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# THE ASSET JOURNAL



ASSET MANAGEMENT COUNCIL

ASSET MANAGEMENT  
SYSTEM BENEFITS  
FOR INDUSTRY AND  
GOVERNMENT

Achieving Line of Sight by  
Understanding Assets as  
Complex Systems

Changing Strategic Asset  
Management

How to Sustain a \$130bn  
Multi-Modal Asset Portfolio  
Whilst Balancing Cost Risk  
and Performance



## ERNST KRAUSS

EDITOR IN CHIEF

Have you thought about the Systems governing your Organisation? Is the System providing guidance to achieving Value and outcomes that your Team is setting out to deliver and in turn does the Organisation deliver the Value expected by Stakeholders? A System is meant to provide a framework that enables the desired outcomes to be delivered, targets to be met and most of all, support Value creation. The Asset Management System described in the ISO 55001 Standards is just such a framework.

It describes the System elements that, when appropriately balanced, will enable this achievement. Of course, we need to consider how in a larger Organisation it is more difficult to realise the System based outcomes. When we look at Government, Systems face many obstacles and barriers, be they societal, political, environmental, or technological. I am sure you can think of many more barriers that Government faces and closer to Home, the Organisation you work for that influence the efficiency of Systems.

Balancing the priorities of managing through Systems the cost – risk – performance expectations (the Value generation process) depends on the System supporting processes. In a recent Asset Management System analysis in a small Water Supply Organisation, we found that approximately 120 processes are required to manage Organisation and Assets. That reached from the Executive Management level right to the Worker level. We identified that there were many more sub-processes required to support the main processes and make them sustainable. Often this complexity is intended to be simplified through Technology which now matured into highly responsive platforms that can tell us in very small time increments what happens in our Assets and how well Systems and processes (including administration) function. The future will judge how well we can manage these responsive analyses through traditional Systems management, that typically has a significant level of inertia.

Adapting Systems to that new reality requires not only agility in thinking, but also application of agile Systems, Planning and Delivery. My personal observation is that only few Government, Business or Organisational Systems allow strategic flexibility, adjusting to changed markets or service requirements efficiently.

The question is, can your Business or Organisation sustain inefficiencies that inevitably exist in any System and continue to miss optimum Value creation? The uncertain future of traditional economic principles and the disruption we have experienced to working in remote ways, could be your trigger to revise the way your Organisation and Systems operate and revise the efficiency of the embedded Systems and processes to achieve higher Value outcomes and associated Benefits. In this Volume of the “The Asset”, we bring you some articles about Value and Benefits of Systems, that may create some idea for discussion and improvements in your Asset Management System. As always, we value your feedback and discussion on these topics.

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# FROM MY DESK: CHAIRMAN'S LETTER

**CHAIRMAN,  
DAVE DAINES**

**The theme of his month's Asset Management Journal is "System Benefits for Industry and Government" and it is a very timely theme given the current situation the world finds itself in during the COVID pandemic.**

Organisations have had to move very quickly as the restrictions imposed as a result of the pandemic have taken hold. In most cases, where it has been feasible to continue operations, this has resulted in many people working from home, adapting to different working shifts and conditions, and generally undergoing an amount of disruption to their daily lives.

For organisations that have had robust systems and processes in place, this transition has been somewhat easier to manage.

Be it in HR systems, the systems and processes involved in day to day business or the overarching Management Systems that form the back bone of the business, these have provided a structure to continue successful operation in a disruptive environment.

The Resilience of an organisation can be demonstrated via the strength of its business processes and systems and the adaptability to change. From multinational Resource Companies to small non for profit organisations the same factors apply albeit on a scalable basis.

If I were to reflect on how the AM Council has rapidly adapted to the changing environment, it has been successful to a large degree through robust systems

and processes that have been easily applied to the changing environment. The efforts of the small Operation staff, applied through the volunteer organisation has enabled the AM Council to continue to deliver value to its members and meet its strategic objectives. The challenge now is to continue this success into the future as we all adapt to a different paradigm!

**David Daines**

National Chairman, Asset Management Council.



# ARTICLE 1 – Achieving Line-of-Sight By Understanding Assets as Complex Systems: The Convergence of Asset Management and Systems Thinking

Steve Ashfield, Nova Systems

## SUMMARY

**Many people are confused about the level of maturity required by their organisation on respect to managing their significant portfolio of assets?**

The PDCA loop from ISO55000 can (and should) be used by organisations to hone in on their objectives.

This approach needs to be coupled

to systems thinking to yield emergent results for the entire asset.

Nova Systems has developed and applied the Nova Vortex service delivery model, highly aligned to the PDCA loop of ISO55000; that examines asset problems using Systems Thinking and breaks them down into a set of root causes, which are reframed as individual opportunities to create contributory value. The approach has been

successfully applied to a power cost issue on a \$10B Coal Seam Gas asset in Queensland, deriving an actionable solution to what was previously seen as an unsolvable problem.

**Keywords:** Actionable Initiatives, Adaptive Iteration, Chaos, Complexity, Cynefin, Emergence, Problem Solving, Systems Thinking



## 1. COMPLEXITY, CHAOS AND EMERGENCE

### 1.1 Cynefin Framework

Let's begin with a show of hands; "who thinks their asset is not Complex?"

The Cynefin framework is a modern construct used for making sense of problem solving. It basically says, "not all situations are equal" and allows us to choose approaches that suit the level of complexity observed in the system and its surrounds.



**Figure I – Cynefin Framework**

The framework categorizes five types of systems;

- Simple – a direct relationship between cause and effect of the problem that can be easily seen
- 1. Complicated - there are multiple right answers, and expert diagnosis is required.
- 2. Complex - problems are always more unpredictable than they are predictable, we can see patterns. Hindsight can only tell us if there is a right answer. Current results can then be used to define the next step toward a solution, in short this is no one solution. Complexity can be driven by external factors.
- 3. Chaotic - no one knows what the answer may look like with certainty, and we need to see what works first instead of the right solution

- 4. Disorder – here we need to start breaking down the situation into smaller problems. Then reapply the problem to one of the four categories and work on a solution.

In the Complicated space classical Systems Engineering prevails. When we put many Complicated systems together, as in some asset systems, we often end up with a Complex "Systems of Systems", which has seen a new era of Systems Engineering, still in its formation today.

Emergence is the term for when attributes are realized only jointly, because of system interactions. A good example is a car, where the emergence of being able to drive, only comes about once all the parts are put together. True emergence is when an attribute arises that we did not expect, in a Complex system.

### 1.2 Examples of Asset Complexity and Chaos

A simple asset may be a section of pipe, a pole, or a tank. A widget.

A complicated asset may be a Water Treatment Plant, or an Electrical Substation.

A complex asset may be a LNG conversion plant, a city water network, or an entire city power grid. A degree of unpredictability creeps in.

Chaotic may include the National Energy Market – a complex asset with chaotic aspects including market dynamics, quickly arising new technologies, dynamic government policy, and more.

**Figure ii Chaos Impact on an Asset**



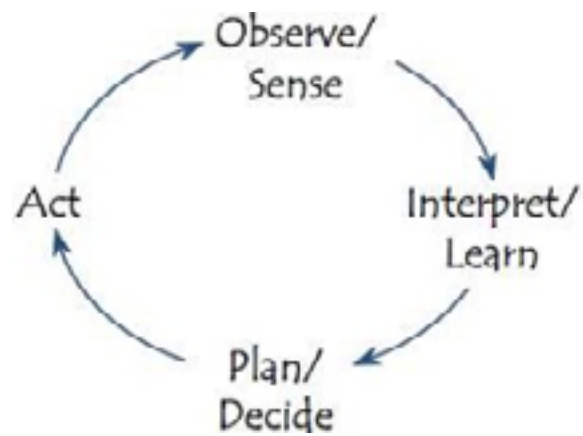
The bottom-line – the solution approach must match the level of complexity involved.

Another show of hands; “now who thinks their asset is not Complex?” We suggest that many asset managers fail to appreciate how complex their assets are, and they struggle because they are using poorly aligned techniques. People often underestimate complexity.

### 1.3 Adaptive Iteration

ISO55000 is based upon an Adaptive Iteration approach – why? Adaptive iteration is an effective method of implementing change in a Complex system [1]. It works largely because it uses many successive solutions to work towards overall goals.

The last twenty years has seen a range of adaptive iteration approaches, all with the intention of improving performance in an ongoing way.



**Figure iii – Base Adaptive Iteration approach**

The PDCA Cycle as used in ISO55000 has its roots in Continuous Improvement from Japan [1]. It works well with predictable approaches and has strong focus on learning. However, for those reasons, it may not be so good with situations that are unpredictable, uncertain and emergent.

		Observe/Sense	Interpret/Learn	Plan/Decide	Act
Kolb	Experiential Learning	Reflective Observation	Abstract Conceptualization	Active Experimentation	Concrete Experience
Boyd	OODA Cycle	Observe	Orient	Decide (Hypothesize)	Act (Test)
Deming/Shewhart	PDCA/PDSA Cycle	Check/Study (Observe)	Act (Learn)	Plan	Do (Test)
Haeckel	Adaptive Loop	Sense	Interpret	Decide	Act
Dixon	Organizational Learning Cycle	Integrate	Interpret	Act	Generate
Snowden	Cynefin: Complex Domain	Sense		Respond	Probe
Ries	Lean Startup	Measure	Learn	Build	
Eoyang	Adaptive Action	What?	So What?		Now What?
Fietz	Adaptive Iteration	Observe	Interpret	Design	Experiment

**Figure iv –Variants of Adaptive Iteration**

In solving complex problems for our clients, we decided upon a variation of the OODA cycle (developed by a US fighter pilot). Very similar to PDCA, and later versions of OODA used many feedback loops. The OODA Orient stage is performed relative to objectives, whether absolute or relative (as in a dog-fight) and we use it to define solution options and start measuring how well they meet overall objectives.

Both approaches are only as effective as the ability to Observe, as shown by Boyd in his later years.

**Figure V – PDCA Adaptive Iteration as part of ISO55000**



#### 1.4 Line of Sight

Maintaining line-of-sight (LOS) means having a connection between our actions (Act) and the objectives (Plan). This often justifies spending and may prioritize funding. Under modern utility regulations, many agencies are required to show this LOS on a grand scale, e.g. we will reduce XYZ by N% for \$x million.

As outlined, maintaining this LOS gets harder with increased complexity. We can't be fully certain of results or outcomes, so how do we handle that? It begins by understanding there is no 1-1 relationship between initiatives and outcomes, rather, initiatives combine to give an emergent or net effect. From Systems of Systems Engineering we can apply enterprise and whole-of-asset models that ultimately drive decision-making.

This blurring of 1-1 on LOS highlights the need to have clear objectives and measures (and this is the very essence of ISO55000).

#### 1.5 Systems Thinking

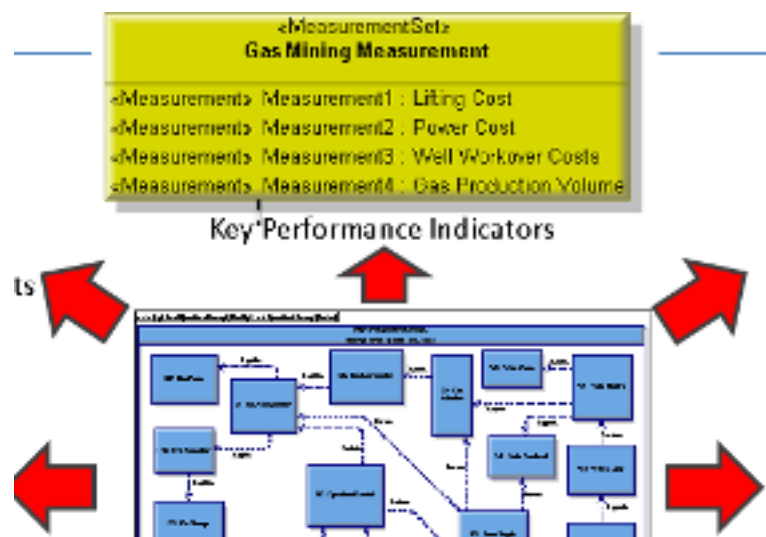
Systems Thinking (ST) is holistic rather than reductionist, and typically does everything possible to encourage creativity, giving rise to innovation [2]. ST discourages finding a single solution to a single problem or symptom. It's a many-to-many solution space. No single initiative X is going to solve problem Y in a complex scenario.

Classical Systems Engineering, that many of you may be familiar with, is one form of Systems Thinking, best suited to Complicated assets, rather than Complex ones.

ST also tells us;

- In complex systems we can see patterns but not always predict – this is a simple fact that we should leverage.
- Certainty is our friend – any method that provides meaningful data will help defeat uncertainty. This includes digitalization, data analytics, big-data, and machine learning, for examples. A key advantage of digitalization is the abundance of data that it provides, defeating uncertainty at least to some extent

**Figure vi – An Enterprise Model and High Level Objectives**



The key finding here is that when using an adaptive iteration approach with a Complex asset, there is rarely a single solution, nor a single problem to solve.

## 2. ASSET MANAGEMENT VS PROBLEM SOLVING

### 2.1 Creative Problem Solving

So how do we get from problems to solutions? Consider a creative problem-solving (CPS) process; this may be considered as a softened approach to classical systems engineering.

- Objective finding – what are we trying to achieve or solve?
- Fact finding – a discovery process to see the facts regarding where we are at
- Problem finding – identify the actual problems behind meeting the objectives

- Idea finding – potential ways to solve the problems
- Solution finding- actual solutions
- Acceptance finding – validation of a solution set under an executive decision process

This approach will yield many problems and many solutions. Of note, the symptom or the high-level issue, is often not the problem but is a perception of the impact of many problems. For example, an issue may be the ability to operate plant in bad weather, but there are in-fact many underlying problems and solutions.

Again, this highlights the need for clear objectives.

### 2.2 Our Approach

Our adaptive iteration approach has stages for Discover, Define, Decide and Deploy. It aims to identify problems and then to reframe them

as opportunities to create value. That value is then used to distill the most effective options to the top. It also aims to support transformation as well as improvement, by opening the problem space to innovation.

### 2.3 ISO55000

It wasn't long before we picked up on the similarity between our Nova Systems Vortex approach and the adaptive iteration at the center of ISO55000. The PDCA approach is solid, and for it to better cope with complexity it needs to be supplemented with CPS, taken from ST.

## 3. THE UNSOLVABLE PROBLEM

### 3.1 Houston – We Have a Problem

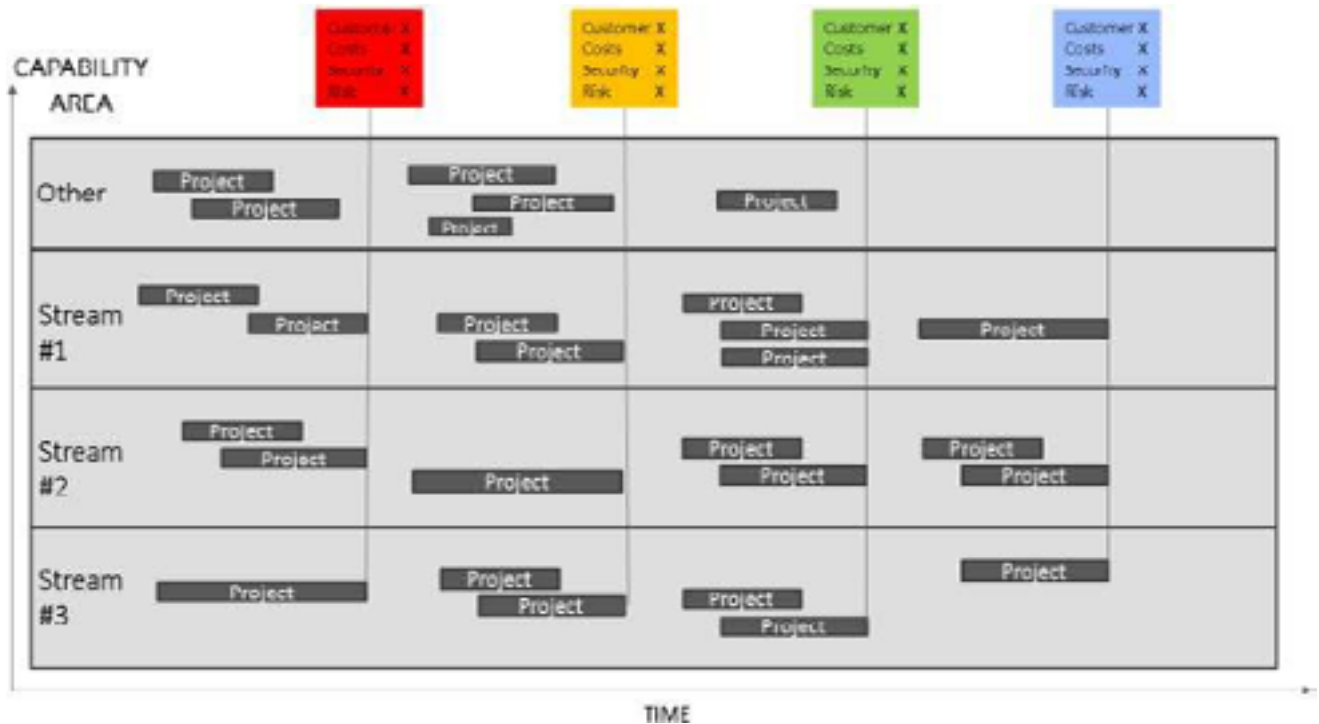
We have applied our approach to an issue in an upstream CSG project in Queensland. The client presented



**Figure vii** – Our Approach to Complex Problem Solving



**Figure viii i – Generic Program of Works**



with a Power “problem,” claiming their power cost was excessive, and the amount of cost was unpredictable. This represented a major issue facing their entire operation. They thought “this cannot be solved”.

### 3.2 Problems and Root Causes

Our process identified 24 underlying problems, and 27 actionable initiatives, all resulting from this one issue. The solution space was arranged into three streams;

- Asset controllability
- Using gas to make electricity
- Management

### 3.3 A Solution as a Program of Works

By examining the inter-dependencies and relative values of the actionable initiatives, they were

arranged into the three streams of work, over three waves of change, resulting in a solution roadmap. Each work package had its own ROI, and the roadmap showed the positive impact on key business goals as a function of time.

The description of the problem space, the solution space, and the overview plan for delivery as a program of work, was recorded as a Strategic Vision, and used to start a change management program.

## 4 SUMMARY

We have shown that PDCA is a necessary and often suitable approach to continuous improvement, but it can be supplemented with some System Thinking techniques to better cope with complexity;

- Techniques to reduce uncertainty through data

- Establishing very clear objectives and targets through a repeated process of discovery
- Creative Problem Solving to identify underlying problems and the many solutions likely to be needed
- Establishing an integrated, multi-year program of works

## 5. REFERENCES

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- [2] Mike Jackson, Systems Thinking, Creative Holism for Managers, Southern Gate Chichester, West Sussex PO19 8SQ, England, John Wiley&Sons Ltd, 2003



## ARTICLE 2 – Changing Strategic Asset Management

David Eccles – TasNetworks

### SUMMARY:

(T)90 per cent of TasNetworks poles are treated CCA wood poles (204,528), with an expected service life of 50 years. From 2005 to 2017, the percentage defect rate in pole inspections has risen annually due to a bow wave of wooden poles installed after the 1967 bushfires of Tasmania reaching the end of their service life, and undetected carrot/soft rot of the pole,

This paper outlines some of the innovative opportunities that TasNetworks has been exploring to improve the strategic asset management of its poles through better monitoring and evaluation of condition whilst maintaining expenditure and failure rates at existing levels. Key benefits from these opportunities are more effective condition monitoring and controls for carrot rot (local types of soft rot) that degrades the pole safety factor, improved distribution network resilience to bushfire and wind storms and therefore supply

reliability, and whole of asset life cycle cost effectiveness in pole asset management.

Keywords: Innovation, Wood Pole, Risk Management, Asset Management, Electricity Network

### 1. INTRODUCTION

TasNetworks is Tasmania's transmission and distribution electricity network service provider. 90 per cent of TasNetworks poles are CCA treated wood (TN) poles (204,528). These poles have an

expected service life of 50 years, with the population having a current average age of 28 years. Over twenty per cent of the wood pole population has reached or is approaching 40 years of service (over 42,000 poles), and of those, some 18,000 poles are over 50 years of service. Forensic profiling has shown aged wood pole subpopulations pose a higher risk of failure from undetected carroty rot, and /or splits, cracks and aged wood shock loading weakening with increasing splits and cracks.

In addition to an impending bow wave of asset replacements, recommendations from TasNetworks bushfire mitigation strategy review in 2011 concluded that further focus was required for distribution pole assets to further reduce bushfire risk from and to the wood poles. The review identified relatively high volumes of target pole assets with varying levels of perceived risk throughout the state. A key question required to be addressed related to the timing of when the risks posed by the identified target pole assets and to the target pole assets would reduce to the level of acceptable risk identified by the business.

In order to ensure financial and economic decisions were based on sound risk management framework that aligned to corporate risk appetite, TasNetworks had to explore a number of innovations to facilitate the better monitoring and evaluation of our pole assets, and the quantification of pole risk and measured risk reduction over time as mitigation tasks are progressively and auditably completed.

TasNetworks reviewed the level of asset information and the way this information was structured within its asset management system and

found that:

- there was sufficient asset information in order to identify relevant assets and locational information
- there was sufficient data and processes to ascertain key information such as asset age; failure history and forensics; failure consequences, and program costs.
- adequate systems were in place that enabled interrogation of data. Systems include:
  - geographical information systems (GIS);
  - outage analysis systems;
  - fault systems;
  - third party system input (e.g. fire authority systems);
  - unassisted pole failure forensic reports; and
  - pole defect information and condition history.

information regarding pole failure risk and bushfire risk levels did not exist at a level of granularity that would enable meaningful prioritisation of tasks.

- lack of information pertaining to pole failure risk levels for undetected carroty rot limited the level of analysis that could be undertaken by TasNetworks' to enable the formation of a predictive model that would ensure program volumes and costs were matched to ensure highest risks were actioned over appropriate timeframes (aligned with TasNetworks' corporate risk appetite).

A number of opportunities were identified to improve TasNetworks asset information and analysis gap

that are outlined in more detail below.

## 1.1 Carroty Rot Research

Carroty rot is difficult to detect with traditional pole inspection methods used during periodic asset inspections (drill and tap). This form of soft rot had been detected in forensic inspection of about half the annual unassisted pole failures in the network and was a contributing factor in many of the other unassisted pole failures due to wind loading. TasNetworks needed better knowledge of rot location and rot growth rates to assist with staking practices, pole wraps, rebutting and impairment mitigation.

In 2016, TasNetworks sought out a partnership with the University of Tasmania (UTAS) to identify and detect fungal species causing carroty rot. The intent of this partnership was to provide a baseline of knowledge to test biocontrol's capable of retarding soft rot growth in wood poles which could have industry wide benefits.

16 different ecological combinations of the bacteria and fungus have been identified to date, with various combinations of bacteria and fungus identified as retarding or accelerating decay. The next steps are to increase the sample size of the pole population and test the effects of biocontrol's at retarding rot growth rates.

## 1.2 Non-destructive Testing Methods

In conjunction with trying to better understand the causes of carroty rot and it's growth rate, TasNetworks recognised that the current drill and tap method of inspection was not adequately detecting carroty rot and potentially compromising

the condition of the pole through the unintended introduction of moisture or bacteria and fungi. A number of non-destructive testing (NDT) methods were field trialed over a period of 6 months for rot detection and cost effectiveness. Two successful technologies were selected in early 2018 for roll out into standard business practices, with a more specialist NDT scanning test available as a follow up if required.

### 1.3 Risk Profiling

In order for TasNetworks to make informed and justified decisions, additional information was required to enable more informed decisions to avoid just executing like for like replacements of an asset with all its associated risks for the full service

life of the asset. TasNetworks identified and defined critical support structures where the cost to replace the poles are high due to:

- additional equipment on the pole, such as a regulator(\$90K), recloser(\$54K) or pole mounted substation (\$34K);
- the length of the span adding additional loading considerations for the pole replacement, and
- site where timely restoration of supply was compromised due to access issues.

This information was overlaid with bushfire risk modelling undertaken as part of TasNetworks bushfire mitigation strategy review, which had defined four different spatial areas to support the understanding of the risk exposure of the

electricity network and enable the prioritisation of targeted asset programs in various bushfire risk areas:

- High bushfire loss consequence area (HBLCA);
- High bushfire risk area (HBRA);
- Low bushfire risk area (LBRA); and
- High bushfire loss area (HBLA).

Table 1 shows the breakdown of the critical support structure within and outside the HBLCA and table 2 shows the breakdown of pole assets within the various bushfire risk areas and high level timeframes for work programs (Ref 2).

**Table 1 – pole population by critical structure (CS) type and by location in High Bushfire Loss Consequence Area**

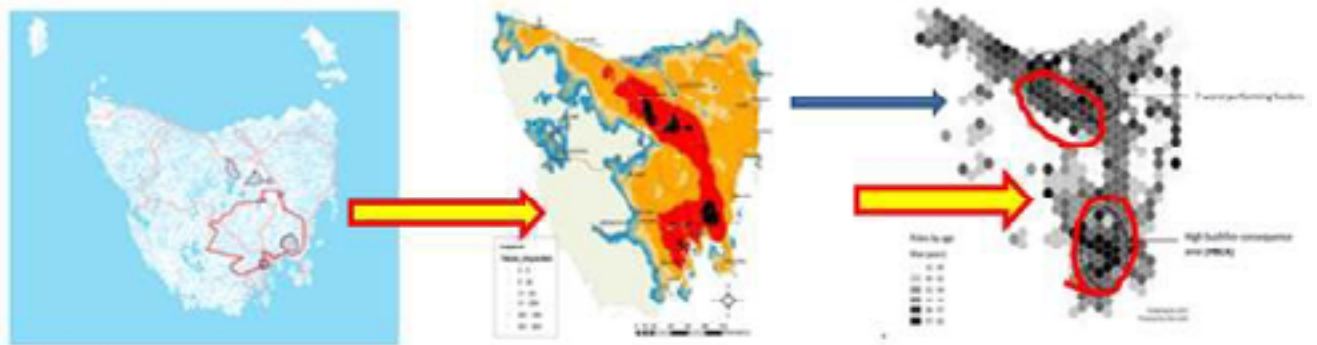
Critical Support Structure (CS) TN Wood Poles	Total CS in network	CS Located in HBLCA	CS Located in Other areas
Equipment structures	13,483	2,376	11,107
High stress structures	7,000	1,232	5,768

**Table 2 – TasNetworks bushfire mitigation program prioritized according to fire risk areas poles**

Focus	Urban (LBRA)	Rural (HBRA)	HBLCA	HBLCA and HBLA as overlap	HBLA	Totals
Pole population per cent	35	52	13	0.5	NA	100
Pole population	79,450	118,040	29,510	1,810	3,820	229,360 (all pole types)
Program timeframe (years)	-	5 to 10	1 to 5	1 to 5	5 to 10	Condition based



**Figure 1** – shows the distribution of pole assets in the HBLCA and HBLA areas by age.



#### 1.4 ALTERNATIVE WOOD POLE TECHNOLOGIES

Non-wood poles have historically been used to increase bushfire resilience and reliability of the distribution network. TasNetworks currently has steel lattice and Stobie poles as alternative pole types in its network. CCA treatment of poles controls external brown rot but adds CCA after burn risk in bushfire and fuel reduction burns. Fire dart and ground line bushfire ignition carbonizes CCA wood poles, completely or partially to reduce pole section strength and service life. This can be mitigated by the use of intumescent coating.

To this end, TasNetworks are

currently field trialing bushfire resilient non-wood pole alternatives in the HBLCA (Figure 2). Economic sensitivity analysis (NPV) comparing CCA wood poles to a range of alternative pole materials indicate better financial outcomes for a 50-60 year bushfire return period for wood pole alternatives for critical structures. (Ref 1). Figure 3 shows that for anything less than 60 years, non-wood material poles become far more suitable options for new or replacement installations of critical structures.

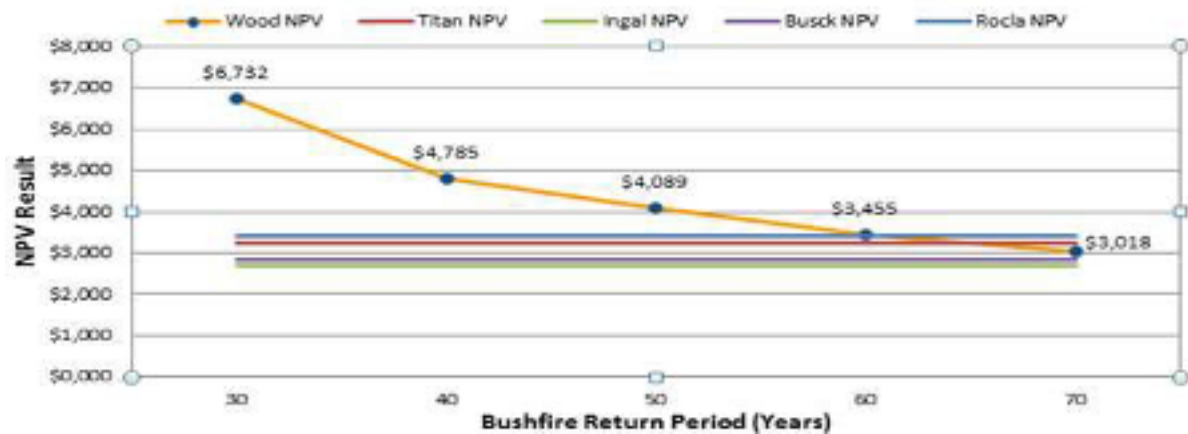
Where an existing wood pole exists with significant remaining service life, the retrofitting of an intumescent coating for the first 2.5 meters of pole above ground

level offers added resilience from fuel reduction burns and low level scrub or razor grass bushfires. A range of intumescent brands coatings were applied and fired in a comparison pole fire trial in October 2017 to recommend practical retrofit ease and wood ignition stopping rankings.

Other pole technologies are also being explored to improve staking technologies that enable the deferral of condemned wooden poles, such as pole wrap, rebutting, and longer stakes, and as an alternative for TasNetwork's existing pole caps, such as a thermoset epoxy, or similar.



**Figure 2** – 2017 Intumescent coatings fire test and NDT trial micro drilling / gamma scan/THORs hammer



**Figure 3 – Bushfire Resilient Pole NPV Sensitivity Analysis, CCA afterburn , Titan & intrumescent poles**

## 2. CONCLUSION

From NDT and identification of caroty rot fungal species (conducted by UTAS) undertaken so far, improving rot detection is now more promising. This will enable more effective risk and safety management of TasNetwork's CCA wood pole population and staked pole risk mitigation choices. Ongoing trials will develop and improve caroty rot detection methods and future controls, as well as better attachments for caroty rot rate matched with available impairment mitigations.

Wooden pole alternatives that provide increased bushfire resilience are currently the priority focus in HBLCA, with plans in the future to extend this to include assets in the HBLA.

These innovations together will assist in mitigating the impacts of TasNetworks predicted bow wave in expense associated with pole replacement and risk reducing targeted investment to critical structures for improved bushfire and reliability of supply resilience.

## 3. REFERENCES:

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- [2] M Emmett, Strategic Asset Management of Powerlines Within bushfire risk areas across TAS, AMPEAK 2018
- [3] K.Barry & M.Glenn, 2017, UTAS Final Report \_Identification of soft rot decay fungi in eucalypt power pole samples"( R 719238)



## Article – How to Sustain a \$130bn Multi-Modal Asset Portfolio While Balancing Cost, Risk and Performance

Lucio Favotto & Samiha Najem – Transport for NSW

### SUMMARY:

Transport for NSW (TfNSW), as the asset owner, manages a diverse and complex transport system across various modes including infrastructure (rail and road networks), fleet (trains, buses and vessels) and supporting assets (ICT and customer information). TfNSW is responsible for managing and shaping the future of the transport system in NSW across the asset life cycle. TfNSW is committed

to an integrated transport system in which all modes of transport work together effectively and efficiently to deliver sustainable outcomes that are valued by all stakeholders.

#### TfNSW's current challenge includes:

- Increasing demand for more transport services across NSW
  - Aging Asset portfolio reaching end of life
  - Increasing maintenance

backlog impacting asset condition and performance and ultimately services to our customers.

- Fare box revenues struggling to keep pace with the real costs of operations and maintenance.
- Increase growth in the asset portfolio currently valued at \$130bn estimated to grow to in excess of \$170bn over the next 10 years.



- Changing landscape in legislative requirements (eg equitable access) adding to the priority challenges for funding (capital and recurrent maintenance).

TfNSW has implemented an Asset Management Framework Overview that communicates to all internal and external stakeholders and service providers engaged in Asset Management activities across the Transport cluster, the key components of TfNSW's Asset Management Framework, and the approach to leading the deployment of the TfNSW Asset Management Policy.

TfNSW engages a number of Service Providers to operate and maintain assets to deliver service outcomes. Service providers submit Asset Management Plans annually with a 10 year rolling funding profile for works required for the life cycle of the asset to sustain asset condition and performance to meet the service obligations.

TfNSW has undertaken a collaborative Asset Management Plans (AMPs) review process. The aim of the reviews is to identify asset management recommendations to assist TfNSW in the long-term financial sustainability of assets while

balancing asset condition, and risk to achieve, business and service outcomes for our stakeholders.

**Keywords:** Asset item, thing or entity that has potential or actual value to an organisation

Asset management is the coordinated activity of an organisation to realise value from assets (ISO 55000)

Service Providers operator / maintainers, designers, constructors providing services to TfNSW to manage the day to day operation and maintenance of the TfNSW assets

## TFNSW TRANSPORT FOR NEW SOUTH WALES

### 1. INTRODUCTION

#### 1.1 Background

Transport for NSW (TfNSW), as the asset owner, manages a diverse and complex transport system. TfNSW is responsible for managing and shaping the future of the transport system in NSW. TfNSW is focused on establishing an integrated transport system in which all modes of transport work together effectively and efficiently to deliver sustainable outputs that are

valued by all stakeholders.

TfNSW objective is to align our business to quality requirements as we work towards achieving the NSW Premier's and State Priorities, implementing our Corporate Plan Connecting NSW and providing transport services for the people of NSW.

The Asset portfolio includes an extended network of operating modes including road, rail, buses, taxis, ferries, light rail, cycling, walking, community transport services, regional air services and freight transport and owns assets valued over \$130 billion.

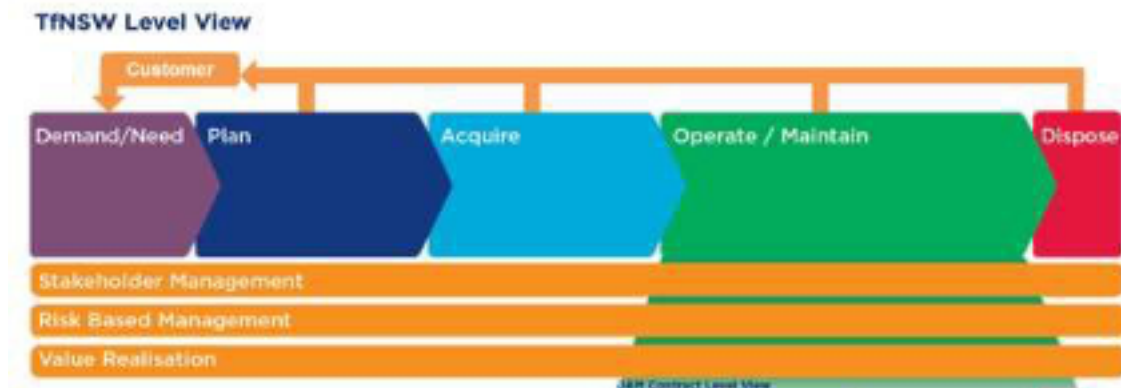
#### 1.2. Service Providers

Transport for NSW (TfNSW) engages a number of Service Providers across all transport modes to operate and maintain assets to deliver service outcomes. In some cases the Service Providers are transport agencies such as Roads and Maritime or Sydney Trains, while in other circumstances the Service Providers are contracted organisations providing operation and maintenance services (such as ALTRAC for Light Rail) or purely maintenance services (such as John Holland for Country Regional Network).



**Figure I – Transport for NSW Service Providers**





**Figure II – Transport for NSW Asset Life Cycle**

## 2. TfNSW ASSET LIFE CYCLE

The Transport cluster undertakes activities across all stages of the asset life cycle. Coordination of these life cycle activities across the cluster (Asset Management) is the key to realising value from assets and achieving organisational objectives.

### 2.1 Challenge

TfNSW needs to assure itself that the assets remain fit for purpose, safe and sustainable over the asset life cycle. This includes having a better understanding of:

- Service (Now & Future)
- Asset Risk Profile
- Delivery Challenges
- Asset Handover Risks (New and Contract End)
- Value from Assets
- Investment Opportunities and
- Alignment of Opportunities (Integrated across TfNSW)

Service Providers need to assure TfNSW that assets are fit for purpose and safe to deliver service

outcomes over the asset lifecycle. This includes communicating to TfNSW:

- Assurance Outcome
- Production (scope)
- Condition
- Backlog
- Risk to Service Outcomes
- Performance against Asset Management Plans

## 3. SERVICE PROVIDER ASSET MANAGEMENT PLANS

TfNSW works collaboratively with Service Providers during the development of Asset Management Plans. AMPs are submitted to TfNSW annually with a 10 year rolling funding profile for works required for the life cycle of the asset to sustain asset condition and performance to meet the service obligations.

### 3.1 Transport Service Provider AMP Standard

TfNSW published the Transport Service Provider AMP Standard in December 2016. The purpose

of this standard was to outline the Asset Management Plan (AMP) requirements including linking funding requested to asset management objectives (such as safe and available, operational, reliable and sustainable, and presentable) and risk management. The Service Provider AMP Standard aligns with the Asset Management Framework (AMF) and TfNSW Asset Management Policy.

Service Providers prepare AMP's to demonstrate how assets are managed to delivery service outcome and provide confidence to TfNSW that assets are managed in ongoing and proactive way. The Service Provider AMP's articulate the risks to service outcomes, asset condition and overall network performance in relation to different funding scenarios. The AMP's are assessed as part of the AMF.

The successful roll-out and implementation of the standard has enabled TfNSW and its' Service Providers to mature in their understanding and articulation of how asset management is undertaken.

### 3.2 TfNSW AMP Review Process

The AMP review process is part of the overall Transport assurance and decision making process. It is completed collaboratively across various TfNSW divisions. Throughout the process the Transport Executive and the Finance and Investment Committee (FIC) are briefed on emerging issues/risks on proposed funding strategies, recommendations and mitigations.

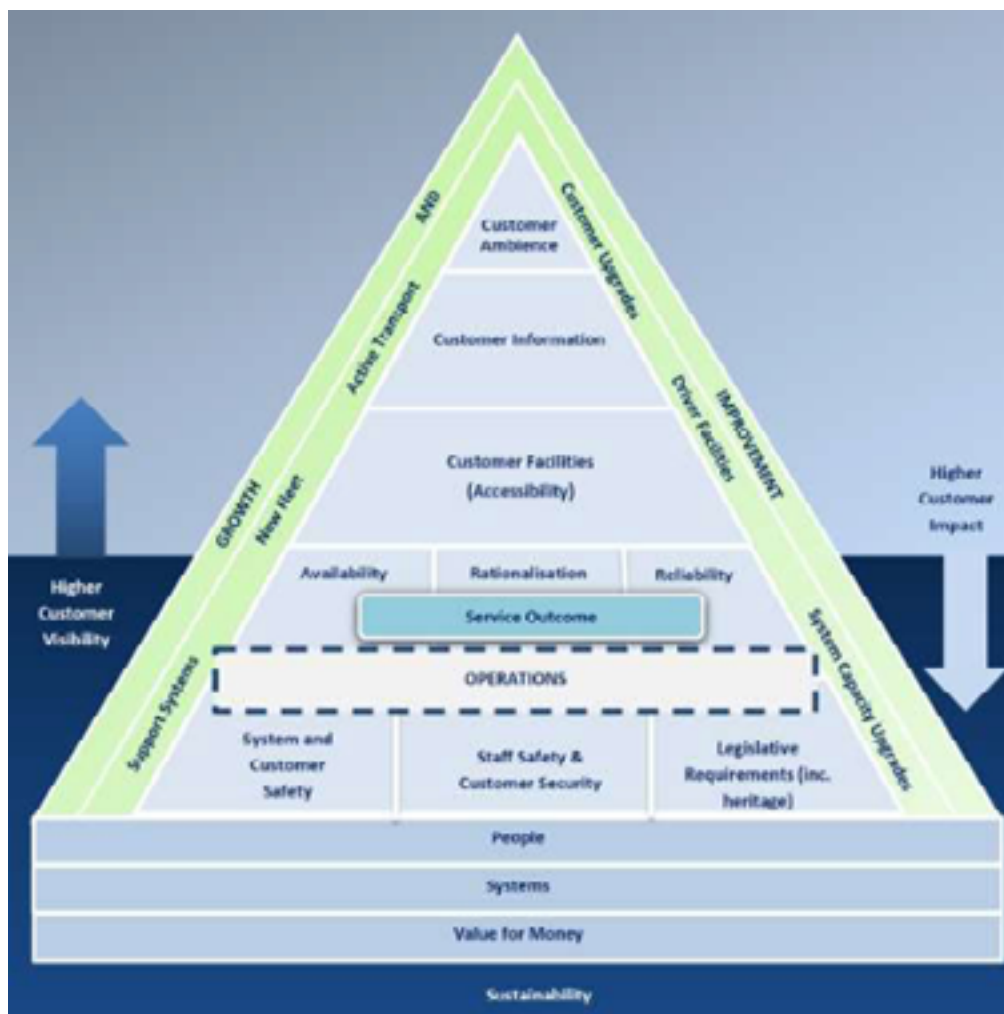
### 3.3 Balance of Cost, Risk and Performance

TfNSW has developed an Investment Decision Framework that encompasses the challenges of identifying risks to service outcomes across the transport cluster. It allows for a consistent view of Costs, Risks and Performance can be benchmarked across agencies and industries.

The hierarchy of service drivers is displayed in the Investment Decision Framework below. The funding required maintaining and operating the Transport network is determined by service outcome drivers. Customer

focused drivers are crucial and immediately visible. Other drivers, not immediately visible draw a large component of the required maintenance budget.

A large portion of the operations and maintenance program is needed to ensure a safe and reliable Transport system. These expenditure categories are not always immediately visible to the travelling passenger, but are crucial to ensure a safe and reliable service which results in acceptable risk profile and service outcomes. The outcomes drivers have a direct link to the Transport Outcomes Framework and Asset Management objectives



**Figure III –**  
Investment  
Decision  
Framework

### 3.4 Asset Management Plan Assessment

The analysis of service providers is completed in two steps:

1. Assessment of AMP to standard and maturity of Asset Management Systems These include assessing Service provider ability in:
  - Asset Management Framework
  - Approach to Determining Current State of Assets
  - Asset Information System
  - Configuration Management
  - Asset Assurance

In addition overseeing effective Asset Management Systems in place in managing life of assets to ensure processes for Configuration Management, Defect management, FMECA, RCM, TMP improvements, Obsolescence Management, Critical spares, Steady state/backlog, condition reports, Asset criticality, SME knowledge, Self-assurance audits

2. Assessment of how management of the assets balanced cost and risks along in partnership with delivering service outcomes as per investment decision framework (section 3.3).

## 4. CASE STUDY REVIEW

As part of the asset management plan reviews a number of key initiative where endorsed by the TfNSW executive team with a focus of bridging maintenance funding gap this included:

- Asset Rationalisation

Removal of redundant assets which are either no longer required for operational purposes. Re-purposing of redundant assets to other networks across NSW.

- Asset Management Community of Practice

TfNSW have established an Asset management Community of Practice with all Service Providers to:

- o Improve the understanding, capability and application of AM
- o Apply and improve the Transport AM Policy and AM Framework
- o Foster alignment, improvement and efficiencies in relationships
- o Share learnings between Operators/Maintainers
- Standards Review

Review standards to ensure appropriate assets are built and review designs to ensure they are appropriate in the context of ongoing maintenance.

- Business case process

TfNSW provide adequate assurance that recurrent maintenance requirements are considered in new projects.

## 5. CONCLUSION

## 6. REFERENCES

- [1] ISO 55001
- [2] Total Asset Management Manual – NSW Treasury
- [3] AMBOK Framework for Asset Management – Second Edition

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# Research & Industry Day

R.A.I.D.

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- Findings from the CSIRO bushfire report for Resilient Asset Management

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# A departmental experience of asset management through a global pandemic

**An interview with Deanne Leaver  
Director Asset Strategy  
Victorian Health and Human  
Services Building Authority  
(VHHSBA)**

**By Linda Kemp, Communications  
Specialist, Asset Management  
Council**

During shutdown, I have been intrigued to learn how businesses are managing through this crisis. One area that kept my focus was our health sector. Obviously. Those at the frontline, working with little regard to their own health captured the attention of us all. But I was also interested in the physical assets: the buildings, the respirators, the number of ICU beds, and how government departments are adapting in this time of crisis. And to answer these questions, I contacted Deanne Leaver, from VHHSBA, and architect of the famed Babushka Dolls analogy, to see if she could squeeze in a brief chat with me to share the department's progress through the coronavirus shutdown.

The COVID pandemic created an unprecedented challenge for intensive care facilities and, while the health system in Victoria is robust, a surge in caseload presentations was nonetheless expected. One of VHHSBA's key priorities is to 'develop and maintain an asset base that is capable of meeting clinical services standards, now and into the future'. To achieve such a priority, preparation is paramount.

As COVID-19 became the priority within the health department, VHHSBA re-pivoted to help the sector respond to the pandemic. Victoria has a 20,000 bed capacity across Victoria's health providers, but as international media highlighted in countries gravely affected, a lack of preparedness within ICU and critical care units would manifest in the loss of numerous lives. VHHSBA worked alongside Victoria's health services to face the expected surge in COVID caseloads, adapting current spaces by adding physical assets including suction and power points, changing mechanical ventilation systems and creating more space around beds. This was rapidly and deftly achieved across Victorian hospital sites and health services.

In further preparing assets for COVID, Deanne mentions two key projects within VHHSBA that were fast-tracked in order to cope with demand. The accelerated completion of Monash Health's Casey Tower brought an additional 140 beds online, and the redevelopment of Shepparton Hospital doubled the capacity of the emergency department and made available a further 88 beds for patients. VHHSBA also recommissioned two disused hospitals. In Geelong, the recommissioning work for Barwon Health opened fifty respiratory clinical rooms, and in Melbourne, the old Peter Mac site recently completed will see a further 84 beds added to the hospital system. VHHSBA was also ready for action

to temporarily alter the Melbourne Convention Centre, however, due to the state government's quick reaction in containment measures, including the message for individuals to stay home, such repurposing work was not required.

VHHSBA has a clear line of sight on many positive stories rising out of this crisis. Deanne's team adapted well to a remote work environment. The key platforms required to support such a shift, including videoconferencing tools, were already in place, given extensive planning over the previous eighteen months due to a change in their office location and a conscious realignment of workplace culture. The enforced transition to remote workstations was a smooth one, underpinned by Deanne's strong leadership and clever use of the metaphor of her team moving from training for a marathon, to running in the actual event. Primarily, though, Deanne labels what she's witnessed, both within her own department and across the wider health portfolio, as a 'team of teams': many people working together with a common objective, and sharing loads.

Another positive from COVID is an increase in uptake of the telehealth service for outpatients, which will continue to reshape the delivery of health services in the future. With a wider acceptance from individuals of telehealth, hospitals are therefore able to be used and accessed for high acuity care. The

department is currently working on an evaluation piece around the use of telehealth and how this important infrastructure can be further utilised and sustained in the future.

Even in a crisis, maintenance of assets must remain a priority. VHHSBA introduced stringent guidelines on infrastructure activities in hospitals during a pandemic. This included preventative, essential, reactive and routine maintenance activities as well as construction and capital works to ensure the continued operation of hospitals was not affected and the spread of infection, safety of patients, staff and the community was maintained. Physical assets under VHHSBA's portfolio inside the hospital environment, including air-conditioning and handling units that held potential for contamination had additional cautionary measures implemented such as maintenance crew embracing a wider uptake of PPE, maintaining social distancing during shifts, breaks, toolbox meetings and at change of shifts and regular cleaning, including tools.

Deanne adds that she recently had the privilege of being a participant in a Zoom conference with emergency workers at New York's Tisch Hospital. Interestingly, as New York State was faced with overwhelming numbers of COVID infected patients, the hospital was working hand-to-mouth, running out of supplies inside the hospital as more were being unloaded in the loading bay. During the conference call, Deanne was able to pose the question of what element in the pandemic took the hospital by surprise. The unequivocal response was an under-supply of medical gases and liquid oxygen needed to respiration patients. Deanne took relief in knowing that her team had been well prepared. Risk mitigation analysis and subsequent strategies by VHHSBA in March, as the crisis crept across the ocean, included increasing oxygen supply contracts, and upgrading storage vessel capacity across a number of hospital sites.

Without a doubt, Victoria and Australia have handled this crisis extremely well by international

standards. The government's quick and decisive action, coupled with the majority of the community following advice on containment measures enabled Victoria to keep infection rates relatively low, and our frontline staff equipped to do their jobs.

Deanne ends our time together by proudly stating that VHHSBA's multi-pronged strategy and a planned ability to pivot and adapt on their scheduled projects meant that the department itself was poised and ready for such a crisis, even before coronavirus reared its crowned head onto the horizon.

And that's a positive experience of asset management through a global pandemic.

Linda Kemp wishes to thank Deanne Leaver for taking time out of a busy schedule to speak regarding VHHSBA's asset management experience through COVID.



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## CPAM STAR PROFILE – Andrew Cox



### 1. Why asset management?

At a fundamental level, I enjoy converting tangible and intangible complex problems into simple solutions. The challenge is aligning thinking and organisational goals, then identifying, establishing and implementing solutions which consider the people, processes, technologies and all the organisational parts in the achievement of organisational goals.

### 2. How long have you been working in the asset management sector?

Asset management as a term is relatively new, I did not realise I was working in the asset management sector until 2014 when ISO55000 was released. I started working in the sector in 1996 after joining the Navy. Since then I have been progressing and building my skills. I started out as a mechanic and then went on to be an electrician. And then I got in to predictive maintenance, reliability engineering followed by asset management.

### 3. What is your speciality?

This might sound really strange, but my speciality is my underlying work ethic and most recently my emotional intelligence. I apply these though a continuous improvement mindset. Starting

out as a tradesperson provides me with a unique insight across all levels of an organisation and the ability to implement practical solutions delivering the most value with minimal effort. There is no single way to solve anything, having worked in culturally diverse and rapid changing environments you get an appreciation of the need to draw on individual individual's strengths within a team to produce the best possible outcome.

### 4. What drew you to explore more about this speciality?

With regards to emotional intelligence, I loved working in Papua New Guinea and Nauru, these roles significantly changed my mindset. It taught me that sharing knowledge and creating a continuous improvement culture within a team was a key to long-term success.

### 5. What's the best career advice you've ever received and who gave it to you?

Peter Walker, a continuous improvement leader that I worked with in Papua New Guinea, gave me a book—What Colour is your Parachute. It's a self-help book which resonated with me at the time, I had been applying a similar methodology for a few years prior and this confirmed my thinking. The book gets you to think about what you are good at, what your passion is, establish goals and then develop a path across roles and industries to achieve the long term goals. A large part of the book is about networking, building relationships which has been a central part of my self-driven career development, as an example I set out to

become a certified maintenance & reliability professional (CMRP) shortly after reading the book and applying gained knowledge in the workplace, following that I decided to become university qualified and gained a graduate certificate in engineering asset management through the university of Wollongong while running my own consulting business and raising three young children. Most recently I have become a member of the Asset Management Council, become a certified practitioner in asset management (CPAM) & a certified asset management assessor (CAMA) through the world partners in asset management.

### 6. What makes a great asset manager?

A great asset manager needs a balance of technical and behavioural competence to see the whole picture. They also need the ability to think strategically and implement improvements at tactical and operational levels. Working in culturally diverse and rapidly changing environments requires a higher level of behavioural than technical competence. It is also important for an asset manager to adapt to varied scenarios quickly.

### 7. What is the most exciting trend that you've noticed in asset management today?

Based on my background I have an appreciation for getting the fundamentals and structure right so I find ISO55000 an exciting trend. It is an international standard for a consistent approach to asset management. A lot of people have been referencing and using

## CPAM STAR PROFILE – Andrew Cox

it. A lot of state governments are including the standard as part of asset management policy requirements, implementing modern frameworks and organisational change to realise value from assets. It is exciting to think about the sheer volume of people being exposed to asset management and this standard around the world.

### **8. What is the biggest challenge facing up-and-coming asset managers today?**

First it is fundamental to have a common language and understanding of what asset management is along all its elements. And to shape that language to fit different industries. The other challenge is leadership and culture. You need leadership and buy in to drive change. Improvement activities and driving value from assets cannot be sustained in a work environment with a poor culture.

### **9. What advice would you give to an up-and-coming asset manager today?**

Asset management is quite broad so work to your strengths. Build them into a career path that makes you happy, so you continue enjoying the job, utilise the WPIAM designations paper as a guide. An asset manager needs a broad understanding, but you should apply your skills to the area that drives the most value.

### **10. What is the biggest challenge facing the asset management sector today/your field of asset management today?**

Asset management has gone through heavy capital investment across the country. This will decline over the next 5 years.

So, there will be a big shift in thinking from capital investment to managing assets with stricter budgets. With COVID-19 we are going through a bit of a financial crisis now. Being able to shift capital thinking to balance cost, risk and performance from your assets with reduced budgets is the challenge.

### **11. What is your proudest career achievement?**

While I did not face conflict like a lot of others, I am proud to have served in the defence force and returned from active duty. A lot of hours and training, working as a team to achieve a goal through any means necessary is a behaviour I am still applying to this day.

One of my other proudest moments was transitioning with my family from working in Papua New Guinea as a reliability engineer & into a Melbourne based software company as a software product owner.

The role I moved into was to develop cloud based computerized maintenance management software (CMMS) for the local government sector in Australia. We started development from a few pieces of paper as the user interface, business processes and information requirements, then developed the solution from a central team & a team working remotely overseas. A key to the success of this was leadership support & the complimentary skill sets of the whole team.

### **12. What's next for you?**

In the short term I am aiming to become a Certified Senior Practitioner in Asset Management (CSAM) through

the Asset management Council.

Over the next 3 – 4 years, implementing an asset management system across the whole of NSW Health as part of the TPP19-07 Asset Management Policy for the NSW Public Sector.

A major & complex Organisational change management activity, involving people, process & technology delivering value to the people of NSW in terms of Health Outcomes and efficient use of tax payer money. Maturity Assessments based on the Asset Management Council's System Model, fit-for-purpose Strategic Asset Management Plans, Asset Management Plans, Asset Registers supported by existing systems and technologies.

### **13. When you're not busy at work, what do you enjoy doing to unwind/relax/explore?**

What I am doing right now is pretty typical, I am currently watching the videos on AMSPEAK from this year and reading books about asset management. I also enjoy spear fishing close to home. Another large part of my time is supporting and watching my three children with sports or getting out and about in the local area bushwalking.

Andrew recently fast-tracked his CAMA accreditation to achieve his Certified Practitioner of Asset Management (CPAM). To find out more about our internationally recognised certification scheme, visit [www.amccouncil.com.au/certification](http://www.amccouncil.com.au/certification)

## CSAM STAR PROFILE – Uj (Ujwal) Lakra,



### 1. Why asset management?

AM is such a diverse field, yet the principles of AM transverse sectors, industries, geographies and asset types. This gives practitioners of AM, the ability to apply the strategic principles of asset management anywhere, at any time and to any asset type. Furthermore, there is a growing demand for alignment to 'best practice' AM, as organisations are now starting to understand the value added benefits from the application of the ISO 5500x suite and standards and as consultant, this is particularly beneficial, as more and more clients look to bring in advisory support to assist them with their AM maturity transformational journeys.

### 2. How long have you been working in the asset management sector?

My journey in AM started 10 years ago, when I was working as a graduate for an IFM service provider. The organisation had an AM CoE which I got involved in when I submitted a paper on the benefits of AM, for which I received a ticket to AMPEAK. It was then that I discovered the relatively new field of AM as we know it today.

### 3. What is your speciality?

I provide advice to clients to develop SAMPs, AM Policies,

AM Strategies, AMPs for the built environment, etc. (among other AM and Facilities Management services), across a range of sectors including Utilities, Local and State Government, Universities, Health, and PPPs.

### 4. What drew you to explore more about this particular speciality?

Based on industry trends, particularly at the state and local government sector across jurisdictions, from an engagement level perspective there has been an increase in the need or requirement for AM specialists.

### 6. What makes a great asset manager?

I believe that AM is much more of a management field than it is technical. I therefore believe that a great asset manager has both a combination of soft and hard skills with a greater focus on the soft skill base. AM is about places, people and processes. A great asset manager must understand the strategic direction of the organisation and the key measures to success to achieve the strategy. The management of their asset base (in terms of either custodianship or stewardship) must be positioned to ensure that the strategic goals can be achieved. And requires a critical and analytical mind set, with great customer/stakeholder satisfaction importance.

### 7. What is the most exciting trend that you've noticed in asset management today?

The benefits of AM are far reaching and the take-up rate is growing exponentially. Given this demand, the future for AM looks

bright.

### 8. What is the biggest challenge facing up-and-coming asset managers today?

I think whilst the benefits of AM are being well understood at a tactical level, there is still a level of uncertainty at the board/executive level. Asset managers should be entitled to have a say in the operations of the asset base as this insight inevitably contributes to the long-term sustainability of the function or service being provided by the asset.

### 9. What advice would you give to an up-and-coming asset manager today?

Keep learning and upskilling. There are a lot of lessons to be learned from mistakes that you can apply to your own practices, so seek this out and don't be afraid to make your own mistakes and fail!

### 12. What's next for you?

Given the scope of my role, I will invest some time in becoming CAMA accredited.

### 13. When you're not busy at work, what do you enjoy doing to unwind/relax/explore?

My wife and I have a 2.5 year old at home and she keeps us busy. We spend as much time as we can with her, including travelling to new places (when we can!).

Uj recently achieved his Certified Senior Practitioner of Asset Management (CSAM). To find out more about our internationally recognised certification scheme, visit [www.amcouncil.com.au/certification](http://www.amcouncil.com.au/certification)

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# **CENTRE OF EXCELLENCE FOR ASSET MANAGEMENT**

OPTIMISING SUSTAINABLE ASSET VALUE

## Trends in Maintenance and Reliability

Linda Kemp provides a journalists report from a presentation delivered by Carlos Gamez, Head of Asset Performance, Western Power at the 2020 AM Council's Maintenance and Reliability Forum held

Western Power is the nation's largest utility provider, covering a huge portion of land in Western Australia, and boasts a workforce of nearly 3000 members, thirteen community power banks, over 270,000 streetlights, 1GW of rooftop solar equating to 30% of homes, and almost 800 approved battery systems.

The business is a transmission and distribution network. It does not generate or retail electricity; rather it is an essential cog in the chain of moving the electron from the generator to the customer. Given its large asset base, Western Power holds an intentional focus on maintenance and reliability. Currently, Western Power is looking at the ways in which current trends impact the business objectives, particularly in the maintenance and reliability arena.

### TRENDS

Any business needs to be mindful of current trends in order to adapt successfully for the future. Throughout 2020, keeping a watchful eye over trends and pivoting accordingly has never been more important.

Prior to unexpected COVID-related trends, Western Power has over time noted major trends in the evolution of the network. Traditionally, transmission networks were made up of one network operator and one market operator, with one generation source, substations, and distribution networks and, finally, the loads. High-load periods were generally seen in the evening, with consumers returning home from school and work, using electricity in the activity of the evening: making dinner, using appliances such as heaters and air-conditioners, watching TV, using power for devices such as iPads, laptops, etc.

More recently, however, transmission networks have seen an increase of network operators and additional market operators. Renewable sources, coming online at the transmission level, also alter the look and delivery of the network, as well as new solutions for consumers, including smart meters, micro-grids, and the ability to send unused power from homes back to

the grid. Such trends pose challenges at a technical level, effecting the stability of the network due to the two-way flow of currents and voltage, and present new opportunities on how to manage the network while maintaining the quality of power for customers.

A further trend noted by the business is the change to loads throughout the day. There is an increase to high-load periods during the middle of the day, and low-demand periods at times when previously the network experienced high usage from consumers. These changes impact the level of voltage the system can sustain and therefore Western Power's delivery of the power, and how to integrate these sources into the network.

In recognising and adapting to these trends, Western Power is presented with a new perspective for the decommissioning of ageing assets, raising questions including how to wind down such assets, while acquiring new assets that offer better ways to manage new solutions. Stand-alone Power Systems (SPS) offer a viable solution in regional areas, where a large number of assets are accessed by typically low density of customers. SPS assets offer a better service at a reasonable cost to the consumers as well as the risk level carried by the network.

Below are further examples of the various lenses through which Western Power view current trends.

### CUSTOMERS

Western Power seeks to understand their asset base from the customer perspective: What is important to the customer serves as a path moving forward in maintaining assets. The three main areas as noted by customers are highlighted as:

- decreasing the cost of renewables,
- greener future,
- technology and innovation.

Renewable energy sources such as solar panels, batteries wind powers and any as yet unidentified innovations of the future are becoming increasingly expected by consumers. These renewable energy sources are competing with more traditional sources like diesel, gas, coal, however, they are currently expensive. Western Power recognises the need to decrease the cost of renewable energy sources, as it organically provides a flow-on effect into their customers' expectation of a greener future. The aim is to recover damages caused to our world over last 100 years or so, as well as acknowledging too that non-renewable energy fuels are finite, and thereby the use of renewable sources now provides a smooth transition in the future. The underpinning concept of technology and innovation highlights how present and emerging technologies affect the type of service provided, but also serve as a guide on how to improve and streamline the services in the future.

## NETWORK

The changing needs of the network effect Western Power's objectives, strategy and planning for the future. The generation of electricity is reflected in the years between 2006 and 2019, where Western Power notes a change in renewables at the consumer level from 6% to 12%. Additionally, in the same period, coal-fired power generation fell from 53% to 43%. It is the expectation of Western Power, that in the future, renewable energy generation will make up the greater portion of electricity generation, and coal will become the least used fuel,

which presents a new landscape for electricity generation, transmission services and providers.

## THEMES

Western Power see four main themes in adapting and driving change when necessary.

- **Shaping future network:**

This represents the enterprise's decision-making on how to adapt to changes and optimise the investment of the network. Asking questions such as 'Do we exchange like-for-like assets?', or 'Should we acquire entirely new assets?' forms the basis of prudent decision-making. Understanding the unique geographical distribution landscape of the state of Western Australia places Western Power in a strategic position when shaping the future of the network.

- **Leverage grid electrons:**

Western Power recognises and encourages two-way flow of electrons on the grid and works to enable this by seeking ways to provide the capability for customers to inject electrons back onto the network in a fair and reasonable manner.

- **Leverage existing assets:**

The ability to leverage existing assets is critical to good business. For Western Power, this step is embedded into the space of a transition period, in creating new ways to maintain current assets, understanding how to better extend their lives, and using existing assets in new ways that also provide a new revenue-generating avenue.

- **Leverage existing capabilities:**

Being a financially prudent company is important to Western Power. Western Power recognises the need to be sustainable and not place undue pressure on the community. All decisions made within the enterprise are undertaken with the financial impact in sight, with a crucial balance to maintain each asset's technical function and its financial cost.

## EVOLVING THE GRID

Many of the assets owned and operated by Western Power are 70 years old, representing a model that was formed with the grid itself; one of traditional interconnected poles and wires, that along with many other networks are ready for renewal. However, in evolving the grid, it is Western Power's aim to be a Modular Network, one that is flexible, with a centralised grid that embraces Stand-alone Power Systems (SPS), microgrids, Virtual Power Plants (VPP) and other new technologies. Such an evolution in the grid is reliant on community behaviour, technology advancement rates, regulation, and policy.

- **Asset Management Framework**

For any business, any such trends as noted above effect the stages of the asset management cycle and the subsequent development a guiding framework. For Western Power, each step in the asset management framework is considered in light of:

- Needs—both the customers' and those that form the business objectives
- Plan—the network configuration moving forward
- Design—technical solutions that merge fluently with old existing brown-field designs, and integrate new solutions effectively and cost-efficiently while ensuring compliance measures are met
- Build/Deliver—while balancing cost and utilisation
- Operate—with reliability, safety, and stability

- Maintain—asset function and performance
- Refurbish—extend asset life within the lens of maximising CAPEX and OPEX
- Dispose—decommission ageing assets safely while transitioning newly acquired assets

## DECISION-MAKING

All decisions at Western Power are made in light of the above framework balanced with the following elements of each asset:

- **Condition**—understand condition of asset, technology

- **Performance**—communicate and articulate the performance of the asset to community, management, leadership, and stakeholders
- **Risk**—concept of the level of risk and how the business deals with it and understand
- **Investment**—assessing to better inform decision surrounding investments
- **Delivery**—reach point to ensure delivery as intended, in timely manner and expected ways.



Western Power's Asset Management Framework<sup>1</sup>





## DIGITAL ASSET MANAGEMENT

Understanding and leveraging data at Western Power is more than just installing a few sensors. The business seeks ways to model digital capabilities in order to predict an asset's future behaviours. Using the fundamental elements of safety and reliability, digital asset management is used to inform management decisions by leveraging all scalable and automated systems, and ultimately provide a flow of information thus:

### **Define » Acquire » Analyse » Visualise » Action**

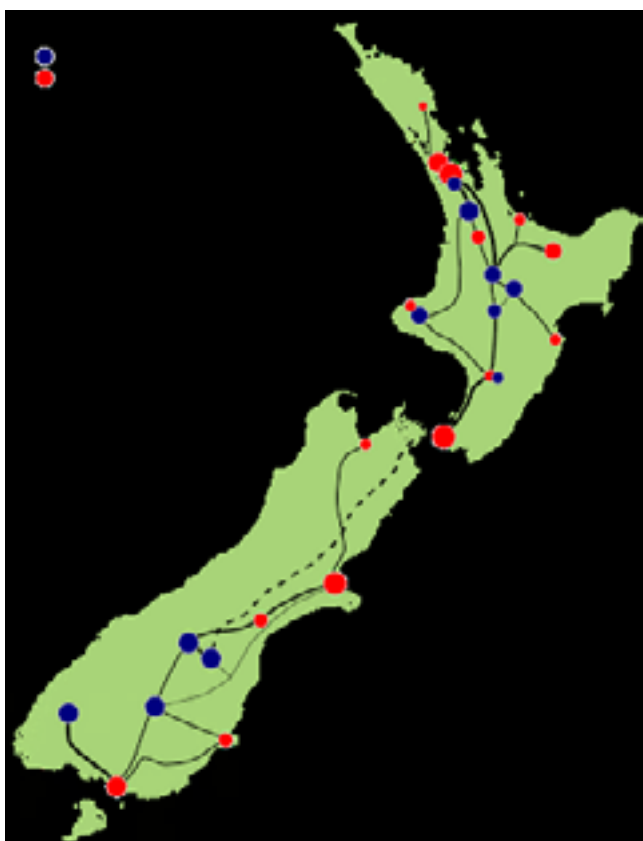
The intention behind leveraging data to create a deeper knowledge within a digital asset perspective is to underpin Western Power's journey to action. It enables streamlined monitoring of an asset's function, condition, and capabilities, while also guiding the business's understanding of current level of risk.

An asset management framework is always live and fluid. Western Power, with such fluidity in mind, remains alert and ready to embrace new concepts that stem from both their customer base and the current market. These technologies are then leveraged to transition the network, while enabling asset managers and operators to remain vigilant and ready to pivot with the expected acceleration of digital technologies in the future. And finally, a focus on the changing needs and preferences from customers, and holding firm to robust asset management principles ensures that Western Power is on a strong journey to enabling value from effective asset management.

<sup>1</sup><https://westernpower.com.au/media/3698/distribution-substation-plant-manual-introduction-20191220.pdf>

# Transpower NZ – An Asset Management Data Journey

Linda Kemp writes a journalists account of a presentation delivered by Stuart MacDonald, Transpower NZ at the 2020 AMCouncil's AM Data Forum



New Zealand power company, Transpower NZ, has recently undertaken a journey to transform the way the business leverages data. At the AM Council Virtual Data Forum, delegates were guided through the challenges faced and the lessons the business learned during that journey.

Transpower NZ own and operate the country's electricity transmission system. With assets amounting to more than 420,000, including a HVDC link to connect the two islands. The network grid travels about 12,000kms, following the long line of the country and includes 172 substations, with generation centres that are often remote from the load centres. Operating a 220 110kv network to transport the energy to the load, Transpower generates approximately 35,000GWh/year.

## WHY DID THE BUSINESS REQUIRE BETTER DATA?

As any asset manager reading will know, data provides a solid foundation in business. Having the right data with the right quality is a fundamental enabler to performing asset management well; data underpins decision-making surrounding not only the assets but the wider business objectives that can build greater value for the business.

For Transpower NZ, many of their assets have a projected lifespan of numerous decades. The use of appropriate data not only effectively extends the life of the asset, but provides detailed and reliable information for asset managers in the business in years to come.

Within the business, a motivation to move to asset management maturity and to increase investment opportunities also underpinned the need for better, more reliable data. A shift of focus on maintenance practices within Transpower NZ from time-based to condition-based maintenance required the need for sophisticated asset health models and decision-making frameworks, critically supported by trustworthy data.

## WHAT SORT OF CHALLENGES DID TRANSPOWER NZ FACE?

Complexities within the business's asset types and portfolios plus a lack of clear definitions surrounding roles and responsibilities in data collection, meant that information silos existed and therefore the data quality was poor. There also a lack of trust in the data that was mined and leveraged.

To support the journey to more rigorous data management practices, Transpower NZ needed improved asset models and therefore had to source data that had never before been used by the business. Although this presented a challenge, these new data requirements proved invaluable to inform

the business' five year funding proposal through the country's regulator, the NZ Commerce Commission.

## ASSET MANAGEMENT MATURITY

The journey to asset management maturity always necessitates a rigorous assessment process and this is also true in the context of data asset maturity. Before the journey can be commenced with a view to embracing and achieving real value, Transpower NZ underwent a capability maturity model whereby every data concept was measured and assessed against five levels: Performed, Managed, Defined, Measured and Optimised.

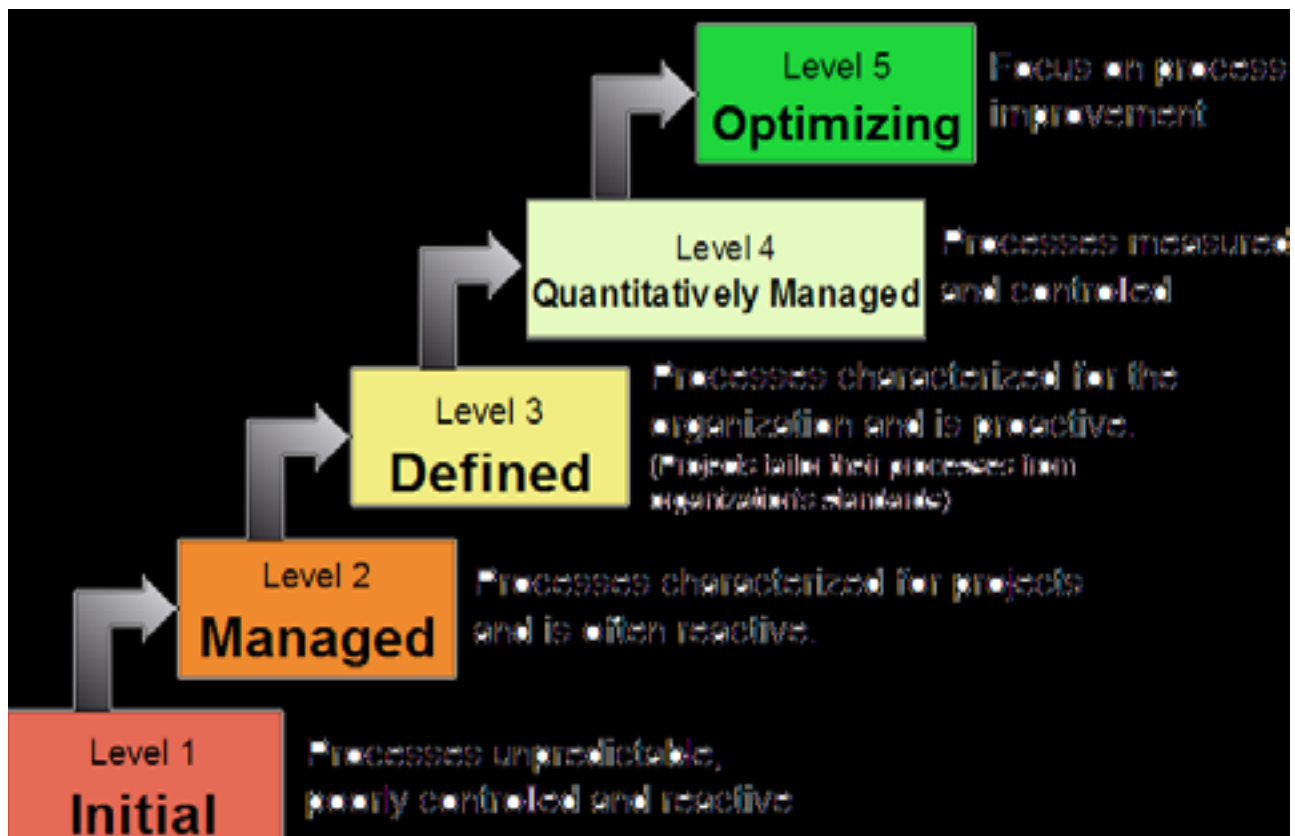
Transpower NZ were aware that instating such a model sets in

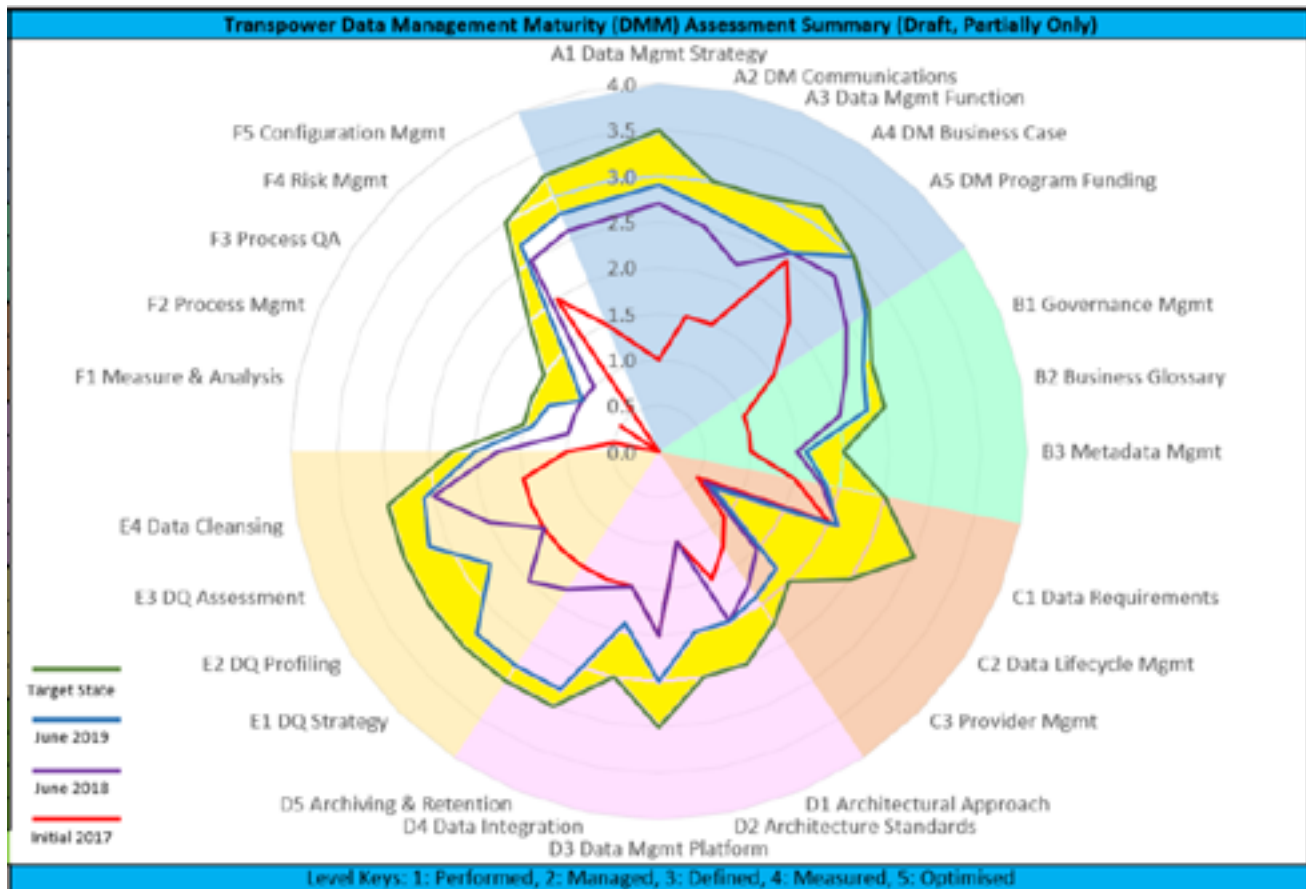
place good standards to begin the process and allows for future goals to be easily assessed and targeted. An investment by the business of \$2 million over a three year period showed the commitment to asset maturity and clearly mapped out the areas of focus. The image below shows the assessment and targets of the business.

From there, the business was strongly placed to begin its roadmap to maturity. The journey began with critical decisions surrounding the establishment of clear roles and responsibilities among its people, importantly, the nomination of data stewards, whose role lay with data mining, collection, cleansing and leveraging. With a clear focus achieved through new asset data standards, Transpower NZ built the

core strategies of governance and planning, using these to underpin new platforms and architecture for the business.

New platforms for a data management program included a defined system of record to align with the complexity of Transpower NZ's thirty-two asset classes. The new system incorporated mandatory values that linked with key business process that stated the reasons and benefits of data collection, as well as newly introduced electronic devices used by technicians in the field to collect accurate and timely data. This allowed for immediate uploading into the system, thereby opening up precise interrogation that calculates how complete the data is, and gives Transpower NZ a faster and more user-friendly path into data validation.





For Transpower NZ, the journey to data quality in asset management has created far-reaching benefits for the business itself. Chiefly, the enablement of automated condition data in the field has shown to vastly improve data quality, accuracy, and timeliness.

## WHAT LESSONS WERE LEARNED?

- Set frameworks around benchmarks
- Remain pragmatic about what can be achieved
- Set targets that are focused on areas of importance for business

- Remember that change often needs to infiltrate at an organisational level
- Process takes time
- Keep people in mind at all times
- Communicate!
- Carefully manage expectations from management and stakeholders

There are no easy fixes to improving data procurement. It's a long hard road that often reveals large gaps in information, silos in leadership, and issues with communication across any business. Transpower NZ's discovered these issues occurred in their data management journey,

but armed with a business-wide tenacity and desire to increase value, improve its assets and asset management practices, and leverage all the data available, the company has been able to achieve a richness in data quality that strengthens the core of the business.



# Defence Perspective of Product Management and ISO 55000

**The Asset Management Council's recent virtual defence summit, held in late July, was a huge success. Delegates were able to hear of the common issues that need to be addressed within the sector and thereby create an open forum of collaboration in order to successfully implement strategic and useful asset management practices.**

The presentation delivered by Group Captain Adrian Morrison from the Department of Defence's Capability Acquisition and Sustainment Group (CASG) highlighted the defence perspective of product management and the development of ISO 55000 through the lens of sustainability. Defence uses the term 'product' to describe its portfolio of assets, and refers to the overarching and integrative approach that encompasses each asset, its components, materials, services, information, and intangibles.

The path to product management within CASG focuses on sustainment of assets in line with a specific application of ISO 55000 to cater to defence perspectives. The ultimate objective is effective product management that underpins sustainable delivery of capability during the in-service phase of an asset's lifecycle. Key concepts for CASG's product management include:

- **Leadership and Culture »** a critical and fundamental element that underscores implementation of any asset management plan. Good leadership and culture won't guarantee success; however, poor leadership and culture will ensure failure.
- **Sustainability »** important to focus on long-term outcomes that deliver optimal cost with minimal risk.
- **Assurance »** evidence-based assurance throughout asset's capability lifecycle.

These concepts are guided by shaping factors, chief of which is the focus on capability encompassing maintenance, supply, engineering, and business. In addition, shaping factors to product management include:

- Complexity of organisation
- Qualitative proposition

- Commonwealth as owner, operator, and decision-maker
- Deployable products equals high risk

In light of these shaping factors, CASG's Product Management Framework includes risk management, objectives, scope, management plans and assurance. The aim of the framework is to ensure consistency, with a better alignment through acquisition to sustainment. The development of strong leadership and culture, underpinned by clearly defined roles and responsibilities, will embed an understanding of the scope of the framework. This organically leads to the framework evolving and adapting with the product itself. And the ultimate aim within CASG is effective management of assets and products.





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# **Asset Management Excellence Awards 2020**

Winners to be announced:

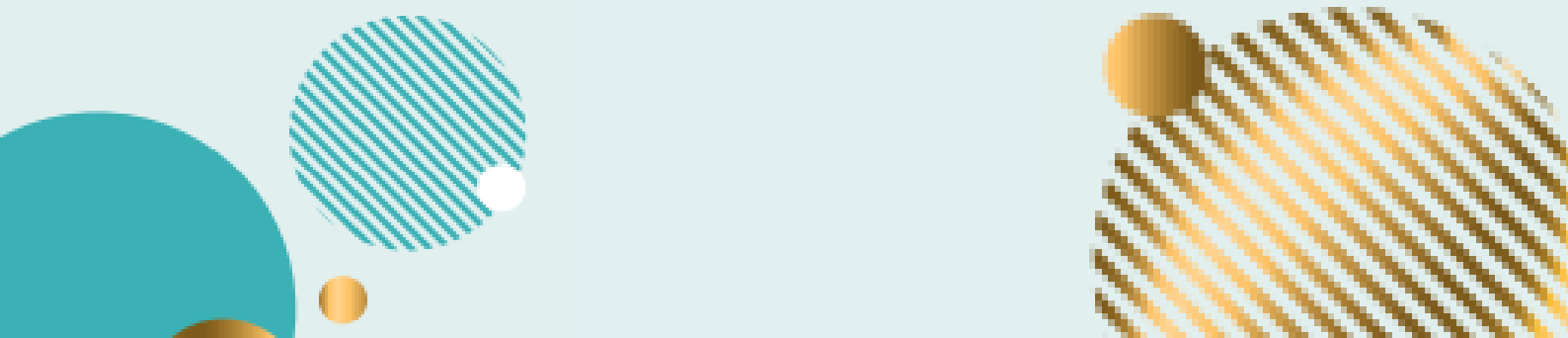
**Friday 16th October 2020 @ 12.30pm AEST**

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- Asset Management CRP Award - Cost/Risk/Performance
- Asset Management Environmental and Social Value Award
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- The Asset Management Diversity Award

For details of the shortlisted finalists and their submissions, and to secure your spot at the virtual ceremony, visit:

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**SEPT 8,  
2020**  
1:00pm AEST

**Field Data to Fleet Investments - predictive and prognostic asset maintenance approach to help drive operational excellence**  
Ravi Kiran, Industry Solutions Exec APAC Utilities, Hitachi ABB Powergrids



**SEPT 10,  
2020**  
4:30pm AEST

**Leadership in Asset Management: A Practical Review**  
Peter Crane, Founder and Director, SER Solutions



**SEPT 16,  
2020**  
6:00pm AEST

**Asset management through the eyes of young asset management professionals**  
Andrew Scott, Ausgrid & Warwick Garth, Sydney Trains



**SEPT 17,  
2020**  
3:00pm AEST

**Asset Information Life-Cycle Management - Getting Organised**  
Dianne Scheepers, Court Services Victoria



**SEPT 22,  
2020**  
12:00pm AEST

**Informal logic for asset managers: cutting to the truth for better decisions as leaders**  
Steve Doran, Director, Infrastream



**SEPT 29,  
2020**  
10:00am AEST

**Turning change into Millions - the Need for a Chief Change Officer**  
John Fortin, Asset Management Technology Global Lead, Jacobs



**OCT 6,  
2020**

**The Psychology of Industry 4.0**  
Dr Meg Hooper, Director, Carousel Consulting



To view recordings of past webinars, visit:  
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Troy	Morse
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Lahey	Tshering
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