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Service Levels
More than Asset Condition

The most provocative paper at the *2005 Adelaide International Public Works Conference* was by Dr Ian Greenwood, Opus International Consultants.

Throwing completely new light on the issue of determining service levels in terms of user outcomes, he shows how

1. User outcomes are a combination of asset condition *and the technologies that are used with them*, page 993
2. That recognising this trade-off permits asset managers *to maintain service levels at lower cost* pages 994-995
3. Planning future service levels to take account of the future gains from technology *that can already be assessed* makes sense – and yields benefits that may be deployed in many ways see page 996.

This is an all Opus issue, as our second feature is also from Opus International Consultants, by Tony Porter and Neil Cook.

I was particularly taken with Tony Porter's Value Chain that gives specific attention to "Setting the Right Objectives" which he calls "Efficacy". I like that: I think that it is important enough to have its own word!

You will find Tony's value chains on page 992.

And on pages 997-999 he and Neil Cook look at some of the blockages that need to be overcome on the way to good asset management..

Enjoy

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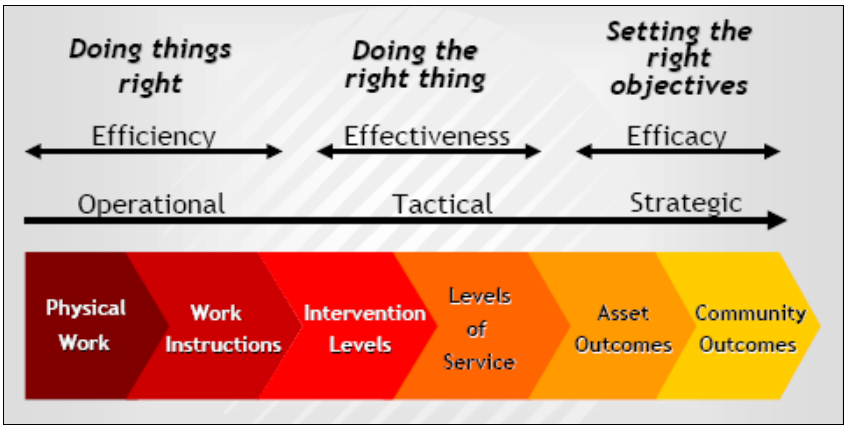
EFFICIENCY, EFFECTIVENESS, EFFICACY

TONY PORTER & NEIL COOK, OPUS INTERNATIONAL CONSULTANTS

Delivery of Asset Management

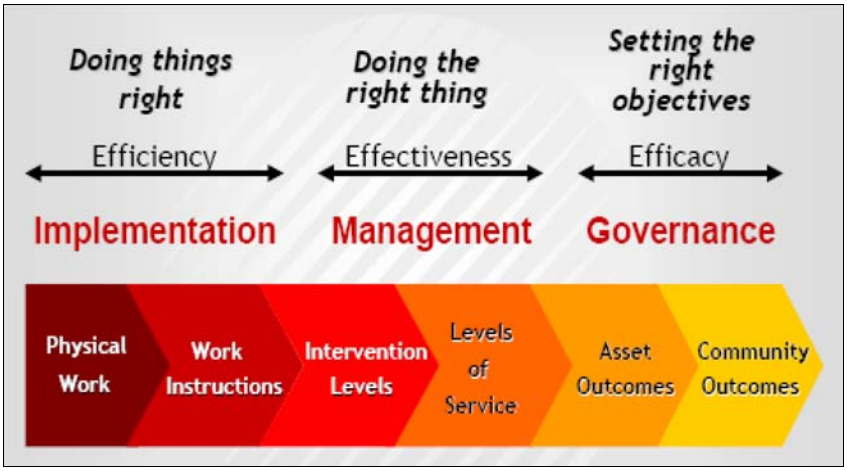
Tony Porter's Value Chain is interesting for its explicit recognition of **"the setting of the right objectives"** or **"Efficacy"**



Roles

Efficacy is the Governance role and includes

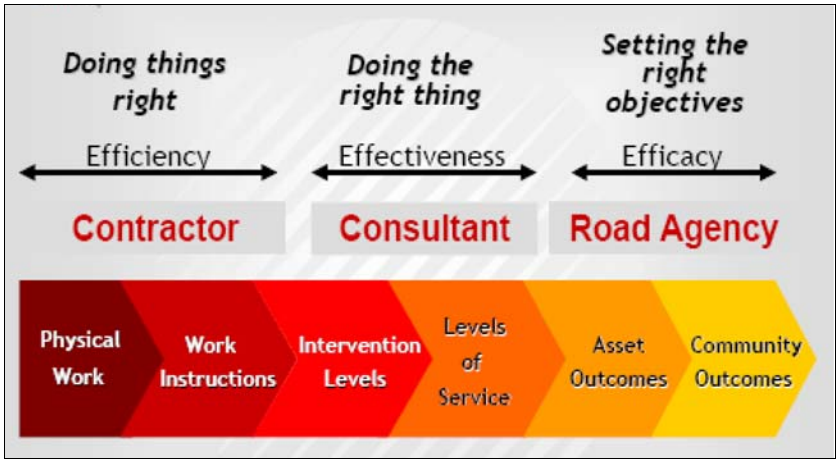
- Audit
- Defining Service Levels
- Agreeing Investment needs
- Managing funding issues
- Allocating resources (as controlled by funding)
- Approving and owning the Asset Mgt Plan



Roles

Contractors and Consultants may be in-house or out-sourced, but ownership—and governance—cannot be abrogated.

Note: that while Efficacy is *not* the role of Asset Managers, it is their role to provide the information and analysis on which decisions will be made.



SERVICE LEVELS = TECHNOLOGY + ASSETS

IAN GREENWOOD,
OPUS INTERNATIONAL CONSULTANTS

The level of service experienced is a combination of the condition of the asset and the technology utilised on the asset

Dr Ian Greenwood, Opus International Consultants

Ian is internationally recognised for his work in the field of pavement management. Within New Zealand Ian is a co-author of the NAMS group manual on Optimised Decision Making, and is the Technical Manager for the implementation of Pavement Performance Modelling to New Zealand on behalf of the RIMS group. Ian currently leads Opus's Auckland based Asset Management team, and is a Partner in the company.

What is the current level of service?

Levels of service are normally specified and measured in terms of the condition of the asset. For example, levels of service relating to the provision of road assets may include items such as the average roughness of the road network, some form of a worst tolerable condition and the like. These traditional standards make the implicit assumption that the level of service experienced is 100% related to the condition of the asset. The rational for this approach is that using asset condition standards, we have targets that are easy to measure and are something that the asset manager can readily control.

Is the asset condition the same as the LOS the customer gets?

If we consider the situation with roads, then for the level of service observed by the road user to be the same as the asset condition, then the road user would have to travel directly upon the road (refer Figure 1

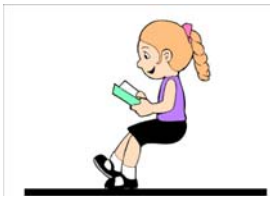


Fig 1 Road user experiencing road condition.

In the main, the road user does not travel directly upon the road asset, but rather uses some form of technology (such as a car), which modifies the condition of the road into an observed level of service (refer Figure 2).

Fig 2: Road user experiencing road condition as relayed by technology

Figure 1 indicates that the implicit assumption in many asset plans is that:

Asset condition = LOS

However, as indicated in Figure 2, the situation is actually one of:

Asset condition + Technology used = LOS

SERVICE LEVELS, TECHNOLOGY AND ASSET CONDITION

IAN GREENWOOD,
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The Technology – Asset Condition Trade off

Some facts about technologies

- There will be a range of technologies used on any asset, such as cars, vans and trucks. Each will combine with the asset to provide a different level of service for the user.
- Technologies will change over time
- Asset managers are not in control of technologies

Should the asset manager take technology into account in determining the asset condition necessary to achieve a given service level?

Where technology plays a major role, the answer would have to be yes. For example, considering roads, the asset manager has produced all weather roads, improved geometric conditions and better management of texture depth and skid resistance. At the same time, technology has produced better vehicle suspension, air conditioning, improved reliability, air bags, ABS, etc. It would be fair to say that in terms of general motoring comfort, that vehicle technology plays as much a part as asset condition, and should therefore be considered integral to providing the level of service to the user.

If road surface holding can be controlled by the combined texture depth of the road plus the tyre tread depth, can we reduce overall costs by lowering road maintenance but requiring great tread depth on the tyre?

Are we being optimal?

Because we can only control one part of the equation, what asset managers tend to do is attempt to provide the desired level of service assuming that technology will provide a neutral impact. However, is this a valid approach, and moreover would we be better leaving part, or all, of the effort to technology? For example, consider an aquaplaning vehicle. One of the key aspects is the combined texture depth of the road plus the tyre tread depth. At present there is a substantial investment by road controlling authorities each year to provide a minimum texture depth on the road surface. The question to ask though is whether we could reduce maintenance costs on the road and increase requirements for tread depth on the tyre.

Typically the future target LOS is set to maintain the current condition of an asset, with no consideration given to how that target will be impacted by technology. Similarly no consideration is given to whether an alternative combination of asset condition and technology could deliver the same LOS for a lower cost to the end user.

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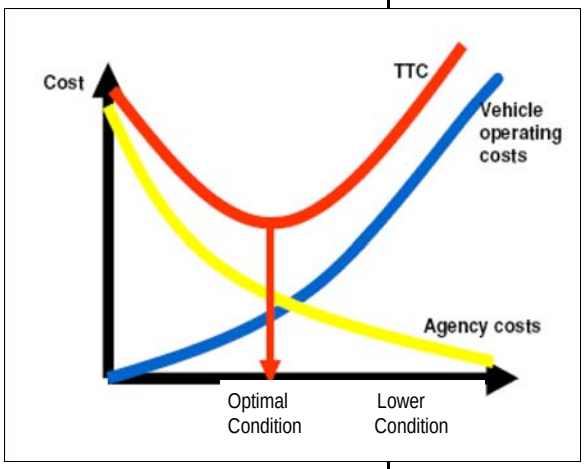

Fig 3 Total Transportation Costs

Example

Consider the optimal roughness of a road. If the intent was to provide a network that minimised the total transport costs (agency plus vehicle operating costs) on the network, then the optimal condition is when the costs are minimised. In simplistic terms, the agency cost is the cost to provide the road in a given condition, while the vehicle operating cost is the cost to operate a vehicle on a road of a given condition, with the total transportation cost being the combination of the two as illustrated in Figure 3.

In considering the above, vehicle operating costs have reduced significantly over time owing to better suspension and more reliable vehicles. Overall, the decrease has been in the order of a 70% reduction over past 2-3 decades.

This reduction in VOC is plotted in Fig 4.

The Level of Service is a function of both asset condition and technology, so the question is what is the most cost effective way of achieving a given level of service?

With VOC reducing faster than asset condition costs, the optimal combination of asset condition and technology will be one that has more of the service level controlled by technology and less by the asset level. Of course, technology can only go so far, so asset managers are still required to manage the asset condition, but to a lower level.

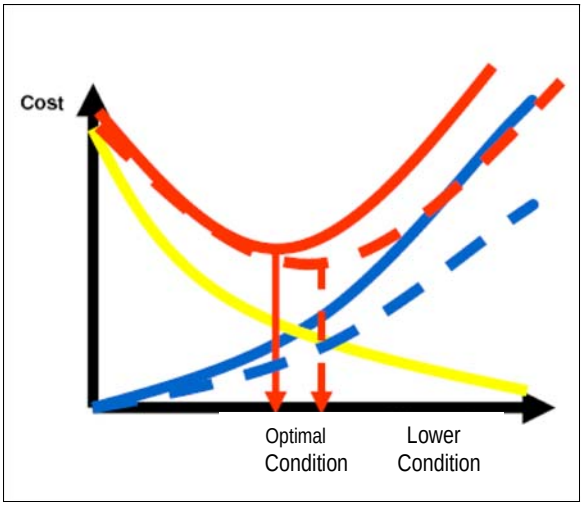

Fig 4 Impact of changing VOC on optimal asset condition

With technology we can provide better service for the same dollars, or the same service for fewer dollars.

What can be done with the cost reduction benefits that technology brings?

1. Roads can be maintained to a higher standard of service, or
2. The savings can be allocated to improving other road problems, eg traffic congestion, or
3. Savings can be allocated to other community outcomes

--- as the community decides.

PLANNING FUTURE SERVICE LEVELS - Using the technology/asset condition trade-offs

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How can we make optimal decisions with an unknown future?

1. The worst we can expect in the future is the same as the best we can find today.

Well, just how unknown is the future? The saying of "today's innovation is tomorrow's expectation" is a good rule of thumb to utilise in predicting where technology is heading. Fortunately with technology being slow to impact, we can use this to provide a relatively good estimate of the future in the short term and in many cases a moderate estimate of the future over the total life of the asset.

In general, whenever the life of the technology used (eg a car) is of a similar value to the life of the asset under consideration (eg a road pavement), then we can reasonably estimate what the future will hold over the life of the asset. Where the life of the asset is significantly longer than the life of the technology using the asset, there will be increasing levels of uncertainty.

2. The impact of changing technology is long term while the impact of changing asset condition is immediate.

In most cases we can reasonably foretell what the minimum situation will be in 10-20 years time. For most planning horizons this is sufficient.

So if the outcome is that we should not be setting out to maintain the current asset condition, but rather trying to provide the same level of service, then how does one document what the agency is trying to achieve?

Firstly, it is necessary to identifying whether technology is likely to change the future asset condition needs. A good way to identify this potential is to review the ratio of the worst technology to the best technology currently in use. The greater this ratio, the more potential exists that the future asset condition can be relaxed. For instance, if the best car technology provides a 50% better ride quality than the worst car technology, then this indicates that with time a lower asset condition can be provided.

3. Build for today, but maintain for tomorrow – in this way you can provide optimal outcomes over the life of the asset.

As better technology enables us to get the same result for less asset effort, the optimal condition will continually become lower. We can build to the appropriate standard for today but leave our interventions for longer periods. This enables us to take advantage of the car's improving technology and to maintain the changing optimal condition, by operating on the element that we can control - the quality of new assets and the maintenance effort on existing assets.

BLOCKAGES TO THE INTRODUCTION OF ASSET MANAGEMENT

TONY PORTER & NEIL COOK,
OPUS INTERNATIONAL CONSULTANTS

Any attempt to implement a new approach must be expected to face hurdles and challenges, despite the benefits that the new approach may offer. Resistance and hurdles that need to be overcome may range from subconscious resistance to the unfamiliar, to stubborn and orchestrated resistance to change.

Software - "In our experience the asset management journey can be impeded by placing too much attention on the tools and systems available in the market, ahead of assigning appropriate attention to the changed work processes they are designed to assist. While the tools certainly have their place, in our opinion it is the adoption and adherence to the "whole of life" philosophy that makes the real difference."

Cf The experience of the Asset Information Best Practice Group in the last issue.

Common blockages the authors have encountered can be summarised as:

Institutional Inertia – the situation where an organisation has its own momentum which is rooted in history. The organisation and its people are so familiar with their traditional ways that they either fear change or do not believe any change could deliver benefits. Strong leadership from the top of the organisation is required to clear this blockage.

Siloed Structures – The traditional way of managing assets typically involved inputs and responsibilities by a range of entities within the organisation, each operating in relative isolation. This is not conducive to integrated asset management and sensible whole-of-life decision making. In this situation there is a real potential for gaps and conflicts which in turn can often lead to unwelcome surprises, including failures and service discontinuity. With the communication processes and obligations built into modern asset management practice, these silos do get broken down.

"It's an accounting issue" – This attitude sometimes expressed by the "die-hards" in the engineering fraternity demonstrates a lack of understanding of the benefits of asset management and needs to be overcome. In reality it is an extension to the silo syndrome identified above.

Software — It is not uncommon to find the development of good asset management practices stalled in an organisation by the failed introduction of an advanced computer based tool. All too often organisations are attracted to the "gee wiz" elements of a software package without properly defining the business practices it is intended to support. These business processes must be defined by the strategic goals and the agreed levels of service for the asset. The lack of fit that can occur if the business process is not understood and not reflected in the tool leads to a lot of frustration and inhibits uptake. It is important to define the process before selecting tool i.e., the process must define the tool and not vice versa.

"Trust me I know what I am doing" – such an expression is indicative of a defensive mechanism to be expected from some people and organisations that are content with the status quo and do not want to consider, let alone adopt, a different approach. The transparency that asset management brings to decision making is often seen as threatening and engenders resistance to change. Again, where this type of attitude exists, pressure and engagement are required in order to bring about the required change.

TONY PORTER & NEIL COOK,
OPUS INTERNATIONAL CONSULTANTS

Asset Management needs a budget

Another hurdle in this respect can be inadequate budget to fully define the business processes, specify and the purchase the required systems and then the subsequent training of staff in their use. Each organisation needs to drive change from the top, making it very clear that dissension is not an option.

Tony Porter is a Fellow of the NZ Institution of Professional Engineers and has participated in the evolution of NZ's roading asset management since the 1980s.

Neil Cook is Chairman of the Hawke's Bay East Coast Branch of INGENIUM, with many years of practical experience 'at the coal face' in asset management in NZ.

Lack of corporate buy in – Where there is any indication that an organisation is not fully committed to change, it is almost certain that change will not take place, or if it does it will not realise its full potential. Creating a new "Asset Management Department" and expecting them to effect change simply does not work. The culture of the entire organisation needs to change

Lack of time - The pace at which change is planned to take place needs careful thought to ensure that it is fast enough to bring about necessary results, yet not so fast that measures will prove unsustainable. However, once a sensible time frame is adopted it must be expected that some people will take the attitude that they do not have time to adopt the change. This is where a "champion of change" and those who are converts to the new ways have an important role to play. Not only can their mentoring, example and leadership help stretch the imagination of individuals, but the fear of appearing to be left behind also has a positive effect.

Data Deficiencies – The lack of available data is often used as an excuse not to proceed. However in our opinion there is always enough information to make a start. If the first attempts are based on guess work the next attempt will be better. Our mantra when starting the asset management planning process is "START NOW - If you don't know take a guess, write down your assumptions, and move on." All of the good knowledge that you get out of people's heads will then be in a domain where it can be shared and used to best advantage through the definition of strategies, business processes, asset plans and the appropriate specification of any systems and data requirements.

"Ribbon Cutting Syndrome" – It is not uncommon to encounter political resistance to the introduction of asset management as building and commissioning of new facilities is often seen as "vote winning". The same cannot be said of maintenance and this is understandable because successful maintenance does not manifest itself by ceremony or even as something visible. In addition the structured strategic approach does not lend its self to pork barrel politics.

This presents a challenge to demonstrate and influence public perception of the wider benefits of sustainable, whole-of-life management and how we can all positively impact on the communities we live in. As Asset Managers we need to work at all levels to develop political awareness and understanding in our communities of the importance of asset management. When this is achieved we will have reached the end of our current value chain and will be looking for the next link to take us forward.