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**Myths we
(mis-)manage by**

The best lies have a grain of truth and the best myths have an element that resonates with our common-sense. Some myths just 'feel' so right, that we have difficulty in standing back and looking at them critically.

In this issue I look at some of the myths that affect the way we go about asset management - where the idea came from, what impact it has on the way we go about our work, and how we can do better.

Myth 1: If you can't measure it, you can't manage it

Myth 2: Maintenance should be a minimum 2% of Replacement Value

Myth 3: The Law of Fives

Myth 4: As asset managers we understand and plan for the longer term

and a few others to exercise your minds on.

I hope that you enjoy this selection and are inspired to question what we have long assumed to be true.

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Myth 1: If you can't measure it, you can't manage it.

Where did it come from?

This is usually ascribed to Edward Deming or Peter Drucker. Deming was an American statistician who rose to fame by helping Japanese manufacturing industry improve the quality and reliability of its product through concentrating on measures that enabled them to reduce variability.

Deming is often misquoted as saying, "You can't manage what you can't measure" but Deming realised that many important things that must be managed couldn't be measured. Spend \$20,000 training 10 people in a special skill. What's the benefit? "You'll never know", answered Deming "You'll never be able to measure it. Why did you do it? Because you believed it would pay off!"

In one of his books, "Out of the Crisis" (p.121), he cites Lloyd S. Nelson, director of statistical methods for the Nashua corporation, who said "The most important figures that one needs for management are unknown or unknowable, but successful management must nevertheless take account of them."

Gut feel, intuition, imagination all play a role in management, but today we tend to denigrate these elements and consider them less important than metrics. As an aside, every business man is urged to do consumer surveys to measure the likely demand for new products and to then base his decision on the metrics. If Steve Jobs had thought that way we would not now have the iPhone, the iPad, and the iPod; products that, at the time, were beyond customers' perceptions. As I said, gut feel, intuition and imagination all play a role. There is more to management than simply measurement.

What's the problem?

Here are four that I see.

1. Metrics and Understanding

Metrics are important, and the more we are able to measure what is really important, the better we are at managing it - however, this is not only because we have the metrics, but rather because we have more *understanding* of what is causing the outcomes we are trying to achieve. When we simply adopt a measure that comes from another field, time, or circumstance *without understanding*, is when problems arise. Because creating our own relevant metrics is time consuming, there is a natural tendency to seek short-cuts.

In an earlier issue of SAM I cited the case of the Transport Department that had decided that the life of a bus was 12 years. When asked what analysis they had done to decide this figure, it turned out that all they had to go on was a statement, made some 15 years earlier, by an Engineer who said “We don’t know how long a bus should last but it certainly shouldn’t be more than 12 years.” This was a statement made on his best professional judgement at the time. However when a statistical analysis was carried out, the life of the bus turned out to be very close to 16 years. Uncritical adoption of the 12 year figure had thus meant that 25% of the life of every bus was being thrown away. Also, since all the buses were imported, it increased the extent to which the Department was subject to exchange rate risk. Worse, the analysis revealed that the model of bus that they had discarded was better than the newer models. The analysis gave them a better understanding of what to look for in choosing their buses in the future. *Figures you calculate yourself increase understanding.* This is not true of figures that you adopt uncritically from another place or time.

2. Metrics and Ease of Measurement

Some things are easier to measure than others - quantity, for example, is easier to measure than quality. Inputs are easier to measure than outputs. Outputs are easier to measure than outcomes. Products are easier to measure than services.

The aim of all management is to secure desirable outcomes but it is easy to get diverted into measuring what it is *easy* to measure rather than what it is *important* to measure, for example, how many councils have hours of videos of storm water infrastructure - unanalysed!

The condition of road seal is easier to measure than the condition of the underlying road pavement, the first is visible whereas the latter is not. Some years ago a state transport authority adopted a policy that they called ‘a stitch in time’, quite a catchy title for maintenance. Under this policy they required agencies to reseal every ten years and to reconstruct the road pavement every 100 years. Easy to measure! But it resulted in reseals being carried out over decidedly unsound road pavements because the time for road pavements was not up. Unsurprisingly, the reseals did not

last, much money was wasted and the overall condition of roads deteriorated until the policy was changed.

3. Metrics and Mindless Obedience

Focus on understanding - ask what are your measures suggesting to you? Do they make sense? Realise that you must check your measures constantly.

A model constructed by an electricity authority was used to forecast when the next increment to its power plant would be needed and how long it could expect to be in use. Two previous plants of exactly the same design in the same location had been built with an overall life of about 30 years, yet the model suggested that the third plant would have a life of only 20 years. One would have thought that this would have screamed out for attention and questions to be asked. But no. When asked why the third plant would have a greatly shortened life, all the modeller could say was that 'It is what the model says'!

Many a works system is designed to determine when works should be carried out. Inevitably this is based on the designer's best knowledge and judgement at the time. But what if circumstances change? Do you know enough to make adjustments? Are you critically analysing the output of the system or do you take the system outputs for granted?

4. Metrics as an End in Themselves

"I measure, therefore I manage", is one of the unfortunate spin-offs from the focus on metrics alone. Those who collect data and perhaps use it to draw graphs or charts, but do not use it to make decisions may have inadvertently slipped into this mindset.

What can we do to improve our management?

Deming was, of course, a great believer in the value of metrics and statistical analysis, but even he realised that there was more to management than metrics and stated that one of the seven deadly diseases of management is running a company on visible figures alone.

To improve:

1. Recognise that the aim of the game is not to produce metrics but *to improve understanding of the processes* so that better outcomes are achieved. Metrics are but one element in this.
2. Constantly question the meaning of the metrics. Assumptions need to change over time and unless they do, your measures will give you wrong answers. Use your judgement to query the answers you are getting. Do they make sense? Don't put your critical faculties on hold simply because you have measures and a model.



Myth 2: Maintenance should be at least 2% of Replacement Value

Where did it come from?

It is hard to tell when and where the 2% figure first surfaced. It was certainly around before 1990 when “Committing to the Costs of Maintenance and Repair of Public Buildings” was published by the Committee on Advanced Maintenance Concepts for Buildings, Building Research Board, National Research Council, Canada.

It is worth looking at this work in a little detail. I am not disputing the need for maintenance, nor even the figure itself. Yet there are still reasons to say that this particular formulation is overall not helpful for asset management. The reason it is that it does not increase understanding or performance.

The 2% figure did not come from a statistical analysis.

“In the absence of an adequate statistical basis for recommendations the authors of this report have applied their extensive experience and judgement to propose a benchmark for the maintenance and repair component of this cost of ownership”. p. 3

Their reason for so doing was

‘Managers of facilities seldom have adequate information to predict when problems will occur if maintenance efforts are deferred. These managers are often poorly equipped to argue persuasively the need for steady continuing commitment to maintenance. Underfunding of maintenance and repair is such a prevalent practice in the public sector that it has become in many agencies a de facto policy that each year compounds the problem as the backlog of deficiencies grows.’ p.2

The Committee recognised that there can hardly be a single figure for the appropriate level of maintenance

“In general the following factors can have a major influence on the appropriate level of M&R expenditure:

Factors determining maintenance requirements

- Building size and complexity
- Type of finishes
- Current age and condition
- Mechanical and electrical system technologies
- Telecommunication and security technologies
- Historic or community value
- Type of occupants and users
- Climatic severity
- Churn (i.e. tenancy turnover rates)
- Criticality of role or functions
- Ownership time horizons
- Labor prices
- Energy prices
- Material prices
- Distances between buildings in inventory

‘While the M&R component of the cost of ownership will vary from building to building, it is possible to develop a consistent relationship between this component and characteristics of an inventory of buildings. A variety of such relationships are in use to estimate average levels of the cost of M&\$. Typical maintenance expenditures per square foot is frequently used as a yardstick for determining what an appropriate level of M&R budgeting should be.’

Then, and curiously, they argue that ‘such a measure is insufficiently sensitive to either external financial conditions or building characteristics’ And so *the relationship is better stated in terms of an annual percentage of the inventory’s current replacement value.*

The current replacement value, however, is no more sensitive to ‘external financial conditions’ or ‘building characteristics’. Yet the practice continues.

The Committee concludes that “Based on experience and judgment, the committee proposes that the appropriate level of M&R spending should be, on average, in the range of 2 - 4% of current replacement value of the inventory”. p. 18 (original underlined) and the accompanying footnote says “This rule is based on the committee’s combined judgment”.

From this others have assumed a ‘minimum’ of 2%.

What's the Problem?

A figure of 2-4% of current replacement value represented an advance in understanding - **in 1990!** The fact that we are still using the same figures and the same approach almost 25 years later is a sad reflection on our industry.

We now have the ability to analyse each of the general factors listed above as affecting maintenance requirements and using them to

- (a) design buildings that require less maintenance (e.g. by more appropriate use of finishes to suit usage)
- (b) fine tune our maintenance regimes to suit the age, complexity and climatic severity of the buildings
- (c) to project the maintenance requirements of more complex buildings
- (d) etc.

But, in general, we are not using this ability - we are still focussing almost all our efforts on getting the budget, and not focussing on what we will do with the budget.

What can we do to improve our management?

To Improve:

Change the focus. Instead of arguing for a general 2% minimum, which is merely a budget bid, tell your agencies what service outcome improvements they could expect from addressing each of the maintenance factors in the list above.

In 1990 it was OK to say that “Managers of facilities seldom have adequate information to predict when problems will occur if maintenance efforts are deferred.” If this is still true today, what does that say about our ability to manage?

Getting a bigger budget is often regarded as a sign of good asset management - but the real test is achieving better outcomes.



Myth 3: The Law of Fives

Where did it come from?

The Law of Fives was introduced by de Sitter in 1984 after in depth studies of corrosion protection of reinforcement for concrete structures. He argued that one dollar spent in getting the structure designed and built correctly is as effective as spending \$5 when the structure has been constructed but corrosion has yet to start, \$25 when corrosion has started at some point, and \$125 when corrosion has become widespread.

The best myths contain an element that resonates with our general understanding and who would doubt that costs escalate as the problem (a) becomes more serious and (b) when it is harder to deal with? So “The Law of Fives” was quickly adopted - and used in a wide variety of contexts outside of concrete corrosion. It became a handy shorthand for the importance of good design, but was also used as a handy shorthand for the importance of maintenance.

In some contexts it has been very useful in leveraging the budget for maintenance. For example SKM won an award for helping asset owners in the Solomon Islands understand what they are responsible for maintaining and to plan accordingly, while considering whole-of-life cycle philosophies using simplified systems.

In November 2011, the Pacific Infrastructure Advisory Centre invited SKM to co-present this work to the Pacific Islands Financial Managers’ Association workshop on Better Practice for Medium-Term Budgeting. Representatives of the Finance Ministries were interested to hear of the exponential impact of poor asset maintenance on national budgets, given De Sitter’s “Law of Fives”.

So, what’s the problem?

So far so good. As an illustration of a general proposition that deferral of critical maintenance will have escalating characteristics, OK. However, to argue that all maintenance is well chosen and that the failure to carry out scheduled maintenance is to necessarily incur such escalating costs is to assume what you are trying to prove.

De Sitter, at least, carried out detailed experimentation and testing over an extensive period of time to support his contention in the context of corrosion protection of reinforced concrete.

But others, who have piggy-backed on De Sitter's work and applied it to other fields, generally have done no such experimentation and testing.

- (1) It is easy to assume from the 'Law of Fives' that preventative maintenance will always pay off and that reactive maintenance (fix when fail) will always cost more - which is decidedly not the case.
- (2) It is so easy to 'sell' the notion of the 'Law of Fives' that more detailed analysis of the consequences of deferred maintenance is unlikely to be undertaken.
- (3) We could ask why 5? Why not 3 or 4, or 6? This question doesn't matter as long as we are only using the law as illustration. But it does matter look for evidence that the costs rise in the ratio of 5:1 and ignore any evidence to the contrary.
- (4) Finally, we can easily move from myth to magic. A search of the internet on the law of fives will readily show up a whole heap of nonsense. "All things happen in fives, or are divisible by, or are multiples of five, or are somehow directly or indirectly appropriate to 5" and "The Law of Fives is never wrong".

Even the brightest can be captured by mysticism associated with numbers. Sir Isaac Newton famously said that the number of distinct colours that can be seen in the visible spectrum was seven. Why seven? Because seven had religious or mystic connotations and he was a religious man. In actual fact there are an infinite number of colours that can be seen in the visible spectrum: we have the primary colours - red, yellow and blue, the secondary colours (combinations of the primaries) orange, green and violet, and then the tertiaries, etc. Newton included the primaries, secondaries and just one of the numerous tertiaries to make the number up to seven.

Here are some other myths that you might like to exercise your mind on.

Myth 4.

Asset Managers take a long view.

The truth? Last month, in Paris, a group of 25 members of Suez Environment's Forecasting Advisory Committee, spontaneously responded to the question: Looking forward over the next 30 years, what keeps you awake at night? / what concerns you?

Each member was able to present four cogent, long run broad, human and philosophical concerns looking out over the 30 years. A week or so later, I asked the same question of 45 senior asset managers in London. All the answers here were largely focussed on the next 4-5 years.

How would you answer this question? (bearing in mind that most of our AM Plans go out 20-30 years).

Myth 5.
Pro-active maintenance should be 60% of the total and reactive maintenance only 40%.

This is a comment I have heard a number of times. Is it true? If so, how do we know it is true? If it is not true, but we act as if it were, what are the consequences?

Myth 6.
Renewals are only one third of capital spend, with new works being two thirds, it should be the other way around.

Should it? Again, how do we know? What happens if we get it wrong?

In general, any all encompassing general statement involving figures in asset management could be considered to be a myth. That is because the purpose of asset management is to provide service - and the services that are required are unique to the organisation - if not in type, then in the priority or urgency ascribed to them.

RANDOM THOUGHTS

Tools are often seen as goals, instead of means

An asset management plan is a tool, a condition audit is a tool, a life cycle analysis is a tool. They produce pieces of information that need to be weighed against much other information in the making of final decisions. It is not the job of your organisation to slavishly follow the precepts of your tools (e.g. renewal forecasts). They are not goals, and they are certainly not corporate goals.

It is often thought that policy explains and implements itself - it doesn't

Policy developed without an understanding of the context in which it is to be applied and the problems it will face in application is doomed to fail. Policy makers need to rid themselves of the notion that 'application' is someone else's job and does not need to be thought about. As William Edwards Deming says, "A system must be managed. It does not manage itself".