What level of service is to be aimed at? Well, that depends on what you can afford. Which, in turn, depends on what other costs you have to manage. In other words the renewal life has to be corporate level decision and it can, and does, change from year to year. You may think that corporate does not intervene in setting economic lives, but it does so constantly by determining what it is prepared to fund. How much of your infrastructure gap arises from using economic lives not consistent with corporate decision making?

Modelling building renewal is most useful when used to consider alternative futures. I have been personally responsible for many such building renewal models. The defaults have always included the status quo as one possible option. Not until decision makers know how much their current settings are costing are they able to make changes. When they know, the decision may be to change the service level. This is a legitimate choice.

Refusal to accept that the funders have made this legitimate choice leads to dissatisfaction from asset and facility managers. They may choose to protest by claiming that the models 'prove' that assets are overdue for renewal. It doesn't do this at all. It simply says that the useful lives in the model are no longer appropriate.

### The take away messages?

Renewal models are designed for predicting the approximate level of future costs and timing. They cannot tell you *which* assets need to be renewed.

The fact that you have assets which have exceeded the midpoint of the economic life distribution does *not* indicate that they are overdue for replacement.

The model must be checked against reality - and you may have to change your economic life assumptions.

## **ASSET MANAGEMENT PLANNING:**

### **What is most important for you at the moment - the process or the plan?**

This is not a trivial question in that either answer may be appropriate and it *does* matter.

#### **The Process**

In the early days of asset management, when it is important to get everyone 'on the same page' and enthusiastic, it is likely to be the process of constructing the AMP that generates the most benefit. The more people involved and the more questions that they ask - and answer - the better. It is the thinking and the involvement that is the most important thing at this stage. The benefits come from recognising and working through the issues, through teamwork. And, quite frankly, it doesn't matter if the final report just 'sits on the shelf' for it is not the plan that is important but the process of learning. The preparation of this plan is just the vehicle for learning.

#### **The Plan**

Later, when asset management is the accepted 'way things are done around here', then the emphasis changes and the focus is on implementation and the guidance for action that the plan can provide. Once you get to the stage where you are ready to implement and your systems are developed, then the purpose of the plan changes. Now it is to be used to guide your actions. Just 'sitting on the shelf' at this stage represents failure.

#### **What works and doesn't work**

It is important to know which stage you are currently at. To employ a consultant to 'do' an asset management plan if you are at the early stage is a complete waste of time and resources. You learn nothing and your systems are not yet ready to apply the information provided.

However, once asset management is understood and accepted and your systems are in place, then the use of consultants can be extremely valuable. They can save you time, verify your approaches or suggest new ones, provide new ideas, and add a degree of credibility to your data and information.

#### **To Avoid**

The most important thing to avoid is ever having the asset management plan become an end in itself, something that is produced because 'you have to', but then just 'sits' and is never used.

Preparing a plan for compliance purposes distorts the learning process because now you are not seeking out asset management problems and solutions but compliance problems and their solutions - a very different thing. Compliance can make the AM Plan an end in itself whereas it should be a means to an end - either learning or guidance.

Early 1980s



## The rise and demise of Public Sector

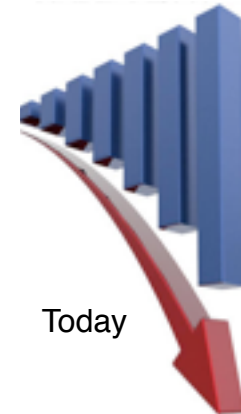
### CORPORATE PLANNING: a cautionary tale

In the early 1980s, corporate planning units flourished in the public sector. Today you will be hard pressed to find half a dozen in existence. Will asset management go the same way?

#### At the beginning

In the early 1980s corporate planning was introduced into the public sector in South Australia and across Australia. It was a forerunner to asset management for me and for many others because the Public Sector Corporate Planning Group initially consisted of the asset rich organisations such as road, rail, water, electricity, telecommunications and construction, and the corporate issues that we were dealing with were, as a consequence, asset related.

The Group was highly enthusiastic and meetings (usually over a meal of spaghetti and plenty of red wine) were well attended. Discussion was intense and interesting. We were learning a lot. When, in 1985, I joined the Public Accounts Committee to establish the future costs and timing of major infrastructure renewal I asked for my contact officers in the various organisations to be from the corporate planning units. Later, when the study was finished in 1987, and I set up the first asset management users group, it initially comprised the same corporate planners.



Today

#### However, by the late 1980s, things started to change.

The first thing was that the enthusiasm of the group attracted other agencies to join. These included what some of my engineer friends referred to, somewhat impolitely, as the 'soft and fluffies', agencies like education, justice and social welfare which, while having many assets, did not see them as a prime focus of their activities. They wished to discuss other matters.

The strong asset focus that had held the group together became diluted. Discussion became more academic, and philosophical. The desire to find a group solution to common problems ceased to be the driving force. The very practical members who had been the initial members of the group felt that it was turning into a talk fest and they lost interest. Then, without the organisational discipline that this section provided, the group itself lost momentum.

What happened in the group was mirrored in the organisations. The engineering and water supply department had nine members in its corporate planning unit when I joined, making the tenth. This was in 1982. By 1990 the unit no longer existed.

The demise of corporate planning was not caused only by the dilution of the asset focus of the corporate planning group.

## Process and the Plan

The second change was in corporate planning itself. In the beginning the benefits of corporate planning were to be discovered in the thinking, discussion and greater understanding of the central issues that were developed. The plan itself was merely a vehicle to enable this learning to take place.

This should have evolved to the stage where the corporate plan was used as guidance for action, but this never really happened. The mistake that was made was that the corporate plan remained 'top heavy'. It remained at the system level. For it to be implemented it was important that the next layer down understood what they needed to do to contribute to the corporate goals and what information needed to be provided to them, and what actions monitored from the level below. This needed to be replicated at each successive level down to the field. It wasn't.

In nearly all organisations the corporate plan was a product of the top echelon with very little contribution from or discussion with the other sections of the organisation. It became filled with jargon that only the top echelon understood. To those lower down in the organisation it was gobbledegook. They ceased even trying to read it. My experience was that the only people interested in reading our corporate plan were the members of other corporate planning units wanting to see how it was done, or glean some ideas for their own.

## We were losing touch with reality

My first clue that we had lost touch with reality was when I was asked to write the latest version of the corporate plan. Naturally I asked who I should consider my key audience to be - and was floored with the answer: "Everyone, the man-in-the-street" Try as I could, I was not able to envisage the average 'man in the street' as having the slightest interest in the Engineering and Water Supply Department's corporate plan. (Although now that water is such a public issue things might be different today!)

Really there were two credible answers to this question, depending on whether we considered ourselves to be at the process or plan stage. At the Process stage we should have realised that the purpose of the plan was to act as a record of our discoveries and that our audience was those senior managers and corporate planners who had taken part in its development - and who should now be considering how to disseminate this information down the line.

At the Plan stage, we needed to realise that if the plan was to serve to give direction to the organisation then we needed to be actively implementing it, which meant translating the high level goals into medium level and then lower level activities.

This realisation, and therefore the required action, never happened.

## The Plan became an end in itself

Compounding this lack of awareness, was 'the prize'. Towards the second half of the 1980s the Institute of Public Administration, thinking to improve the quality of corporate planning, started issuing prizes for the best plan, and promoting those that won. Corporate Planning groups began vying with each other to produce a winning plan.

Now the plan became an end in itself. Few corporate planning units put in the hard yards to turn the plan into action. Instead they focussed on getting the best visual effects on quality paper stock! The cost of the corporate plan rose astronomically - and the effect they had on their own organisations dived.

## Could this happen to asset management?

Consider this comment from a correspondent in New Zealand.

*"I think our legislative environment is driving odd behaviour in that Councils want to show that they are 'doing' good asset management when, in fact, they are hiding behind pretty documents which don't really do anything for them in real terms. They are often completed for the big tick."*

We could consider this a warning sign and with increased interest at senior levels of government in councils 'getting their asset management right', we are at risk of going the same way as NZ and ultimately the same way as corporate planning.

Preparing Asset Management Plans for compliance purposes could be the first step on the traditional slippery slope.

## What can we do to prevent it?

The first step is to be aware of the danger.

The second step is to make sure that everything we do is directed to improving service delivery.



## ALL WHY QUESTIONS ARE STRATEGIC

In another interesting communication this week was the following comment:

“What is interesting me most at the moment is helping asset managers at a grass roots level, the questions they need answering aren't the strategic ones.

It's "how do I make sense of this data?" "Why do I not spend anywhere near my renewals budget?" "Which assets should I be renewing?" "How do I operate the service and do AM when I don't have the resources of the people with the right skills'.

As I looked at this list it occurred to me that they were really ALL strategic questions. In fact they are the important strategic questions. All WHY questions are strategic.

#### **"How do I make sense of this data?"**

can equally well be expressed as "Why does this data not make sense to me?" - which leads on to questions such as "Is this the right level of data for the decisions that I have to make, is it timely enough, accurate enough, relevant enough - all of which leads on to other questions that help me to understand what I really want from my data.

#### **"Why do I not spend anywhere near my renewals budget?"**

is an excellent WHY question in its own right.

#### **"Which assets should I be renewing?"**

is really a WHY question. i.e. it could be rephrased as - "WHY do I need to renew this asset, and why now?" Even

#### **"How do I operate the service and do AM when I don't have the resources or people with the right skills?"**

could usefully be rephrased. This question, as normally phrased, is rhetorical and no answer is expected, so it goes nowhere.

But try rephrasing it as "WHY do I believe that I do not have the resources or people with the right skills?" and a whole heap of options opens up. Perhaps the first answer is "Because I can't carry on doing my normal job without a lot more money". Which, of course, then lends itself to the obvious question "Why do I want to do what I have always done in the past. What other options are open to me?"

The skill of strategic asset management is to pursue these WHY questions to the end, and the end that you require is a clear understandable strategy that you can implement.

### **ISSUES OF CURRENT INTEREST**

What are the issues / topics / problems that are interesting **YOU** most at the moment. I am trying to reach as many readers as I can to gauge what will be of interest in future SAM issues.

If you would like to contribute your ideas, please do, either by telephone 08 8359 0559 or by email at [penny@amqi.com](mailto:penny@amqi.com).

Thanks.