

# THE ASSET JOURNAL

SEPTEMBER 2017

# ISSUE 03

Volume 11



ASSET MANAGEMENT COUNCIL

## ASSET MANAGEMENT PLANNING

Asset Management  
Defending the Business

40Yr Life cycle Outlook  
for Building Assets

PowerStream –  
a Canadian Case Study

Financial Models for Long  
Term Asset Management  
Planning

Implementation Framework  
for Improved Renewals  
Planning”



## ERNST KRAUSS

EDITOR IN CHIEF

Much focus has been put towards Infrastructure development especially in the Eastern States that have a large and complex existing Infrastructure compared to Western Australia and Northern Territory. We hear much about urgently needed renewals or replacement and extension of existing Infrastructure. That naturally extends the attention to the needs for Assets and new Infrastructure. Planning levels in public Infrastructure is generally 40 years plus and in cases extend beyond a hundred year horizon. Good planning methodologies and tools are critical not only for the justification of investment, but also in the forecasting of sustainability of the chosen solutions. Regulators and Investment Advisors are keen to see transparent methodologies for determining appropriate levels of investment and the resulting Asset solutions and the sustainment budgets. The case for following an Asset Management system such as provided in ISO 55001 gains more and more persuasive power.

We have seen in the last few years that many organisations that have achieved success in improving their practices of managing their Assets. It is also clear when looking especially at the private sector, that much work is still needed. Many Senior Managers shy away from making wide reaching changes in their organisations to align with the Asset Management Systems Standard to improve the way assets are managed and by extension, the organisations operate. Strategic and Operational planning are essential parts and a starting point for good Asset Management. How this planning process affects the capability of an organisation and how maturity in Asset Management matters, is demonstrated in the series of articles provided in this edition. Case studies from Australia and Canada provide interesting comparisons of issues that the Electricity Industry faces and provides good learning points for all types of Organisations, not only public utilities.

The series of webinars and technical presentations that are planned over the next few months by the Asset Management Council Chapters and Nationally provide further opportunities to find out how Asset Management provides a catalyst for improving specific aspects of managing an organisation and case studies that show how changes were implemented. Members can also search for the specific events and knowledge elements in the large Asset Management Body of knowledge that is available on the website. Why not make the time to participate either in a Chapter event or a webinar? And as always, we welcome your contributions to that Body of Knowledge and your feedback.

# CONTENTS

<b>Editors Column:</b> The Asset Journal, March 2017	2
<b>From my desk:</b> Chairman's Letter	3
<b>Article 1.</b> Asset Management – Defending the Business	4
<b>Article 2.</b> 40 Year Life Cycle Outlook For Building Assets	13
<b>Article 3.</b> Powerstream Case Study	20
<b>Tutorial 11</b> – Capability Model – Systems Engineering	28
Chapter News	34
<b>Article 4.</b> Financial Models for Long Term Asset Management Planning	40
<b>Article 5.</b> Implementation Framework for Improved Renewals Planning	46
Upcoming Events	52
AMCouncil Member Profile	54
Membership Application	57
New Members	59
Corporate Members	62
Testimonials	63

**Publisher:** The Asset Management Council

**Chief Editor:** Ernst Krauss

**Publication Design:** nonilou

ISSN: 1834-3864

For all enquires please contact:

**publications@amcouncil.com.au**

Asset Management Council

PO Box 2004 Oakleigh Vic 3166 Tel 03 9819 2515





# FROM MY DESK: CHAIRMAN'S LETTER

**CHAIRMAN,  
DAVE DAINES**

It has now been 5 months since our AMPEAK Conference in Brisbane, and what a busy time it has been. Planning is already underway for the next AMPEAK in Hobart on the 15th ~ 18th April 2018 and the preceding Technical Exchange weekend in Melbourne on the 17th ~ 19th November 2017. The planning cycle never stops and the earlier that you can enter that cycle can significantly benefit the outcome.

The AM Council has a Strategic Plan (Strategic Direction 2015 -2019) that states the Mission, Vision & Values of the organisation. The document contains the Four strategic objectives that set the context for the planning and delivery for the business –

**1. Create a deeper understanding of asset management through global linkages to enrich the Asset Management Body of Knowledge for the benefit of stakeholders**

Test and expand the knowledge frontier of asset management both nationally and internationally to create value for the community and business. This will be done through our national and

international relationships to enrich our body of knowledge to benefit our members and other stakeholders.

**2. Engage communities to value and use asset management**

Share stories about asset management, through all media, including web, blogs, journal and video etc. to encourage stakeholders to understand the benefits of asset management, and to promote the use of asset management.

**3. Support organisations to improve business performance through sound asset management principles and practices**

Utilise the Asset Management Body of Knowledge and expertise within the membership to promote asset management as delivering value through a balance of cost, risk, opportunities and performance benefits throughout the life cycle of their assets

**4. Develop personal and organisational capabilities**

Utilise the body of knowledge and the available material to develop effective methods to increase the asset management

capabilities of individuals and organisations whilst reinforcing the potential of the Asset Management Council in this area via an active marketing campaign building on success.

These Objectives are supported by additional common intents and the organisational structure designed to be able to deliver the outcomes to our members and stakeholders.

Our operational planning is based upon delivering these strategic objectives whilst ensuring that our members and stakeholders remain engaged. We have recently issued a survey to our members and stakeholders with the purpose of testing our strategy against their needs. This feedback will form input to sessions planned for the forthcoming Technical Exchange weekend, so it is important to have your say! Access the online stakeholder survey through this link <http://www.amcouncil.com.au/survey/survey5.aspx?svld=40>

There are exciting times ahead and as the Chair and I am looking forward to my time in this role. We have a great team of volunteers and staff working with my fellow Board Members and our partnering organisations to achieve our organisational objectives.



## ARTICLE 1 – ASSET MANAGEMENT – DEFENDING THE BUSINESS

Jim Kennedy, CPEng, CFAM, CAMA Director INTERLOGIS Consulting Pty Ltd  
Peter Kohler, CFAM, Director Capability Partners Pty Ltd;

**Summary:** Our world is changing. Organisations that deliver value to their stakeholders through the management of productive assets are challenged by sophisticated business models such as venture capital funded class actions intent on transferring that value to others. Failure to manage the risks posed by these adversarial business models will at best reduce value for stakeholders and at worst result in the demise of the organisation. Two of these potentially lethal challenges for organisations have recently been successfully defended in court. This paper will examine the predatory business models involved in firstly Class Actions and secondly Opaque Regulatory Determinations using two recent case studies that represented a successful defence by the parties involved.

The paper will describe the role of quantitative fact and risk based decision processes and demonstrable audit trails in that successful defence and their application in achieving a defensible asset management budget. In particular, the setting aside the Australian Energy Regulator's current funding determination for Ausgrid and ActewAGL by the Australian Competition Tribunal and the failure of the recent Class Action against Endeavour Energy shall be explored. The case studies provide real and compelling stories for how two organisations successfully developed legal arguments to defend themselves from such predatory actions.

**Keywords:** ISO 55000, Asset Management, Class actions, Regulator, Defensibility





## 1. INTRODUCTION

In recent years, organisations that do not focus on their ability to defend the decisions they have made regarding the management of their assets have suffered serious financial impacts. These impacts are not just the result of direct service losses but also subsequent litigation that has become almost inevitable after any significant event effecting large numbers of stakeholders. An example of this was provided at ICOMS 2013 (Clarke) who noted that “litigation as a result of natural disasters and other major catastrophic events is now inevitable. Not only can the outcome be expensive but the litigation effort and the discovery process itself can cost more than the rectification of the plaintiff’s claims”.

The requirements of a successful defence are unchanged from the 2013 observations (Clarke) “In order for a litigant to be successful in their claim, they must be able to prove to the satisfaction of the court a number of basic points. These are:

- Causation: the failure in question was the direct or indirect cause of the loss
- Foreseeable: the failure was foreseeable by a reasonable person
- Preventability: the failure (or elimination or mitigation of its consequences) was preventable by the defendant).
- Reasonableness: it was reasonable for the defendant to

be able to take the necessary steps to prevent or manage the consequences or the failure.

In addressing these points, the courts may direct that the expert witnesses for opposing parties come together to find areas of agreement and disagreement. The plaintiff’s case will rest on the significant points of disagreement.

Recent examples of such litigious activity are:

- Wivandhoe Dam (Class Action) where the engineers in charge were subject of a Crime and Misconduct Commission investigation and despite their exoneration, a class action by Maurice Blackburn Lawyers is due to go to Court in October 2017. To date \$16.5 million has been spent by Maurice Blackburn funded by IMF Bentham (litigation funders) and costs are expected to top \$28 million by trial end.
- Ausgrid (Regulator Determination) where OPEX reductions by the Australian Energy Regulator, primarily on the basis of flawed benchmarking, made a retrospective direction that the budget for a 5 year regulatory period be reduced by 39%.
- Endeavour Energy (Class action) where the disastrous Winmalee fires were blamed on Endeavour and the successful defence resulted in a pay-out to claimants of just 4.5% but covered all the expenses of the lawyers of both plaintiffs and defendants involved.

## 2. CLASS ACTIONS - A PREDATORY BUSINESS MODEL?

Class actions are a business model run on a supposed “no win - no fee” basis. Such actions bring together a funding agency, the legal entity undertaking the class action and the litigants hoping for some redress of perceived loss through the malfeasance of deep pocketed defendants such as Governments and Insurance Companies. The current Wivandhoe Dam class action by Maurice Blackburn provides some insight into the funding model with IMF Bentham (the funder) expecting to take some 30% of the final settlement after payment of legal costs. Costs are expected to be \$28 million with the vast majority going to fees for Maurice and Blackburn. The legal team cannot by law fund itself or take a percentage of the settlement hence the need for third party funding.

Australia has become the most likely nation outside the United States where a corporation (government or private) will face weighty class action. The growth of class actions in Australia is described in an industry white paper (Allens) that puts the position that the growing number of class actions are government driven; “At least in part, these developments are the direct result of Federal Government support for class actions (and third party funding of class actions) as important means of facilitating access to the civil justice system. The checks and balances in the Australian system have, however, helped to prevent what was

predicted in the mid-2000s to be an ‘explosion’ of class action activity”.

There are a number of differences between the Australian Class Action model and that of the United States. It is these differences that have dampened the Australian experience to date. “The absence of a class certification process and the low common issues threshold make it easier to commence and maintain a class action in Australia than in the United States. As a result, the Australian class action regime has been described as ‘one of the most liberal class action rules in the entire world’. The Australian position in respect of costs is, however, generally acknowledged as being a significant deterrent to speculative litigation and a key reason why Australia has not seen a proliferation of class action activity” (Allens).

Interestingly enough, the majority of class action cases do not relate to large asset driven adverse events but to the more readily proven Australian statutory prohibition of “misleading or deceptive conduct”. In proving those claims, it is only necessary to prove that the company misled the market; whether or not the company intended to do so, or was negligent in doing so, is irrelevant. By way of contrast, most similar actions in the United States (including under SEC Rule 10b-5) require proof of scienter (intentional fraud or deceit) (Allens).

Most class actions in Australia are shareholder class actions replacing product liability

claims as the major cause. As an example there are 20 class actions, current on the Maurice and Blackburn Lawyers books. Of these, only two represent an action driven by asset management related factors. Additionally, in recognition of the risks associated with class actions, most class actions are settled out of court, often before they are filed. Winmalee is one of those class actions settled out of court.

### 3. CASE STUDY 1 – CLASS ACTION ON WINMALEE BUSHFIRES

The Winmalee class action led by resident Sean Johnston claimed that Endeavour Energy a State-Owned Corporation, failed to remove a rotting acacia tree that fell on the power lines and sparked the 2013 bushfire, razing 194 houses and destroying 3600 hectares of land in the suburbs of Springwood, Winmalee, Yellow Rock. Mr Johnson alleged that at around 1.20 pm on 17 October 2013 an acacia tree on Linksvie Road Springwood failed and fell onto live bare aerial conductors owned and operated by Endeavour, and started the fire. He alleged that Endeavour were negligent in failing to detect and remove the tree so that it could not fall onto the conductors and cause the fire.

The Plaintiff argued that in regard to a duty of care, Endeavour Energy:

- Had ultimate responsibility for all activities associated with the planning, design, construction,

inspection, modification and maintenance of the power line

- In particular had ultimate responsibility in relation to inspection for hazardous vegetation and tree clearances so as to ensure anything which could make the power line become a potential cause of bushfire or potential risk to public safety was clear from the powerline.
- The class action requires a “yes” to all the questions posed at Clause 1 of this paper for a successful claim or just one “no” for the claim to be rebutted. The Supreme Court papers had the following information contained in Defence 290714:
- Causation: the failure in question was the direct or indirect cause of the loss – Court documents contended that the tree was not a large gum tree as claimed as the wires were not severed by the falling tree. Arcing between street lines and a tree would also not occur as the tree was an insulator and that arcing between the wires and the ground was not possible as that required a broken wire which would automatically disconnect from the system. There was no evidence of fire either on the conductors, the tree or the grass in the vicinity of where the tree fell.
- Foreseeable: the failure was foreseeable by a reasonable person – The defendant was aware of risks from electrical conductors and had taken design actions to mitigate that risk with insulation on pole



to house conductors and a minimum vegetation separation and spreaders for bare street wires. The actual failure was not foreseeable as the rot in the subject tree was not readily visible and required testing beyond the required visible assessment.

- **Preventability:** the failure (or elimination or mitigation of its consequences) was preventable (by the defendant). – Endeavour had a Tree Management Plan which listed the area as bushfire prone setting the inspection frequency and method noting in resulting inspection records that no part of the subject tree was growing within 1.5 metres of the wire. The defendant also noted that the initiating event was not preventable as vegetation had been inspected in a timely manner, which relevant notices to private landholders were forwarded and follow up audits done that would result in disconnection if the landowner failed to undertake the required actions.
- **Reasonableness:** it was reasonable for the defendant to be able to take the necessary steps to prevent or manage the consequences or the failure. The defendant noted the significant assets (23,400 km of overhead wires) being managed and the regulatory constraints on resources by the AER. It was not possible for the Defendant to undertake work that was a legal responsibility of a landowner. Noted that the implied definition of a hazardous tree by the plaintiff was one which if it fell onto the power line had the propensity to cause a fire described many thousands of trees in the area and accordingly was not reasonable to expect removal of all such trees. Such a definition and subsequent action was not reasonable.

As a result of this defence, the subsequent \$18 million settlement for a Blue Mountains bushfire lawsuit was found “fair and reasonable” by a NSW Supreme Court judge and very much in the interests of the hundreds of victims. Justice Clifton Hoeben said the most compelling reason for provisionally approving the proposed settlement was the plaintiffs’ poor prospects of proving Endeavour Energy’s liability. The decision to settle the case, which involved 779 other bushfire victims, came in February 2016 under a different NSW Supreme Court judge. The proposal said Endeavour should pay the \$18m in settlement without admission of liability. (AAP).

Judge Hoeben in agreeing to the settlement noted that “At no time did Endeavour or any of its contractors detect the fact that the tree was rotten and therefore at substantially increased risk of falling and falling onto the powerlines”. Hoeben also cited the evidence indicating the tree had internal rot which could not be seen by looking at the tree, and would have required more testing noting that experts were conflicted whether there would be some visual trigger to warrant such additional testing. “The conclusion I have reached is that had the trial proceeded to judgment, it was unlikely that Mr. Johnston would have succeeded in establishing liability,” Hoeben said. (AAP)

Madden’s lawyers advised that the 799 plaintiffs would receive 4.5% of their total losses after payment of legal fees for all parties being both plaintiffs and defendants. As reported by the Blue Mountains Gazette on 12 Aug 2016- “One man, who asked only to be identified by his surname, Smith, called the settlement “bulls\*\*t”. “They’re in it for themselves, the lawyers, and screw everyone else.”

#### 4. A SUSTAINABLE DEFENCE

As part of an asset management system (see ISO 55000 for relevant information) Asset Management Plans (AMPs) support the delivery of the asset management objectives which in turn are based upon the organisation’s objectives.

Accordingly, the AMPs represent the ‘how’ the organisation is going to achieve those objectives, for the assets included in that plan. The AMPs are supported by a budget that can deliver the agreed residual risk and the agreed asset performance (all part of the asset management objectives).

As most asset managers are aware however, plans are just that, a plan! A plan represents what the organisation has agreed to do when and by whom. They always include assumptions about the future - and sometimes those assumptions are incorrect. As a result, many organisations develop what are called “defensible maintenance budgets” - to support their asset management plans.

A “Defensible Budget” is a budget whose provenance can be traced to all the way back to the asset management objectives where each and every needed resource is founded upon the achievement of those objectives. In that way, any change in budget can be described not just in financial terms but importantly, in the effect to the business. See AMPEAK 2015 (Kohler) for further discussion on this topic.

The value in preparing Defensible Budgets can be appreciated in the context of a number of credible scenarios. These scenarios could include the following:

- **Scenario 1. Reduced Maintenance Budget (as a result of a reduced OPEX). A Defensible Maintenance Budget would enable the organisation to identify**

**options and discuss/agree those with stakeholders based upon:**

- Extending the frequency of maintenance tasks for those tasks that have the least impact to the business (without compromising personnel safety); and/or
- Deferring and/or cancelling maintenance tasks (without compromising personnel safety).

In this way, a number of options can be provided to senior management where each option identifies a number of ways that the budget reduction can occur, but importantly is also able to identify the change in risks and/or asset performance for each option, enabling senior management to choose the most appropriate.

- **Scenario 2. Change in asset performance – identify budget options and discuss/agree with stakeholders based upon determining:**

- What systems and assets are now needed; and
- What each system/asset then has to achieve (the Asset Management Objectives); and
- The changed maintenance budget.

In this way, a number of options can be provided to senior management where each option identifies a number of ways that the change in asset performance can occur, but importantly is also able to identify the change in risks and/or budget for each option, enabling senior management to choose the most appropriate.

To support the above capability,







“Defensible Maintenance Budgets” are therefore:

- Fact and risk based;
- Fully traceable to AM Objectives outputs;
- Demonstrably good practice (international and national standards);
- Compliant with statutory and regulatory imperatives;
- Implemented by competent (certified) staff;
- Supported by verified technology (information and decision systems);
- Transparently and verifiably costed; and
- Deliverable in the agreed time frame.

Importantly, Defensible budgets are developed to provide a level of defensibility, meaning that budgets can be justified in the face of change and/or criticism.

The ability to provide such a robust approach to the development of defensible budgets, relies upon the ability of the organisation to implement processes that logically link requirements (the Asset Management Objectives) to the supporting budgets, in a way that supports a “what if” capability.

A number of Australian organisations have developed this capability, as part of their desire to both increase their asset management maturity but in particular, to be able to respond to likely challenges within their business environment.

## 5. REGULATORY DIRECTION

National regulators have an important role developing a national approach to provision of core services to Australians in such markets as energy, transport and so on.

National laws have been introduced in most states and territories to ensure that most markets are regulated by a set of nationally consistent laws.

As an example, Australia's energy markets operate under a set of rules and regulations that aim to meet the long-term interests of consumers.

The Australian Energy Regulator aims to give consumers greater options in the way they source and use electricity through reforms which support the development of innovative tariffs and energy services.

These reforms should enable and empower consumers to make informed choices about their energy supply and use and decide which best meets their needs.

Reducing regulatory complexity and lowering barriers for energy service providers to enter the market means more competition and more opportunities for consumers to control their energy use and bills.

## 6. CASE STUDY 2 – AUSGRID AND OTHERS VERSUS AER

### 6.1 Introduction

The Australian Energy Regulator (AER) is the economic regulator for transmission and distribution electricity and gas network businesses across Australia.

In the words of the AER, “the networks are regulated to manage the risk of monopoly pricing, where a business can charge higher prices or provide poorer services compared with the situation in a competitive market. The networks comprise the poles, wires and transformers used for transporting electricity across urban and rural population centres to homes and businesses”.

The AER regulates electricity networks and natural gas pipelines by setting the maximum amount of revenue they can earn.

The AER sets a network business' allowed revenue for a period (typically five years) based on the best available information, an assessment and consideration of consumers' views. Network businesses are then provided with incentives to outperform the revenue we determine. Those savings are passed to customers through lower network bills.

### 6.2 The AER Determination

On 30 May 2014 Ausgrid submitted its initial proposal to the AER. The AER published its draft determination on 27 November 2014.

The National Electricity Rules provide an opportunity to make revisions to incorporate the substance of any changes required to address matters raised by the AER's draft distribution determination or the AER's reasons for it.

Ausgrid subsequently revised its regulatory proposal in light of the AER's draft determination for Ausgrid - for the period 1 July 2014 to 30 June 2019.

While a number of issues were identified by the AER in its determination, the following is relevant to this discussion:

- Operating expenditure – The AER was not satisfied that Ausgrid's proposed forecast operating expenditure of \$2,888.2 million (\$2013/14)<sup>20</sup> reasonably reflected the OPEX criteria. It therefore did not accept Ausgrid's proposal. Its alternative estimate of Ausgrid's total forecast OPEX for the 2014–19 period is \$1,758.5 million (\$2013/14).<sup>21</sup> The main driver for the AER's substitute operating expenditure forecast was its alternative estimate for what it considered an efficient base level of operating expenditure.

The Ausgrid's response to the AER draft response is summarised as follows:

"In terms of the AER's constituent decisions, we consider there are fundamental issues with its decision-making process in respect of:

- "OPEX – ... The AER have applied flawed benchmarking analysis as the primary basis for its decision to reject and substitute our proposal, without adequate consideration of materials provided in our proposal, or adequately addressing other factors in the rules."

With specific reference to the OPEX determination, Ausgrid noted:

"The draft determination did not include a safety risk assessment of the potential for increased network asset / system failures as a result of the proposed reduction in 'resources', or the extent to which these reductions would have adverse risk consequences to the health and safety of workers and members of the public. In making the draft determination, the AER did not have sufficient regard to Ausgrid's legislative obligations under the Work Health and Safety Act 2011 (NSW) (WHS Act), in particular to meet the "primary duty of care".

The AER's proposal to accept the safety consequences of higher rates of network asset failure and an increase in local service interruptions (blackouts) is neither consistent with the NEO nor the objectives of WHS legislation. The safety risk assessment undertaken on behalf of Ausgrid found that it is foreseeable that safety risks for Ausgrid workers and members of the public will increase from the AER's draft determination where it is proposed that Ausgrid's operating and capital expenditure be significantly reduced.

Based on consideration of all factors, we are of the opinion that the proposed operating and capital expenditure allowed for in the draft determination would preclude Ausgrid from complying with its obligations under the WHS Act. We are also of the opinion that if the AER is aware of the safety impacts of the proposed operating and capital expenditure allowed for in the draft determination and it makes its final determination allowing for these same levels irrespective of these safety impacts, it will be in breach of its primary duty of care under the Commonwealth WHS Act.

Of particular concern is the reduction in Ausgrid's vegetation control program implied by the AER's 39% aggregate reduction in operating expenditure. The Commissioners of NSW Fire and Rescue and NSW Rural Fire Service<sup>6</sup> have both expressed in writing a concern over proposals to substantially reduce this operating expenditure and the possible impact on vegetation management in bushfire-prone areas of NSW and whether detailed risk assessments of the broader impacts of the AER's draft determination have or will be conducted by the AER."

"If Ausgrid were to operate within the constraints of the AER's draft determination, then in the short term, the number of safety incidents, especially to employees, is expected to spike.....In the longer term, this analysis indicates that for the foreseeable threats to members of the public considered in this review, an increase of around 3.4 per annum in the fatality rate from network hazards would most likely occur. In addition, the likelihood of the Ausgrid network starting a catastrophic bushfire (meaning 100 fatalities and 1,000 houses lost) more than doubles as a result of increased equipment failures due to longer inspection cycles".



With reference to Ausgrid's stakeholders and consumers:

"The AER has discounted the substantial body of evidence gathered by Ausgrid to assess and test consumer and stakeholder preferences."

With specific reference to how Ausgrid is able to "demonstrate" the outcomes of such an OPEX reduction:

"Ausgrid utilises asset related preventative and mitigative maintenance controls (resources) to reduce the likelihood and consequence of hazardous events, particularly those events that have the potential to result in loss of life. In 2000, Ausgrid introduced the Failure Mode, Effects and Criticality Analysis / Reliability Centred Maintenance (FMECA / RCM) process, to identify the tasks and activities most cost effective in managing the safety and reliability consequences of the manner in which assets fail (asset failure modes). These tasks or activities may include maintenance, replacement or redesign, or where the individual failure mode does not have an adverse impact on safety and reliability, the methodology allows the option of a 'run to end-of-life' (failure) to be adopted. The application of a quantified FMECA / RCM, coupled with regular reviews of the asset performance data, ensures the task periods calculated for the chosen controls deliver a reasonable balance between both cost and risk for optimal asset performance.

This means that Ausgrid utilises objectively determined pre-emptive (preventative maintenance and asset renewals) and planned corrective maintenance as preventative controls to identify and address possible failures before they occur in order to maintain a safe, reliable and sustainable network so far as is reasonably practicable (SFAIRP) in accordance with the hierarchy of controls (HoC).

That is, foreseeable hazards should be eliminated if reasonably practicable, and if this is not possible, mitigated so far as is reasonably practicable"

### 6.3 Determination by the Australian Competition Tribunal

In 2015, Ausgrid made application to the Australian Competition Tribunal with respect to a number of issues with respect to the AER's draft determination, and in particular that of an adequate OPEX. In that respect, Ausgrid noted:

"The draft determination did not include a safety risk assessment of the potential for increased network asset / system failures as a result of the proposed reduction in 'resources', or the extent to which these reductions would have adverse risk consequences to the health and safety of workers and members of the public."

In February 2016, the Australian Competition Tribunal set aside the AER's approach to determining an OPEX budget. Gone is the ability for the AER to use simple benchmarking – and in its place, a broader range of modelling and benchmarking inputs. However, the most significant change is

in the Tribunal's impetus to also include a 'bottom up' review.

While much commentary has centred around the possible impact on consumer prices, little has been made of this last point. The "bottom up" approach advocated by the Tribunal requires the Regulator to consider how an OPEX should be developed cognizant of the asset base, the stakeholder requirements, together with its operating and physical context – that is, determine what is required to operate that particular network safely and reliably to meet customer needs.

The increased risk to "the health and safety of workers and members of the public the health and safety of workers and members of the public" was able to be "demonstrated" by Ausgrid because of its ability to identify the changed risks associated with the AER's proposed OPEX budget reduction - through an understanding of the change in risk associated with a change in maintenance periodicity – since a 39% reduction in OPEX equated to an almost doubling of asset maintenance periodicities.

### 6.4 Defensible Budgets and Process

Ausgrid successfully challenged the Regulator's approach. Ausgrid's ability to use Failure Mode, Effects and Criticality Analysis/Reliability Centred Maintenance (FMECA/RCM) or a "bottom up process" provided the "Defensible" basis for their OPEX budget.

This best practice approach delivers a “Defensible Maintenance Budget”, i.e. one that enables an organisation to “demonstrate the effect of any change,” whether that be a budgetary change, an asset performance change, or a change in acceptable risk! This obviously has applications for any organisation managing physical assets, irrespective of whether or not they operate in a regulated industry.

The Tribunal’s decision has provided both asset managers and Boards with a sound and legal precedent, an approach to how organisations can “demonstrate” the effect of a maintenance budget reduction upon the way they manage their assets in a way that not only provides asset managers with the capability to demonstrate the effect of change, but also enables Boards to exercise their “duty of care” as Directors.

## 7. CONCLUSION

The above two case studies involve two differing contexts, but have much in common – and reason for asset managers to take notice of that common approach – the capability to develop “Defensible Maintenance Budgets”.

That capability is based upon analytical tools sets (processes and data), used by competent people who are able to causally link each and every resource need (maintenance, spares, etc.) to stakeholder requirements.

In doing so, they employ data driven, quantitative, risk based and transparent analytical approaches that meet international standards – standards such as ISO 55001 and such standards as FMECA/RCM standards.

And interestingly, all the above now has a legal precedent!

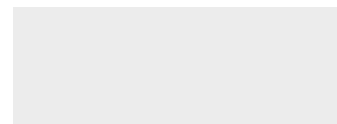
## 8. ACKNOWLEDGEMENTS

The authors thank the following for their invaluable assistance in the development of this paper:

- Phil Clarke, Director, Phil Clarke Consulting Pty Ltd

## 9. BIBLIOGRAPHY

1. P. Clarke, Asset Management and Litigation, ICOMS 2013
2. Allens - White Paper, Class Actions in Australia Updated, February 2017 <https://www.allens.com.au/pubs/pdf/class/papclassfeb17-01.pdf>
3. New South Wales Supreme Court, Endeavour Energy Winmalee Defence 29/07/14, Case number 2014/148790
4. Sarah Hawke, ABC/AAP article “Blue Mountains bushfires: Provisional settlement calls for Endeavour Energy to pay \$18m over Springwood blaze”, 18 August 2016
5. P Kohler, “Defensible Maintenance Budgets”, AMPEAK 2015



**CLICK** on triangle to view video presentation relating to this article

*this content is available to AMC members only, see our affordable membership options*



# ARTICLE 2 – 40 YEAR LIFE CYCLE OUTLOOK FOR BUILDING ASSETS

Andrew Sun - RMIT University

The management of physical assets for RMIT is a core business activity and integral to extending the effective life of assets. Assets need to be designed, acquired and maintained with careful consideration to ensure facilities operate at peak functionality, providing reliability for students and staff. A robust Life Cycle program will extend the life of assets and reduce replacement period and cost.

Development of the Australian campus life cycle model and the initiation of a more comprehensive asset management approach to

maintenance within Property Services will improve asset data at RMIT to support a comprehensive maintenance planning framework that has previously been lacking.

RMIT Property Services life cycle analysis is the first of its kind for any University in Australia (that we are aware of). It substantially differs from TEFMA Backlog Maintenance (TEFMA) because;

- TEFMA details the cost to replace all assets that are not in 'good' or 'excellent' condition at a point in time.

- Life Cycle provides a strategic and planned approach to asset management that considers all associated costs of the operation of assets including; reactive and planned maintenance, faults/repairs, acquisition/replacement and refurbishment in order to determine;
- the replacement and/or refurbishment period.
- whether increased maintenance can extend the effective life
- the impact of facilities should replacement and/

or refurbishment be delayed or deferred. This important delineation is crucial to enable performance metrics to be measured and monitored to enable targeted and predictive maintenance regimes to extend the effective life of the Property portfolio.

A Life Cycle program is the representation of the sum total of the present value of all asset costs incurred in the operation over its anticipated lifespan and then provides the metrics to make planned strategic decisions relating to refurbishment vs. replacement and the impact on the portfolio.

## 1.LIFE CYCLE METHODOLOGY

In 2016, we embarked on a journey to capture key asset attributes through a comprehensive asset data collection exercise utilising a combination of service providers, Facilities and Asset Management staff, and Work Integrated Learning (WIL) students from the College of Science, Engineering & Health (S.E.H.), in particular School of Civil Engineering. The

type of assets captured are categorised as:

Finishes - external finishes such as painting

- Fittings – furniture, fixtures such as sanitary fittings, equipment such as white boards etc.
- Internal Fabric – internal walls, doors, partitions etc.
- Internal finishes– suspended ceilings, tiles, carpet etc.
- Services - air conditioning, electrical, fire systems etc.
- Superstructure – above ground building components including stairs, external walls, ramps and walkways, together with roofs
- Vertical Transport - escalators, lifts etc.

No AV, ITS or CCTV assets have been included in the initial program due to time constraints however it is our intent to include these assets in the next audit.

Our data capture was aligned to ARCHIBUS naming conventions, utilising the life cycle modelling tool, Central Asset Management System (CAMS), developed by RMIT's Professor Sujeeva

Setunge, Deputy Dean, Research and Innovation, School of Engineering & Kanishka Atapattu, Research Fellow.

CAMS is a software tool developed for deterioration forecasting and life cycle modelling to enable maintenance and life cycle determinations to be optimised. This systematic asset assessment is backed and endorsed by significant research and utilised by a number of public sector Clients.

Industry benchmarks referenced used by CAMS include; • National Asset Management System (NAMS) • Local Government and Council • Manufacturers Life Expectancy

The condition assessment framework (figure 1) was used to physically assess 450,000m2 (GFA) of RMIT space and physical assets in Australia in early 2016. This framework ensured the highest and most comprehensive level of data quality input was used to calculate the University's total liability. A similar program has already been completed for our Vietnam Portfolio (March 2016).

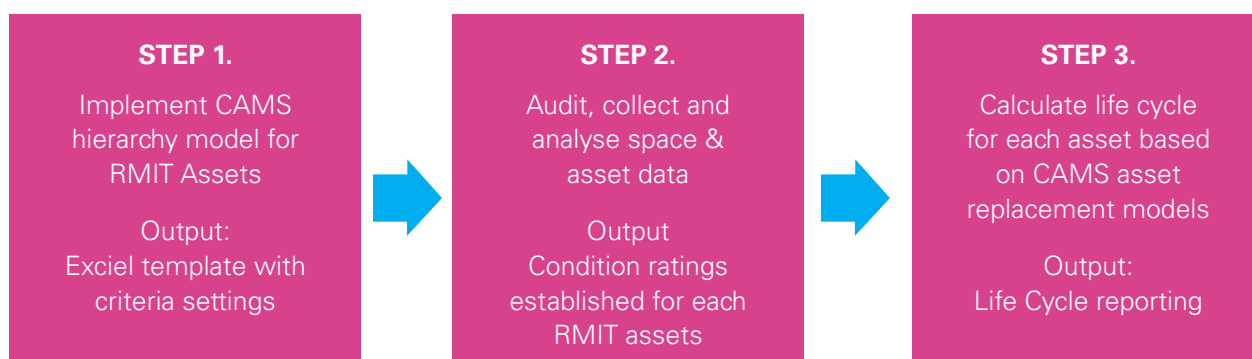


Fig.1: Life Cycle assessment framework

The condition assessment framework, definitions and ratings used are consistent with industry practice and are outlined below:

Condition Performance Standard	Condition Standard Rating	Rating
Excellent	Component has no defects; condition and appearance are as new.	5
Good	Component exhibits superficial wear and tear, minor signs of deterioration to surface finishes; does not require major maintenance; no major defects exist.	4
Fair	Fair Component is in average condition; surface deterioration requires attention; services are functional but require attention; backlog maintenance work exists.	3
Poor	Component has deteriorated badly; serious structural problem; general appearance is poor with eroded protective coating; elements are defective; significant number of major defects exists.	2
Very Poor	Component has failed; is not operational and is unfit for occupancy or normal use.	1

The life cycle of each asset is simply illustrated in figure 2 below. It highlights that as assets move through their life cycle the relative effectiveness of maintenance on the asset changes. While at the start of an asset's useful life asset management focuses on routine maintenance, this focus transitions to refurbishment and replacement as the asset condition deteriorates.

Optimal conditions to refurbish and/or replace assets in the effective life period addresses the following:

- Maximum effective life
- Economies of scale opportunities are maximised
- Forecasting capital with certainty and a smooth future cost profile.
- Maintaining operational efficiency and customising maintenance regimes based on criticality
- Reduction/elimination of asset failure

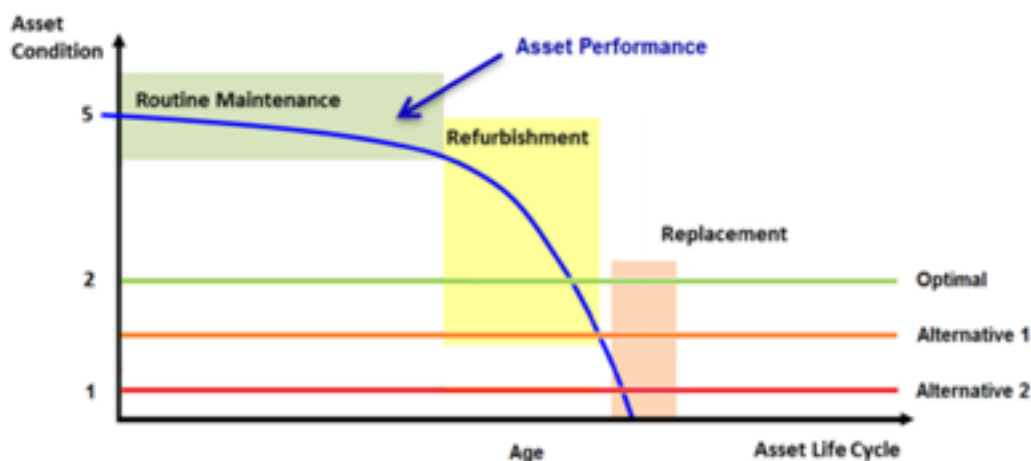


Fig.2: Asset Life Cycle Curve



- Enhancement of the student experience

Beyond the optimal life cycle replacement period, risks to asset availability increase and a more exaggerated cost profile will occur in future years. Whilst the life cycle program provides the 'optimum' period to refurbish or replace, the very nature of the program includes metrics to strategically review the impact of delayed refurbishment/replacement due to reduced capital funding availability. This feature has been implemented in CAMS and enables us to compare and analyse different scenarios.

Typical Scenarios	Refurbishment / replacement period	Cost Impact	Risk to Asset availability
Optimal	Optimal	High in the current period and low in future period	Low
Alternative 1	Delayed	Low in the current period and high in the future period	Moderate
Alternative 2	Significantly delayed	Low in the current period and significantly high in the future period	Very High

## 2. LIMITATIONS

- We are not able to benchmark life cycle analysis against other Universities because we are not aware of any other University performing or developing full life cycle modelling.
- The condition assessment has been undertaken based upon physical inspection, age and nature of use.

- There have been no reviews conducted relevant to potential impacts upon life cycle of any existing leases, our model assumes continuity of existing leases and conditions – i.e. a business as usual approach.

## 3. KEY STATISTICS AND LIFE CYCLE COST OUTCOMES

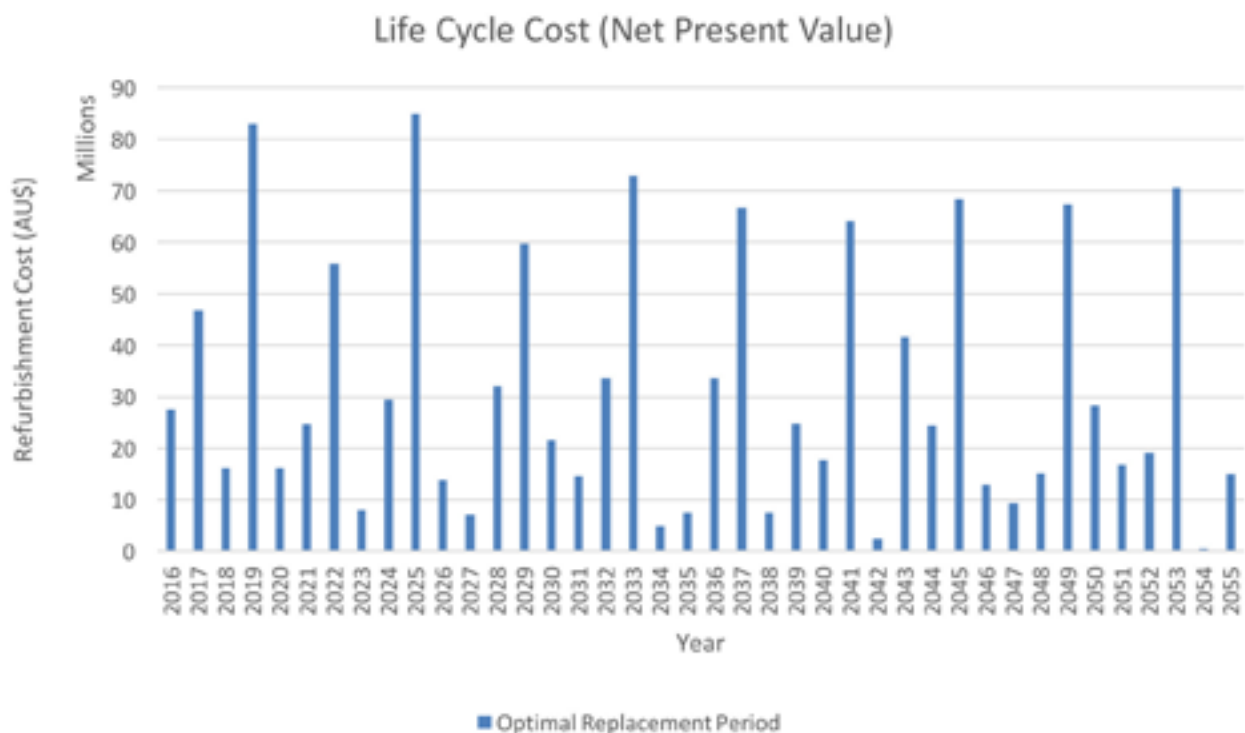
The raw data shown below is the total auditable information during the assessment. Condition assessments were carried out against each item.

Category types	Data Count
Finishes	39
Fittings	113,456
Internal Fabric	13,813
Internal Finishes	25,051
Services (physical assets)	20,010
Superstructure	10,362
Vertical Transport	608
Grand Total	183,339

It is important to note that the cost variation over the full life cycle of the building will only differ based on an annual escalation index – i.e. CPI or in this case 3%. Utilising the optimal scenario case the Australian campus 40yr life cycle outlook is illustrated in figure 3 below. The net present value over the 40 year outlook is ^\$867 Million (total future cash outflow is \$2.3 Billion). The key feature of this model shows a smoothing of capital expenditure costs over the period.

^ assumed CPI/Inflation rate of 3% and 5% WACC

Fig.3: Australian Campus Life Cycle Cost outlook



The 2017 life cycle outlook has been summarised in the table below. Both optimal and alternative life cycle program options are presented. The model recommends that \$46.8M be spent from a capital replacement program to ensure assets are optimally replaced to ensure reliability and delivery of facility services (noting excludes major capital works investment as project not handed over).

Life Cycle Program Options	Cost	Scope	Description
Optimal Option 1	\$46,841,849	All assets at Condition 2 (rated poor) or below	Best outcome to delivery full strategic benefits to Property portfolio ↓
Optimal Option 2	\$22,214,113	All assets at Condition 1 (rated very poor)	
Optimal Option 3	\$13,169,412	All very high & high risk assets at Condition 1 (rated very poor)	
Optimal Option 4 *	\$9,939,252	All very high risk assets at Condition 1 (rated very poor)	Significantly delay in asset replacement/ refurbishment & attract significant risks
Optimal Option 5	\$6,283,283	Targeting only specific critical assets at Condition 1 (rated very poor)	

\*Optimal Option 4 is the absolute minimum standard without significantly risking failure of critical equipment

Alternative life cycle program options are outlined to accommodate potential budget constraints; however this needs to be considered in line with relevant risks to asset availability. It is important to note that whilst short term capital outlay is minimised, the likelihood and consequence of asset failure increases as refurbishment / replacement periods are delayed.





## 4.ASSET LIFECYCLE MANAGEMENT BY RISK

Prioritisation of asset replacement need to be considered if choosing any of the delayed refurbishment / replacement scenarios. This is determined using the asset risk profiles. The Australian Standard AS/NZS 4360, Risk Management, includes a traditional severity and likelihood approach. However such an approach only assesses a single severity (consequences) at a time e.g.: cost or safety impact, and its likelihood of occurring. The RMIT Risk Management Procedure follows these principles.

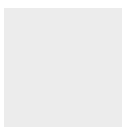
Based upon Reliability Driven Asset Management principles, a more sophisticated approach has been taken combining key factors affecting asset criticality (or consequence of failure) and asset condition assessment to identify its effect on the University, to support whole of life cycle asset management planning decisions.

Asset Risk score is the product of Asset Criticality score and Asset #Condition score. Referring to the Risk management matrix this will be low, moderate, high or very high. See figure 4 below. Once we understand the meaning behind the number, the criticality analysis model becomes a tool used to develop the asset lifecycle management program

#Condition score reversed in comparison to condition definition table on page 2.

Fig.4: Asset Risk Matrix

CRITICALITY	5	MODERATE	HIGH	VERY HIGH	VERY HIGH	VERY HIGH
	4	MODERATE	HIGH	HIGH	VERY HIGH	VERY HIGH
	3	LOW	MODERATE	MODERATE	HIGH	HIGH
	2	LOW	LOW	MODERATE	MODERATE	MODERATE
	1	LOW	LOW	LOW	LOW	LOW
		1	2	3	4	5
		CONDITION				



**CLICK** on triangle to view video presentation relating to this article  
*this content is available to AMC members only, see our affordable membership options*



## ARTICLE 3 – POWERSTREAM CASE STUDY

Boudewijn Neijens - Copperleaf, Canada

**Summary:** This case study explains Canadian electrical utility PowerStream's approach to defining its value and risk frameworks, and its rigorous capital planning and decision making cycle. The ultimate goal is to identify the highest value capital plan across the entire organization (including fleet, facilities, IT), while complying with the Ontario Energy Board's regulations and the internal 5-year capital constraints.

**Keywords:** Value framework, optimization, rate case, capital plan

## 1. POWERSTREAM'S BUSINESS

PowerStream is a regulated power distribution utility in Ontario, Canada owned by three municipal shareholders and serving over 350,000 customers in an 800 km<sup>2</sup> total service area. It owns over 60 substations, 45,000 transformers, 40,000 poles, 6,500 km of overhead lines and 8,000 of underground lines.

## 2. REGULATORY FRAMEWORK

All power utilities in Ontario are regulated by the Ontario

Energy Board under its 2012 Renewed Regulatory Framework for Electricity [1]. This new framework has a three-pronged approach to regulation including: incentive-based rate-setting; a 5-year capital planning cycle to support rate applications; and outcome-based performance assessments. The 5-year plan requirement is part of a wider vision to ensure an integrated approach to distribution network planning, as illustrated in Figure 1.

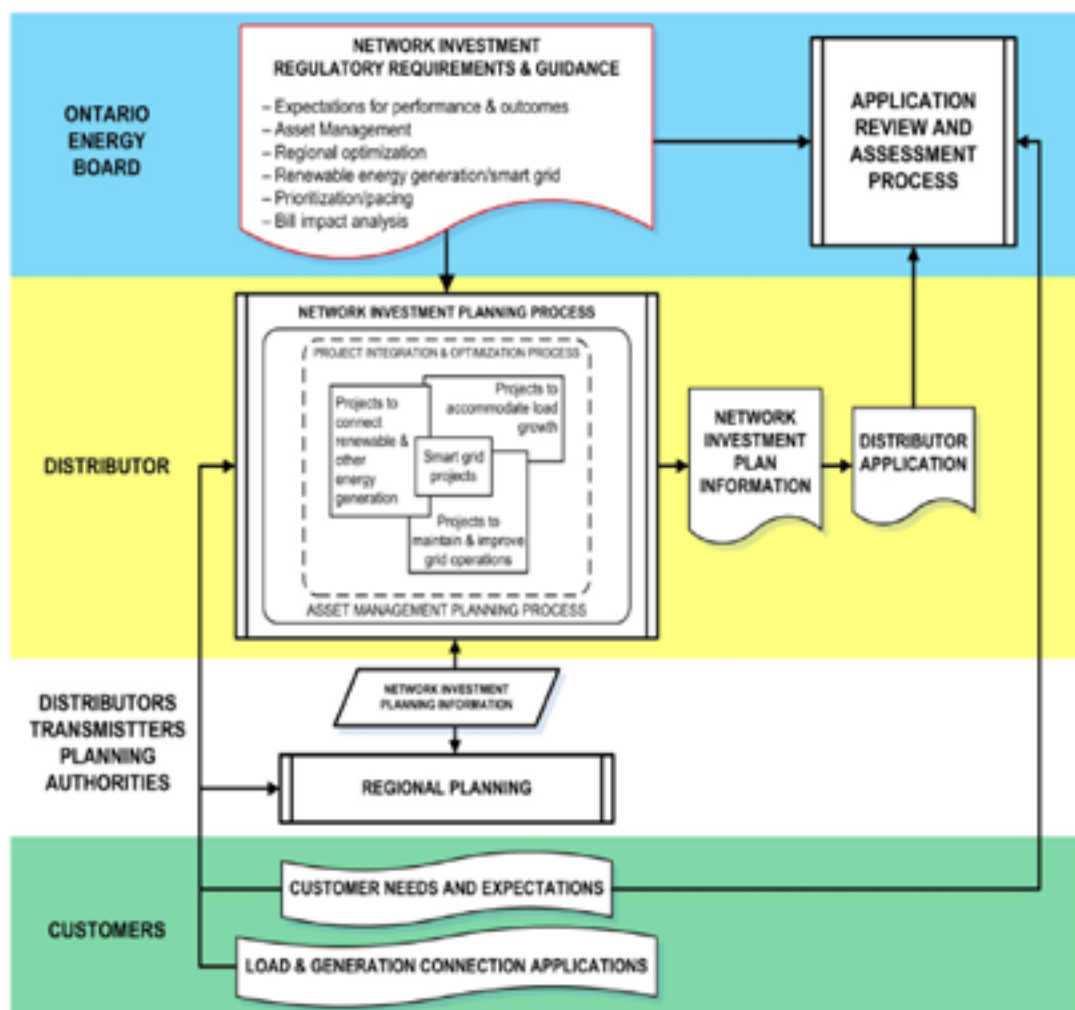
Figure 1: OEB's integrated approach to distribution network planning.

The OEB is increasingly seeking to reward utilities based on outcomes using prescribed metrics in the four following areas:

- Customer focus
- Operational effectiveness
- Public policy responsiveness
- Financial performance

It expects utilities to monitor performance metrics in all four areas, and has developed a list of typical metrics for each area as illustrated in Figure 2.

Fig 1. OEB's Integrated Approach to Distribution Network Planning





Customer Focus	Operational Effectiveness	Public Policy Responsiveness	Financial Performance
<i>services provided in a manner that responds to identified customer preferences</i>	<i>continuous improvement in productivity and cost performance; and delivery on system reliability and quality objectives</i>	<i>delivery on obligations mandated by government (specific legislation or via directives to the Board)</i>	<i>financial viability maintained; and savings from operational effectiveness are sustainable</i>
<ul style="list-style-type: none"> <li>• Customer complaints</li> <li>• Connection statistics</li> <li>• Connection of New Service</li> <li>• Reconnection</li> <li>• Telephone Accessibility</li> <li>• Appointments Met</li> <li>• Written Response to Enquiries</li> <li>• Emergency Response</li> <li>• Telephone Call Abandon Rate</li> <li>• Appointments Scheduling</li> <li>• Rescheduling a Missed Appointment</li> </ul>	<ul style="list-style-type: none"> <li>• Distribution Losses</li> <li>• System Average Interruption Frequency Index (SAIFI)</li> <li>• System Average Interruption Duration Index (SAIDI)</li> <li>• Customer Average Interruption Duration Index (CAIDI)</li> <li>• Momentary Average Interruption Frequency Index (MAIFI)</li> </ul>	<ul style="list-style-type: none"> <li>• Electricity Conservation (Kwh)</li> <li>• Peak Demand Reductions (KW)</li> </ul>	<ul style="list-style-type: none"> <li>• Current Ratio</li> <li>• Debt Service Capability</li> <li>• Interest Coverage</li> <li>• OM&amp;A Cost per Customer</li> <li>• Return on Equity</li> </ul>

Figure 2: OEB examples of performance metrics.

### 3. POWERSTREAM'S CAPITAL PLANNING PROCESS

For the last few years PowerStream has typically spent \$125M yearly on roughly 500 capital projects and programs. Under the impulse of the RRFE, the company decided in 2014 to review its capital decision making processes [2], seeking to answer the following questions:

- How did the distribution system perform?
- What needs to be done?
- What options are available?
- What options are best?
- What will get approved?
- How can we get the work done?
- How well did we do?

Historically the company's engineers had a tendency to submit every new project as "must-do," leading to ongoing painful debates on what should be funded or not, with little flexibility to defer or reject less valuable projects. This invariably led to the need for arbitration by the Executive Management team and much frustration across the organization.

Under the new process, projects are rigorously broken out into four classes:

- System Access: Investments that are modifications to PowerStream's system in which there exist an obligation to perform customer connections and comply with mandated service obligations. These projects generally belong in the "must-do" category since the utility has an obligation to serve its customers, but flexibility can

be added by deciding when to undertake the work (e.g. by combining various projects in a same area).

- System Renewal: Investments that involve replacing or refurbishing system assets to extend their service life. This class also includes system storm hardening and emergency work on existing assets. Under the new process, only work that is mandated by a regulator and/or mitigates a safety threat is considered mandatory; all other projects are discretionary.
- System Service: Investments that are modifications to PowerStream's distribution system to ensure that operational objectives are met and future customer requirements can be addressed. Includes network capacity increases, automation upgrades, station safety work

and smart grid projects. In theory only projects mitigating imminent safety threats are considered “must-do,” but some projects labelled as having a strategic importance for the company are also considered mandatory.

- General Plant: Investments that are modifications, replacements or additions to PowerStream’s assets where these assets are not part of the electrical distribution system (land, trucks, computers etc.). These are generally considered discretionary.

This classification means approximately 40% of the projects are now truly discretionary, and of the remaining 60% only compliance and safety-related projects are truly non-negotiable.

The balance of the projects has some flexibility in timing and/or scope. For instance, large renewal programs such as cable replacements might be capped to avoid them consuming too big a portion of the available resources.

#### 4. VALUE-BASED DECISION MAKING

The OEB encourages utilities to adopt a value-based and risk-informed decision making framework, in line with the principles of ISO 55001. This has prompted PowerStream to adopt an Asset Investment Planning and Management methodology and system that aligns closely with ISO 55001. Figure 3 illustrates the four key steps of the process:

- Identification of the value and risk metrics that allow PowerStream to quantify the alignment of its decisions with its corporate objectives.
- Calibration of all criteria by using a value and risk framework that normalizes all metrics and optionally applies weights to specific metrics to emphasize specific objectives (e.g. a focus on safety).
- Assessment of all projects and programs using the same metrics.
- Optimisation of portfolios of projects and programs that are competing for finite financial and human resources.

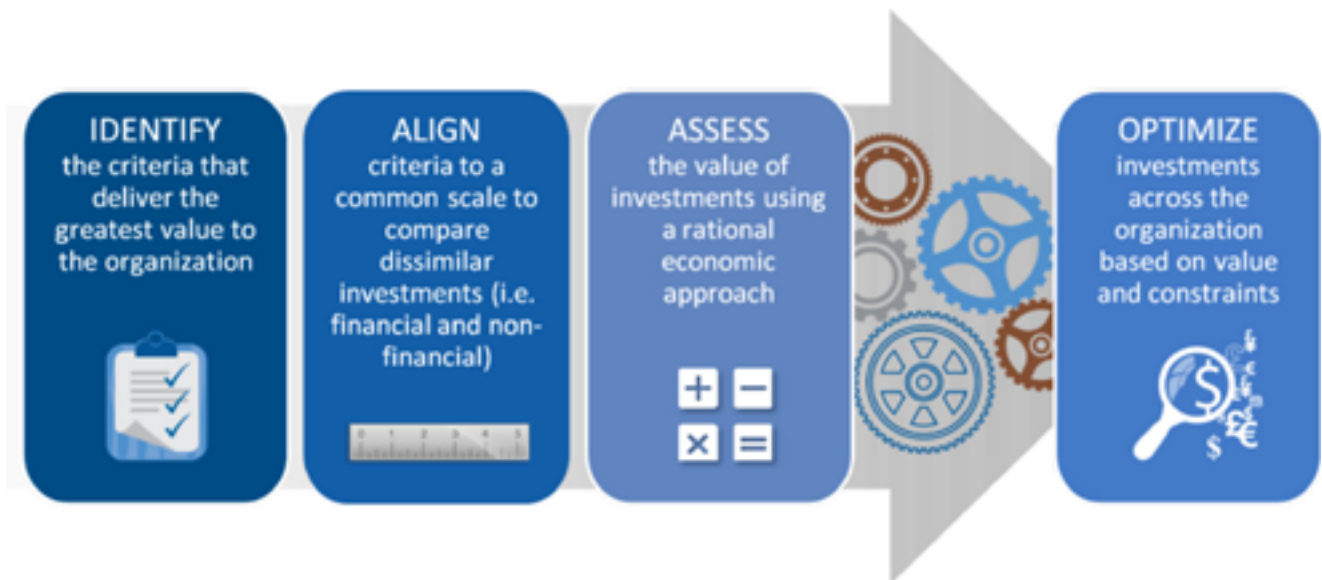


Figure 3: Value-based decision making framework at PowerStream.

#### 4.1 Identification and Calibration

The first step requires the identification of metrics supporting PowerStream's corporate objectives, broken down into the four major areas of interest to the OEB as described in Figure 4. For each of the stated objectives, PowerStream has identified at least one applicable metric (e.g. F3 and F4 might call for a Capital Financial Benefit, which computes the savings in internal and external labour costs plus other quantifiable cost savings resulting from a capex intervention). The company has identified a total of 19 metrics (7 risks, 10 benefits, 2 cost streams) which are all normalized to a common scale.

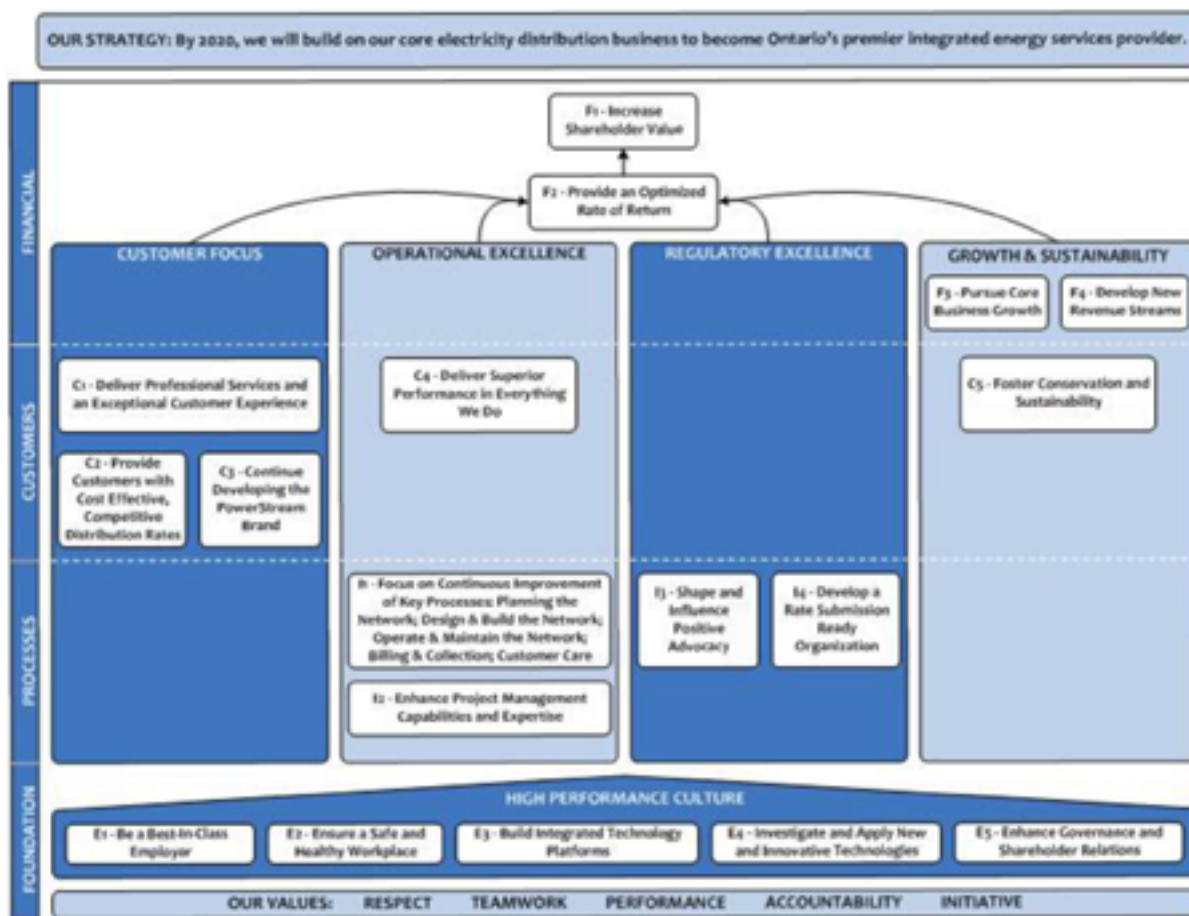


Figure 4: PowerStream's corporate objectives plotted against the four key OEB areas.



## 4.2 Assessment

Every capex project and program planned within the coming five years is captured in the AIPM system by its project lead. The engineering team must explore and document a number of alternatives (or options) for each project, and a full forecast of expenditures and resource requirements is entered into the system. Projected benefits and risks are quantified using predefined questionnaires that automatically compute the overall benefit and risk scores based on the metrics defined above. Typical assumptions such as burden rates, interest charges and inflation are automatically applied to ensure consistency. The use of standardized questionnaires is especially important, as it allows for easy peer reviews of assumptions and prevents project leads trying to “game” the system.

Programs are used to capture ongoing work (e.g. pole replacements) and to quantify how work will be distributed over the years to come. The project work planned for the coming year is then broken down into smaller time-limited projects for inclusion in the budget.

## 4.3 Optimization

Once all newly proposed projects have been entered into the AIPM system, and multi-year projects have been updated based on the latest forecasts, the project plans

are submitted to management for approval. Approval cycles first focus on the merits of individual projects taken in isolation, and then on comparing projects within each department.

## 4.4 Validation

A central planning group then validates the computed benefit and risk values for all projects, in preparation of a formal optimization process where projects will be ranked based on overall value contributed to the company. This optimization will honour multiple constraints, both for the overall portfolio of projects under consideration (e.g. financial constraints) and for specific asset classes or programs (e.g. put a limit on the spend per asset class to avoid “winner takes all” situations). The optimization process can honour prior commitments (e.g. projects already under way), mandatory projects (e.g. compliance-driven) and “strategic” investments (that didn’t score well based on value but are considered as essential by management).

## 4.5 Constraints and Time Variance

The optimization system uses a multi-criteria decision analysis engine which will identify the combination of project alternatives and timing that delivers the highest value, while honouring all the constraints. In addition to resource constraints, the system must also honour risk tolerances:

a project that is discretionary when first proposed might become mandatory if deferred, because it mitigates an asset failure risk that increases over time and eventually reaches an unacceptable level. This highlights the importance of capturing all project data as time variant since costs, value and risks all evolve with time. Uniquely, PowerStream crosses all departmental silos during this optimization process: IT, fleet and facilities investments are put in direct competition with substation, smart metering and power line projects.

## 4.6 Scenarios

Since PowerStream does not know what level of capex spend will eventually be approved by the OEB, it runs multiple optimizations reflecting different funding scenarios (e.g. on target, -10%, -20%). A sensitivity analysis will reveal which projects (and within each project, which alternative) are most robust. Management will compare the various scenarios and apply its own judgement to determine which scenario will most likely gain approval from the Executive team and from the Board. PowerStream refers to this last stage as finding the best balance between “science” (i.e. mathematical optimization) and “art” (i.e. the ability of Management to inject more subtle and political considerations).

## 5. KEY FINDINGS

PowerStream has been gradually implementing its value-based decision making framework since 2014. The process, based on a commercial off-the-shelf asset investment planning and management system, has significantly improved its ability to respond to the OEB's new demands. Key findings to date are:

- Optimization is only as good as its inputs. A significant effort to develop consistency through questionnaires paid off by making projects comparable. Approval cycles are important and ensure every project becomes truly comparable by eliminating the biases of various project sponsors. Consolidating all asset and project data in a single data repository frees up more time to focus on data quality, ensuring better and more credible optimization results.
- If users like the process, they are more likely to buy into the results. The natural resistance to change and the “what’s in for me” question need to be addressed up front. Creating electronic business cases for all projects initially seemed more work-intensive, but turned out to be more effective and less error-prone than the prior method. The transparency of the whole process (including how the value and risk framework was created) helped create buy-in for the results. It also ensures that the consequences of decisions changed by Management are visible and better understood.
- A robust process instills confidence at the Executive level. It takes a while to gain the trust of General Management for any new decision making process. A phased approach allowed for refining of the process, and the use of comprehensive and rigorous process reduced scepticism. This resulted in 80% time reduction in Senior Management involvement

in capital planning once the system was fully operational – and ensured the remaining 20% of the time was focused on developing and approving truly defensible plans.

## 6. REFERENCES

- [1] Ontario Energy Board, Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach, Ontario, 2012.
- [2] PowerStream Inc., 2016 to 2020 Custom IR Rate Application, File No. EB-2015-0003, Section III, Ontario, 2015.

## 7. BIBLIOGRAPHY

International Organization for Standardization, ISO 55001:2014: Asset management - Management systems - Requirements, First Edition, Geneva, 2014.

Copperleaf Technologies, Value-based Decision Making, White Paper, [www.copperleaf.com](http://www.copperleaf.com), Vancouver, 2016.



**CLICK** on triangle to view video presentation relating to this article

*this content is available to AMC members only, see our affordable membership options*

# Asset Management in Action Webinar Series



The Asset Management Council is pleased to present a series showcasing projects from our Excellence Awards finalists during AMPEAK16 and 17.

12th  
September

**A Unique Solution for Asset Integrity Management**

*by Dr Yvonne Power*

26th  
September

**Advancing Decision Support in Asset Management**

*by Mike Schulzer, ActewAGL*

10th  
October

**OneAsset System Integration and Data Visualisation Framework**

*by David Scott, Wave Digital*

24th  
October

**Program of Work Balance Model**

*by Tim Purves, Icon Water*

7th  
November

**Development of an Asset Information Submission Guideline**

*by Richard Lu, Sydney Trains*

21st  
November

**Infrastructural Condition Monitoring**

*by Jun Li, Curtin University*

5th  
December

**Creation of the Route Design for Auckland Transport Light Rail**

*by Josh Symonds, Arup*

19th  
December

**Plant Audit of a Mining Company & Life Extension of Gas Powered Generators**

*by Mark Mackenzie, K2Techno*

Join us every  
second  
Tuesday for an  
online  
lunchtime  
presentation

**Tuesdays  
@ 1pm  
AEST**

**Free for  
Members**

\$30 for non-  
members

**Details and Registration:** <http://www.amcouncil.com.au/education-networking/webinars.html>

# Tutorial 11

## Capability Model – Systems Engineering

### 1.1 SYSTEMS ENGINEERING

Systems engineering is a well-documented and standardised process and can be defined as an interdisciplinary engineering management process to evolve and verify an integrated, life cycle balanced set of system solutions that satisfy customer needs.

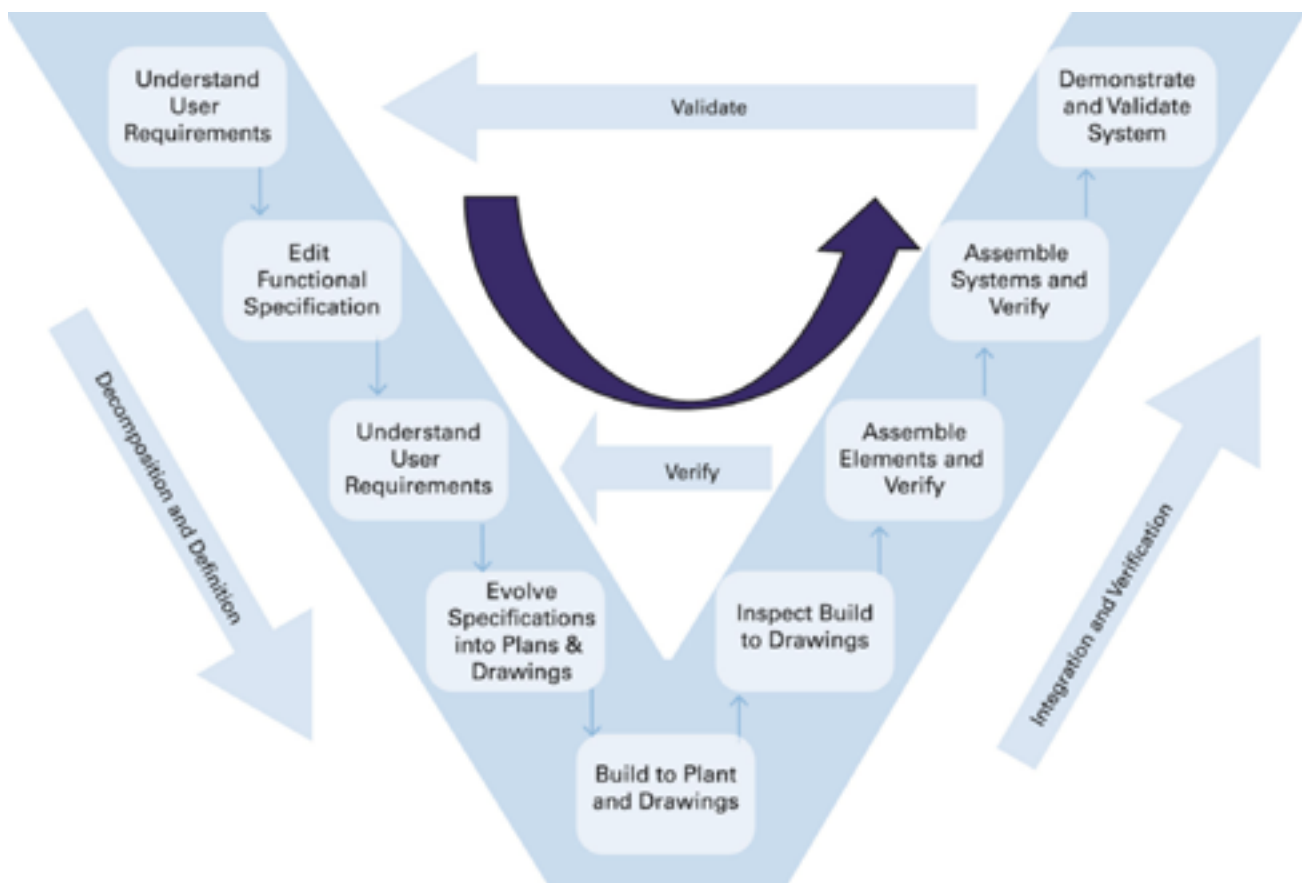
A simpler definition would be “the translation of a set of stakeholder requirements into a balanced and verified solution”.

The verification process is carried out to ensure that the outputs of the design stage (or stages)

meet the design stage input requirements. The solution is verified by checking that system specification requirements, which are measurable and hence testable, are achieved layer by layer, from performance requirements into sub systems, equipment and parts.

Design validation is the process of ensuring that the final product conforms to defined user (customer) needs and/or requirements. The Systems Engineering “V” Process is shown in Figure 1.

Figure 1: Systems Engineering ‘V’ Process

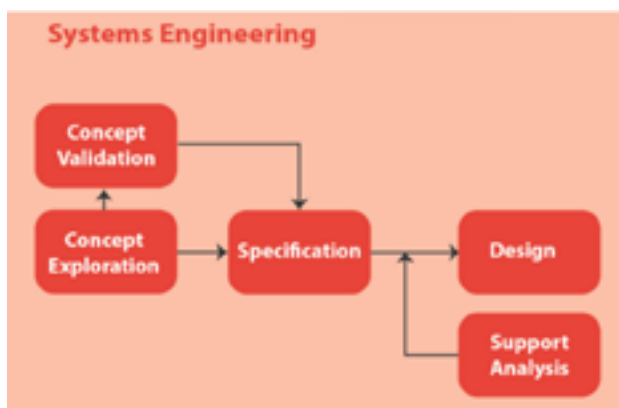




The solution achieves balance by using lowest life cycle cost as a balance between what is paid today (design and manufacture, sometimes called capital expenditure or CAPEX) against what is paid tomorrow (maintenance and operation, sometimes called operating expenditure or OPEX).

Systems engineering is at the very core of the Capability Delivery Model. It is a connective tissue linking stakeholder needs at the front end of the model to the all the asset related expenditure required to assure agreed service capabilities. It can be argued that all the finances of an asset dependent organisation go either directly into the conduct of asset acquisition/dispose, operations and maintenance or to the enabling functions that support those tasks.

Fig 2. Systems Engineering in the Capability Delivery Model



## 1.2 SYSTEMS ENGINEERING COMPETENCY ELEMENTS

### 1.2.1 Concept Exploration and Validation

“Concept” is the first stage in the asset management life cycle. This stage can apply to a variety of asset scopes from whole networks and large petrochemical facilities to incremental improvements involving new equipment and systems. This stage commences with the identification of a need that could be met by the provision, replacement or upgrading of an asset.

Concept exploration represents the initial exploration, fact-finding, and planning period, when economic, technical, strategic, and market bases are assessed

through stakeholder and market survey, feasibility analysis and trade-off studies. Alternative solutions to meet an identified need are also developed.

Concept validation involves development of experimental or prototype models and removal of any high-risk aspects that may be evident in the conceptual solution. Support systems needed across the life cycle are also identified and included in the evaluation of alternatives to achieve a balanced life cycle solution.

Typical outputs of the concept exploration and validation stage are stakeholder requirements, concepts of operation, assessment of feasibility, preliminary system requirements, outline design solutions in the form of drawings, models, prototypes, etc., and concept plans for enabling systems, including whole life cost and human resource requirements estimates and preliminary project schedules. Stakeholder feedback to the concept is obtained.

Implementation of this stage requires appropriate methods, techniques, tools and competent human resources to undertake market/economic analysis and forecasting, feasibility analysis, trade-off analysis, technical analysis, whole life cost estimation, modelling, simulation, and prototyping. At the completion of this stage, decisions such as whether to continue with the development of a solution in the following specification stage or to cancel further work are made.

### 1.2.2 Specification

Engineering specifications provide the design basis for equipment to be designed or purchased and become part of the configuration documentation for an approved design. They range in complexity from a comprehensive document that describes the functional and performance requirements, to a simple “one page” statement of requirements.

Specification commences with a detailed understanding of the functional requirements and outline of a feasible solution that can be achieved with manageable risk. Planning for this stage begins in the preceding stage to ensure the organisation has the necessary capabilities available to undertake acquisition (if needed) by whatever method is chosen. The capabilities include methods, techniques,

## Tutorial 11 Capability Model



tools and competent human resources. Developing this information set is a complex task and has profound implications for the remainder of the asset life cycle.

The outputs of this stage must be sufficient to enable the managed acquisition of assets (as part of the CAPEX) and their necessary support such as operational and maintenance capabilities (as part of the OPEX). Additionally, the hardware, software and operator interfaces must be specified, and the functional requirements for integrated support defined.

To reduce error, most organisations use defined specification formats and content. Specifications also provide the necessary hooks into company-specific standards and policies, enabling the company to specify not only what is to be achieved, but also provide its view of what is the range of acceptable design solutions and practices.

### 1.2.3 Design

Design is both the process and the end product. The design competency element translates requirements into solutions which are represented by structured data such as a drawing or plan or process description. Design in this case can be defined as:

- Design (verb) - “the process of defining, synthesising, selecting, and describing solutions to requirements in terms of products and processes”; and
- Design (noun) - “the product of the process of designing that describes the solution (conceptual, preliminary or detailed) of the system, system elements or system end items”.

Effective design management is essential to maintain the safety and integrity of assets and to comply with state and industry statutory obligations. It enables the business to obtain and maintain quality accreditation such as AS/NZS ISO 9001 and to

deliver a quality design service in support of the business outputs.

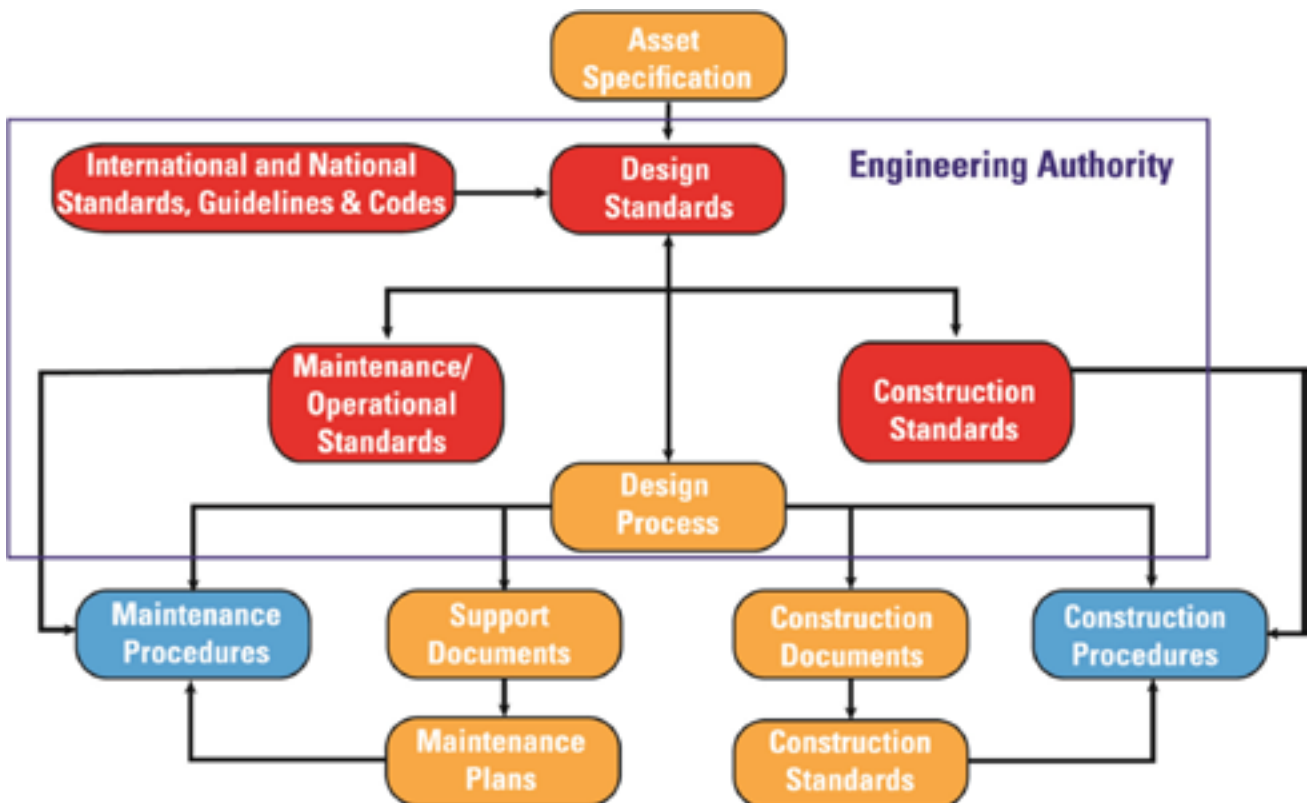
The key design tools in determining likely risks of failure in terms of operational and maintenance impact is Failure Modes Effects and Criticality Analysis (FMECA). The FMECA process is best conducted during design, when improvement options are relatively cheap to implement while only paper/electronic media is involved.

Inevitably, design work involves the application of established design principles, rules and standards to meet the requirements of a specification for new or altered infrastructure. These are known as design standards.

Selecting and applying design standards is integral to the design activity and essential to achieving appropriate levels of safety and integrity. Inappropriate use of standards that considerably exceed needs can substantially increase the cost of construction and maintenance. The application of design standards leads to the creation of two supporting standards as shown in Figure 3.

As shown in Figure 3, an asset specification leads to a design solution achieved by a design process applying design standards. This solution comprises support documents such as maintenance plans and associated enabling capabilities such as personnel, training, spares, etc. Plans are developed both for construction and

Figure 3: Application of Design Standards



maintenance actions which refer to procedures for each task in the plan. These procedures refer to standards where necessary, to define the limits.

## 1.2.4 Support Analysis

Asset support requirements are the wherewithal that enable a design solution to achieve its output capability today, tomorrow and for the duration of the intended life of the design.

Support analysis involves analysing support needs, over the life of the asset, to optimise

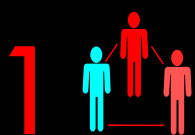
where to invest money. The greatest challenge in the support analysis process is, if there is only certain funding available, how is it spread amongst these support elements, which all affect each other and also impact on dead and live time? This is the greatest challenge in asset management for engineers, statisticians and data collectors.

The advantage of having determined support analysis during the development of the design solution is that when the asset is acquired, there is

enough time to buy the support for it. Required support should be in place on the first day of the commissioning function and in fact its verification should be part of that commissioning activity. It matters little that the asset is brand new: it can, and will, fail if the right spare is not available or the staff are not trained appropriately. Without required support, the design intent of the asset will not be achieved and the business case will be compromised.

# TOP 9 Asset Management Issues in 2017

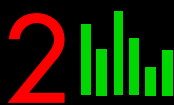
As a lead up to AMPEAK17 the AMCouncil asked members what their greatest asset management issue is in 2017. The responses were grouped into nine categories, shown below with their respective figures.



1 17.8%

## Internal organisational Leadership & Cultural Issues

Reported issues that pointed to poor leadership and culture in the workplace-such as "pass the buck" culture. Lack of communication between business teams, and confusion as to who is responsible when something goes wrong.



2 15.6%

## Information Management

Implementing and managing data and analytics around asset management was seen as an issue from the responses collected. Some concerns were implementing the data correctly, delegating responsibility of the asset management data to the right person, and keeping up with technological advancement and industry trends, such as BIM.



3 11.1%

## Frameworks & Systems

Obtaining certificates and implementing for ISO550001 across organisation was an issue. Developing a strategy that works effectively and reliably across all asset types is a goal that all businesses have as part of their strategy.



4 11.1%

## Ageing Assets

Issues with ageing assets affect a number of sectors, mainly with infrastructure. The challenge is to best implement funds to maintain the condition of these assets.



5 11.1%

## Funding

Funding models are constantly changing, and cuts are being made to infrastructure renewal and maintenance budgets. Customers also have less income to invest, so optimisation of maintenance costs due to commodity prices rising, which is a challenge.



6 8.9%

## Population growth/decline

Population growth, especially in big cities, means less infrastructure is available to stakeholders. On the other hand, a decrease in population, particularly in rural areas will enable local councils to manage assets. One last factor is climate change; which can determine where people live.



7 8.9%

## Collaboration

Responses suggested that a possible solution to maintaining the condition of large, ageing assets, was for rural councils with similar demographics and geographic characteristics to collaborate and put the customer at the heart of the business.



8 8.9%

## Showing the value of AM

Asset owners don't always see the value in investing in asset management, which is an issue many outlined. Developing a business case to influence the thinking of Executive Decision Makers was suggested as a means for sustaining asset long term asset performance.



9 6.6%

## Regulation

Saw an issue balancing industry practices with decision-making process..





ASSET MANAGEMENT COUNCIL INTERNATIONAL

empowering  
sustainable  
change

# 2018 AMPEAK

ASSET MANAGEMENT COUNCIL INTERNATIONAL CONFERENCE

"The AMPEAK conference is the key meeting place for thought leaders in asset management across all industries"

**SUNDAY 15 APRIL -  
WEDNESDAY 18 APRIL 18**

Wrest Point, Hobart Australia

[www.ampeak.com.au](http://www.ampeak.com.au)

## AMPEAK 18 HOBART CALL FOR PAPERS

We would like to invite professionals, students and organisations from asset intensive industries and academia to apply to present their asset management technical and research developments at AMPEAK18 Asset Management Conference 2018

**ABSTRACT SUBMISSIONS  
CLOSE 30TH NOVEMBER 2017**

**AMPEAK18 THEME IS "ASSET MANAGEMENT –  
EMPOWERING SUSTAINABLE CHANGE"**

AMPEAK18 will consider common asset management challenges and share solutions that may be from academia, from a maintenance practitioners experiences an asset management journey or from a specific industry sector. Eight sub themes have been identified under the conference theme of empowering sustainable change as follows:

### **KEY DATES:**

Abstract submission closes  
**Thursday 30th November 2017**

Final paper submitted **Friday 9th March 2018**

For details and to submit your abstract  
go to <http://www.ampeak.com.au>

**Leadership  
and Culture –**  
how do you embed  
an AM culture?

**Technology &  
Innovation –** how  
to use to drive  
empowerment

**Sustainable  
Asset  
Management  
Planning**

**Measuring  
Sustainable  
Impact –** what data  
do you need?

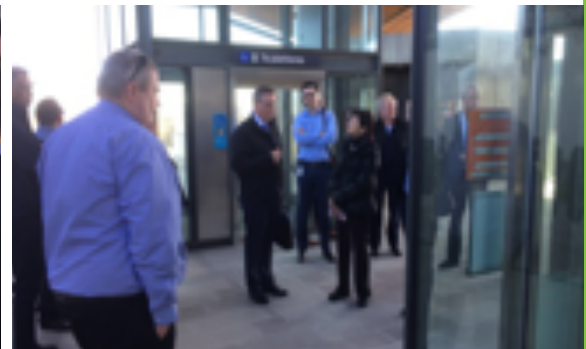
**Shared value**  
– value of AM  
to community,  
organisations,

**Equipping  
yourself and your  
workforce** for a  
sustainable  
future

**Legal**  
aspects of asset  
management

**ISO5500x & AM**  
Frameworks,  
Standards,  
Certification

# CHAPTER NEWS



## WHAT'S HAPPENING IN THE SYDNEY CHAPTER?

**The last quarter has been a big one for Sydney with large turnouts for each of their monthly events. The most recent of which, held on 17th August, saw a busload of twenty keen attendees taken out on an exciting and interactive Sydney Metro Site Tour.**

The guided tour was an excellent opportunity to view and get up-to-date with this huge infrastructure project. The tour was taken by Alexander Lawrance, Stakeholder Management Advisor of Sydney Metro, and concentrated on the infrastructure along the north-west corridor and the prototype facilities built for the Metro project to date.

Tour highlights included the opportunity to view a station prototype, the Sydney Metro

Trains facility site, the Cudgegong Road station site, the Sky train site and a life sized model train. It was an excellent visit with plenty of chances for Q&A with the tour guides from Sydney Metro and raised positive feedback from many of the people who came.

Thank you to Roland, the wonderful driver from Sydney Coach Charter, who provided comfortable and timely transport in getting us to all of these sites and enabled a good view of specific features along the corridor.



## WHAT'S HAPPENING IN THE ADELAIDE CHAPTER?

**On the 19th July, our Sensei Jim Kennedy attended the INCOSE International Systems Engineering conference in Adelaide to participate in a ninety minute panel session. The session, entitled 'Systems Engineering and Asset Management, Two Sides of the Same Coin' explored the common ground between Asset Management and Systems Engineering. The four panel members each gave a ten minute opening warm up then faced the enquiring minds of the systems engineering audience.**

Jim's talk focussed on the role of system engineering as core technical discipline for asset management. The adoption of systems engineering in the published 1993 asset management model, later adopted by the AM Council, emphasises how long ago a systems approach had first been applied to the evolving approach to asset management. Case studies from the successful Sydney Airport link and the application of the asset management model to achieve long term organisational change were presented.

The questions from the floor provided some insight into the interest in asset management as a key stakeholder in the systems engineering discipline. In particular the value of ISO/IEC 15288:2015 Systems engineering – Systems lifecycle processes, was emphasised along with its relationship to key AM Council models in particular, the recently published IEC 62775TS Technical and Financial Process in Asset Management. Hopefully the opening of new doors for system engineers will result in closer collaborative relations between the two disciplines to the benefit of both.

Since Jim was in town it seemed a good idea to have a local chapter session and leverage off the INCOSE theme. This event titled 'Leading Edge of Asset Management' top and tailed Jim's presentation with two excellent sessions on asset modelling work being conducted by students and staff at University of Adelaide. These sessions presented by Seyed Ashkan Zarghami (PhD Student) and Indra Gunawan (Faculty) demonstrated the value of maths based quantitative modelling and supported Jim's theme of 'Achieving the Defensible Budget' as the key leading edge capability for all asset management focussed organisations.



The session focussed on the concept of a defensible budget developed during work done by Jim for the Maritime Division in the former Defence Materiel Organisation. The approach assures that budgetary requests can be defended from arbitrary change unless there is a commensurate rebalancing of performance and risk as required by ISO 55000.

The Adelaide Chapter is growing and they are keen to up the amount of events being held there to accommodate this growing interest so look out for more happening in the area in the near future.

# CHAPTER NEWS



Keith Paintin



Mick Drews



Marc Avery

## WHAT'S HAPPENING IN THE BRISBANE CHAPTER?

**The latest Brisbane Chapter Seminar was held on the 12th July, 2007. The 50+ strong audience were informed about managing assets within a constrained environment based around the water industry.**

The event was chaired by Ken Chapman and the audience heard from three engaging speakers: Mick Drews, Program Manager from SeqWater; Marc Avery, Executive Coordinator Asset Investment Planning from Gold Coast Water and Waste; and Keith Paintin, Engineering Asset Management Technical Leader

from Jacobs.

Mick's informative presentation considered the challenges in planning for long term supply security when different parts of the region can be suffering from flooding and water restrictions at the same time. Mick also highlighted the work that was being done to engage with the customer and garner their thoughts and views on SeqWater's plans. Marc's topic was focussing on prudence and efficiency which was entertaining.

These two factors are crucial within asset management to demonstrate long term stewardship decision making. Keith's focus was on customer expectations and regulatory developments from a UK perspective.

This session provided an insight into where Australian water regulation may go from a customer viewpoint and their increasing influence on Water industry activities. To conclude the event, there was an opportunity for the audience to engage with the speakers in an



## WHAT'S HAPPENING IN THE CANBERRA CHAPTER?

**The Canberra Chapter of the Asset Management Council hosted a joint meeting with the Australian Institute of Project Management PMO Community of Practice, on Tuesday 11th July, 2017, at which two of Jacobs highly experienced consultants explored how the project management and asset management disciplines offer complementary philosophies**

**and techniques through their respective Bodies of Knowledge (BoKs) that present opportunities to enhance outcomes to an enterprise.**

During an excellent presentation, they provided informed insight and practical examples of how each community can learn from and work with each other. The well-received presentation stimulated a most informative discussion at the end of the evening from the more than sixty leaders in the two fields from a diverse range of industries, spanning both the public and

private sectors, who had braved a chilly Tuesday evening in Canberra.

The presenters, Noel Watts and Andrew Waye educated the audience and made a significant contribution to the level of understanding in these professional communities into how asset management and project management can effectively work together.



# CHAPTER NEWS

## WHAT'S HAPPENING IN THE MELBOURNE CHAPTER?

**The Melbourne Chapter's latest August technical session was focussed on capability development in asset management. Sandy Dunn, AMC member from the Perth Chapter and Managing Director of Assetivity, presented a range of views on the subject and generated a lot of interest. More than forty people attended the session at Engineering Australia's Melbourne facilities.**

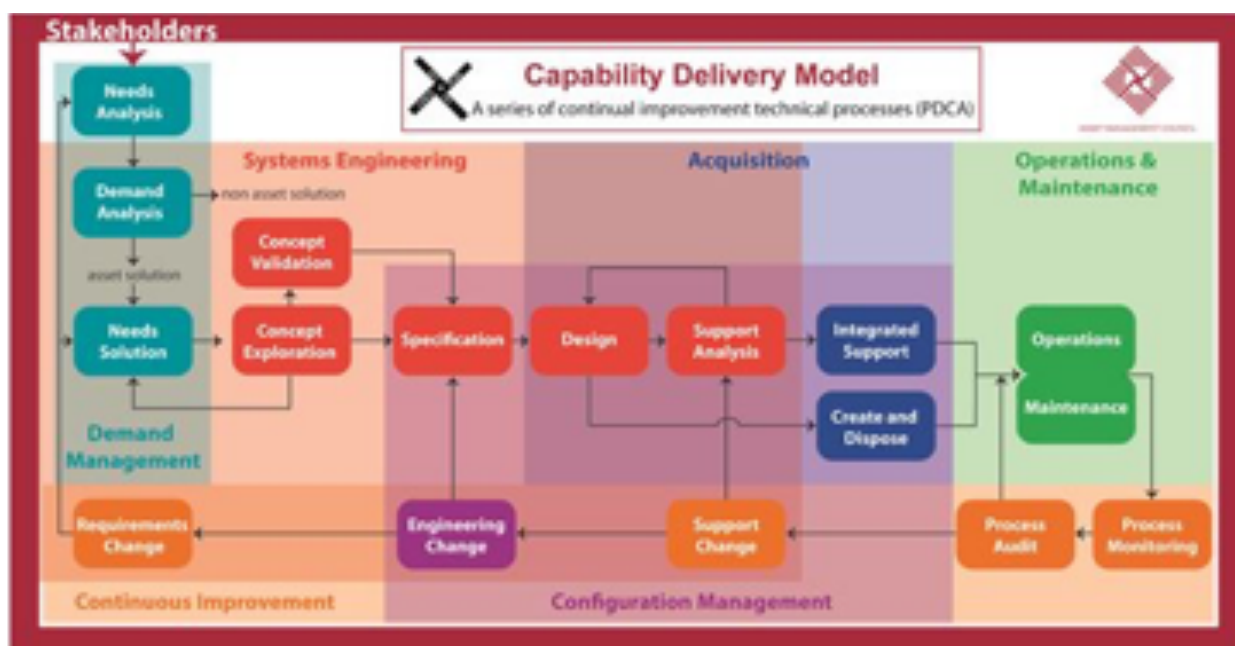
This session discussed the application of a Capability Development Model, its strengths and opportunities for improvement. The terms 'capability', 'competence'

and 'maturity' are frequently used when discussing an organisation's ability to deliver value from its assets - sometimes interchangeably. But these concepts are all quite different. Sandy discussed the differences between 'capability', 'competence' and 'maturity' and how each contributes to the achievement of improved asset management performance.

He also presented examples of organisations that are working to improve their capability, competence and maturity in Asset Management, and the lessons that can be learned from those experiences. T AMC Melbourne chapter was also pleased to host a joint technical session with the Australian Cost Engineering Society (ACES) on the use of the Total Cost

Management Framework (TCMF) when implementing ISO 55001 earlier, on the 18th July, 2017. Tom Carpenter and Dwayne Pretli were the guest speakers.

Tom spoke about the relevance of the TCMF for asset management practitioners, particularly for measurement and reporting of the value derived from the assets under management. Dwayne talked about his experiences on the first accreditation in Australia to the ISO 55001 standard - for management of water treatment plant at the MCG - and the use of total cost management methods to record, track and report benefits to the asset owner. About 70 people attended the event on a chilly Tuesday evening in Melbourne.





Peter Kohler



Philip McFarlane



Raymond Tan

## WHAT'S HAPPENING IN THE OVERSEAS CHAPTER?

**A special late afternoon, technical discussion for the AMCouncil New Zealand was held on Monday 21st August 2017 in Auckland. The topic of discussion was financial models for long term asset management planning.**

On our guest panel of presenters was Raymond Tan from Auckland City Council who spoke on developing financial models for

long term asset management planning. Philip McFarlane from Opus spoke about a research project for the UC Quake Centre and development of a framework for renewals planning for wastewater networks. Lastly, AMCouncil's own Peter Kohler presented on how to develop a 'defensible' maintenance budget.

It was insightful to look at the similar challenges from different perspectives throughout each presentation but, more importantly, the informal conversations before and after

the presentations highlighted further opportunities for the AMCouncil to have a strong presence in New Zealand. It was great to have a full room of our New Zealand members participating in what we hope will be the start of more events for our members across the sea.





## ARTICLE 4 – FINANCIAL MODELS FOR LONG-TERM ASSET MANAGEMENT PLANNING

Local government authorities have to deal with the major challenge of prioritising which assets need immediate attention, and how to budget for their gradual deterioration and replacement, while also managing desired levels of service delivery throughout the assets' life cycle.



In this article, we examine financial models for long-term asset management planning from a New Zealand perspective, based on a presentation by Raymond Tan, Head of Asset Management Intelligence Support at Auckland Council.

## AUCKLAND, NZ – POPULATION AND ASSETS

Auckland Council provides services to a population of 1.6 million over an area of about 4,900 km<sup>2</sup>. Its asset base will grow from \$42 billion to \$60 billion through the 2015-25 period. The capital budget for 2017-18 is around \$279 million and it's predicted that in 2017-18, council rates will rise 2.5% on average.

The city's population is growing at a rapid rate, and facilities have to keep pace – by 2045, the population of Auckland is expected to be 2.2 million. Investment in housing, community facilities, public amenities that contribute to well-being need to be well considered in advance, and hence more financial outlay is required.

To pay for this expansion of services, council can call on central government funding, increased lending from banks, user charges, or increase rates. Refer Fig 1. Understanding Auckland's Growth and How We are Going to Pay For It.

Source: Auckland Council Annual Budget 2017/2018 Volume 1, page 6

Some of the current asset management challenges for Auckland Council are:

- Extending the useful life of aging facilities.
- Re-configuring facilities to consolidate space or accommodate increased levels of service expectations.
- Meeting evolving facility-related standards for health and safety, accessibility, environmental quality, and climate change.
- Optimisation or rationalisation of poor or non-performing facilities.
- Finding innovative ways and technologies to maximise limited resources to address challenges.

Figure 1: Understanding Auckland's Growth

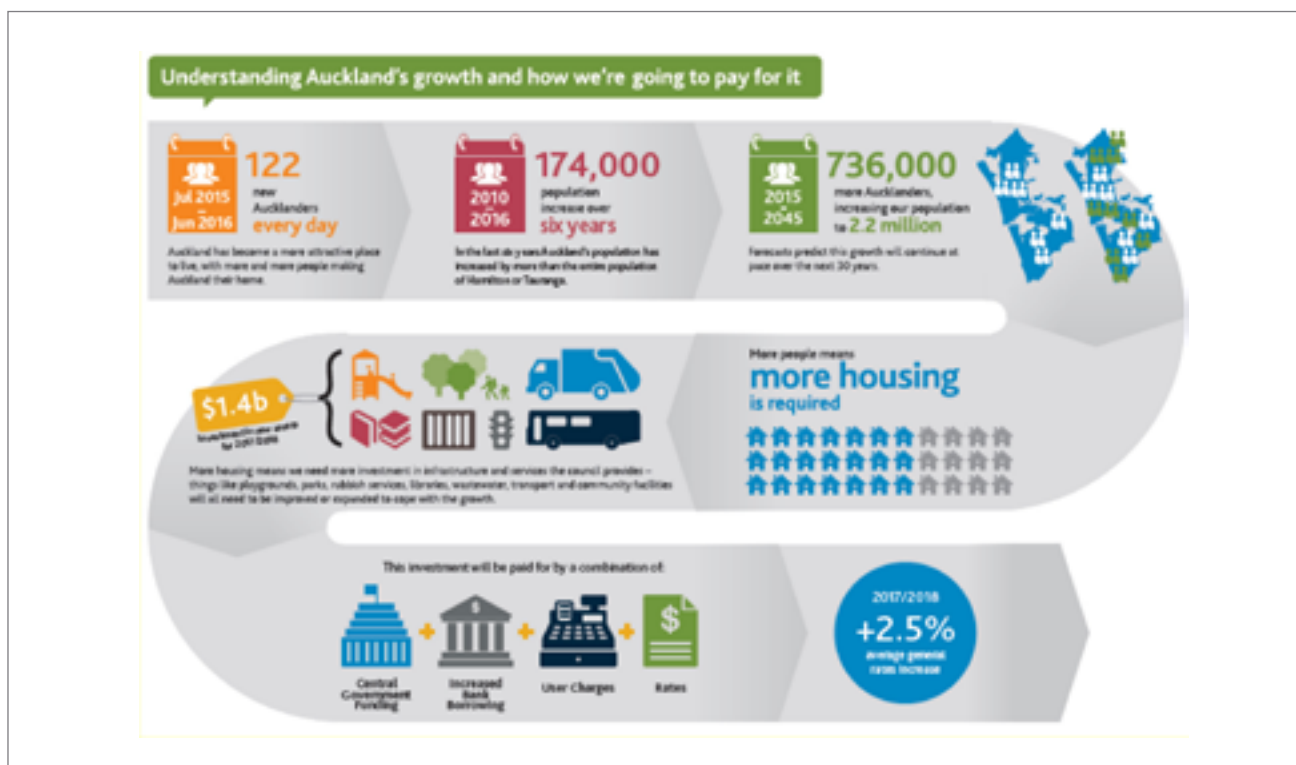




Figure 2 Source: Community Facilities Strategic Asset Management Plans 2012-2015)

In order to create a financial model for asset management to address the above, consideration must first be given to prioritisation of which asset needs the most attention at a given moment in time.

Ascertaining when to renew or replace an asset requires decisions by the governing body and local boards, and such decisions should be informed by quality advice provided by asset, service, and finance managers. There is also added complexity arising from the strategic linkages for asset decisions, as illustrated in Figure 2.

The strategic linkages for Auckland's asset management include local board plans and agreements, which in turn affect the asset management policies surrounding community facilities.

These produce activity statements that feed back into long-term plans. All of these processes feed into asset management plans, strategic plans, operational plans, and business plans.

In the following section, we will examine some of the models that we use to handle the complexities of asset management and the challenges.

## ASSET LIFECYCLE MANAGEMENT MODEL

To enable evidence-based decision making, the Community Facilities department, responsible for a portfolio of the parks and building (\$6bn), has developed the Asset Lifecycle Management (ALM) model made up of the following key elements:

- Asset performance in terms of :
- Fit-for-purpose / Functionality
- Condition / Remaining useful life
- Efficiency / Effectiveness
- Temporal / Quantitative / Qualitative dimensions
- Service-based vs Risk-based assumptions

The model takes into consideration the following criteria:

- Physical condition based on the facility lifecycle that can be affected by:
- Usage (wear and tear)
- Design life / Deterioration profile (material, construction type)
- Environmental or other external effects (coastal, marine, landslips, storms, vandalism)
- Asset (Technical) Performance (breakdowns, utility costs)
- Asset criticality in terms of performance that includes:
- Health and safety (asbestos, lead, mould, fire safety)

- Impact on overall asset system (roofing, services)
- Impact on service (aesthetics)
- Regulatory / legislative requirements (building code)
- Asset risks tolerance (likelihood / consequence)
- Other criteria such as heritage rulings, and costs of construction, replacement, maintenance, monitoring, etc.

The general lifecycle for an asset can be represented as an Asset Lifecycle graph in Figure 3 , where we consider the change in its condition over time.

In the below example, we can represent the desired level of service (LoS) as a minimum asset condition; if the condition is below the LoS line, service-delivery can be assumed as

inadequate. The same concept could be applied to asset criticality, efficiency, etc.

The LoS line in the graph can move up or down when the function of a facility changes. A customer-facing facility, for example, may require more frequent maintenance than a rear staff carpark, or a storage area in the same building.

The decision to renew an asset sometimes also depend on how much more money council can expect from the government, how much it can borrow, and how much it can increase rates.

Where funding for renewal is only available in the future, it is possible to increase the lifespan of the asset by carrying out planned maintenance in lieu of renewal or replacement.

Figure 3: Asset Lifecycle Graph

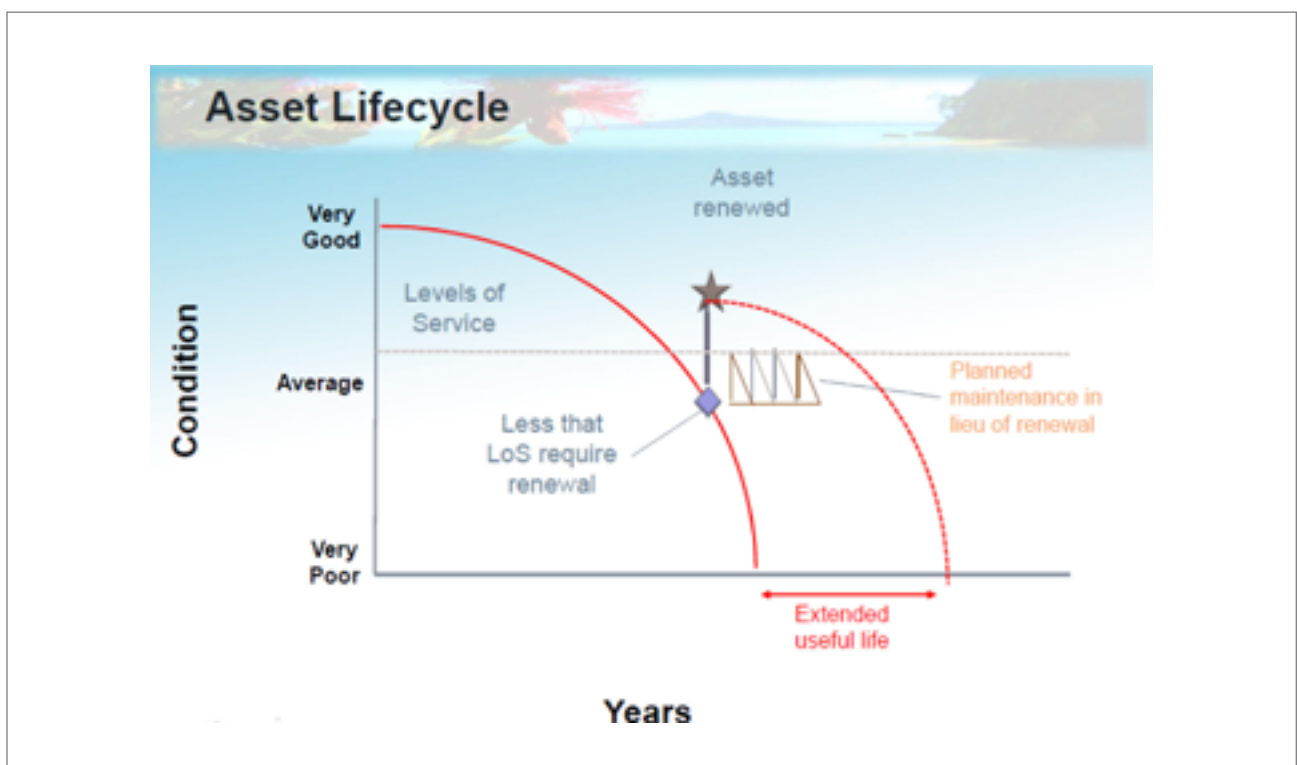




Figure 4: Failure – Impact vs Likelihood

repaired and maintained, possibly until their lifespan reaches its end.

the best decision in terms of the prudent financial management.

## ASSET FAILURE AND DEFERMENT – IMPACT VS LIKELIHOOD

From an asset risk / failure perspective, each council asset can be plotted on a graph with a vertical axis showing the impact to the community of its failure and a horizontal axis showing the likelihood (probability) of that failure. See Figure 4.

Those assets placed in the top right quadrant (high impact, high likelihood) are those requiring renewal or rehabilitation on a regular basis.

Those on the bottom left (low impact, low likelihood) can be

## OTHER CONSIDERATIONS

Also to be taken into consideration is that an asset may be functioning perfectly well, but still failing to deliver the standards of service expected or achieve the desired community outcomes. This could be due to increased pressure on the asset from a growing population, or different types of use than those originally intended, for example parks being used by skateboarders, or a community hall being hired out for private functions.

Deferment of renewal may seem

But every time council defers repair or replacement, there could be increased risk accumulating in the asset.

For example, a small fire in a 50-year-old community hall may not do a huge amount of damage. But because it exposes asbestos insulation in the roof, which is released into the space, asbestos removal and repair becomes necessary. The decision to defer asbestos removal in previous decades means increased risk exposure in the present. Because of this, a 10-year renewal forecast for assets must be further calibrated to align with:



- Accepted risk profile
- Criticality and consequences  
Local board / governing body priorities
- Service requirement
- Budget allocation
- Future development

## LISTENING TO COMMUNITY EXPECTATIONS

Council members have priorities based on the desires of their constituents. Some assets may be clearly in need of repair, but there is simply not enough money to fix everything. Constituent expectations can help rank priorities.

Any renewal forecast must be validated with continuous asset condition assessment. It must take into account not only the risk of failure for an asset, but the ability of that asset to offer services. For example, a building with only one toilet and no space to add another is highly limited in

terms of growth to meet rising use.

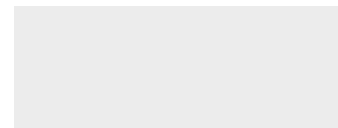
Ultimately, facilities that are crucial to the community will be the ones that get the lion's share of any budgetary allocation. As we have discovered through ISO 55000, stakeholder expectations are paramount in decisions made about asset management.

This article examines financial models for long-term asset management planning, based on the experience of Auckland Council in New Zealand.

## ABOUT RAYMOND TAN:

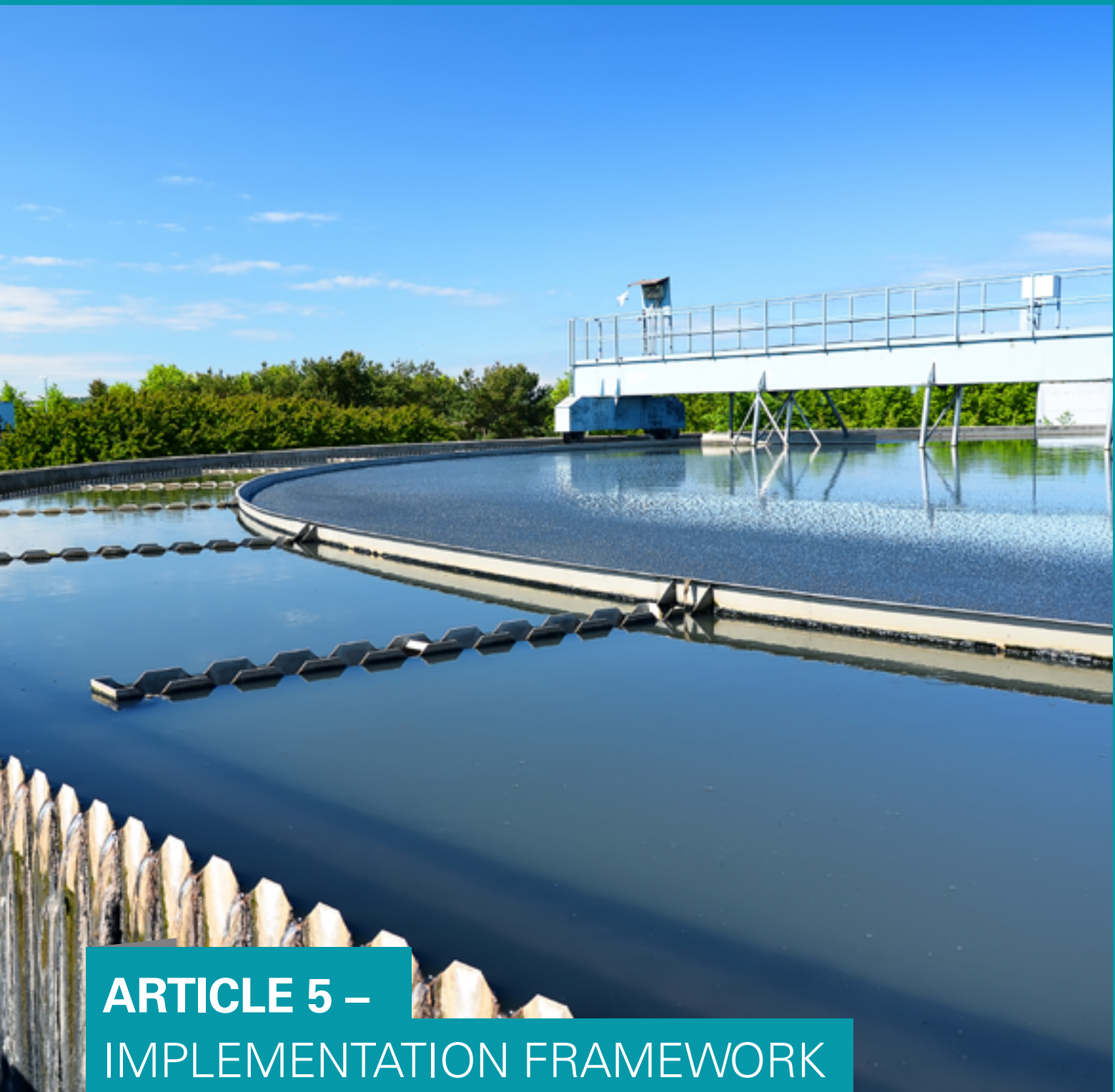
Raymond currently heads the Asset Management Intelligence Support unit in the Community Facilities department of Auckland Council. He has been active in asset management for over 20 years in various sectors, including hospitality, defence, health, education, banking, central and local government sectors.

He has a BA(Hons) in Strategic Management, a Henley MBA, and other qualifications in Banking, Governance and Asset Management and is a certified Kaizen practitioner and an ISO 55000 Asset Management Assessor.



**CLICK** on triangle to view video presentation relating to this article

*this content is available to AMC members only, see our affordable membership options*



## ARTICLE 5 – IMPLEMENTATION FRAMEWORK FOR IMPROVED RENEWALS PLANNING

Wastewater renewals planning includes issues such as pipeline breakage and erosion, proactive and reactive costs, and how to bring failure predictions into budget planning.

In this article, we look at the implementation framework for wastewater renewals planning with reference to the New Zealand experience, based on a presentation by Philip McFarlane from the Water Asset Management sector at Opus.

## WASTEWATER MANAGEMENT AND PUBLIC HEALTH

The contribution of wastewater management to New Zealand's public health cannot be underestimated. The first wastewater systems in the country were installed in 1880 in Christchurch and were followed by a significant drop in water-borne disease.

Most of the country's existing systems were installed in the 1960s and 1970s and replacement value of the NZ Wastewater Networks is now \$16.2 billion.

Some believe the level of investment in NZ public asset maintenance is not high enough. In 2014, the Controller and Auditor General stated that by 2022, the gap between asset renewals expenditure and depreciation for the local

government sector could be between \$6 billion and \$7 billion.

Why is there such a disparity between expenditure and depreciation? There are three possible reasons for the gap:

- Stakeholders are leaving the problem to future generations.
- Renewal is not yet necessary given the lifecycle of the asset.
- Over-depreciation of assets has elevated the renewal figure.

It is possible that assessors are attributing far too conservative lifespans to New Zealand's wastewater assets. For example, if a lifespan of 80 years is allocated to a pipe that can in reality last double that time, then forecast renewals expenditure will be proportionately higher. Assessors need to devise a framework to decide when assets should be replaced so as to cause the least financial and service loss to stakeholders.

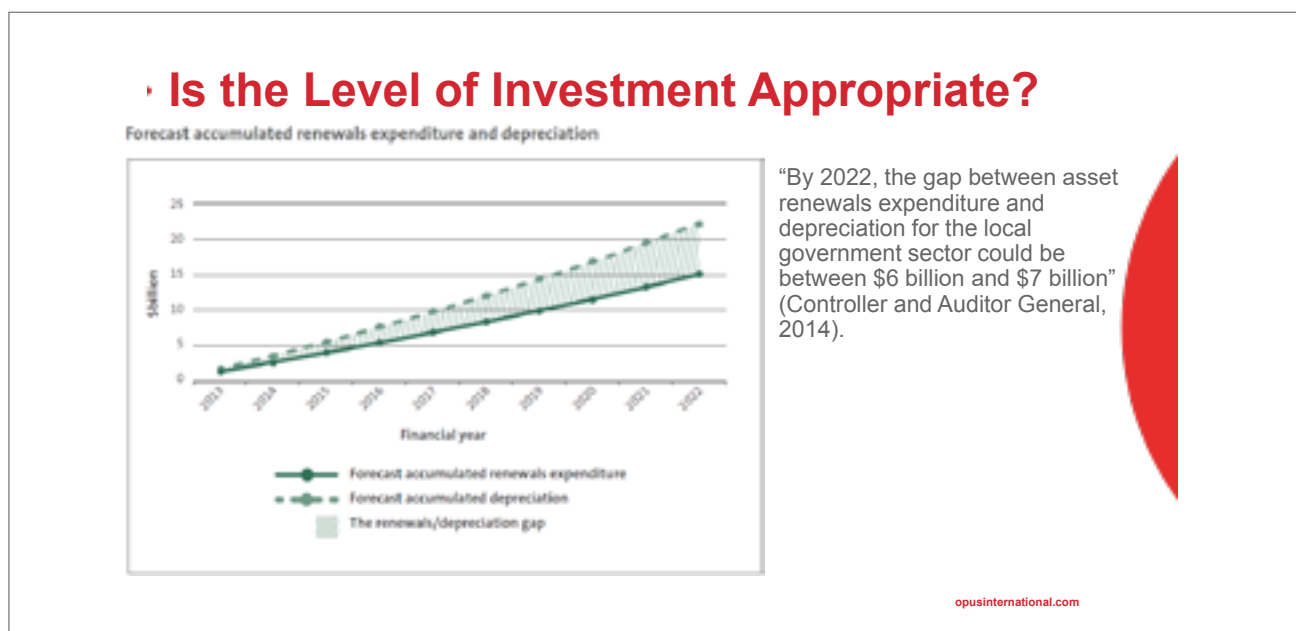
## BALANCING RISK, SERVICE AND COST

Not renewing wastewater pipelines is not an option; there is no end-of-use strategy. Pipelines are there to remove wastewater from an environment, they are there to maintain public health. With a lifespan of 100 years, pipes deteriorate and need maintenance. Pipes also fail, but that's to be expected.

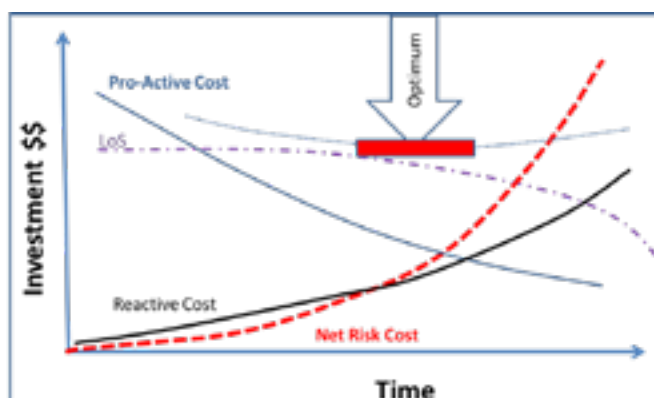
For asset management, it's not that pipes are failing but whether the frequency of those failures is increasing – the risk is increasing disproportionately. When the risk gets too much, it's time to intervene.

Asset management is about trying to balance that risk with service and cost, but there is never enough money to do so perfectly. Managers try to balance those three factors in a continuous process of assessment and implementation.

Figure 1: Is the Level of Investment Appropriate?



## Optimum Replacement Time



### Other Factors

- Growth
- Inflow & Infiltration
- Resilience
- Interface with other works

opusinternational.com

Figure 2: Optimum replacement time

Optimum replacement time:  
reactive and proactive views

Any wastewater implementation framework for improved renewals planning needs to:

- Improve pipeline renewals planning for gravity wastewater pipelines through evidence based decision making.
- Develop a renewals planning framework that is scalable in terms of both network size and maturity of data management practices.
- Identify areas where further research is required, identifying those areas that have the greatest impact on decision-making.

In addition, the planning document is only the start of an ongoing process. It will be amended and added to as new renewals planning processes and uses of data are developed.

Over time, the reactive costs increase – the number of failures rises, as does the cost of repairing them. But the longer the pipes are in the ground, the cheaper the annualised cost of that work is (compared with replacement cost).

The optimum time for asset replacement is when the increase in reactive and risk costs overlap with the fall in proactive costs. In other words, replacement is more financially viable at that point than at any other time in the asset's lifecycle.

However, what happens in most pipe networks is the optimum number of failures from a cost perspective is quite high. Intervention becomes necessary when the risk profile and level of service become unacceptable in terms of the value (services) expected from the asset.

## PREDICTING PIPELINE DETERIORATION

Pipelines deteriorate in four stages. Firstly, the post-construction Stage 1 is where obvious defects in planning or materials become evident and are remedied. The next two stages overlap.

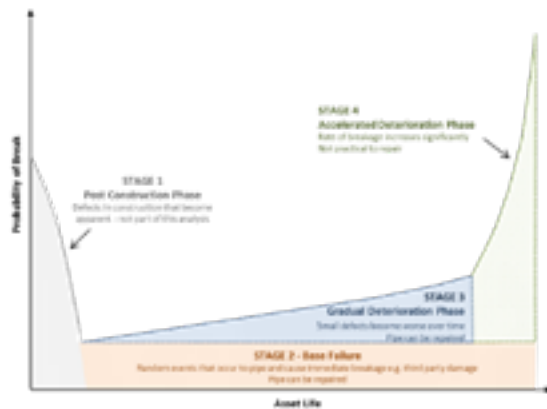
Stage 2 is the base level failure, where random acts such as construction can cause failure.

This overlaps with Stage 3, the gradual deterioration phase that's expected from an asset over its lifetime. Stage 4 is the final stage, a period of rapid disintegration and increased failure leading to replacement.

The main data required by asset managers is not about predicting in which year a pipeline will fail. The key data is knowing what the risk of failure is – and whether the stakeholders can live with that risk of failure.



## Deterioration Of Pipelines



opusinternational.com

Figure 3: Deterioration of Pipelines

Asset managers must intervene earlier for a vital pipe than for one of low consequence. With a low consequence pipe, it is possible that it could be left to run to failure.

This degree of consequence affects the asset monitoring plan, prompting questions like:

- How do you link monitoring and intervention with the risk profile?
- When do you undertake the first inspection?
- If condition is known, when do you inspect again?

Asset monitoring and 'likelihood of failure' predictions

With wastewater pipes there are two distinct failure mechanisms:

- Isolated breaks along the pipe; and
- Pipeline wall erosion.

## FIGURE 4: INITIAL BUDGETS AND MONITORING

A certain number of pipeline breaks are expected, and over time that figure is going to increase. So a threshold, based on empirical data, gives us the likelihood of failure we can expect and gives us a trigger point for inspection.

In the case of pipe walls, the way that particular length of pipe interacts is one factor that needs to be monitored. Then there's containment capacity and blockage, and finally wall erosion that prompts replacement.

This model predicts reactive renewals, and feeds into the budget and testing program.

For example, if each year there's a 2.5% chance that a particular section of pipe wall is going to

fail, and the risk toleration for that pipe is 10%, after four years the asset will need some sort of intervention.

## MASTER PLANNING, INSPECTION AND TESTING

Three areas for controlling the output of the asset in terms of lifetime value are master planning, inspection and testing.

Master planning for wastewater pipeline assets means management should assess improvement for growth, inflow and infiltration and resilience.

They can, with the help of data collected on the likelihood of pipes failing, assign renewal dates for particular pipes.

This means there can be proactive renewal of particular sections of the asset.

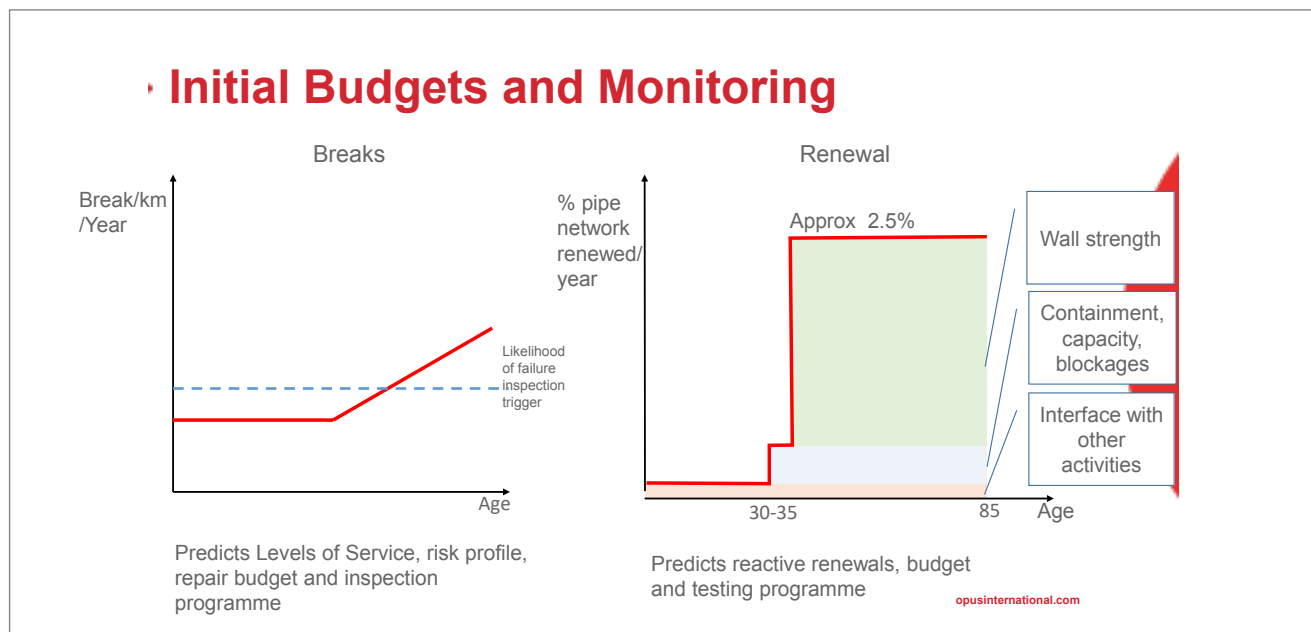


Figure 4. Initial Budgets and Monitoring

Inspections, usually by CCTV or in person, should be followed by an assessment of risk of failure. Following this either a proactive effort will be made to repair the pipe, or the next inspection will be scheduled in the case of a clean bill of health.

Testing of the pipe wall may result in scheduling another test, or after determining the remaining life left in the asset based on the material analysis, a date may be made for its replacement. All these are proactive repairs that can be predicted and included in budgeting and monitoring programs.

## TOWARDS A BETTER RENEWALS FRAMEWORK

A renewals planning framework helps asset managers to forecast risk and level of service. It guides in the allocation of different investment

methods and renewal strategies. It does this on the basis of data that predicts the likelihood of failure during a pipe's lifespan. It means that budgets can be prepared so that available funding is channelled towards those areas of renewable that are statistically likely to occur. It puts asset managers in a position of knowledge so they can exercise more control over utilities.

### Meta description:

A renewals planning framework helps asset managers to forecast risk and level of service. Here's a look at the New Zealand implementation framework.

**CLICK** on triangle to view video presentation relating to this article  
*this content is available to AMC members only, see our affordable membership options*



# DIGITAL INFRASTRUCTURE SYMPOSIUM

**Friday 17th November 2017 | 9:00am – 5:00pm | Windsor Hotel, Burke Room,  
11 Spring Street, Melbourne | COST: AMCouncil Member: \$350 Non member: \$450**

Held annually, this one day technical symposium covers a key topic that is being discussed currently and the objective of the symposium is to improve the knowledge of digital infrastructure in asset management by delivering presentations involving national best practices on key challenges affecting most industries using digital infrastructure.

The Program at a Glance:

- **The Big Picture:** Exploring key insights into the internet of things, analysing how to best manage those increasingly large streams of data, discovering what really makes a smart city and exploring cross industry communications.
- **Digital Risks and Opportunities:** Delving into the realities of managing cyber security, ensuring data integrity and navigating cyberspace in today's complex online world
- **Living in the Future:** What research is showing as the most important digital trends that are set to shape the future of asset management.
- **The Digital Twin:** Invaluable insights into data architecture, the latest standards in IoT and information structure
- **Whole of Life Data Management:** Provision of a unique perspective on how to structure data and manage your workforce to ensure your data is ready to use at any time.
- **Virtually Speaking:** A sneak peak into augmented reality and how this immersive platform has the potential to change asset management forever. We also explore how to better use more common platforms including mobile and desktop.
- **The Customer is Always Right:** How do you really put the customer at the centre of your business?
- **Legal Leadership:** What do core concepts such as privacy, ownership, partnerships, governance, leadership and accountability really mean for the day-to-day running of a business.
- **People and Change:** How can businesses best manage succession planning, training and the adoption of new and emergent technologies and make sure their workforce is "digital ready"?
- **Predictive analytics:** Data is all well and good but how to you extract real value from it? Tips on the latest developments in reporting, mash-ups, machine learning and predictive learning.
- **Automation & Robotics:** Making sense of what artificial intelligence will mean for the asset manager.
- **Your Crystal Ball:** Exploring what your future in asset management will really look like. What benefits are in store for you, and for your organisation?

**REGISTRATION:** [www.amcouncil.com/symposium2017](http://www.amcouncil.com/symposium2017)

**ENQUIRIES:** Call Heidi Robinson at AMCouncil office ph 03 9819 2515 or email [heidi.robinson@amcouncil.com.au](mailto:heidi.robinson@amcouncil.com.au)

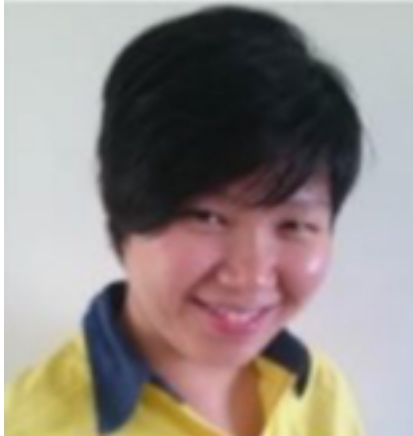
# UP COMING EVENTS

EVENT	DATE	LOCATION	REGISTRATION
<b>September 2017</b>			
Asset Management Fundamentals (Training)	8/09/2017	Sydney	
AM in Action #1 - IMPower by Dr Yvonne Power	12/09/2017	Webinar	
Understanding Reliability: Tips and Tricks for a Reliability Practitioner	14/09/2017	Adelaide	
Asset Management Fundamentals (Training)	15/09/2017	Adelaide	
Asset Management Accountability Framework Lessons to Date	19/09/2017	Melbourne	
Technical Meeting	20/09/2017	Sydney	
Asset Management Fundamentals (Training)	21/09/2017	Perth	
Asset Management at an International Space Station	21/09/2017	Webinar	
AM in Action #2 - ACTewAGL by Mike Schulzer	26/09/2017	Webinar	
Asset Management System Implementation – Determining Key Assets	27/09/2017	Brisbane	
<b>October 2017</b>			
Young AMP	TBA	Newcastle	
Asset Management Fundamentals (Training)	9/10/2017	Hobart	
AM in Action #3 - Wave Digital by David Scott	10/10/2017	Webinar	
Water Plan - Use of the Primo model	12/10/2017	Melbourne	
Women in Asset Management Event	19/10/2017	Sydney	
Asset Management Fundamentals (Training)	23/10/2017	Melbourne	
How to develop a strategic asset management plan seminar (Training)	24/10/2017	Melbourne	
AM in Action #4 - Icon Water by Tim Purves	24/10/2017	Webinar	
How to develop an asset management plan seminar (Training)	25/10/2017	Melbourne	
<b>November 2017</b>			
TUNRA & AGM	TBA	Newcastle	
AM in Action #5 - Sydney Trains by Richard Lu	7/11/2017	Webinar	
Asset Management Fundamentals (Training)	8/11/2017	Brisbane	
How to develop a strategic asset management plan seminar (Training)	9/11/2017	Brisbane	
How to develop an asset management plan seminar (Training)	10/11/2017	Brisbane	



EVENT	DATE	LOCATION	REGISTRATION
<b>November 2017</b>			
Leadership & Culture in Asset Management - John Hardwick	15/11/2017	Sydney	
End of Year Event	15/11/2017	Brisbane	
The Asset Management Value Proposition	16/11/2017	Melbourne	
Annual Symposium - Data for Infrastructure	17/11/2017	Melbourne	
Asset Management Fundamentals (Training)	17/11/2017	Canberra	
AM in Action #6 - Curtin University by Jun Li	21/11/2017	Webinar	
Asset Management Fundamentals (Training)	23/11/2017	Sydney	
Canberra Chapter Event	30/11/2017	Canberra	
<b>CAMA EXAM (WPIAM) - Register Through <a href="http://www.wpiam.com">www.wpiam.com</a></b>			
Australia (CAMA)	22/09/2017	Melbourne	
Australia (CAMA)	22/09/2017	Perth	
Australia (CAMA)	27/10/2017	Melbourne	
Australia (CAMA)	27/10/2017	Perth	
Australia (CAMA)	24/11/2017	Melbourne	
Australia (CAMA)	24/11/2017	Perth	

# AMCouncil Member Profiles



---

## WIAM NATIONAL CHAIR

**Felicia Tristante is the Asset Management Council's Women in Asset Management National Chair.**

She is a passionate asset manager who wants to see a gender balance in organisations that manage assets.

She is also keen to encourage STEM in the school system and breakdown any barriers that prevent girls taking up the STEM subjects.

Based in WA, Felicia Tristante manages to balance family and work as she travels all over the world for GE Digital.



---

## YAMP NATIONAL CHAIR

**Reza Esmaeili, M.Sc. in Mechanical Engineering, has more than 8 years of practical expertise in Asset Management, Reliability, and Asset Performance management in a variety of roles both in Australia and overseas.**

Reza has led several teams in driving positive changes within large engineering operations in Australia, South East Asia, North America and Middle East in a variety of industries including Mining, Oil & Gas, and Utilities.

He is also actively working in Building Information Modeling (BIM) and "Digital" Asset Management area and their mutually-supportive relationship in enabling operations to achieve an effective asset management.

He hopes to spread the message of the value in asset management more widely in his position as Asset Management Council's Young Asset Management Professionals National Chair.

# HOW CAN YOU MAKE MONEY ON SOMETHING IF YOU ALREADY SOLD IT?

**IT'S SIMPLE.  
THE ANSWER IS SAP HANA.**

What if you could gain completely new insights from your assets, and correct problems before they even occur? Efficiently manage the entire asset lifecycle with world-class enterprise asset management software from SAP. With real-time visibility into asset performance and powerful analytics, it's easier to optimise asset usage, shrink costs, better manage capital expenditures, and ultimately maximise your return on assets (ROA) – including fixed property, plant, and equipment.

What if you could turn current products into future revenue? SAP HANA® monitors millions of parts in machines around the world. Helping manufacturers provide intuitive maintenance services for their customers, and new streams of revenue for themselves. Just think what you could do.

For more, go to [go.sap.com/australia/solution/lob/asset-management.html](https://go.sap.com/australia/solution/lob/asset-management.html)





**BROADSPECTRUM**

Infinite Solutions

## OPTIMISING SUSTAINABLE ASSET VALUE

We will work closely with you to provide financial, compliance and technical solutions utilising the levers of degree of in-service support, acquisition and disposal of physical assets.

We understand that managing your assets is about pursuing optimum sustainable performance in support of the development of shareholder value, whilst complying with requirements for health, safety and the environment. To achieve this we adopt a whole-of-life approach, ensure legislative compliance, pursue best asset management practices, make sure the people used in the management of your resources are appropriately selected, developed and trained, and apply continuous improvement at every step.



# Membership Application



ASSET MANAGEMENT COUNCIL

## ASSET MANAGEMENT COUNCIL LTD

A Technical Society of Engineers Australia

ABN: 15 141 532 747 [www.amcouncil.com.au](http://www.amcouncil.com.au)

Phone: +613 9819 2515 Email: [accounts@amcouncil.com.au](mailto:accounts@amcouncil.com.au)

Thank you for joining the Asset Management Council. Please complete all sections. Phone or email with any queries.

### PERSONAL DETAILS (Please print in BLOCK CAPITALS)

Title (Please circle) Dr Mr Mrs Ms Miss Other (Please specify) Sex (Please circle) F M

Family Name Given Names (in full)

Date of Birth Engineers Australia Membership No

### CONTACT DETAILS (Please print in BLOCK CAPITALS)

Preferred Address: ☐ Private Address or ☐ Business Address

Position

Organisation

Postal Address

City State

Country Postcode

Phone Fax

Mobile

E-mail

### AREAS OF INTEREST (Please tick)

#### Technical Topics

- ☐ Reliability
- ☐ Availability
- ☐ Maintainability
- ☐ Performance
- ☐ Spares Planning
- ☐ Maintenance Planning and Scheduling
- ☐ Maintenance Plan development and implementation
- ☐ Maintenance Policy/Strategy development
- ☐ Logistics
- ☐ Shutdown planning and the maintenance interface
- ☐ Asset Management
- ☐ Other:

#### Issues

- ☐ Skills development
- ☐ Training
- ☐ Other:

#### Industries

- ☐ Facility Management
- ☐ Consulting
- ☐ Power
- ☐ Transport
- ☐ Defence
- ☐ Oil and Gas
- ☐ Mining and Industry
- ☐ Water and Utilities
- ☐ Infrastructure
- ☐ Other:

Return completed Membership Application with payment to:  
Asset Management Council  
PO Box 2004, Oakleigh Vic 3166

## GROUP AFFILIATION

☐ Young Asset Management Practitioners (18-35 year olds)

## CHAPTER AFFILIATION (Please tick one)

☐ Newcastle ☐ Canberra ☐ Sydney ☐ Illawarra ☐ Mackay  
☐ Melbourne ☐ Adelaide ☐ Brisbane ☐ Hobart  
☐ Darwin ☐ Overseas ☐ Gippsland ☐ Perth

## MEMBERSHIP FEES Effective Jan 2015 (Please tick one membership type only)

Individual Annual Fee (including GST)

☐ Member \$154.00

☐ Student \$33.00

Corporate Annual Fee (including GST)

☐ Platinum \$9,570.00

☐ Silver \$1,804.00

☐ Gold \$3,608.00

☐ Bronze \$957.00

GST (10%) does not apply to overseas memberships.

## CORPORATE MEMBER NOMINEES

Platinum – 30 nominees, Gold – 10 nominees, Silver – 10 nominees, Bronze – 5 nominees

Name	Email	Date of Birth (Mandatory)	AM Council Chapter
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Contact Asset Management Council to provide more corporate nominee details.

## PAYMENT

**Method of Payment** (please tick one and enclose payment)

☐ Cash

☐ Money Order or Cheque drawn in AUD from an Australian bank payable to **Asset Management Council Ltd**

☐ International Money Order

☐ Credit Card  
(Australian or New Zealand Bankcard only acceptable)

**Credit Card Details** Please charge my card (tick one card type)

☐ Visa

☐ Bankcard

☐ Mastercard

☐ Diners

☐ American Express

Card no

Expiry

Amount \$

Name on card

Signature

Date

# New Members

Raja Taha	Ali
Cameron	Armitage
Nathan	Arnold
Aaron	Arthur
Steve	Ashfield
Julian	Barbi
Daniel	Bartlett
Glenn	Bellingham
Gordon	Benn
Allison	Bennett
Minenhle	Bhango
Allan	Birch
Joshua	Birkbeck
Bill	Black
Sylvia	Bolye
Anthony	Borgo
Rod	Box
Matthew	Brierley
Henni	Bruin
Rafael	Brymora
Stuart	Burckhardt
Sophie	Burgess
Chris	Burke
Romulo	Cabalse
Martin	Callaghan
Gala	Camacho Ferrari
Alexandra	Cashion
Gina	Chapman
Ryan	Chenery
Ron	Churchill
Matthew	Clarkson
Ian	Coker
Adam	Collins
Doug	Collins
Judith	Connelly
Brett	Corcoran
David	Corica
Jason	Couper
Oliver	Crome
Benjamin	Cross
Lauren	Curnow
Neil	Delaney
Alex	Deng
Christopher	Devlin
Ranajit	Dhar

Thomas	Dickman
Anthony	Dockrill
Siavash	Doshvarpassand
Chantal	Drysdale
Bruce	Dutton
Oriana	Edwards
Susan	Egan
Nayyar	Ehsan
Roy	Elliott
Deb	Evans
Tim	Fairbrother
John	Falade
Jacqueline	Feng
Tim	Ffrost
Daniel	Field
Michael	Fitzgerald
Nigel	Fort
Amy	Foxe
Peter	Gall
Mark	Georgelin
Joey	Girsang
Jacqui	Goddard
Rachel	Goodsell
Ravindran	Gounder
Ronald	Grinsell
Gus	Gudino
Janice	Hagen
David	Hanlon
Evan	Hardege
Daniel	Haworth
Stewart	Haycock
Steve	Hayden
Peter	Heit
Tim	Heldt
Susan	Hey
Nat	Hickcox
Lok Hang	Ho
Bradley	Hocking
Ken	Hughes
Antonie	Jacobs
Johan	Jankowitz
Yanaka	Jayathilaka
Chris	Jensen
Cameron	Jessup
Mohan	Jeyaraman

Kris	Karunarathna
Jaimal	Kika
Shane	Kimpton
Antony	King
Colin	Kirkwood
Alison	Koh
Ravi	Kolli
Amanda	Lam
Ian	Lau
Andrew	Leggate
Jeremy	Leu
David	Levy
Tim	Lewis
BatomBari	Lezor
Richard	Ling
Jason	Lister
Peter	Long
Chris	Lovelock
Will	Ma
Alison	Maccarthy
Michael	Mackay
Deepak	Makhijani
Sandro	Marin
Nigel	Markie
Max	Mate
Roger	McCall
Steven	McCann
Frank	McCarthy
Paul	McCormack
Taran	Medcalf
Jason	Middleton
Rachael	Millar
Gareth	Mitchell
Mohsin	Miyanji
Anthony	Molloy
Colm	Mooney
Natasha	Moore
Allan	Morgan
Fady	Morkos
Steve	Morrow
Fergal	Murphy
Michael	Murray
Stephen	Nadalin

# New Members

Candice	Naidoo
Sunil	Narayan
Long	Nguyen
Khoa	Nguyen
Brett	Nixon
Eve	Novikov
Andre	Oh
Stephen	O'Hearn
David	Okunyah
Torill	Pape
Allanah	Parker
Mark	Parsons
Danny	Pasaricek
Tighe	Patching
Neil	Pearson
Michael	Perez
Mario	Perin
Michelle	Petersen
Ben	Peynenborg
Chendra Mohan Derek	Pgovindasamy
Jason	Plath
Juli	Poole
Mike	Pover
David	Powell
Graham	Priestnall
Vineet	Pruthi
Michelle	Purdie
Ian	Pye
Andrew	Pyke
Mahbuba	Rahmen
Arvind	Ramaswami
Praema	Ranga
Daniel	Rankins
Dinesh	Ratnayake
Jennifer	Ratsep
Chris	Reimer
Andy	Richardson
Simon	Roberts
Rohan	Robertson
Gregory Paul	Rohde
Muhammad Fairozi Bin	Rohin
Alan	Russell

Paul	Sadasivan
Ma	Salayon
Teogenesa Q.	
Russell	Sanbrook
Graceson	Scariah
Peter	Schultz
Yudhir	Shahi
Raj	Sharma
Paul	Shears
Phillip	Shipard
Peter	Short
Tim	Shortis
Brian	Sichone
Aby	Singh
Kenneth	Skelton
Julia	Smethurst
Marcelle	Smith
Stuart	Smith
Liz	Stephens
Gavin	Stewart
Gordon	Strachan
Andrew	Sun
Gregory	Symington
Kiran	Tamadaddi
Paul	Taylor
Danny	Teo
Mitchell	Thompson
Wayne	Threlfall
Michael	Turner
Paul	Ticehurst
Tony	Todd
Elizabeth	Topolcsanyi
ashley	triegaardt
David	Trotta
Phil	Vale
Krishnan	Venkita
Claire	Vervaart
Inderjeet	Virdi
ELANGO	VISWANATHAN
Bruce	Volkiene
David	Vrancic
Mike	Walkington
Steve	Wallace

Caryn	Walters
Gerri	Waterkamp
Ian	Waterman
Nik	West
Cathy	Wilson
Chris	Wong
Edward	Xu
Kim	Yam
Sukru	Yashin
John	Young
Gordon	Young
Adam	Zaranski
James	Zhai





Change Leadership  
Enterprise Asset Management  
ISO55000 Assessment  
Programme Management  
Integrated Management Systems

Delivering Change with Integrity...



Certified Fellow of Asset Management

Level 40, Northpoint Tower  
100 Miller Street  
North Sydney  
NSW, 2060, Australia

+61 2 9539 8886

information@structuredchange.com.au

www.structuredchange.com.au

For more information visit [www.structuredchange.com.au](http://www.structuredchange.com.au)

# POWER Your Asset Management CAREER to New Heights

## BECOME CERTIFIED

Distinguish Yourself from your peers:

- Demonstrate your knowledge
- Gain proof of your skills to apply systems to improve performance
- National and internationally recognized qualification
- Illustrate commitment to continuous professional development



Learn more at: [www.amcouncil.com.au/certification](http://www.amcouncil.com.au/certification)

# Partners, Corporate Members & Contacts

Partnering  
Organisations



Broadpectrum  
[www.broadpectrum.com](http://www.broadpectrum.com)



IFM Investors  
[www.ifminvestors.com](http://www.ifminvestors.com)



SAP Australia  
[www.sap.com](http://www.sap.com)

## PLATINUM

Asset Standards Authority, Transport for New South Wales  
Ausgrid  
BAE Systems  
Broadpectrum  
Downer Engineering, Construction & Maintenance  
Industry Funds Management ("IFM")  
SAP  
Ventia Pty Limited

## GOLD

Airservices Australia  
Austal Ships Pty Ltd  
Bombardier  
Capability Partners  
Department of Defence CASG  
GHD Pty Ltd  
Hardcat Pty Ltd  
Jacobs  
K2 Technology Pty Ltd  
Lendlease Services Pty Ltd  
Naval Ship Management (Australia)  
Power and Water Corporation  
Stanwell Corporation Limited  
Sydney Water Corporation  
Thales Australia Limited  
TransGrid  
Transurban Ltd  
Utopia Global Inc.  
Vesta Partners  
Warship Asset Management Agreement  
Western Power

## SILVER

AActewAGL Distribution  
AECOM  
AGL  
ASC Pty Ltd  
Broadcast Australia  
Capability Acquisition and Sustainment Group - Land Engineering Agency  
Cardno (QLD) Pty Ltd  
City of Perth  
I @ CONSULTING (PTY) LTD  
Jemena Asset Management

Kellogg Brown & Root Pty Ltd  
Logsys Power Services  
Lycopodium Infrastructure Pty Ltd  
Metro Trains Melbourne (MTM)  
Nova Systems  
NSW Office of Environment and Heritage, National Parks and Wildlife Service  
Programmed Facility Management  
Public Transport Authority  
Refining NZ  
SNC-Lavalin Rail and Transit  
Sodexo Australia Pty  
Sydney Trains  
VicRoads  
VicTrack  
WSP Parsons Brinckerhoff

## BRONZE

ABB Enterprise Software  
Activa Pty Limited  
ANSTO  
Aqunta Consulting Pty Ltd  
ARMS Reliability Engineers  
Assetic Pty Ltd  
Assetivity Pty Ltd  
Aurecon Australia Pty Ltd  
Australia Pacific Airports (Melbourne)  
Babcock Pty Ltd  
Bureau Veritas  
Campeyn Group  
Certus Solutions  
Country Fire Authority (CFA)  
Covaris Pty Ltd  
Cushman & Wakefield  
Cyient  
Delta Facilities Management Pty Ltd  
Department of Economic Development, Jobs, Transport and Resources  
Department of Environment, land, Water and Planning  
Egis Road Operations Pty Ltd  
Electrix Pty Ltd  
Energex Limited  
Frazer-Nash Consultancy Limited  
Fremantle Ports  
GDF Suez Australia Energy  
Gladstone Area Water Board

HDR Inc  
Hexagon PPM  
Hunter Water Corporation  
Icon Water Limited  
Indec Consulting  
Innovative Thinking IT  
Institute of Quality Asset Management  
KPMG  
LogiCamms  
Macutex  
Maintenance & Project Engineering Pty Ltd  
Melbourne Water  
Meridian Energy  
North East Water  
NRG Gladstone Operating Services  
Opus International Consultants  
Paradoxian Pty Ltd  
Port of Newcastle  
QENOS  
Redeye Apps  
Relken Engineering  
SA Power Networks  
SEQWATER  
Shoalhaven Water  
St George Community Housing  
State Automation  
Structural Integrity Engineering Pty Ltd  
Sutherland Shire Council  
Tasrail  
TasWater  
Terotek (NZ) Limited  
The Asset Management College  
United Energy  
Water Corporation

# Testimonials

**Mark Mackenzie:** *"It's the peak body, not only in Australia, but for asset management around the world. We've got representation on a number of international forums and organisations. Australia, surprisingly, is leading the world in asset management. A lot of countries are adopting what we're doing and so being part of that is, I guess, being part of best practice with asset management in Australia."*

---

**Greg Williams:** *"I think it's not associated with any particular industry. We're not water, we're not electricity, we're not gas. We're about sharing knowledge, we're about providing forums for people to express points of view, we're about connecting together. Those are the three key reasons that I'm involved and I think those reasons are probably the same that most people get involved in the AMC."*

---

**Melinda Hodkiewicz:** *"They have done a tremendous amount to promote the professionalism of asset management and I really applaud the work that they have done to assist asset managers - not only to professionally develop, but to also provide events like the AMPEAK that bring a whole bunch of people together who wouldn't otherwise have any way to connect."*

---

**Dave Daines:** *"I think now asset management is really starting to draw people in the ability to use the standard to save money and improve performance, so that's really the key now to what the standard was developed for. I think now, when people are talking about it, they come together and there's that vibrant feel to get some activity generated from that."*

---

**Tom Birdseye:** *"It's really given me a leg-up in terms of my ability to be able to network and my ability to be able to communicate with the other professionals in the asset management industry. As a young asset manager, I guess you would call me, I would never really have exposure to any of the types of people or the contacts that I have been able to be exposed to as the Adelaide Chapter Chair."*

---

**Martin Kerr:** *"We're always looking for a new set of eyes, new ideas and of course experiences, and I think it's the richness of those things that actually contribute and make the AmBOK team as powerful as they are. All the models that we actually create, we actually use to create other models, so it actually demonstrates that we're actually testing ourselves for everything we do."*

---

**Peter Kohler:** *"Not just learn from the approach the AMCouncil might take to doing things in terms of its advice as to how you might manage your assets better, but also to be able to talk to people. There's a lot of huge amount of experience - good and bad - in the room and you should get a hold of that, listen to that, and take what you think would be useful and relevant out of that."*

---





ASSET MANAGEMENT COUNCIL

THE  
**ASSET**  
JOURNAL

Asset Management Council

PO Box 2004  
Oakleigh Vic 3166

Tel 03 9819 2515

[www.amcouncil.com.au](http://www.amcouncil.com.au)