

AMCV Project
Asset Management Customer Value

Leading Practices Compendium



WATER SERVICES
ASSOCIATION OF AUSTRALIA

ch2m **AECOM**

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Leading Practices Compendium

Introduction

This compendium is an outcome of the 2016 Asset Management Customer Value (AMCV) project. Run by the Water Services Association of Australia (WSAA), the AMCV aims to create “an international utility knowledge base that drives world class asset management to deliver enhanced customer value”. Participants from water and non-water industries undertook self-assessments of their asset management practices which were independently verified. These results were then benchmarked against the whole cohort and peer groups within the cohort.

From this benchmarking, verifiers identified and nominated ‘Leading Practices’, which reflected leading practices at an organisation as evident from both benchmarking scores and/or the verifier and participant’s experience and judgement. These practices were then assessed by an independent industry committee to identify those that were the most innovative, mature and could translate well to other organisations.

The identified Leading Practices were reviewed and categorised to define the themes of practices as being currently delivered by the industry. These themes formed the basis of the Leading Practices Conferences, held in Melbourne on December 5-6 and Los Angeles on November 29-30.

This compendium is comprised of summaries of these leading practices developed by Participants, arranged as presented at the Conferences. The compendium is to be read in conjunction with the 2016 AMCV Industry Report, to give additional insights into the outcomes of the program and to demonstrate asset management strengths of individual participants which can be used by other participants to improve their own asset management practices.

Melbourne Leading Practices Conference

Monday 5th to Tuesday 6th
December 2016

		Sessions 1 & 2 - Industry Choice					Session 3 - Research & Innovation				Session 4 - Getting Accredited			
Functions	Processes	Sydney Water	SA Water	South West Water	South East Water	WaterNSW	Christchurch City Council	Wannon Water	Coliban Water	Yokohama City	Gladstone Area Water Board	Sendai City	WaterNSW	ActewAGL
1. Organisational Management	1. Asset Management System	X	X		X	X		X			X	X	X	X
	2. Optimised Life Cycle Decision Making	X	X		X	X		X			X			X
	3. Asset Financial Management	X				X	X	X			X			X
	4. Risk and Opportunity Management	X	X		X	X	X	X	X					X
	5. Level of Service and Stakeholder / Regulatory Interface Management	X	X				X	X						X
	6. People						X	X	X					X
	7. Asset Management Plans	X	X			X		X			X			X
	8. Investment Program Prioritisation	X	X		X	X	X	X						X
	9. Quality Management	X					X	X				X		X
	10. Configuration Management Systems	X						X				X		X
	11. Review and Improvement Planning	X	X				X	X				X		X
	12. Innovation Program	X			X		X	X	X	X				X
2. Asset Capability Forward Planning	1. Functional Governance						X	X			X			
	2. Demand Projection	X				X	X	X						
	3. Level of Service Projection	X	X	X		X		X						
	4. Planning for Optimised Assets	X	X			X	X	X						
3. Asset Acquisition	1. Functional Governance						X	X			X			
	2. Equipment / Product / Design Standards				X		X	X						
	3. Concept and Detailed Design						X	X						
	4. Procurement-Best Value	X					X	X						
	5. Program Delivery	X				X	X	X						
	6. Asset Acceptance Procedures							X						
4. Asset Operation	1. Functional Governance							X			X			
	2. Asset Operational Knowledge	X					X	X						
	4. Operating Procedures						X	X						
	5. Work Practices						X	X						
	6. Work Control & Execution						X	X						
	7. Consumables Management							X						
	8. Asset Operational Monitoring	X					X	X						
	9. Asset Productivity Optimisation	X						X						
5. Asset Maintenance	1. Functional Governance							X			X			
	2. Asset Technical and Maintenance Knowledge	X						X						
	3. Business Based Maintenance Strategy						X	X			X			
	4. Maintenance Procedures Documentation							X						
	5. Work Practices						X	X						
	6. Execution of the Maintenance Strategy							X						
	7. Consumables and Spares Management						X	X						
6. Asset Renewal	1. Functional Governance							X			X			
	2. Asset Risk, Performance Assessment and Renewal Planning	X	X	X	X	X	X	X						
	3. Renewal Forecasting	X		X		X	X	X						
	4. Identification of Timing of Asset Renewal	X				X	X	X						
	5. Asset Rationalisation and Disposal	X				X	X	X						
7. Asset Management Support Applications	1. Asset Information Applications	X					X	X						
	2. Operational Applications	X			X			X						
	3. Customer Applications	X	X					X						
	4. Financial Applications	X						X						
	5. Risk Systems	X						X						
	6. Modelling Applications	X					X	X						

		Session 5 – Program Planning, Policy & Processes				Session 6 – Asset Renewal & Investment Accuracy			Session 7 – Asset Life Prediction, Planning & Modelling				Session 8 – Customer Service & Engagement			
Functions	Processes	City West Water	Yarra Valley Water	Seqwater	Toowoomba Regional Council	ActewAGL	City West Water	Melbourne Water	South West Water	Barwon Water	Water Corporation	Yarra Valley Water	Hunter Water	Icon Water	Barwon Water	Yarra Valley Water
1. Organisational Management	1. Asset Management System		X													
	2. Optimised Life Cycle Decision Making													X		
	3. Asset Financial Management						X							X		
	4. Risk and Opportunity Management							X						X		
	5. Level of Service and Stakeholder / Regulatory Interface Management	X									X			X	X	X
	6. People				X									X		
	7. Asset Management Plans						X							X		
	8. Investment Program Prioritisation							X						X		X
	9. Quality Management		X											X		
	10. Configuration Management Systems		X									X		X		
	11. Review and Improvement Planning					X						X		X		X
	12. Innovation Program					X						X		X		
2. Asset Capability Forward Planning	1. Functional Governance															
	2. Demand Projection										X					
	3. Level of Service Projection							X		X			X	X	X	
	4. Planning for Optimised Assets		X					X		X			X	X	X	
3. Asset Acquisition	1. Functional Governance		X	X												
	2. Equipment / Product / Design Standards		X													
	3. Concept and Detailed Design		X									X		X		
	4. Procurement-Best Value			X												
	5. Program Delivery		X	X										X		
	6. Asset Acceptance Procedures		X	X										X		
4. Asset Operation	1. Functional Governance		X													
	2. Asset Operational Knowledge		X													
	3. Operating Procedures		X													
	4. Work Practices												X			
	5. Work Control & Execution											X	X	X		
	6. Consumables Management												X			
	7. Asset Operational Monitoring															
	8. Asset Productivity Optimisation															
5. Asset Maintenance	1. Functional Governance											X				
	2. Asset Technical and Maintenance Knowledge		X									X				
	3. Business Based Maintenance Strategy											X				X
	4. Maintenance Procedures Documentation											X				
	5. Work Practices											X				
	6. Execution of the Maintenance Strategy											X				
	7. Consumables and Spares Management											X				
6. Asset Renewal	1. Functional Governance		X							X						
	2. Asset Risk, Performance Assessment and Renewal Planning		X			X	X		X	X						X
	3. Renewal Forecasting					X	X		X	X						
	4. Identification of Timing of Asset Renewal					X	X	X	X	X						X
	5. Asset Rationalisation and Disposal					X										
7. Asset Management Support Applications	1. Asset Information Applications					X				X		X				
	2. Operational Applications															
	3. Customer Applications															X
	4. Financial Applications					X										
	5. Risk Systems					X			X							
	6. Modelling Applications					X			X							

		Session 9 – Technological Advancements Within the Water Industry			Session 10 – Integrated System Planning & Investment Prioritisation			Session 11 – Strategic Planning and Demand Forecasting			Session 12 – Strategic Asset Management				
Functions	Processes	Power & Water Corporation	South East Water	Auckland Stormwater	Sydney Water	Unitywater	Icon Water	Seqwater	Hunter Water	Seqwater	Unitywater	SA Water	TasWater	Melbourne Water	
1. Organisational Management	1. Asset Management System		X			X		X		X		X	X		
	2. Optimised Life Cycle Decision Making				X	X	X	X		X		X	X		
	3. Asset Financial Management					X				X		X	X		
	4. Risk and Opportunity Management			X	X	X	X	X				X		X	
	5. Level of Service and Stakeholder / Regulatory Interface Management			X						X		X		X	
	6. People											X	X		
	7. Asset Management Plans				X	X	X	X		X	X	X	X		
	8. Investment Program Prioritisation				X	X	X	X		X				X	X
	9. Quality Management													X	
	10. Configuration Management Systems				X										
	11. Review and Improvement Planning						X		X		X			X	
	12. Innovation Program				X		X								
2. Asset Capability Forward Planning	1. Functional Governance				X					X					
	2. Demand Projection				X	X				X	X				
	3. Level of Service Projection					X				X					
	4. Planning for Optimised Assets			X	X	X		X		X	X				
3. Asset Acquisition	1. Functional Governance														
	2. Equipment / Product / Design Standards														
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	3. Operating Procedures				X										
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	5. Work Control & Execution		X			X									
	6. Consumables Management					X									
	7. Asset Operational Monitoring					X				X					
	8. Asset Productivity Optimisation				X	X									
5. Asset Maintenance	1. Functional Governance														
	2. Asset Technical and Maintenance Knowledge		X	X		X		X							
	3. Business Based Maintenance Strategy		X			X		X	X						
	4. Maintenance Procedures Documentation					X									
	5. Work Practices	X	X	X											
	6. Execution of the Maintenance Strategy		X			X			X						
	7. Consumables and Spares Management					X									
6. Asset Renewal	1. Functional Governance				X										
	2. Asset Risk, Performance Assessment and Renewal Planning		X	X	X	X									
	3. Renewal Forecasting				X	X									
	4. Identification of Timing of Asset Renewal		X		X	X									
	5. Asset Rationalisation and Disposal				X	X									
7. Asset Management Support Applications	1. Asset Information Applications	X				X				X					
	2. Operational Applications		X	X		X				X					
	3. Customer Applications					X				X					
	4. Financial Applications					X				X					
	5. Risk Systems			X	X	X				X					
	6. Modelling Applications			X	X	X				X	X				

Industry Choice

Sydney Water: Operational optimisation using BI and data analytics

SA Water: Customer service levels: developing a clear and robust line of sight with capital planning decisions

South West Water: applying whole life cost modelling to low-value high-volume infrastructure (unmapped and unattributed assets)

South East Water: Testing and application of supporting technologies

Water NSW: Capital investment strategy developed with Asset Data Bank

Christchurch City Council: Natural disaster response and recovery

Sydney Water

Operational optimisation using BI and data analytics

Anil Jaiswal

Collaborative Service Planning Manager

Background and context

Sydney Water is Australia's largest and 7th largest water utility in the world. We provide drinking water, wastewater, recycled water and some stormwater services to 4.8 million people in Sydney, the Illawarra and the Blue Mountains.

The key business drivers for Sydney Water are:

- customer service;
- product quality, quantity and continuity;
- asset management (strategy, planning, delivery, operation, maintenance and disposal);
- growth, renewals, reliability, liveability etc.

Over the last two decades like most of the water utilities Sydney Water has acquired large volumes of rich data through massive investment in IT systems such as control and monitoring systems (SCADA), maintenance management information systems (MMIS), finance, HR etc. However, until 2010 Sydney Water was still facing the challenge of unlocking the value in data sources for making sound decisions needed to evolve urban water management to the next level.

Until 2010 all data from various sources was stored in the corporation's mainframe system, which was a basic DB2 system and it was extremely difficult to access and analyse this data in a meaningful way for making informed decisions.



Anil Jaiswal,
Collaborative Service
Planning Manager,
Sydney Water

Description of Leading Practice

Since 2009, Sydney Water has progressively invested in a state-of-the-art enterprise data warehousing (EDW) and business intelligence (BI) technology. EDW gathers data from various disparate operational data sources such as maintenance management system, control and monitoring system (SCADA), finance, HR etc. BI provides advanced data mining and analytics capability.

With BI a number of innovative analytical tools have been developed to derive insight from 'big data' that delivers significant business benefits across the entire value chain and improved customer value. It enables planners to develop evidence based growth servicing strategies and strategic integrated system planning taking into account all current/future drivers such as growth, renewals, reliability, liveability etc. leading to optimal short term infrastructure investment solutions aligned to long term strategy. It also enables operators and maintainers to manage improved assets performance efficiently and effectively.

Presenting data from a variety of sources in a simple and integrated form that is easy to access and analyse allows better decision-support and drives improved planning, operation, asset management and business excellence. The investment in BI has been more than justified by the enormous tangible and intangible business benefits that have already been realised, and continue to be identified.

1. The historical SCADA data trends on asset performance enabled planners to derive evidence based water demand projections for infrastructure planning leading to hundreds of million dollar savings in capital investment.
2. Availability of data of various drivers (growth, renewals, reliability, liveability etc.) enables planners to develop efficiently long term integrated system plans by leveraging the synergy between the divers and optimising capital investment.
3. Timely detection and corrective actions of assets with inefficient operation, resulting in significant energy and maintenance cost savings, about \$1.5 million each year.
4. Migration from a time-based preventive maintenance to a condition-based maintenance regime leading to improved assets performance at a considerably lower cost around \$1M savings p.a.
5. Considerable reduction in reliance on IT specialist skills and the effort taken for report writing allows time for 'value added' activities leading to efficient and effective service to customers.
6. Most importantly, as the Users' knowledge and skills of BI has increased they are now exploring its untapped power to gain further benefits and a culture of 'Continuous Improvement' is being fostered.

Growth servicing planning - BI

Problem

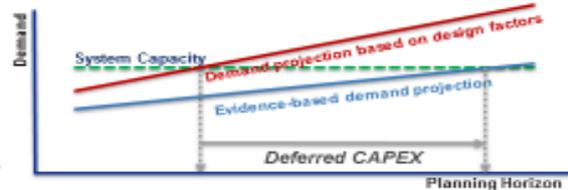
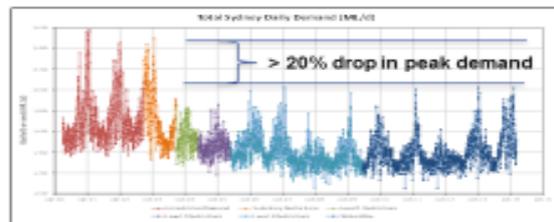
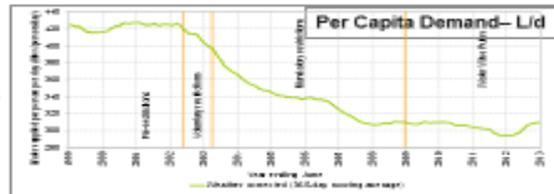
- Traditionally the demand projections were done based on conservative assumptions
- Resulted in oversized system design

Solution

- Evidence-based planning using BI data
- Enhanced network computer models
- Use of spare capacity to serve growth

Benefits

- Improved risk-based approach
- Differed cost savings ~ \$170M
- Avoided cost savings ~ \$40M



Artif. Jalewal - Big data analytics deliver effective asset management solutions - October 2015

Condition Based Maintenance

1. Before BI – No Condition Based Maintenance

2. 2011 – Manual Process



3. 2013 – Automated Process

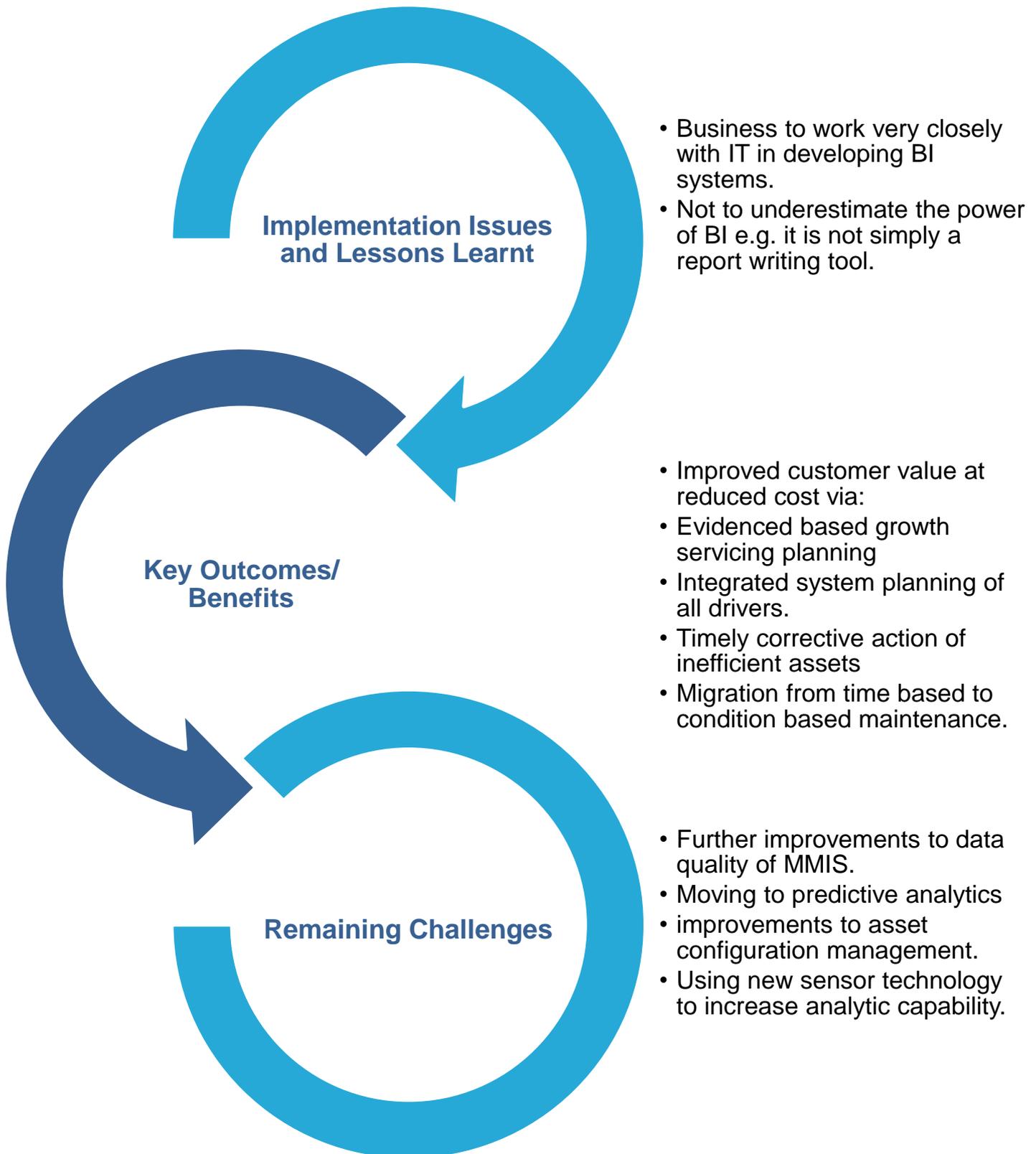


Benefits:

- Reduced time based time based PM – \$1M pa saving
- Improved asset performance



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SA Water

Customer service levels: developing a clear and robust line of sight with capital planning decisions

Daniela Iliescu
Lead Asset Planner

Background and context

SA Water is an infrastructure rich business with over \$22 billion (gross replacement value [GRV]) of assets across South Australia.

In 2015–16, 104 GL of wastewater was collected, treated and dispersed and 219 GL of water was supplied to over 680,000 properties which services more than 1.6 million South Australians. A complex array of water infrastructure assets valued at \$14.4 billion and wastewater infrastructure assets valued at \$6.4 billion was used to achieve this.

The network asset base includes 24,767km of water mains and 8,853 of wastewater mains.

SA Water’s key business drivers which align with SA Water’s strategy and its ‘Outcomes for Success’ are ‘Safety’, ‘Customer Satisfaction’, ‘Compliance’ and ‘Return to Owner’.

SA Water’s operating environment is challenging and includes factors such as broad geographical spread of operations, a wide variety of water sources, tightening customer service standards, increasing regulation (particularly water quality and environment), increased community expectations and diverse array of assets.

SA Water has robust and well developed asset management processes. Over the past 150 years of providing services, asset management was focused on good engineering asset management practice. The recent introduction of economic regulation in South Australia however highlighted the need of a more robust and transparent justification for the Technical Capital Plan submission. In addition, having the customer at the heart of every decision required a move from an asset centric to a customer focus organisational approach.

SA Water’s ‘Outcomes for Success’



Daniela Iliescu
Lead Asset
Planner SA
Water

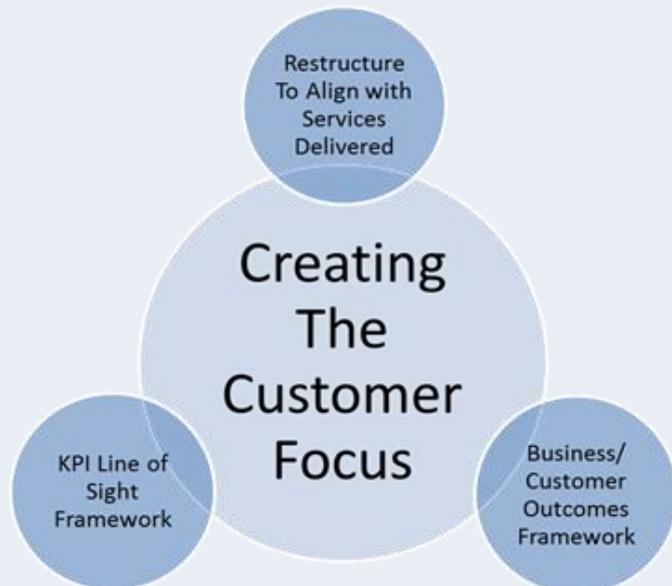
Description of Leading Practice

Since the delivery of RBP2013, SA Water was determined to drive a different approach to ensure the organisation was moving to a more contemporary form of investment decision making. This translates into linking investment to customer’ outcomes which is absolutely essential in supporting conversations with the customers about their expectations in terms of services received and their implications on SA Water investment decisions.

A new perspective has been introduced that represents expenditure categorised in terms of the service level impact for the different beneficiaries. The value of this approach is that it provides a strong and transparent line of sight between expenditure and service levels.

The improved framework now imbedded in Strategy and Planning activities has set change in focus to ensure that SA Water investments can be described in a way that clarifies the outcome for the customer. That enables a more informed conversation with customers & key stakeholders, so that Business KPI’s can be refined and capital expenditure better targeted during RBP2016 and beyond.

Creating Customer Focus in Asset Management



“Customer at the heart of every decision”

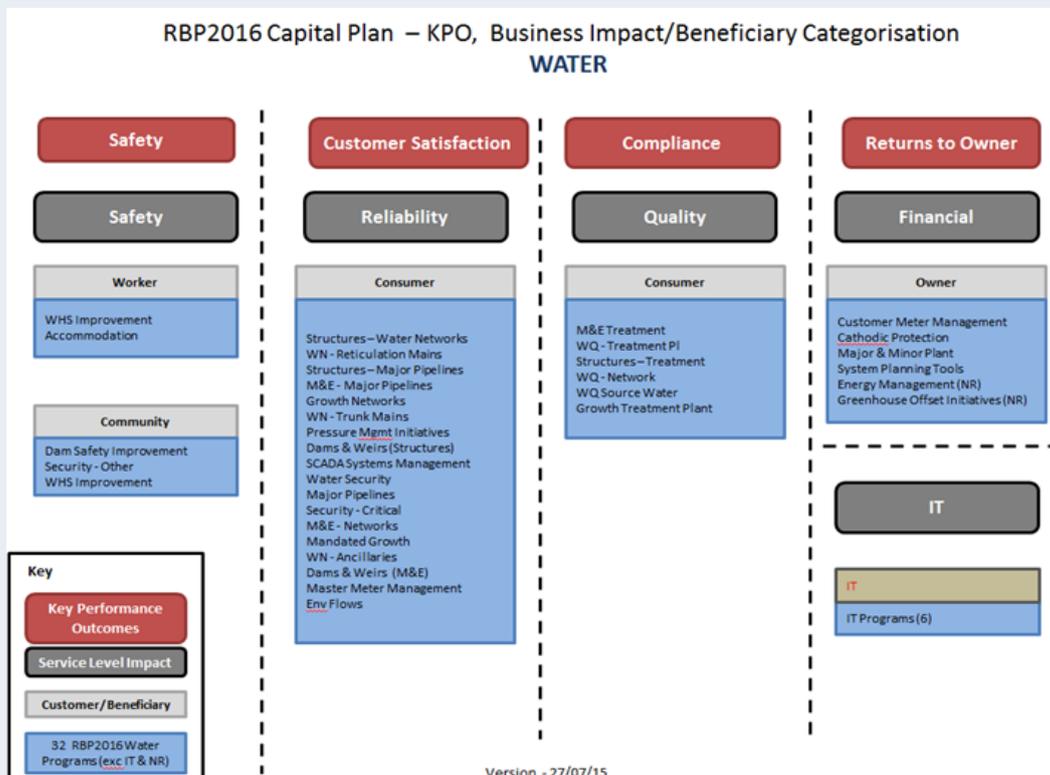
To assist planning activities and focus asset programs investment, new ‘Service Level Impact on Beneficiaries’ (SLIBs) drivers were created including ‘Safety’, ‘Reliability’, ‘Quality’ and ‘Financial’. Examples of SLIBs in the water supply area are: Water Reliability for the Customer, Water Quality for the Customer and Safety for the Community. In Wastewater, examples are Wastewater Reliability Environment (e.g. overflows), Wastewater Quality Environment (e.g. treatment) and Financial for Owner.

This approach does provide a breakdown of the capital plan into business measures (e.g. \$XM CAPEX/yr. in the next regulatory period maintaining reliable water supplies to customers). SA Water is therefore in a better position to understand the costs of providing particular services and then prioritising where necessary. That also enables conversations between SA Water Senior Management and ESCOSA and other regulatory bodies (e.g. EPA) in business terms rather than asset terms.

From the Asset Planner’s perspective it improves understanding of the impact that decisions made at assets level (life cycle planning, KPIs, performance, risk, etc.) have on business performance (measures) and how it could further affect customer satisfaction and SA Water’s reputation . It also provides clarity about what are the business drivers so efforts and investment can be directed to address priorities and achieve the most efficient results in the most effective way.

Figure below shows the relationship between corporate Key Performance Outcomes (KPOs), Service Level Impacts/Beneficiaries (SLIBs), and the Asset Program Summaries (APSs) for water.

Business and Customer Outcomes Framework

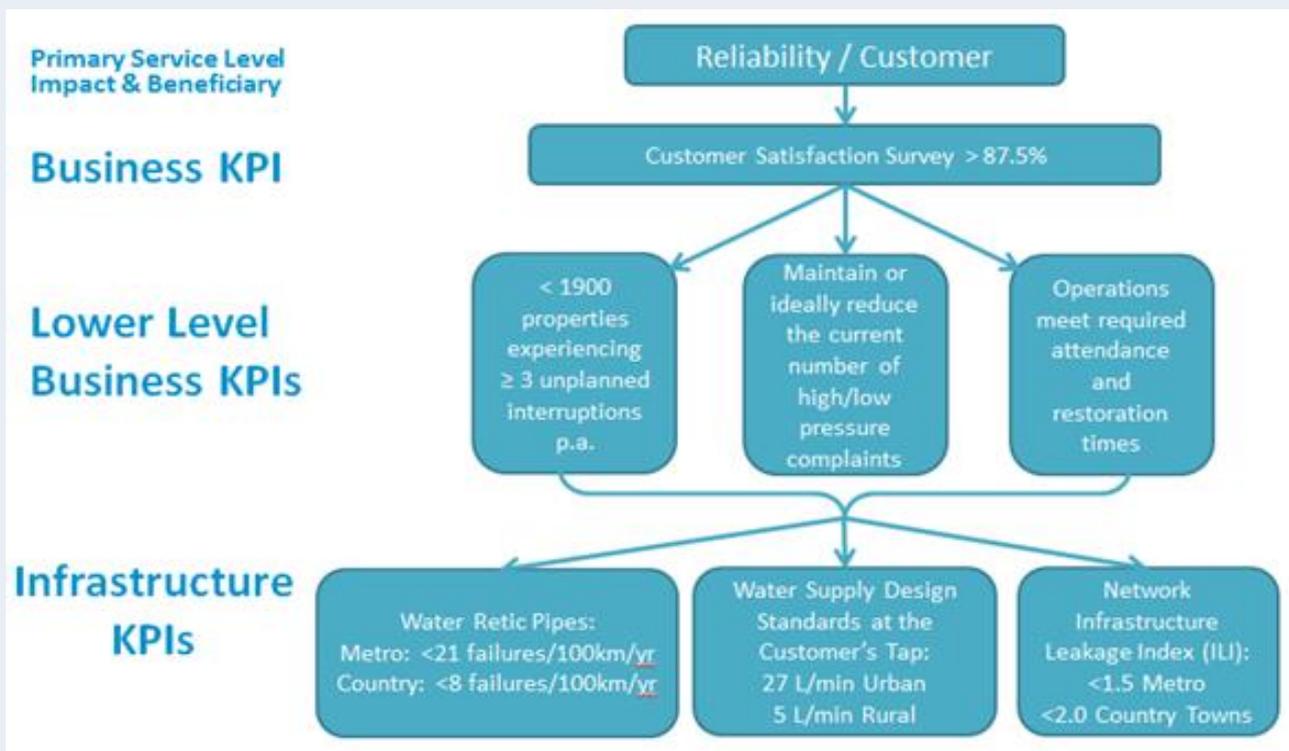


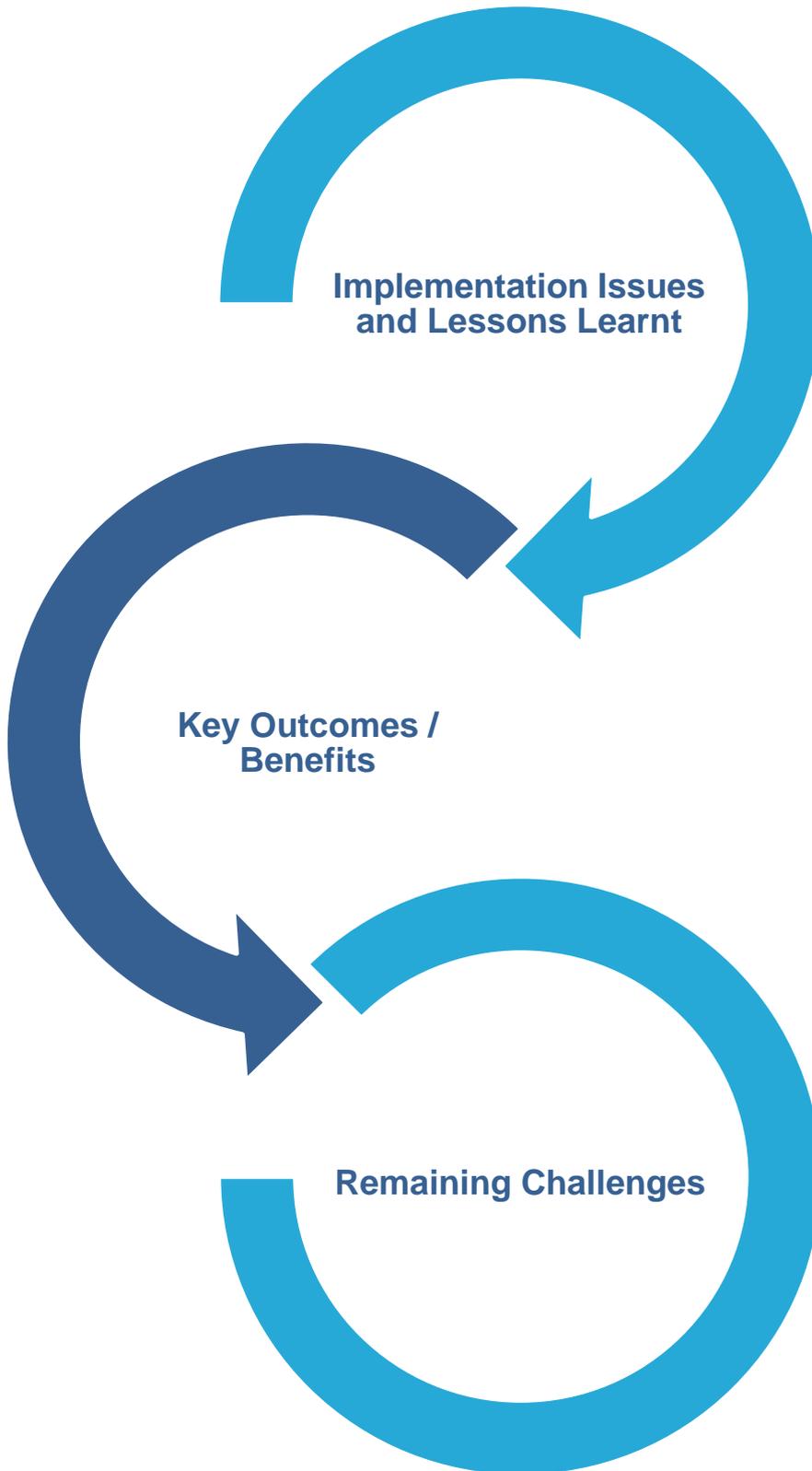
Understanding the drivers of customer satisfaction in this way has also allowed SA Water to have the conversation with its customers in a more meaningful manner, and allowed the results of the customer engagement process to be imbedded in investment decisions and ultimately used as evidence to support the argument to the economic regulator.

The SLIBs and KPI's have been important in being able to articulate to customers through the customer engagement process what the current service standards are and what impact (cost or savings) an increase or decrease in service standard might have for the customers.

The example provided here shows some of the KPI's that have been developed at multiple levels across the business to better understand what drives the satisfaction of a customer particularly in relation to reliability of supply.

Line of Sight through KPIs





- Line of sight between business KPIs and asset KPIs transparent for 80% of asset programs (which is considered a good initial result).
- Significant shift in thinking and planning activities required for RBP2016 submission.

- Focus on achieving business outcomes.
- Clarity of capital investment distribution and prioritisation.
- Improved justification criteria and decision making
- Robust RBP2016 submission.

- Improve line of sight for all asset programs.
- Review and validate customer impact, business and asset KPIs.
- Extend the line of sight to SA Water 'Outcomes for Success'.

South West Water

Applying whole life cost modelling to
low-value high-volume infrastructure
(unmapped and unattributed assets)

Julian Collingbourne, South West Water
Ben Ward, AECOM

Background and context

South West Water provides Water and Wastewater services (including Sludge Treatment) to a population of 1.6million people.

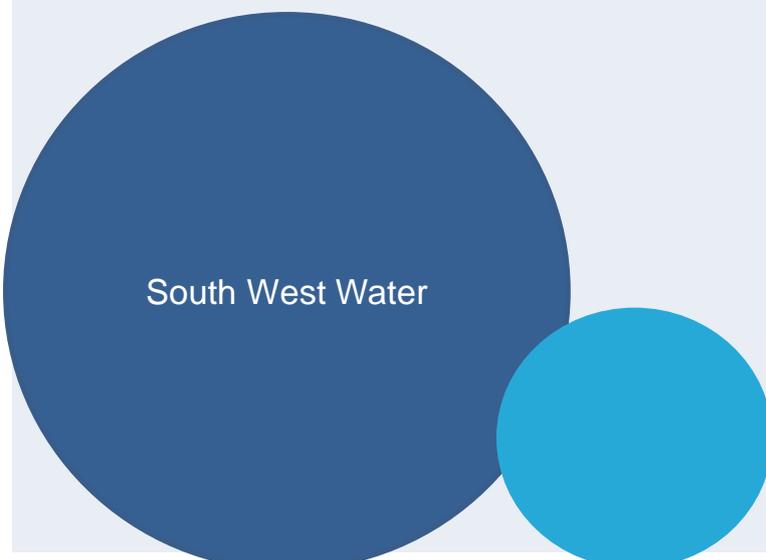
Our key business drivers include:

1. Providing affordable, value for money services to customers.
2. Ensuring required standards of performance are met now and in the future.
3. Maintaining and develop a resilience and security infrastructure that enables the South West economy to thrive.

In October 2011, Section105A of the Water Act of 2003 transferred the ownership of previously privately owned sewers to the ten water and sewerage companies operating in England and Wales. For South West Water, this meant an increase of more than 4,000km of sewer (approximately 50% of their asset stock).

In addition to which, low value and high volume buried infrastructure assets in the water distribution network , i.e., Communication pipes, were also known to be less well understood by the business and often sub-optimally managed in comparison to more critical or higher value assets. Both clean and wastewater assets of this nature, “low value-high volume” are often run to failure and until now have received very little proactive maintenance or attention.

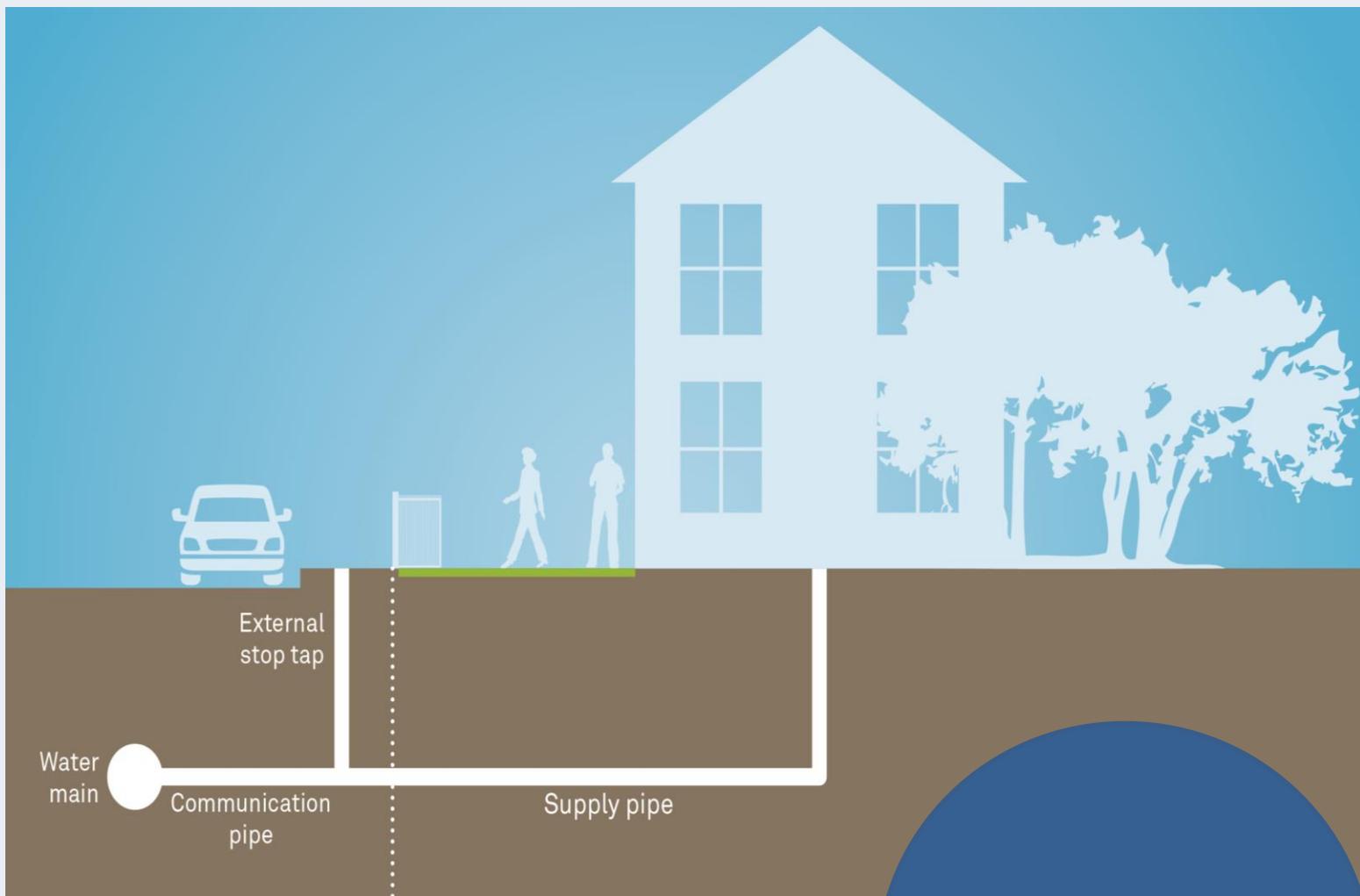
South West Water recognised that the application of good practise asset management techniques directed towards these assets would save themselves money and improve their customers experience. As such, they set about developing a framework to tackle this problem.



South West Water

Description of Leading Practice

South West Water have developed an innovative and comprehensive whole-life cost modelling framework for “low value – high volume” buried infrastructure assets (communication pipes and private sewers). The modelling approach uses a series of geospatial algorithms and fuzzy rule sets to infer the asset stock and assign basic attribution, prior to calibrating Weibull and Semi-Markov reliability curves for common materials. A whole-life cost (50 year) model is then developed and optimised to determine the most cost effective maintenance strategy.

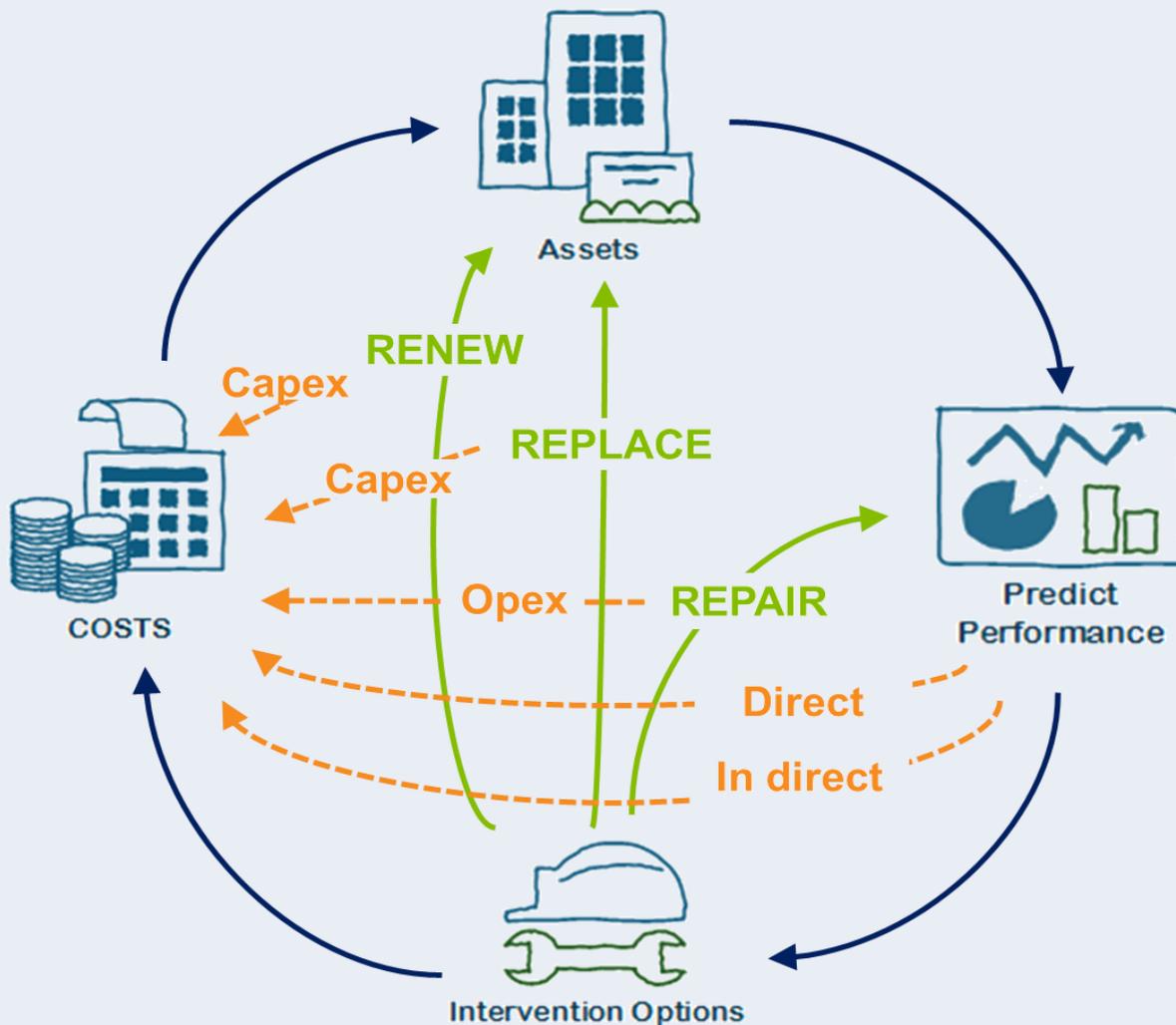


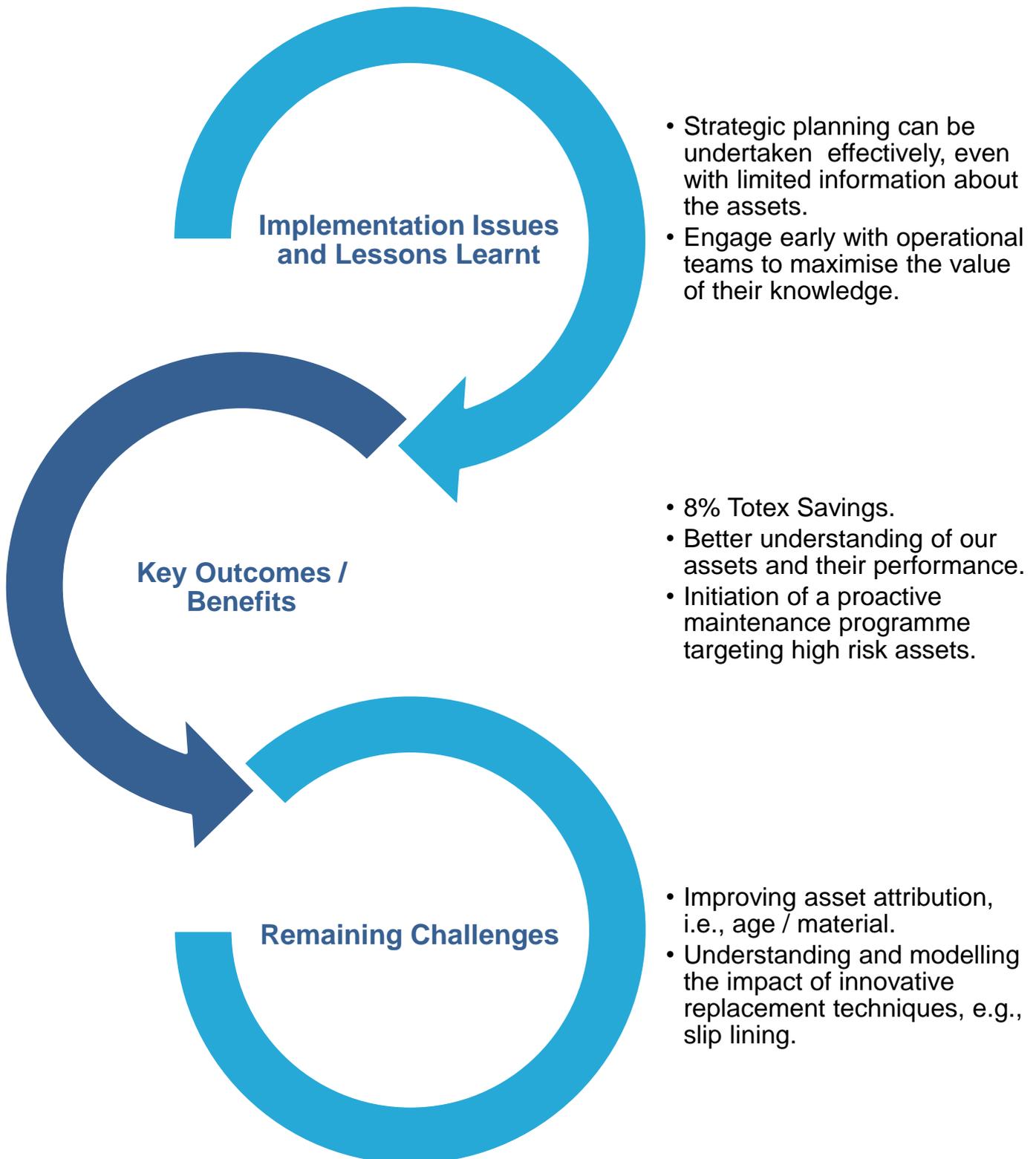
*“initiating a proactive
asset management
programme for assets
with little information”*

The outputs from this study have better equipped decision makers with information surrounding the deterioration and collapse rates of these “low value - high volume” assets. The information has been used to help formulate strategic business planning decisions, e.g., by using cost vs. benefit analysis tools to model different investment scenarios across the network.

Business improvements:

1. Better understanding of assets directly connected to our customers.
2. Initiation of a proactive asset management regime balancing maintenance costs and performance.
3. Improved planning and management of assets.





South East Water

Testing and application of supporting technologies

David Bergmann
Research & Development Manager

Background and context

South East Water, located at Waters Edge in Frankston, Australia, is responsible for approximately 500 employees, 700,000 connections and 24,700km of pipe network. These work together to deliver 136.5 billion litres of water and remove 113.4 billion litres of sewerage in 2015-16.

The key business drivers of South East Water are:

- Customer value;
- Environmental sustainability;
- Efficiency through innovation; and
- Proactive leadership.

Over the years, South East Water have developed an innovative problem-solving culture across the organisation. Individuals and teams are encouraged and often create innovative solutions to solve their particular operational problems and issues. Whilst positive and actively encouraged, the solutions to these problems have at times lacked the robustness and due diligence. Some ideas were rolled out without thorough testing under controlled conditions, or without an appropriately monitored field trial, resulting in unnecessary risk to operations. Other ideas haven't been developed with enough engagement, and have met significant internal resistance, whilst others have failed to consider and protect the intellectual property.

Also with the success of developments such as the OneBox® Pressure Sewer technology, this stimulated and encouraged further ideas and developments, which as times lacked coordination, version control, and the same issues of lack of due diligence and robustness as above, and may not truly meet the business needs.

Also the success of One Box® led to commercial opportunities outside of the regulatory boundaries of South East Water. The response by South East Water has been design and implement a fit-for-purpose R&D process and governance to support its R&D and product development. Also the formation of a commercial arm 'iota' to enable the distribution of the technologies for benefit beyond South East Water.

Description of Leading Practice

A description of the Leading Practice

Ideas for product development are identified from a number of different sources:

- Longer horizon research projects are identified and undertaken by the organisation, and often with the support and collaboration of external universities and institutions
- Grass-roots solutions to everyday operational problems
- Current projects or products stimulating following generations of subsequent product development

Once identified, these projects undergo a basic level of feasibility study and are brought to the R&D Governance forum for approval to proceed into the product development process.

Once approved, R&D projects are undertaken utilising Stage-Gate product development processes, returning to the R&D Governance Forum at defined times, to gain approval to move into the next stage of the development process.

Key aspects of the Leading Practice

Stage-Gate is the industry standard for managing new product idea-to-launch processes. Pioneered by Robert Cooper, it is commonly used for the development of consumer products, it features a series of development stages (i.e. feasibility, development, testing, implementation and review), and decision making points (gates).

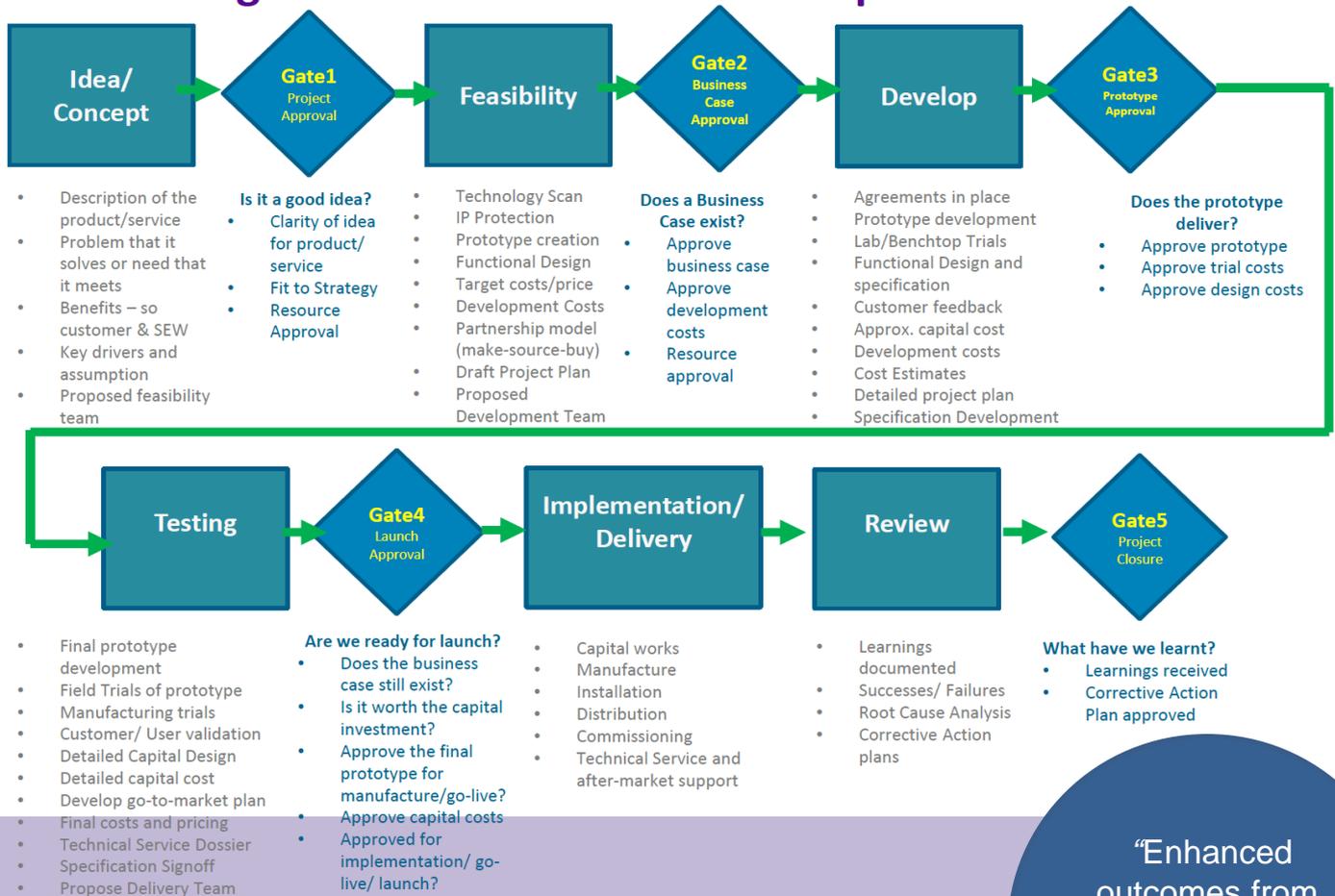
Governance of the Stage-Gate process, including a cross-organisation representation of senior managers, is important to guide the process, support decisions to stop/go/recycle, and oversee the total portfolio and pipeline of R&D.

David Bergmann,
Research &
Development
Manager,
South East Water

Top areas where this Leading Practice has made a difference for your business

- Solar solutions for OneBox® Pressure Sewer - development of basic prototype solutions, lead to the necessary insights to create a stand-alone off-grid solar powered pressure sewer system, which is now being scaled to test out on multiple households and larger amenity blocks.
- Assessment of AC Pipe Renewal technologies - initial paper-based feasibility studies and short-listing of the available technologies, has now lead to initial small-scale trials and testing program, now leading to the development of larger scale trial and operational testing plans
- Design of integrated water and energy solutions for the Aquarevo estate - initial ideas for utilisation of rainwater for hot water were trialled on a test rig at Holmesglen TAFE, before scale up and refinement of the monitoring and control system and integration with solar on actual residential households.

R&D Stage Gate – South East Water’s process flow



“Enhanced outcomes from better design, testing and governance”

Figure: The South East Water Stage-Gate Process



- Communicate the vision and the benefits.
 - Be prepared to roll-up your sleeves and lead by example.
 - Lend your encouragement and tangible support to others .
- Improved transparency of and support for R&D projects in the organisation.
 - Reduced risk through better design, more thorough testing and documentation.
 - Improved IP protection and increased probability of successful commercialisation.
 - Improved collaboration and further stimulation of ideas, and the creation of next generations and a technology pipeline of ideas.
- Continuing to build the processes for supporting R&D product development projects without discouraging grass-roots innovation.
 - Better prioritisation of the projects and allocation of resource (people and dollars).
 - Review of projects post implementation for lessons learned.

Water NSW

Capital investment strategy developed with Asset Data Bank

Chris Braddock
Asset Planning Manager

Background and context

WaterNSW manages and operates a portfolio of Bulk Water Infrastructure that spans the state of New South Wales. We are the largest Dam Owner in Australia, with 42 'prescribed' dams, 300+ downstream weirs/ regulators.

WaterNSW captures, stores and releases bulk water for irrigation and drinking water use.

The key business drivers for WaterNSW are:

- Customer levels of service;
- Water quality; and
- Regulatory compliance.

WaterNSW has developed AssetBank, a risk based investment modelling tool, to provide the organisation with a consistent, repeatable and justifiable approach to allocating expenditure in a prudent and sustainable manner.



Chris Braddock, Asset
Planning Manager,
WaterNSW

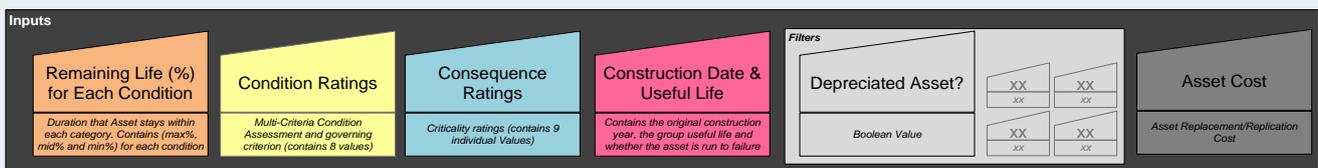
Description of Leading Practice

AssetBank is a risk based approach to determine the expenditure required to maintain asset capability, address asset deterioration, and meet regulatory requirements. Currently AssetBank is an Excel based model that produces estimated optimal intervention times for asset renewals. This is used as a guide by the Asset Planning team to develop an investment profile for investment planning, including for regulatory submissions.

The strength of the model is its wide coverage of the asset base, and the multiple triggers from intervention based upon a standard set of input data. Interventions in AssetBank are triggered based upon the following:

- 1. Condition** - An estimate of when the Asset is expected to reach a 'very poor' or failed state.
- 2. Risk Cost** - An estimate of when the annualised risk cost associated with the asset will exceed the corporate threshold
- 3. "Weighted Annual Cost of Capital (WACC)"** An estimate of when the annualised risk cost associated with the asset will exceed the borrowing cost of the intervention.

This model works well with the new approach WaterNSW has taken in developing the current rural pricing submission. The former approach was to seek funding approval for each individual projects. Now WaterNSW has asked for an appropriate allowance per 'valley' (regulatory pricing area) to offset asset consumption.



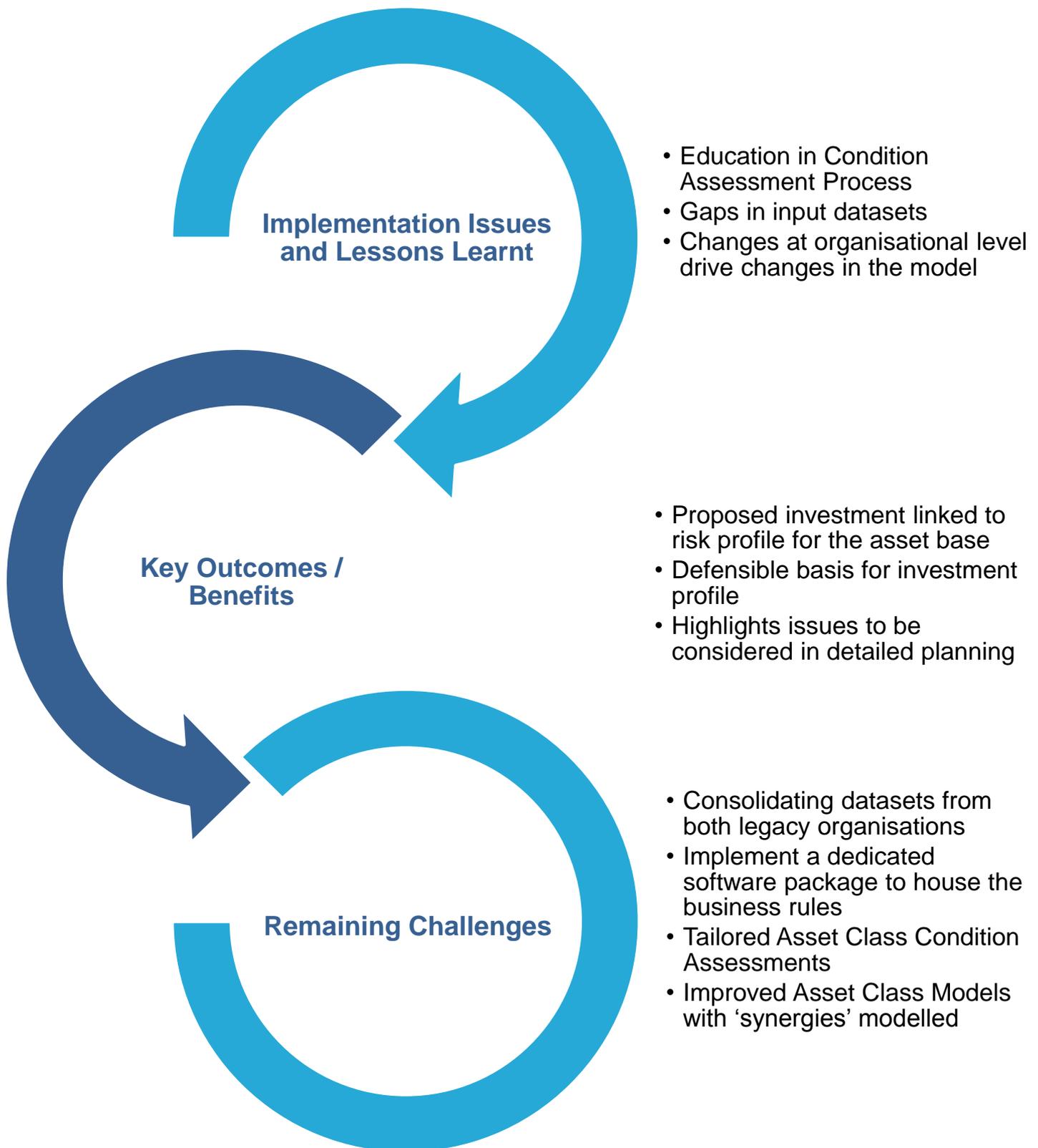
Standard Input Dataset

- *Installation Date*
- *Condition Ratings*
- *Consequence Ratings*
- *Construction Date*
- *Replacement Cost*

Standard Outputs

- *Recommended date for intervention*
- *Intervention Trigger (Condition, Risk Cost or WACC)*

"This approach ensures there is an adequate level of funding is available to offset asset consumption"



Christchurch City Council

Natural disaster response and recovery

John Moore

Planning and Delivery Manager, 3 Waters

Background and context

Christchurch City Council (CCC), located on the south island of New Zealand, services a population of 360,000. It provides pipe assessment, wastewater and stormwater services to its constituents, with 1,600km gravity sewer pipes and 900km gravity stormwater pipes making up its asset base.

Key: business drivers:

1. Good quality information.
2. Sufficient information available to allow designers to commence work.
3. Getting information on time.

After the M6.3 earthquake of February 2011, near Christchurch city centre, the Stronger Christchurch Infrastructure Rebuild Team (SCIRT) was formed as an alliance contract of three funding agencies and five contractors.

As a result, SCIRT was required to undertake the following:

- Decide what criteria to use to assess the condition of assets.
- Agree on the investigation tools to collect asset condition data.
- Store, analyse and make information available to designers and asset owners.

Initially, the criteria for evaluating assets to determine intervention was that any damage observed would be repaired. This low threshold was not critical early on as work commenced in the most damaged areas with no question intervention was necessary. As work progressed to less damaged areas, it became apparent some damage could remain as some assets were still functional, and the cost of immediate repair outweighed the benefit. This led to the development of Design Guide 43B which in coarse terms allowed for renewal of pipes where assessment gave a likelihood of failure within five years.

The tools to undertake assessment used at the time were, CCTV, Pole Camera, Profileometer, MH level, and Sewer leak technology. Although SCIRT had 20 CCTV crews, the estimated time to complete assessments was more than four years so CCTV data became a critical constraint to the rebuild. This led to the development of a Multi Criteria Analysis tool using seven parameters that gave a better than 90% match with CCTV assessment of damage. This was used to direct CCTV crews to the most damaged areas and allow designers to start production.

Prior to SCIRT the individual contractor groups were contracted by CCC after the M7.1 earthquake of September 2010 and each were using different systems for asset assessment including data storage and assessment criteria. It was important to coordinate all these contractors to provide consistent QA'd information in an agreed format.

Description of Leading Practice

The leading practice provides a range of tools, systems, and processes to assess and manage information to provide the greatest value allowing designs for repair to commence. This included Infonet and processes for designer requests, contractor allocation, information collection, audit and training (particularly for Pipe Inspection Manual modified for Earthquake damage).

Visual Inspection: This process was efficient but it did not provide reliable data on pipe condition. Visual inspection also provided visual indication at road surface of mains collapse and at manholes of silt – debris volumes.

Pole Camera: This process allowed for an efficient assessment of pipe condition to 20 metres dependent on debris volume. This process also avoided the need for confined space entry and some traffic management dependent on duration. Pole Camera was used principally for Stormwater Pipes as this was generally clear water or dry.

CCTV and push cam: This process was slower at data capture. However, it provided best practice quality, comparison based data. It was required that pipes were cleaned and plugged and traffic management was in place prior to work commencing.

Electroscan: This process involved a faster rate of data capture in non-metallic pipes. Electroscan did not require pipe cleaning, but required full wetted perimeter coverage to allow for 100% defect detection to occur. This process has been used selectively from mid-2012.

Pipeline profiling: This process allowed for pipeline grade assessments.

Land Survey: M.H. level to determines ground deformation in relation to pipes below.

Geotech investigations: This process provides information to design regarding soil strength to complete designs.

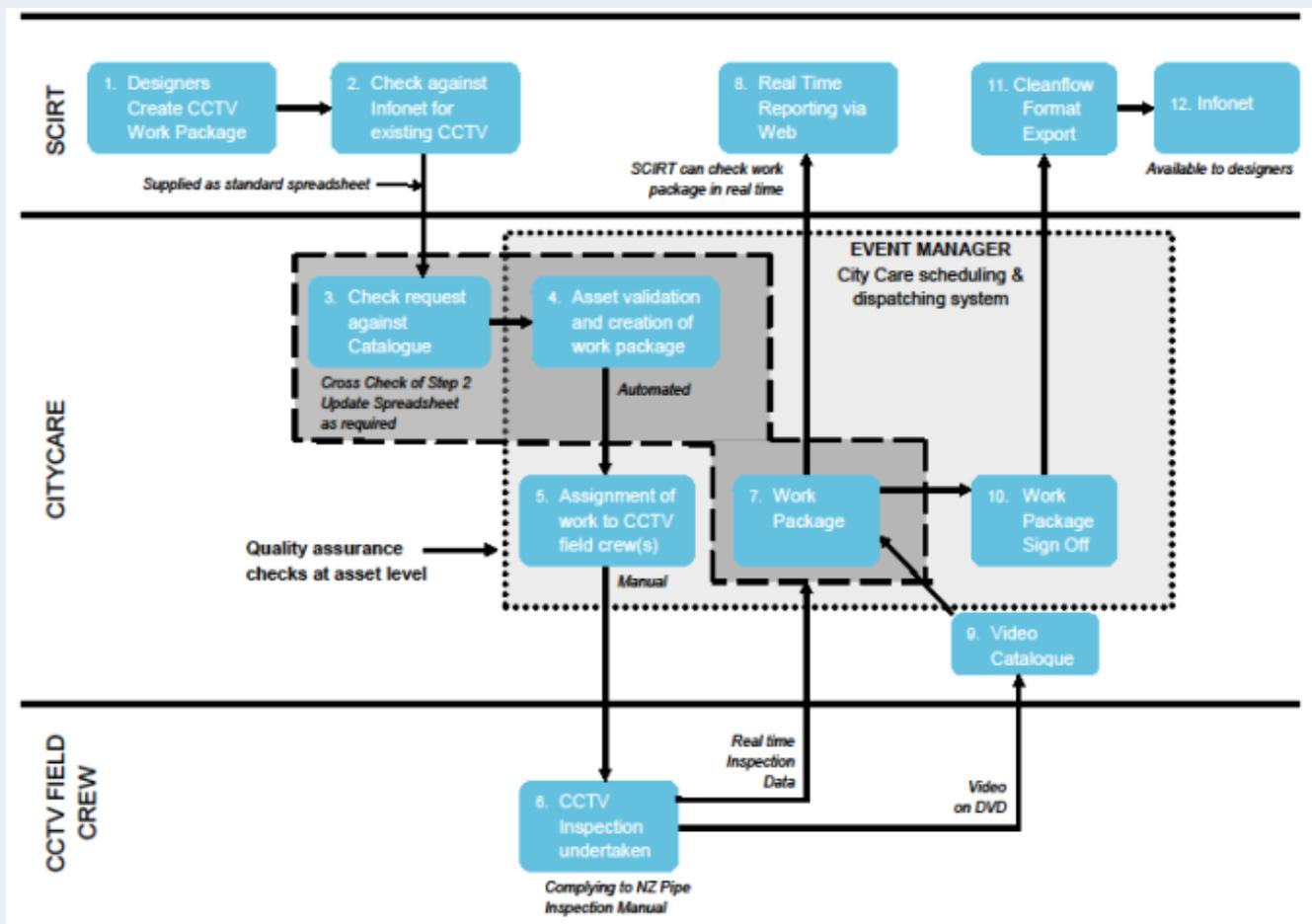
Multi Criteria Analysis: PDAT (Pipe Damage Assessment Tool) provided information on most likely areas of damage to direct further assessment based on seven criteria (Pipe depth, diameter, direction, Liquefaction Resistance Index, Material, Watercourse proximity, Subcatchment, Ramm data).

Description of Leading Practice

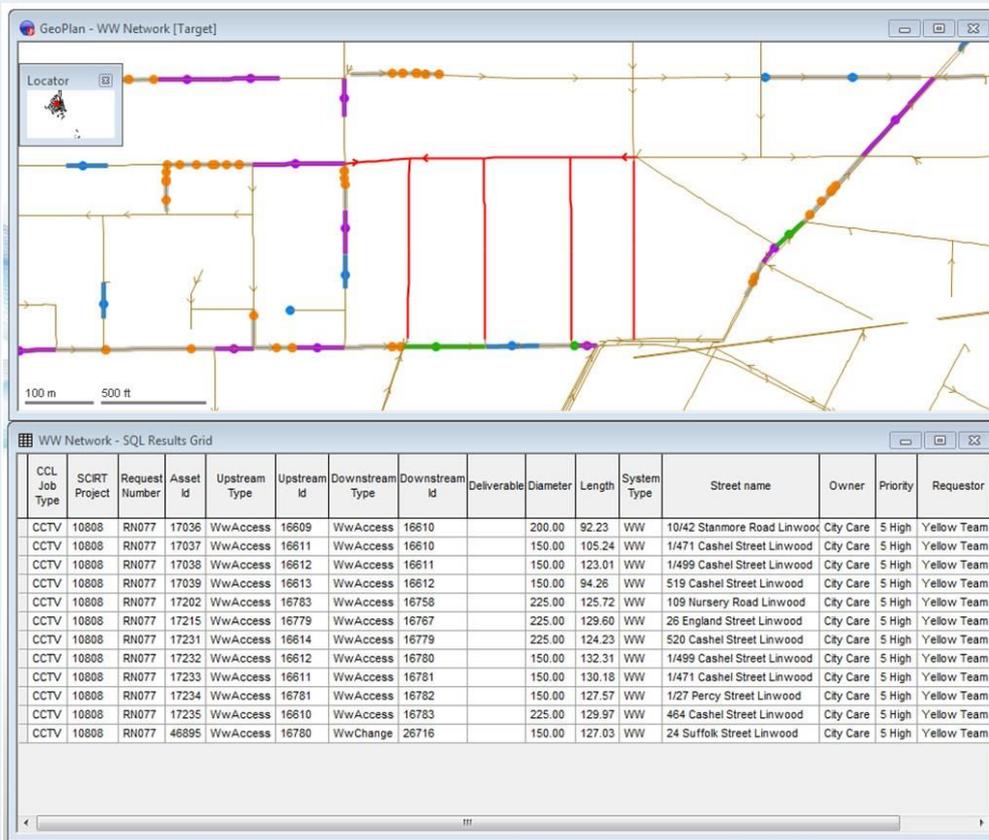
The Assessment field programme involved 150 people at any time at a cost of approximately \$5m/month. It was determined that without robust systems in place the information to be collected, it would not be fit for purpose and SCIRT designers would not be able to complete their tasks putting a further \$30m/month of design and delivery at risk of delay or failure.

The programme systems and processes quickly identified root causes of issues rather than allowing a blame game culture to develop. This allowed all contractors to work collaboratively together sharing information to achieve the necessary outcomes and reducing costs.

Once processes had been implemented, it was possible to incentivise performance based on KPI's such as innovation, health and safety initiatives and quality and production. This provided friendly competition for the allocation of the work and awards programme which lifted performance a further step.

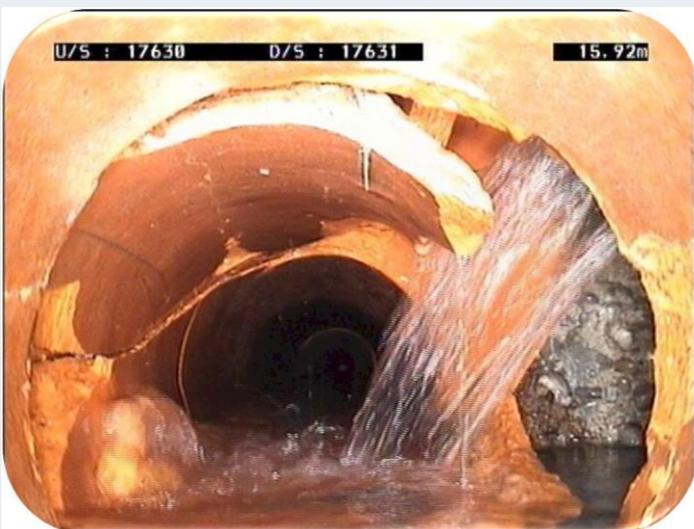


Scheduling CCTV, Pole Cam and Profilometer surveys

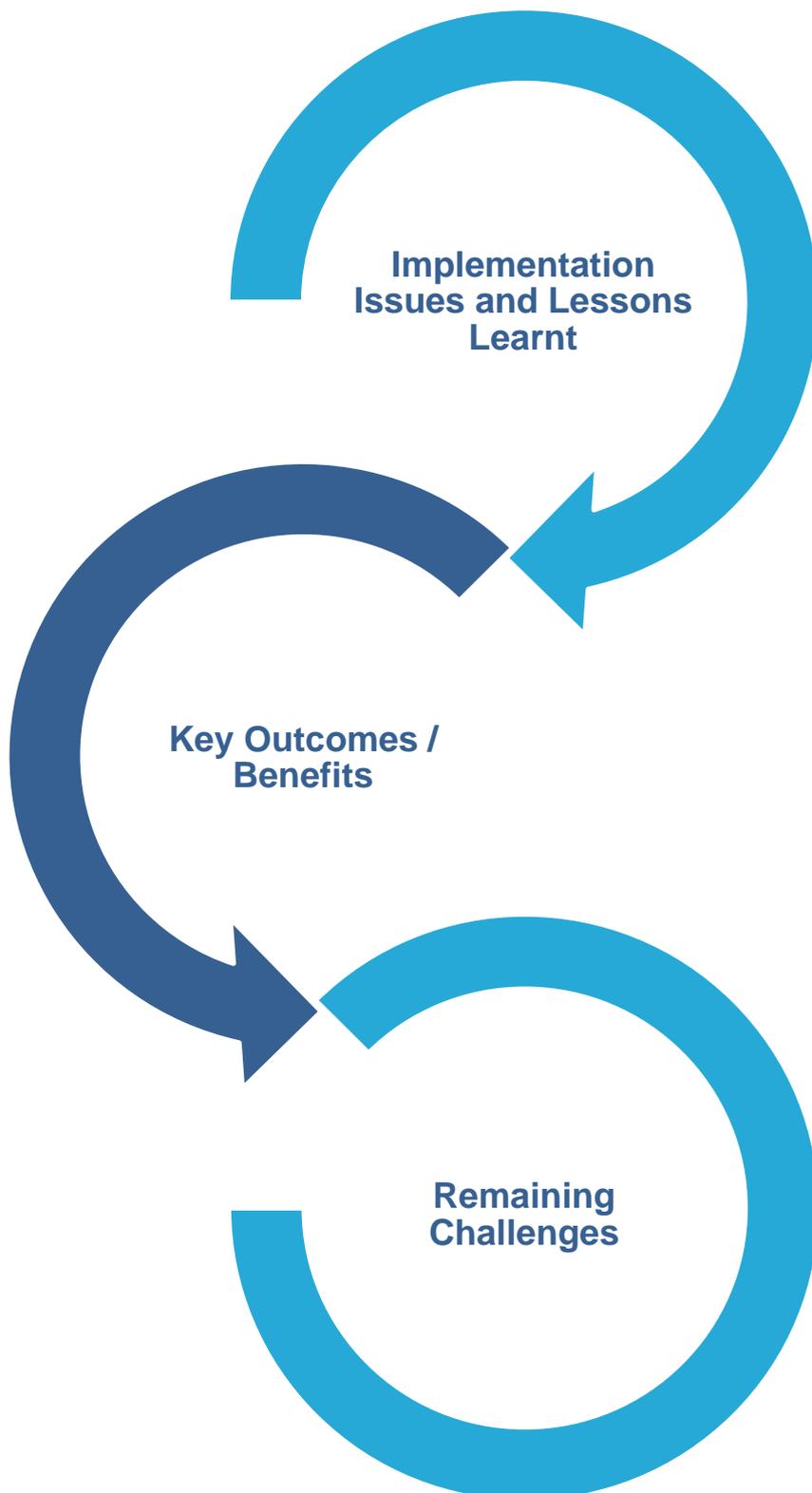


- Scheduling surveys in work packages
 - Pole Cam
 - CCTV
 - Profileometer
- Automation of export to the City Care in house online
- CCTV logging system
- Tracking of package progress and geographic display

The Reason CCTV costs so much!



Natural disaster response and recovery



- The cost of CCTV increased from under \$10/m to over \$100/m after the earthquake and is now approx. \$35/m.
- QA of CCTV and assessment is critical to success. Audit regime is also essential.
- Implement systems early or issues escalate.
- Monitor contractor performance to understand issues being faced in the field and with scoring of defects.
- Consistent information that could be relied on for design purposes.
- Sufficient information to allow designers to produce new designs.
- Systems in place to allow access to information.
- Good as built information for future Asset Management and deterioration modelling.
- Keeping CCTV as a resource available in Christchurch.
- Making sure contractors provide as built information immediately on completion of works.
- Getting hand over information from SCIRT back to CCC.
- Recovery of information from contractors collected prior to system implementation.

Research and Innovation

The benefits of public and private sector collaboration

Wannon Water: Smart tools for innovation

Coliban Water: Innovation as Culture

Yokohama City: Public and private sector collaboration on R&D

DC Water and Sewer Authority: Innovation Program

Wannon Water

Smart tools for innovation

Keith Davis

Project Manager Strategy & Innovation

Background and context

Wannon Water is located in regional South West Victoria, Australia. It provides water & sewerage services to 84,000 residents, with a \$1.1bn asset base covering a 23,500 km² service region.

Key drivers - Regulatory compliance, demonstrating value for money, knowledge management and business decision support systems.

Wannon Water has a significant history of asset management innovations since formation in 2005. Wannon Water's stakeholders, customers and regulators seek enhanced customer value from more efficient, innovative service delivery. Wannon Water strives for long-term economic viability, community value and environmental sustainability as business outcomes. It recognised that innovation was happening, but it was ad-hoc, with no formal processes. There was no central repository of innovation opportunities. There was no standard, robust methodology to easily assess different types of opportunities for investment. This situation raised further questions.

- Should innovation and improvement opportunities be left to chance?
- How does Wannon Water deliberately harvest great innovation ideas from both inside and outside the business?
- Which ideas provide higher shared-value, triple bottom line benefits for the business, our customers and the community?
- How do we better support embedding a "culture" of innovation and change within the business?

Keith Davis
Project Manager
Strategy &
Innovation,
Wannon Water

WANNOVATE
Ideas - Innovations - Improvements

Description of Leading Practice

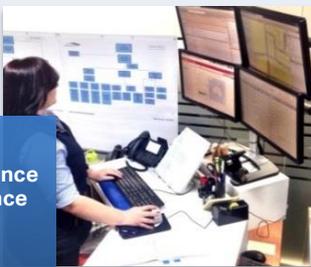
A structured Innovation Program for Wannon Water supports existing and new innovation efforts, asset management, project planning and service delivery aspects of corporate strategies by:

- Effectively communicating innovation as a priority throughout the business.
- Structuring governance to effectively oversee management of the innovation process.
- Applying robust methodologies to assess opportunities and investments for improvements.
- Establishing an innovation portal for capturing ideas and providing support.
- Coordinating training for all employees on innovation processes.
- Positively influencing a growing innovation culture within the organisation.
- Monitoring, evaluating and reporting a wider spectrum of innovation investment outcomes.

A more structured approach to innovation is making a real difference through examples such as:

- Implementing a Maintenance Excellence Plan to improve asset management efficiencies, reduce operating costs, increasing productivity of workforce and contractors and reflecting benefits through savings for customers.
- Constructing a \$2.4 m wind generator to power the city of Portland's energy-intensive water and sewage treatment facilities on renewable energy, reducing the overall business greenhouse gas emissions footprint by a further 8%.
- Developing an aquaculture program as a biological alternative to de-sludge waste water lagoon assets and reduce our operating costs.
- Constructing a world-leading roof-water harvesting scheme in the city of Warrnambool to capture and transfer rain water from new household roofs to existing centralised storage and treatment facilities, avoiding energy intensive transport of this volume of water from a river system over 100 km away.

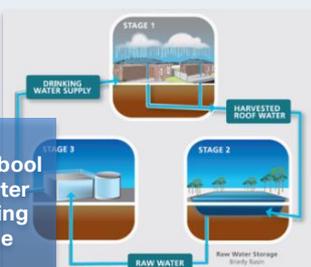
Maintenance
Excellence
Plan



Portland Wind
Energy project



Warrnambool
Roof Water
Harvesting
Scheme



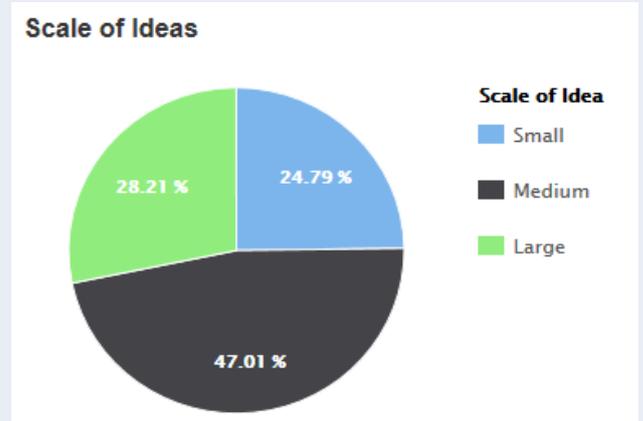
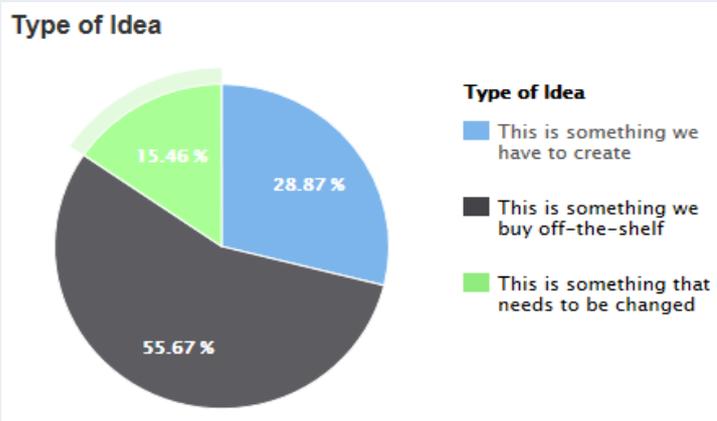
Aquaculture
Program



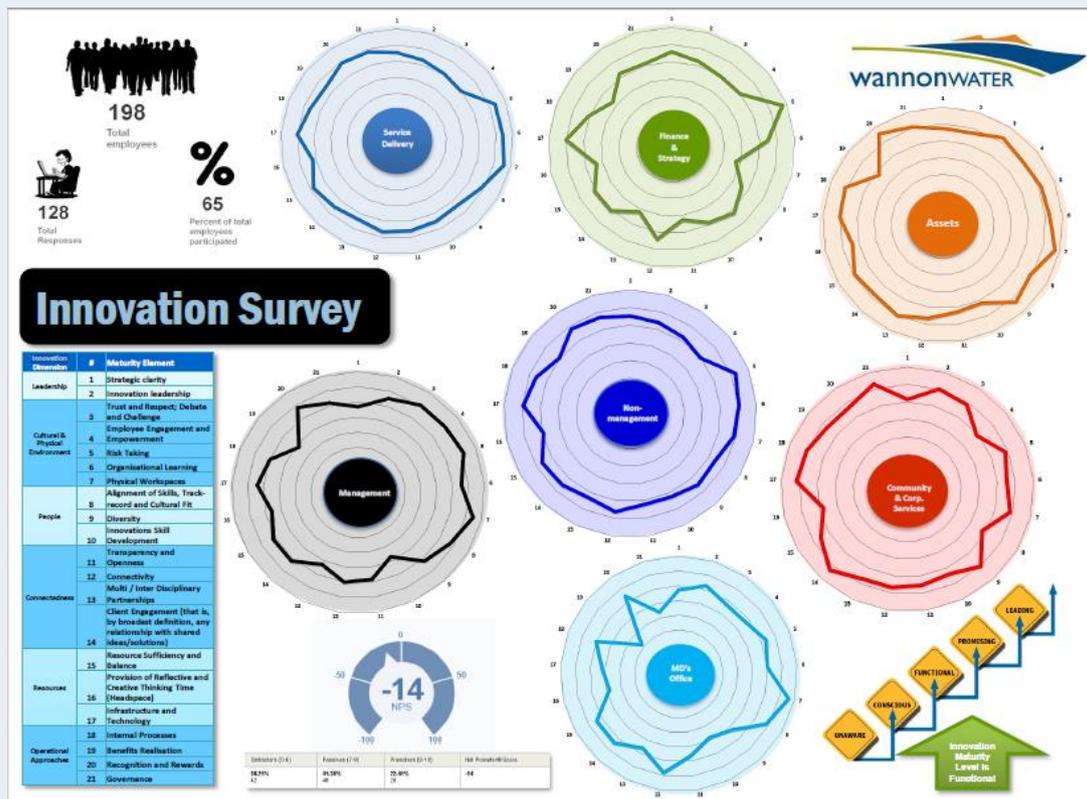
“A structured
Innovation Program
strengthens beneficial
outcomes through
robust assessment of
ideas, sound
management
processes and
targeted investments”

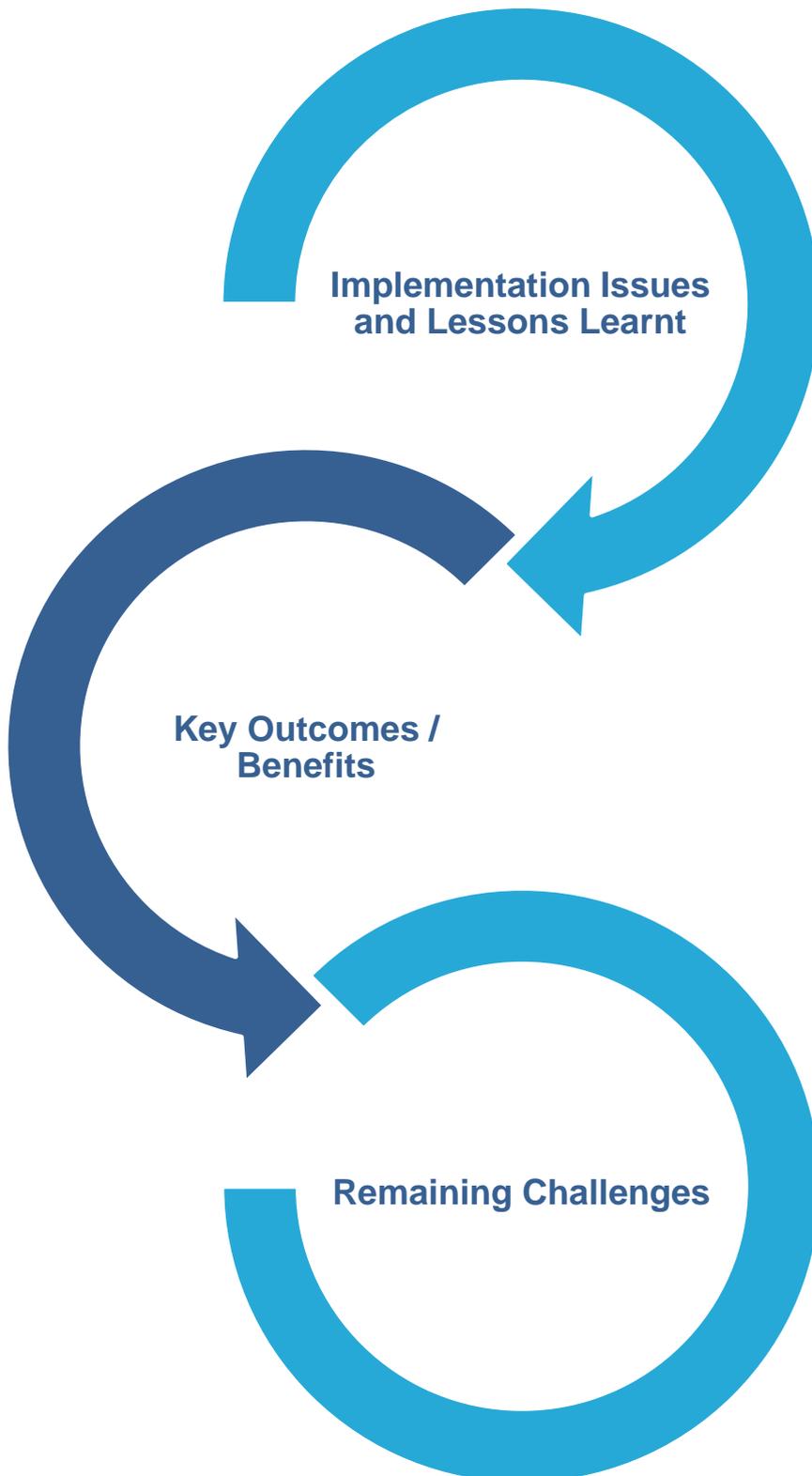
In the first 134 days of deploying the “Wannovate” innovation portal there were...

- \$26m in potential benefits recorded in the portal (\$194K/day)
- \$102K of benefits in business case development (\$761/day)
- \$210K of benefits endorsed for investment (\$1,567/day)
- \$2.5m in benefits with projects underway (\$18,656/day)
- \$56K in benefits with projects completed (\$417/day)
- 253 innovation ideas captured in the portal (average 1.9 ideas/day)



We have surveyed employees to better understand the business culture for innovation and change.





- Understand your business's culture for innovation and change.
- Ensure managers are leading business-wide innovation to achieve corporate objectives.
- Integrate innovation and creativity skills development for users of new support platforms.

- Low-cost, customised innovation portal application, with class-leading features, deployed to 200 staff.
- Effective governance structures for assessing and transforming ideas to innovations in place.
- The business innovation process is transparent and better managed to capture value

- Raising and sustaining employee idea-generation participation rates.
- Rolling out targeted innovation skills training to team leaders and managers.
- Tracking and reporting the tangible benefits of specific innovation investments.

Coliban Water

Innovation as culture

Jon Anstey

General Manager, Insight and Innovation

Background and context

Coliban Water is a large regional urban water corporation north of Melbourne in the state of Victoria, Australia. Our shareholder is the Victorian Government. We are responsible to the Victorian Minister for Environment, Climate Change and Water. The Corporation manages, maintains and operates 35 storages across North-Central Victoria. We provide water and wastewater services across 16,550 Km².

The Australian water sector contributes to the world-class livability of Australian cities.

Best cities

2015, based on liveability index*

Rank	City	Country
1	Melbourne	Australia
2	Vienna	Austria
3	Vancouver	Canada
4	Toronto	Canada
5=	Calgary	Canada
5=	Adelaide	Australia
7	Sydney	Australia
8	Perth	Australia
9	Auckland	New Zealand
10=	Helsinki	Finland
10=	Zurich	Switzerland

Description of Leading Practice

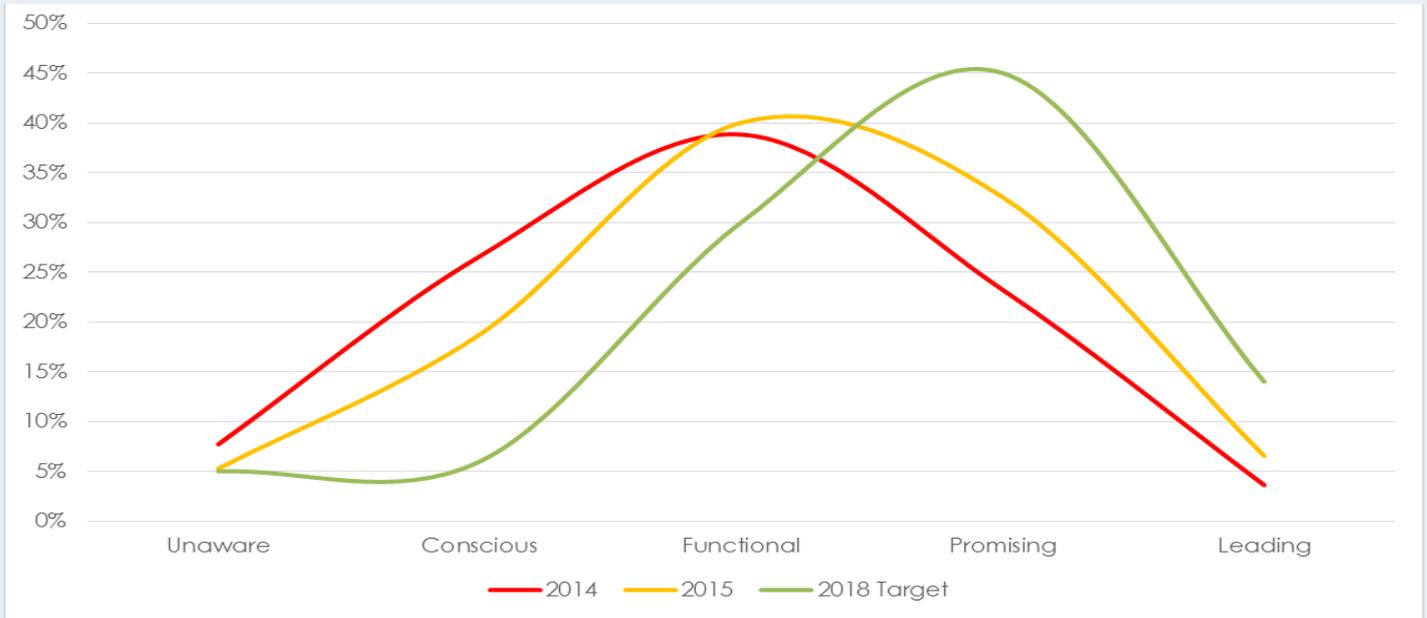
To help maintain this livability, the sector has a critical role to play in improving Australia's 17th ranking globally in innovation (OECD).

Overall Performance	Score (0-100)	Rank
Global Innovation Index 2015	55.2	17
Innovation Output Sub-Index	45.6	24
Innovation Input Sub-Index	64.8	10
Innovation Efficiency Ratio	0.7	72
Global Innovation Index 2014 (out of 143)	55	17

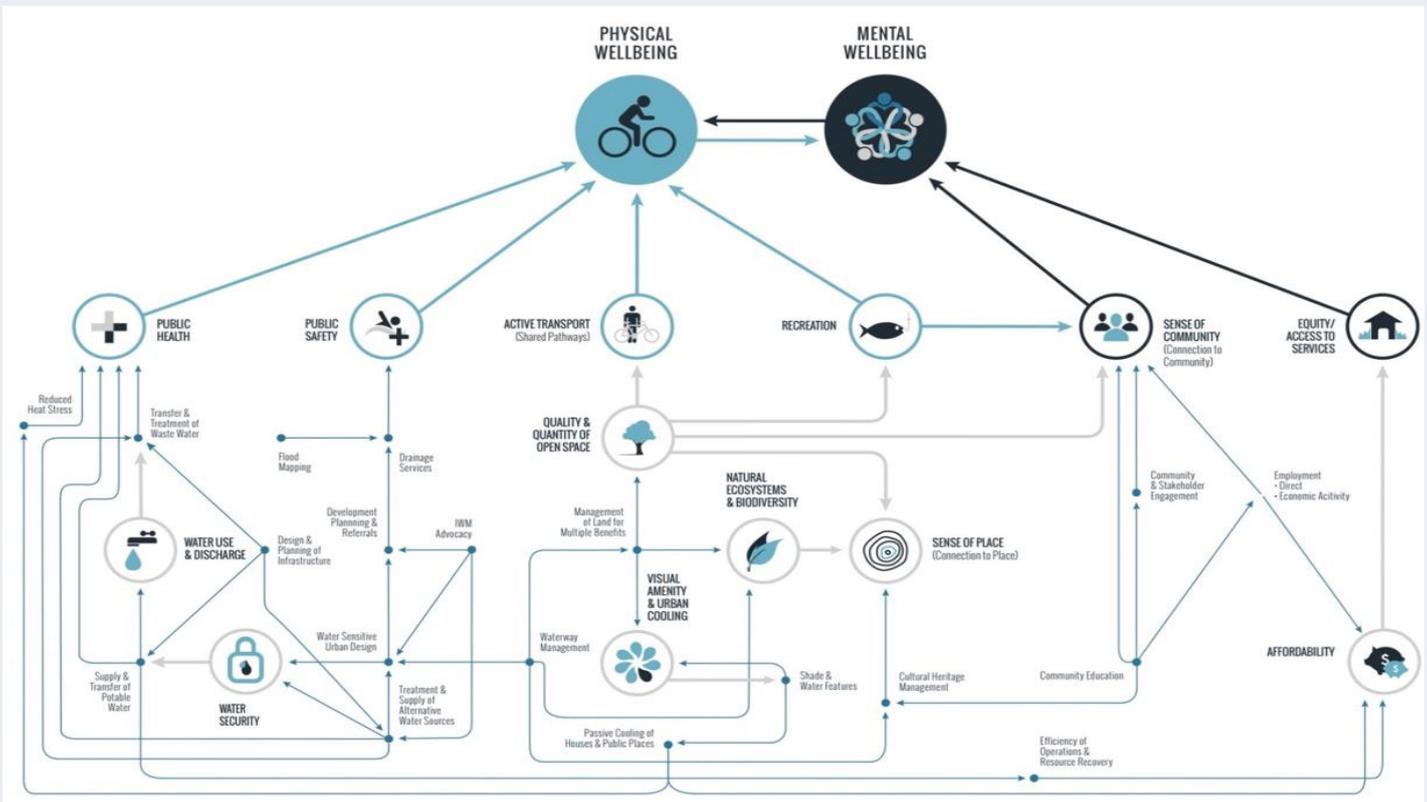
Coliban Water has led the sector's use of the innovation culture roadmap developed by Australia's premier government innovation organization, the Commonwealth Scientific and Industrial Research Organisation ("CSIRO").

LEADERSHIP	ENVIRONMENT	PEOPLE	CONNECTEDNESS	RESOURCES	OPERATIONAL APPROACH
<ul style="list-style-type: none"> Strategic clarity Innovation leadership 	<ul style="list-style-type: none"> Trust and respect; debate and challenge Staff engagement and empowerment Risk-taking Organisational learning Physical workspaces 	<ul style="list-style-type: none"> Alignment of skills, track record and cultural fit Diversity Innovation skill development 	<ul style="list-style-type: none"> Transparency and openness Connectivity Multi / inter disciplinary partnerships Client engagement 	<ul style="list-style-type: none"> Resource sufficiency and balance Headspace Infrastructure and technology 	<ul style="list-style-type: none"> Internal processes Path to impact Recognition and rewards Governance

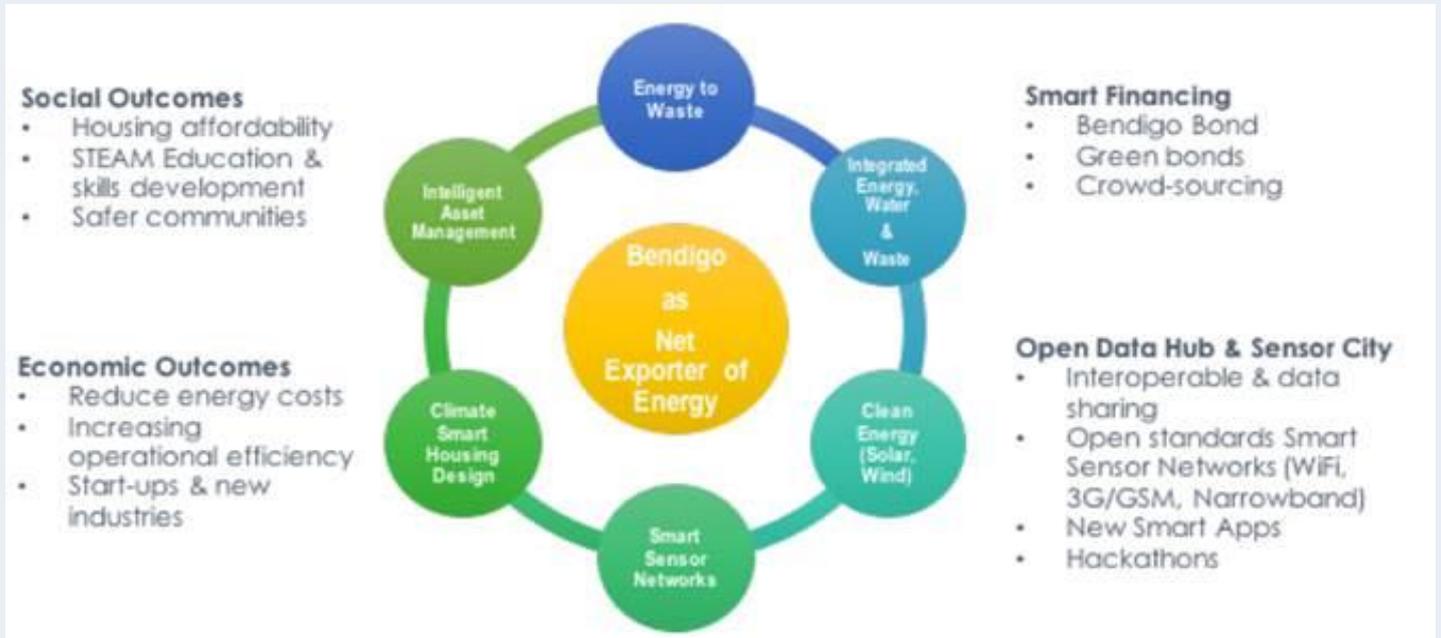
Our Board uses the CSIRO roadmap to monitor our innovation culture performance.



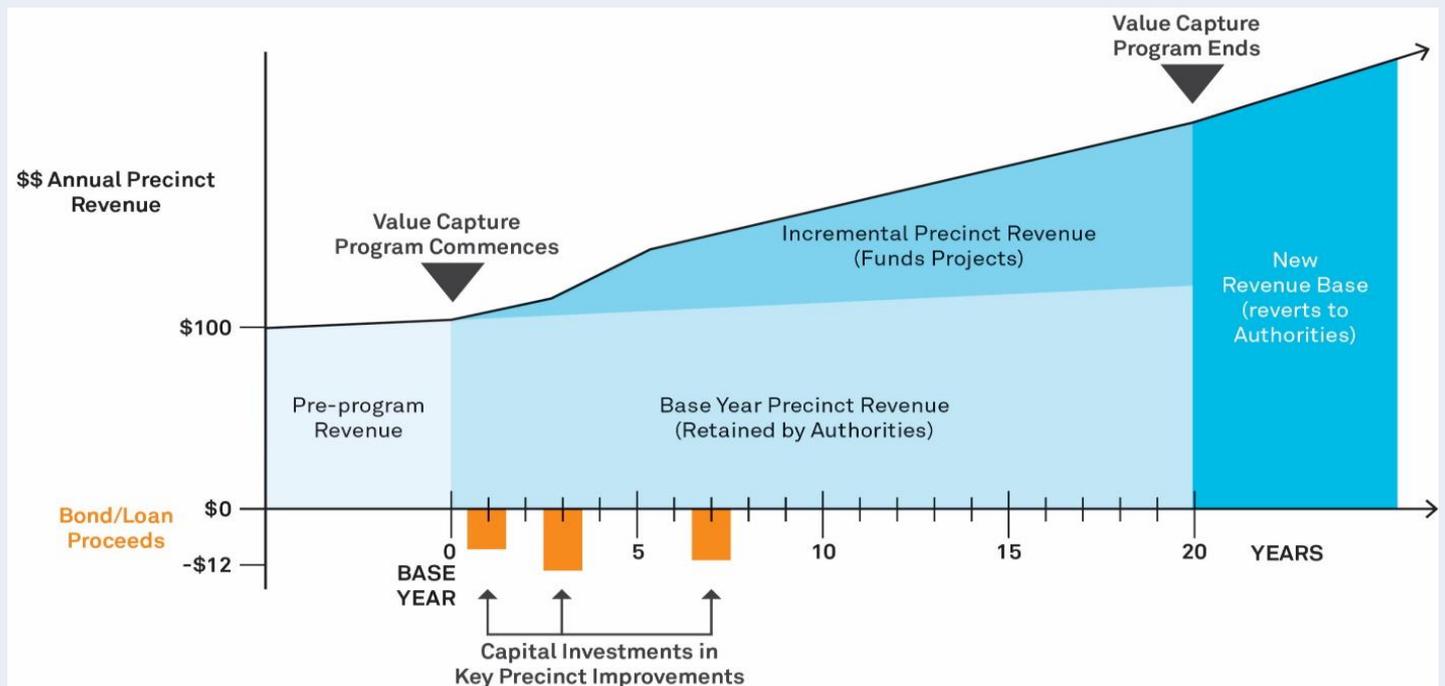
We innovate across a diverse “system” of assets, to improve community wellbeing.

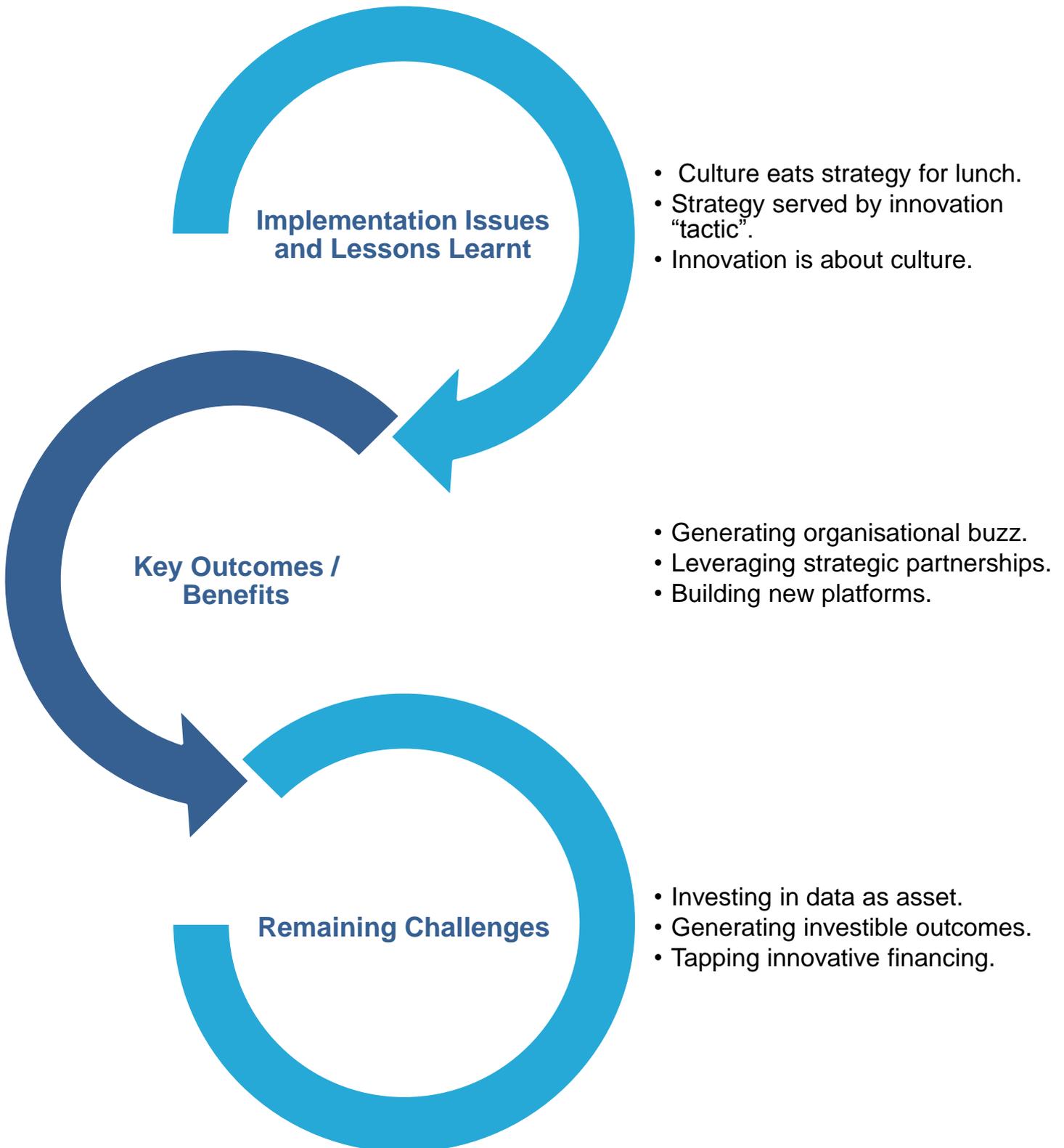


We increasingly treat data as an innovation asset.



Data is central to demonstrating the outcomes required for “next generation” financing of assets, including impact investing, as well as value capture.



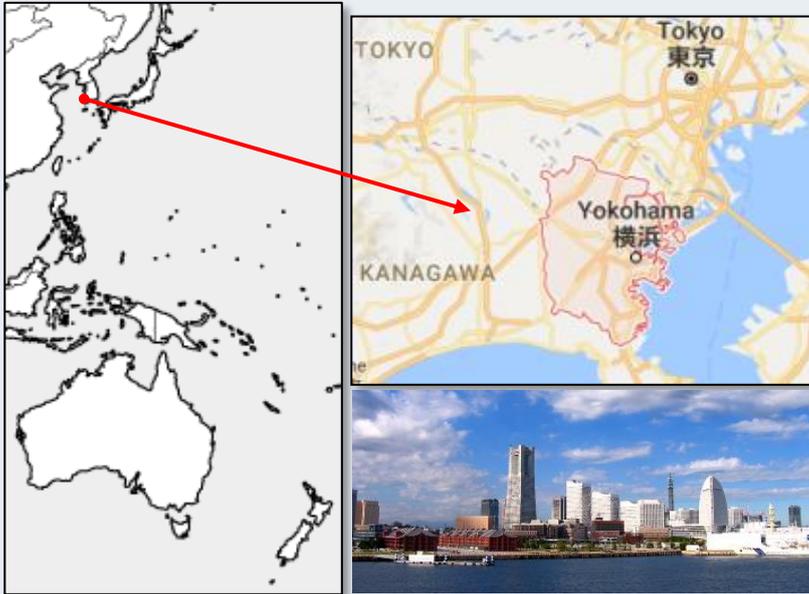


Yokohama City

Public and private sector collaboration on R&D

Toshiaki Yoshida
Environmental Planning Bureau

Background and context



Yokohama is located to the south of Kanto Region, on the east of the main island of Japan, 30 km south of Tokyo.

	Population	Area (km ²)
Yokohama City	3,730,000	437
With sewerage service	3,720,000	311

Yokohama City maintains the city's sewage works and stormwater

The stock includes: 11 wastewater treatment plants (total capacity: 2,250,000 m³/day); 2 sludge treatment centers (total capacity: 27,700 m³/day); 71 pumping stations; and 11,800 km² of sewer lines

Workforce: 820 (internal), 200 (outsourced)

Key business drivers: sustainability, asset lifecycle management



The following issues lead to promotion of public-private collaborations in Yokohama sewage works:

- A large proportion of the management (finances, human resources) and technical workforce will leave the organisation in coming years, and an increase in operation and maintenance and renewal demand of the existing facilities, severe budget constraints.
- Social needs and roles relevant to sewage works have been and will be increasing such as global warming mitigation, energy creation, emergency preparedness and stakeholder involvement. That is, the skillsets for effective asset management are becoming broader.

Toshiaki YOSHIDA

Leading a team working across the business to integrate new assets and ensure they meet operational requirements

Environmental Planning Bureau,
Yokohama City



Description of Leading Practice

Yokohama City is promoting projects that utilise sewerage resources such as sludge through enticing involvement of private technologies, knowledge and finances. Power generation projects utilising digestion gas, sludge-to-fuel projects, and incineration/reclaimed soil projects have been conducted with a Private Finance Initiative scheme to realise cost reduction, energy generation, greenhouse gas mitigation and waste disposal reduction. Solar power generation projects have been implemented on treatment facility buildings' rooftops, delivered with public-private collaborative schemes to raise the investment for this clean energy source that also serves as emergency energy supply.

Environmental Planning Bureau of Yokohama City, in charge of sewage works, promotes innovative research combining private technologies and knowledge with the City's own developed technologies, knowledge and facilities. The City invites collaborative innovative research proposals through formal invitations, and the City and the selected private entity conduct the research together. In unfettered proposal schemes, a private entity makes an innovative research proposal that meets the City's needs and objectives, and conducts the research with the City after approval. In independent collaboration schemes, a private entity makes an innovative research proposal utilizing facilities and data of the City, and conducts the research after approval. Recent innovative research in sewage works includes "the upgrade of digestion gas by membrane separation" and "development of street storm drain grates free of leaf clogging."

Yokohama City promotes co-creation in the fields of the City's wards and bureaus by accepting private entities' proposals and consultations. In theme-defined proposal schemes, the City invites a proposal/idea of public-private collaboration on the City's defined theme, and in unfettered proposal schemes, a private entity makes a proposal/consultation of public-private collaboration on any theme. The Co-governance and Creation Division of Policy Bureau serves as a point of contact and coordinates activities between the private entity and a relevant division of the City. Recent co-creations in the sewage works area have included varied projects such as the "installation of manhole decorative covers with a professional soccer team logo" and "using mobile computers to collect sewer data." Details are overleaf. The common key aspects of the public-private collaborations are illustrated below:

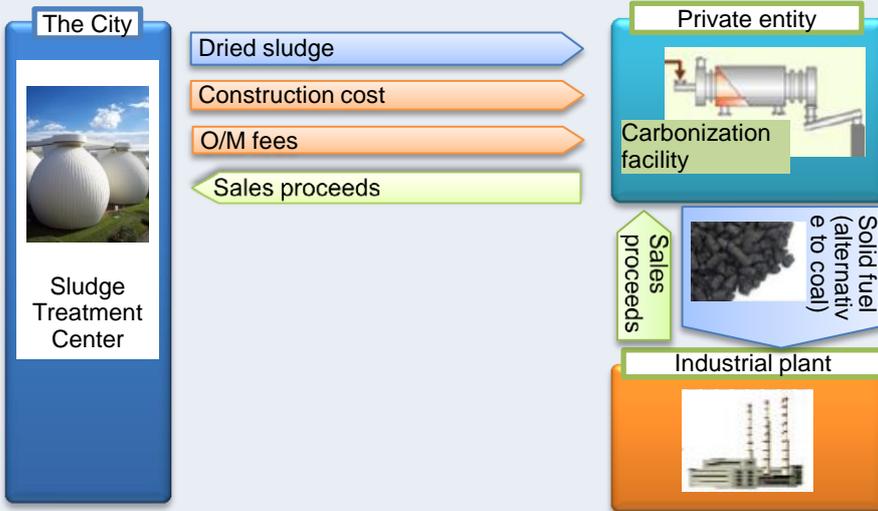


These practices have made differences in the following areas:

- **Efficient utilization of sludge:** Private technologies and knowledge were fully introduced in comprehensive projects with PFI scheme
- R&D was promoted by making the Bureau's facilities or data available to private entities on a proposal and approval basis.
- **Co-creation:** Co-creation and innovation was promoted by accepting private entities' proposals/consultations, benefitting the City and partners.

"Public-Private collaboration should focus on continuous efforts and practices, responding to dearth of management resources, and increasing social needs and roles."

[EX 1] Sludge-to-fuel projects with PFI scheme



[EX4] Development of street storm drain grates free of leaves clogging



Developed through collaboration of the manufacturer with the City's knowledge.
Feature: arrow-shaped opening in grates and slit on the roadside.
Patented and design-registered by the manufacturer and the City.

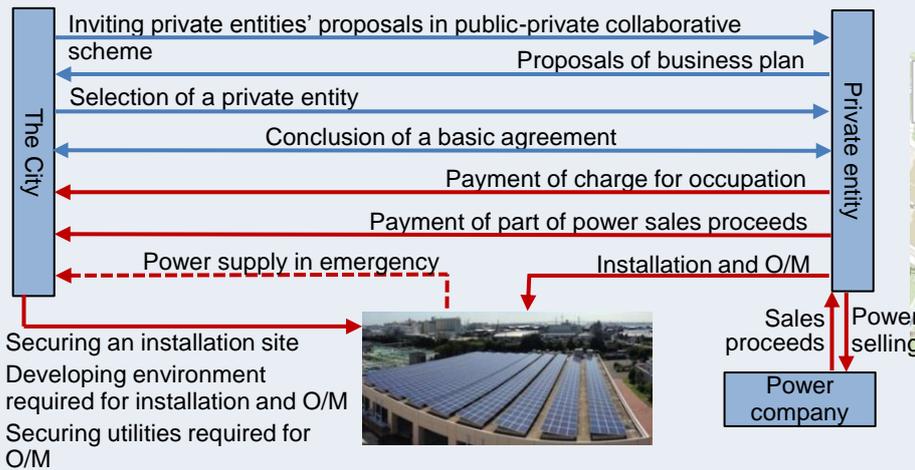
[EX5] Installation of manhole decorative covers with a professional football team

A collaboration between the City and the Yokohama professional football team. The team designed the decorative covers and incurred the cost of cover plates. The City installed the designed covers, replacing conventional decorative covers not complying with the current standards.

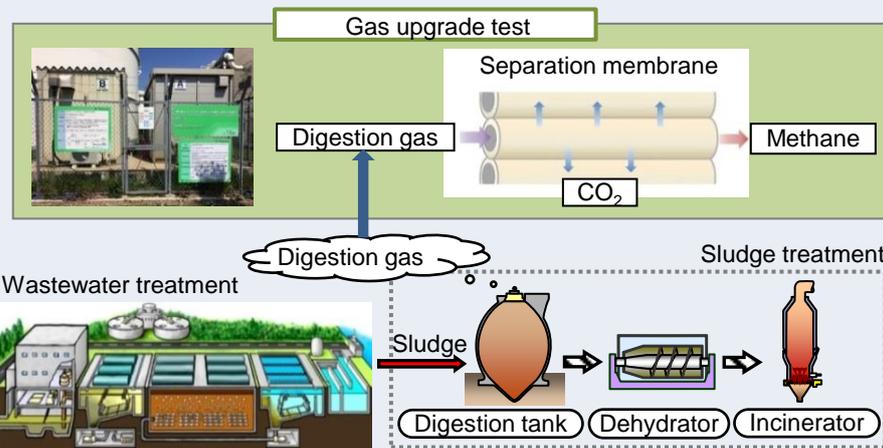


29 installations in fiscal 2011
24 installations in fiscal 2012

[EX 2] Solar power generation projects on treatment facility buildings' rooftops with public-private collaborative scheme



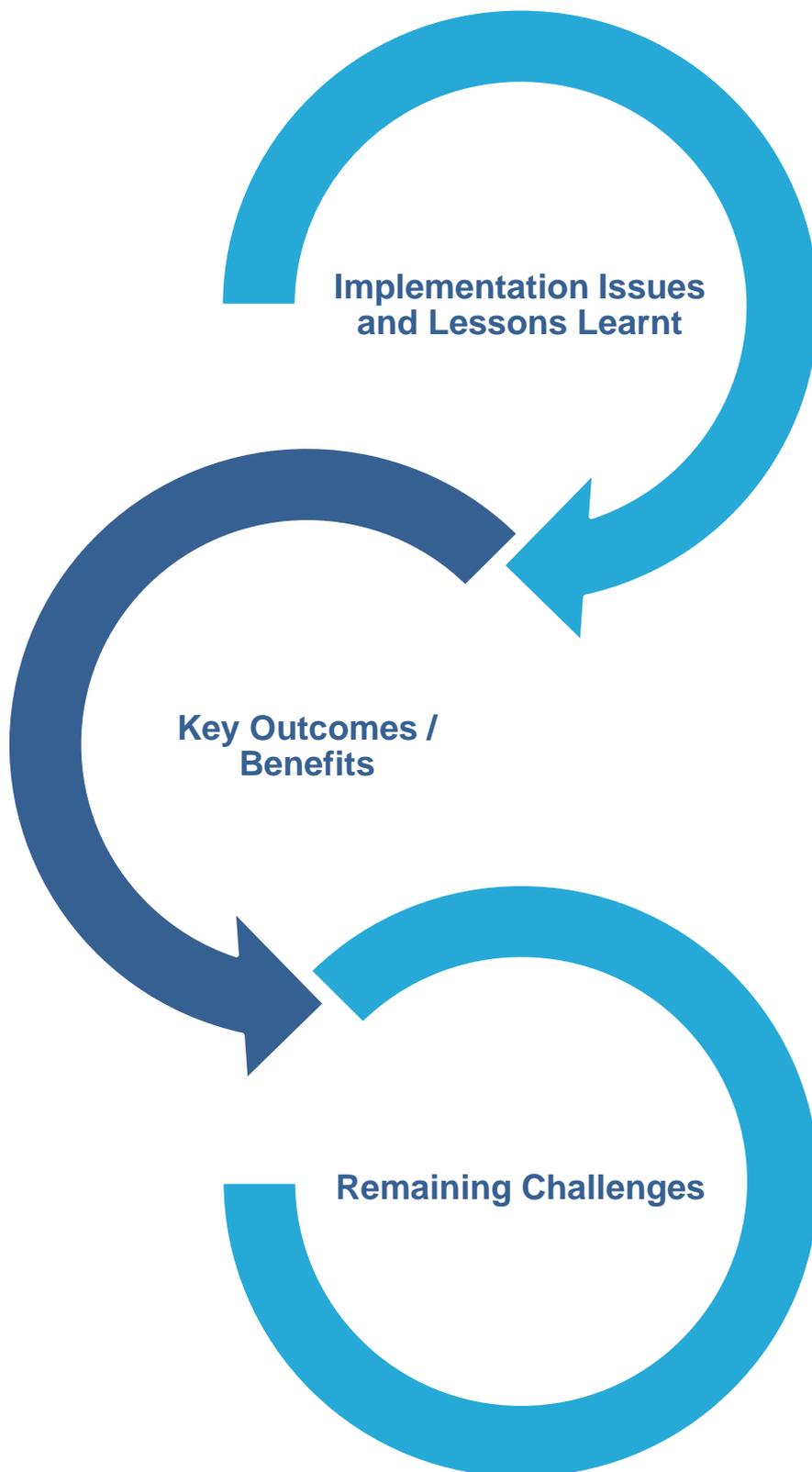
[EX 3] Upgrade of digestion gas by membrane separation



[EX6] Sewer drill information collection by utilizing mobile maps

The mobile maps were established, superimposing the City's sewerage information onto the mobile devices. Tablets were used during drilling activities, both to define sewer locations and efficiently collect on-site data.





- Ensure private partners understand a local government's decision making process.
- Form robust internal coordination approaches, responding to the significance and risks of public-private collaboration.
- A scheme that promotes using private technologies developed through public-private collaboration can reap real benefits.
- Efficient project delivery and high returns for City investments.
- Creation of business and R&D opportunities for private entities, aiding the local economy and customers
- Generation of new technology benefitting the City and private entities.
- To collaborate also with academics.
- To more effectively disclose information about the City's wastewater works to private entities for further public-private collaboration.
- To develop organisational resources and capabilities so the private sector would be further enticed to collaborate.

Getting Accredited

Interactive working session on ISO 55001
accreditation

Gladstone Area Water Board: ISO 55001 Accredited

Sendai City: ISO 55001 Accredited

WaterNSW: Achieving certification to ISO 55001

ActewAGL: Advanced in Seeking ISO 55001 Accreditation

Gladstone Area Water Board

ISO 55001 accredited

John Tumbers

Operations and Maintenance Manager

Background and context

The Gladstone Area Water Board is located in Central Queensland, and employs approximately 96 staff. GAWB assets include land, dams, water delivery pipelines, pump stations, water treatment plants, reservoirs, recreation facilities and a fish hatchery.

GAWB's key business drivers are the sustainability and reliability of water supply.

The GAWB is a price regulated business, supplying bulk raw and treated water to the Gladstone region. GAWB is subject to five yearly price reset negotiations which set its water prices for the five-year period. The price reset process aims to establish whether decisions on asset costs are both "prudent and efficient".

Depending on the season, up to 80% of the bulk water supplied by GAWB is provided direct to industry as raw (untreated) water. The water is supplied direct to the customer's interface, effectively making water supply an extension of their processes. An extended interruption to water supply can result in an interruption to the customer's process.

Raw water is also treated and supplied as drinking water on bulk to the local regional council for reticulation to domestic customers. GAWB aims to ensure a safe and reliable drinking water supply for the Gladstone community.

GAWB transitioned from outsourcing its operations and asset management responsibility to insourcing both from 2009. In 2011 initial maintenance management systems were set up based around the implementation of a computerised maintenance management system.

The need for further change was identified in 2013 as GAWB prepared for the next price reset period. Internal audits and WSAA Benchmarking identified improvements required in asset information and reporting, along with maintenance strategy development. Critical analysis, maintenance strategy / tactics and Life Cycle Maintenance Plans were created as the basis for an Asset Management Framework. This framework was successfully used as the foundation for budget forecasts for the 2015 price reset.

GAWB determined that ISO 55001 certification would enable demonstration of robust and auditable asset decision making, which would assist future price negotiations. Therefore, ISO 55001 certification was set as a corporate objective, with the added desire to be an industry leader.



John Tumbers,
Operations and
Maintenance
Manager,
GAWB

Description of Leading Practice

GAWB wanted to achieve ISO 55001 certification without the need for a wholesale rewrite of its asset management processes, and wished to utilise practices established in existing certified systems (ISO 9001, ISO 14001). The journey to certification followed a path of training, internal and external stakeholder forums, internal and external gap analysis, and a two stage audit process.

It was key to map GAWB's business functions as they applied to asset management. The business process mapping helped identify how GAWB's existing processes could be compliant to the standard. The documents written specifically to comply with the standard were an Asset Management Policy (that met the standard), an Asset Management Strategy and an Asset Management Plan. These documents connected asset practices and processes that already existed within GAWB's asset management framework.

Key Aspects to GAWB Achieving ISO 55001 Certification

- Clearly define the scope of the assets included in the asset management system. By defining what assets were included in the certified system, GAWB were able to focus the auditors on what mattered to GAWB.
- Utilise pre-existing asset management framework and certified systems to demonstrate compliance to the standard. These were identified through business process mapping.
- Identify asset management objectives through existing corporate governance processes such as the corporate and performance plans. By using these objectives GAWB could demonstrate the connection of corporate goals to the asset management system.
- Demonstrate the use of risk assessment in asset decision making through existing corporate risk processes. GAWB have a risk management framework that allows for risk based assessment on asset related issues.
- GAWB used Life Cycle Maintenance Plans (LCMP's) to demonstrate management over the life of an asset. As LCMP's existed prior to certification, there was no requirement to develop individual asset management plans for every asset included in the scope. Rather there is one Asset Management Plan that references the LCMP's.

How has ISO 55001 certification made a difference to GAWB?

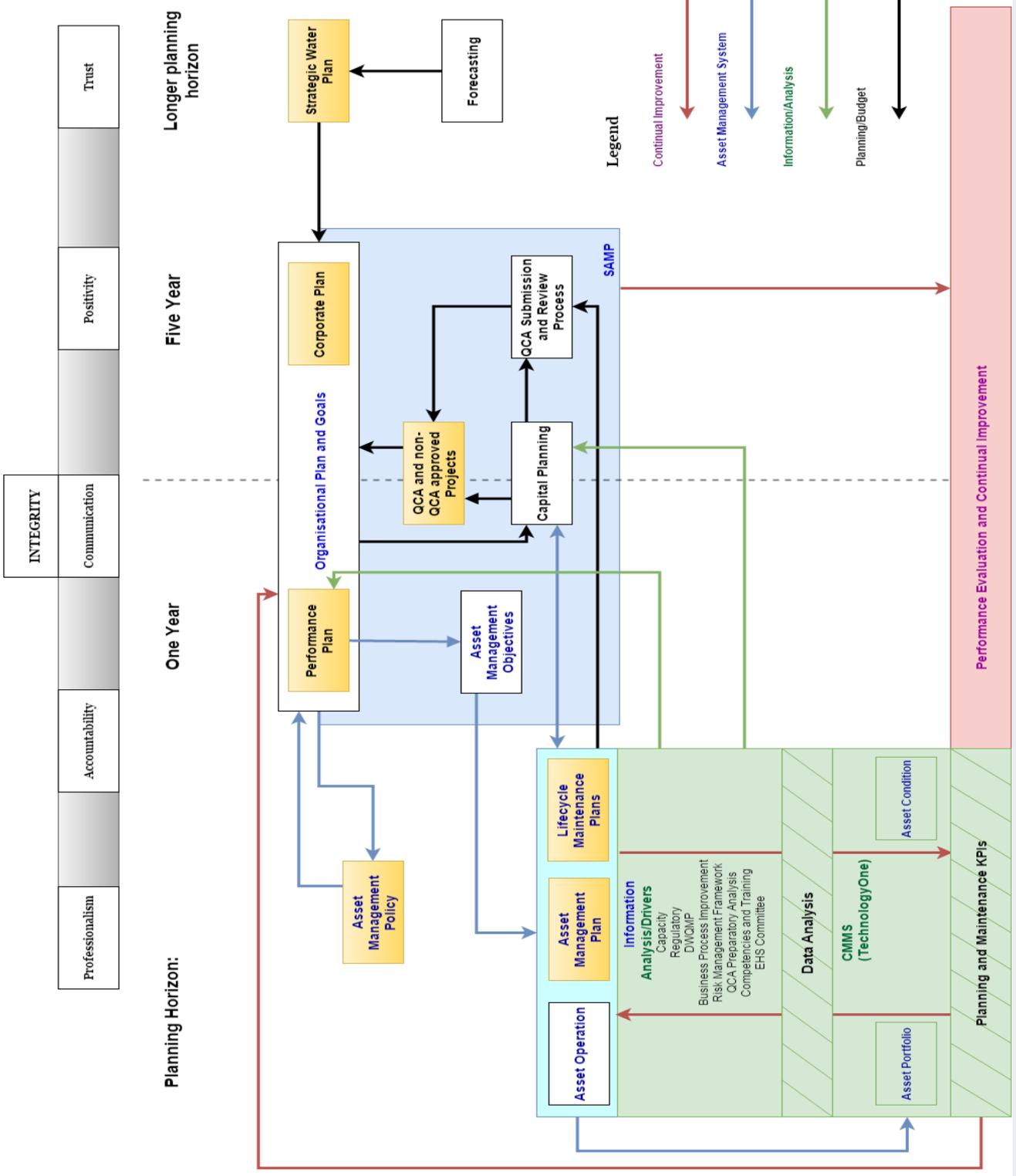
- Certification provides for an auditable demonstration of asset decision making, which will aid negotiation of budgets at the next price reset. Asset decisions must be based on the processes that comply to the standard.
- GAWB's customers have increased confidence in the management of the water infrastructure to meet reliability, cost and safety expectations.
- The management of GAWB's assets is shared across the organisation through the stakeholder engagement as prescribed by the standard. These forums include daily operations meetings, inter department collaboration, through to Board level reporting and customer interaction.
- There is an auditable commitment to continuous improvement. GAWB will be held to account for its Asset Management Improvement Plan at each recertification.

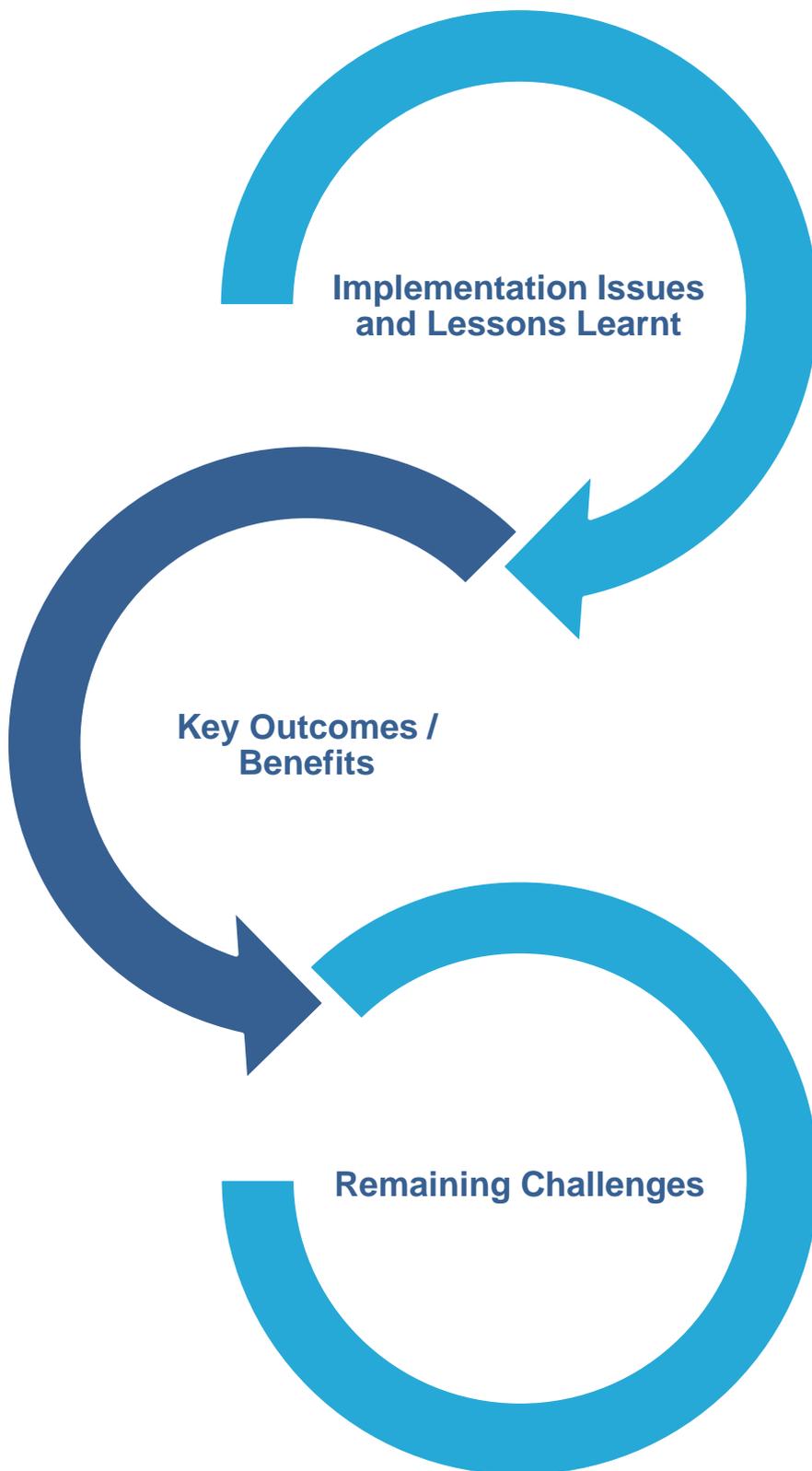


GAWB Asset Management Strategy Map

"To be an excellent water business"

To ensure the long and short term water needs of current and future customers are met in ways that are environmentally, socially and commercially sustainable.





- Ensure document managements systems are understood and available for auditing. The ability to recall information during the audit is important.
 - Don't attempt to implement a new computerised AMS at the same time as working towards certification. It is difficult to demonstrate process across two systems.
 - Involve the auditors on the development journey. Allow them to set the criteria to follow for you.
 - Dedicate a resource to drive the project from the outset.
- Board and customer confidence in asset management.
 - Greater collaboration across the organisation.
 - An organisational desire to improve in AMS.
 - Recognition for being the first water utility in Australia to obtain accreditation.
- Reflecting the benefits of certification at the shop floor.
 - Automating life cycle management within computerised systems.
 - Management and analysis of data for effective decision making.

Sendai City

ISO 55001 accredited

Dr. Tetsuya Mizutani

Leader of Management Planning Section

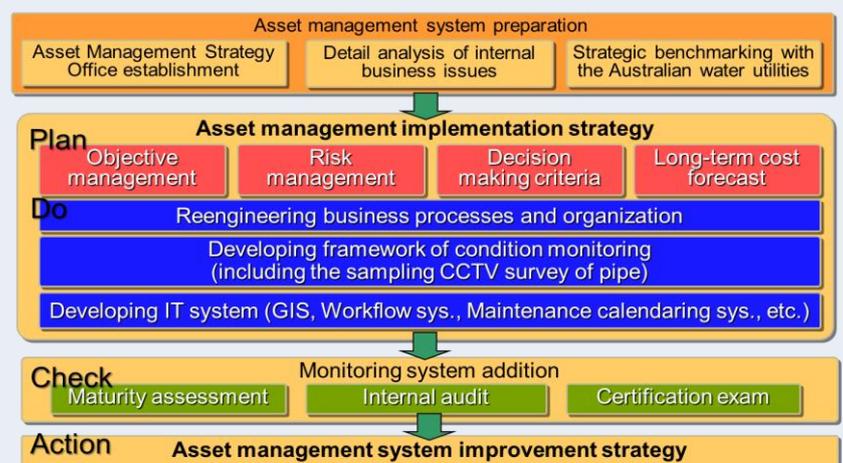
Background and context

Sendai City in Japan provides wastewater and stormwater services to over 1,045,000 people. Its assets include 23 wastewater treatment plants (with a capacity of 424,000m³/day), 319 pumping stations, 4,655 km of sewer and 1,322 domestic water treatment tanks.

Key business drivers for seeking ISO 55001 accreditation:

- Capital expenditure reduction and aging infrastructure
- Improvement to balance the economic, social and environment outcomes
- Staff skills, knowledge and experience retention.

In 2009, The asset management implementation strategy of Sendai Wastewater Utility was developed based on the outcomes from participating in the 2008 'Aquamark' benchmarking program. The contents of the strategy are shown in the figure below. The strategy included business process reengineering and information technology system development to improve our data management processes. This approach contributed to the successful implementation of goal setting, risk management processes, and formulating the asset management plan and decision-criteria. Despite the interruption by the Great East Japan Earthquake, the utility has operated its asset management system since 2013.



'Plan, Do, Check, Act' management cycle of Sendai Wastewater Utility's Asset Management System

Dr. Tetsuya Mizutani,
Manager of
Business Strategy
Office, Sendai
Wastewater Utility

Description of Leading Practice

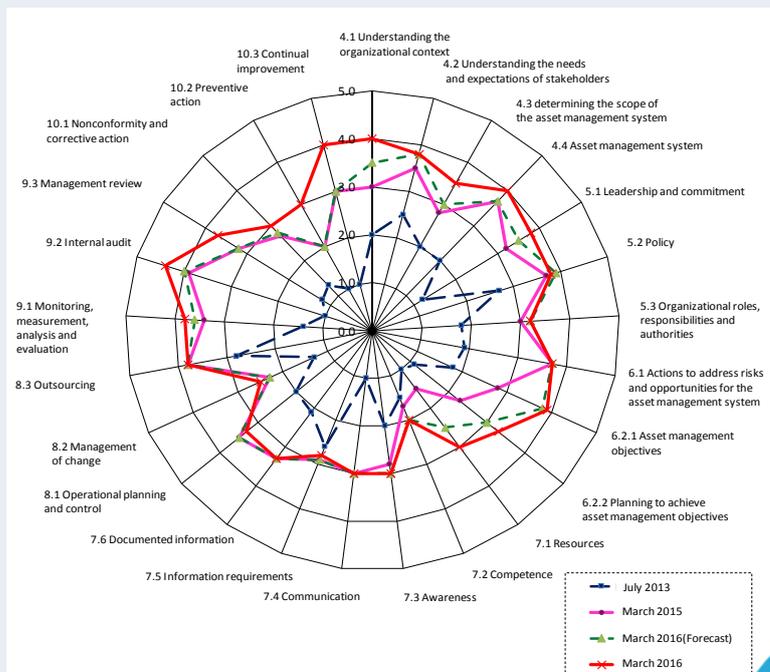
The importance of a system to monitor and improve the asset management system relates to ensuring:

- Validation of the effectiveness of the asset management system
- Conformity of the asset management system activities against stated activities
- Evaluation of the asset management system so as to continue to improve it.

Sendai City developed an internal audit program and series of maturity assessment tools based on the information of ISO/FDIS55001, PAS55 and ISO19011(standards for auditing management systems).

At the same time, the Sewerage Department of the Ministry of Land, Infrastructure, Transport and Tourism formed a committee to draft the ISO55001 application guidelines. The committee chose Sendai City utility to execute the guidelines and sit for certification on a trial basis.

Sendai's asset management system was certified at March of 2014 – a first in Japan. The audit program and certification have contributed to improving business processes, risk management framework and deliverance, and decision making process. Through Sendai City's commitment to developing and executing an enterprise-wide asset management system, the maturity level was improved in all areas as shown in the maturity assessment figure below.



Maturity levels of Sendai Wastewater Utility's AMS

“Applying ‘Internal audit’, ‘ISO55001 certification’ & ‘maturity assessment’ activities in combination enhanced our asset management outcomes”

In particular, our ‘monitoring’ and ‘continual improvement’ activities brought great progress. In addition, ‘role and responsibility’ allocation, ‘communication’ and ‘documented information’ improved as evidenced by maturity assessments and internal audits. Below we summarise benefits and weaknesses of the various approaches we took to improve asset management:

	Benefit	Strength	Weakness
Internal audit	<ul style="list-style-type: none"> Reinforcing ‘plan, do, check, act’ cycles in the utility Facilitating communications between field operators and top management Improving business using auditor advice Improving the asset management system because the auditors acted like core staff 	<ul style="list-style-type: none"> Periodic assessment Improving auditor’s knowledge Easy to agree the nonconformities through the dialogues between auditors and examinees Setting an audit theme timely and appropriately 	<ul style="list-style-type: none"> Difficulty for auditors to ask severe questions in conventional work environments Sampling survey in a limited time Qualitative evaluation Uneven auditor skills
ISO55001 certification	<ul style="list-style-type: none"> Grasping improvement points beyond common senses Facilitating examinees’ understanding of the asset management system through their explanations to assessors Promoting corrective actions found in the audit 	<ul style="list-style-type: none"> Certification based on an international standard Highly objective assessment Challenge examinees with external views Incentive for internal business processes such as an internal audit 	<ul style="list-style-type: none"> Sampling survey in a limited time Checkpoints do not affect the highest level management of specific sectors Difficult to get support to improve businesses because consultation is prohibited in certification
Maturity assessment	<ul style="list-style-type: none"> Recording the situation more accurately and quantitatively Grasping points to improve by quantitative and visualized evaluation Comparing the asset management system with other utilities if assessment criteria are shared 	<ul style="list-style-type: none"> Quantitative evaluation Comprehensive assessment by checking all requirements Indirect assessment without interviews based on the results of other audits and meetings 	<ul style="list-style-type: none"> Insufficient objectivity if evaluated by few staff members Difficult to improve issues when assessment conducted without examinee consultation

The above monitoring system made a difference for our business and other industries as follows:

- Enthusiastic internal audit assessors find improvement points effectively and communicate asset management concepts concisely.
- Internal audit training and preparation for ISO55001 certification brings greater asset management awareness.
- The ISO55001 certification enhances Sendai City’s reputation and credibility.
- Sendai City’s results of trial certification were summarized as part of a new ‘ISO 55001 user’s guide’ for Japanese utility and service providers. It is used not only by wastewater utilities but for dams, canals, roads, and electricity assets.

Implementation Issues and Lessons Learnt

- Grasp asset management system implementation levels and improvement opportunities through maturity assessment.
- Internal audit focusing effectiveness of asset management system.
- Summarize outcomes from your asset management system development and accreditation into user guides for others to benefit from.

Key Outcomes / Benefits

- Finding improvement opportunities in Sendai City's asset management system and acquired ISO55001 certification.
- Formulating asset management system improvement strategy.
- Cooperative and cross-divisional approach to identify improvements in each section.
- Formulating an ISO55001 application "user's guide" for sewerage works and other facilities.

Remaining Challenges

- Avoid overlaps of internal audit and certification exams – seek new insights from all maturity assessments.
- Improvement of asset management system through implementing the strategy such as reinforcing risk management framework, optimizing maintenance and rehabilitation strategy, improving business processes ,etc.
- Service level improvement from asset management system such as reducing failures and long term rehabilitation cost.

WaterNSW

Achieving certification to ISO 55001

John Shaw

Asset Management System Specialist

Background and context

WaterNSW manages and operates a portfolio of Bulk Water Infrastructure that spans the state of New South Wales. We are the largest Dam Owner in Australia, with 42 'prescribed' dams, 300+ downstream weirs/ regulators. WaterNSW captures, stores and releases bulk water for irrigation and drinking water use

The key business drivers for WaterNSW are:

- Customer levels of service,
 - Water quality and
 - Regulatory compliance.
-
- NSW Government Water Reform Program – Creation of Water NSW (January 2015)
 - Both previous legacy organisations (Sydney Catchment Authority and State Water Corporation) previously working towards Certification.
 - Certification in Asset Management to ISO55001 by December 2016 was included in WaterNSW operating licence by its regulator.

John Shaw
Asset Management
System Specialist
WaterNSW

Description of Leading Practice

Achieving Certification to ISO55001 - this has enabled WaterNSW to develop and progress in the following:

- Define and consolidate systems of work
- Certification is a milestone not a destination
- AMS @ Dec 2016 = baseline for improvement/evolution

Challenges in reaching certification included:

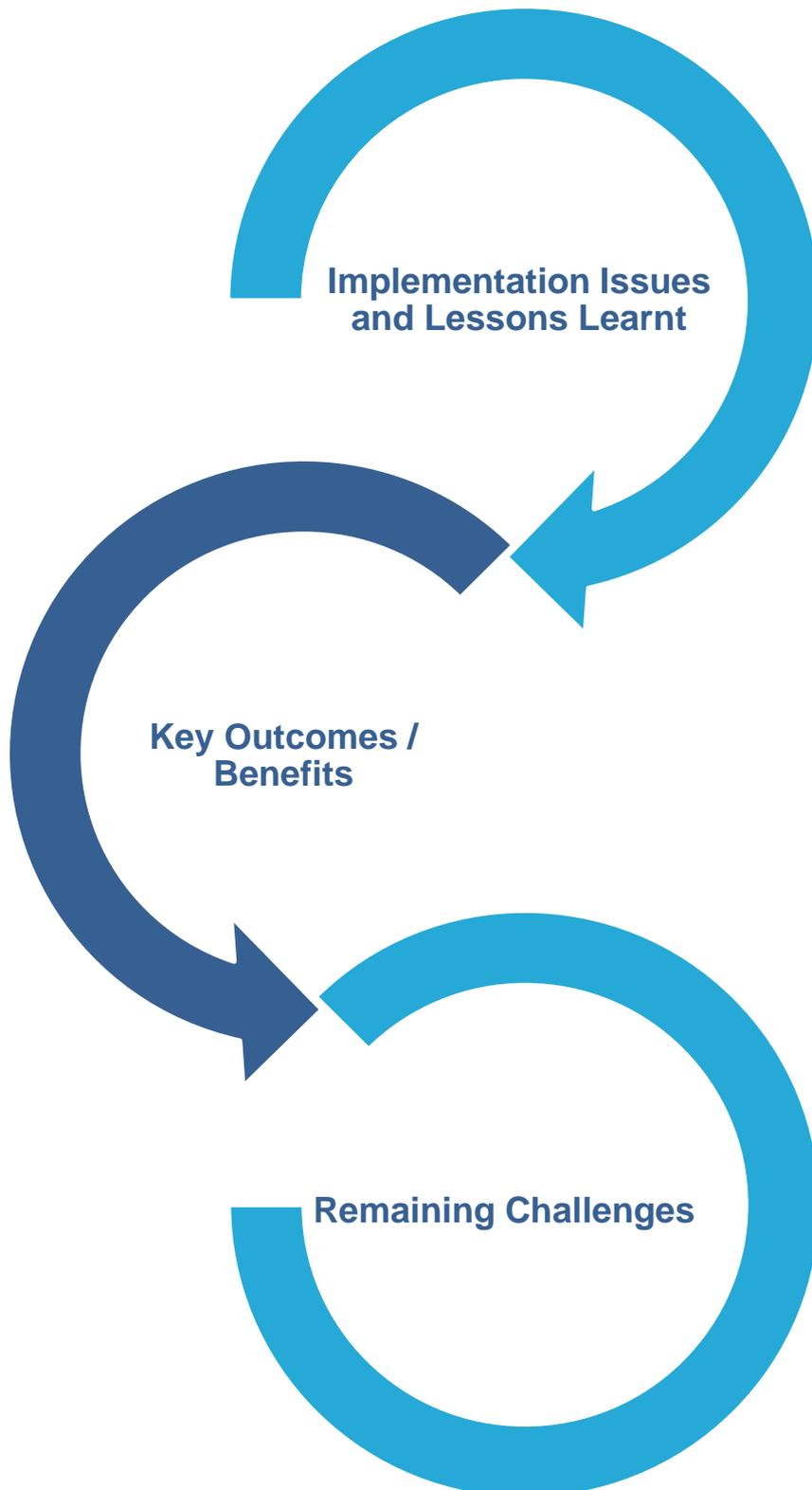
- Extremely tight timeframe
- Business re-engineering
- merging of disparate systems, cultures, processes
- Geographic spread of operations across NSW
- Multitude of competing projects

Certification will provide:

- Functional consistency across business processes
- A continuous improvement platform
- Potential to lessen audit burden



*“Aim for competence
not Rolls Royce “*



- Establish realistic timeframes
- Additional resources
- Communicate expectations earlier
- Geographic spread of assets across NSW

- Business processes developed across several standards
- Building team knowledge
- Processes developed around business requirements
- Ownership of processes

- Continual improvement of processes across geographically dispersed asset base
- Further mergers that potentially change asset base
- Complacency after certification

ActewAGL

Advanced in seeking ISO 55001 accreditation

Mike Schulzer
Principal Engineer,
Asset Management Systems

Background and context

ActewAGL provides electricity and gas services over an area of 2,358 square kilometres to 186,378 electricity and 145,532 gas customers, within the Australian Capital Territory (ACT). Our network consists of an interconnected 132 kV transmission network supplying eleven 132/11 kV zone substations, one 132/11 kV mobile substation, and two 132 kV switching stations, and a single 66/11 kV zone substation. All 132 kV and 66 kV connections have N-1 transmission security. There are three bulk supply points supplying the ActewAGL network which are owned and operated by TransGrid Limited.

ActewAGL is responsible for the operation, maintenance, planning and augmentation of the transmission and distribution system within the ACT.

Key business drivers:

Maintaining infrastructure/physical asset resilience, security based on understanding asset criticality; Promoting a safety culture; Evolving a risk management approach and policy; Regulatory compliance; Succession planning and training; and IT and cyber-systems resilience and security.

Factors which impacted on ActewAGL, automating the process of building asset specific plans

In the past, plans were created by raising or lowering budgeted expenditures on asset management activities in the previous plan. This practice was recognised as an insufficient way to provide the details necessary for a transparent and fully justified maintenance and capital expenditure budget. The process of building asset specific plans from a zero base forces every item of expenditure to be carefully considered, transparent and in context with the whole of the asset life and network.

The absence of the appropriate supporting computer applications and the building and rebuilding of these asset specific plans would be an onerous task by itself. However, the combination of an application that automatically compiles the plan text and has the capability of generating activities from a coded strategy, makes it possible to generate updated asset specific plans on demand, with minimum effort.

Mike Schulzer
Principal Engineer
Asset
Management
Systems
ActewAGL
Distribution

Achieving ISO 55001 compliance

1. Achieving ISO 55001 compliance

- The implementation of the ISO 55001 involved the development of ActewAGL's previous Asset Management Systems (AMS) into a single aligned system, compliant with ISO 55001.
- Some of the desirable aspects of the developed AMS are the ability to implement the organisational objectives with respect to its assets, an assurance that these objectives are being implemented and sufficient development/improvement of the AMS to ensure the business remains competitive and sustainable.
- The changes were achieved by planning, documenting and implementing a series of changes, over time and to ensure the business continued to function during these improvements.

2. ISO 55001 compliance is able to:

- Design and document system architecture – AM framework, policy, strategy, objectives, plans, configuration and governance, communications strategy, and support systems.
- Implement Asset Management Information Systems – Geographical Asset database, Works management application, Operations management application, AM Planning, Support Systems.
- Complete regular assessments of AM System, IAM Self-Assessment, Internal Audit, AMCV benchmarking.
- Implement changes opportunistically.

3. ISO 55001 compliance successfully:

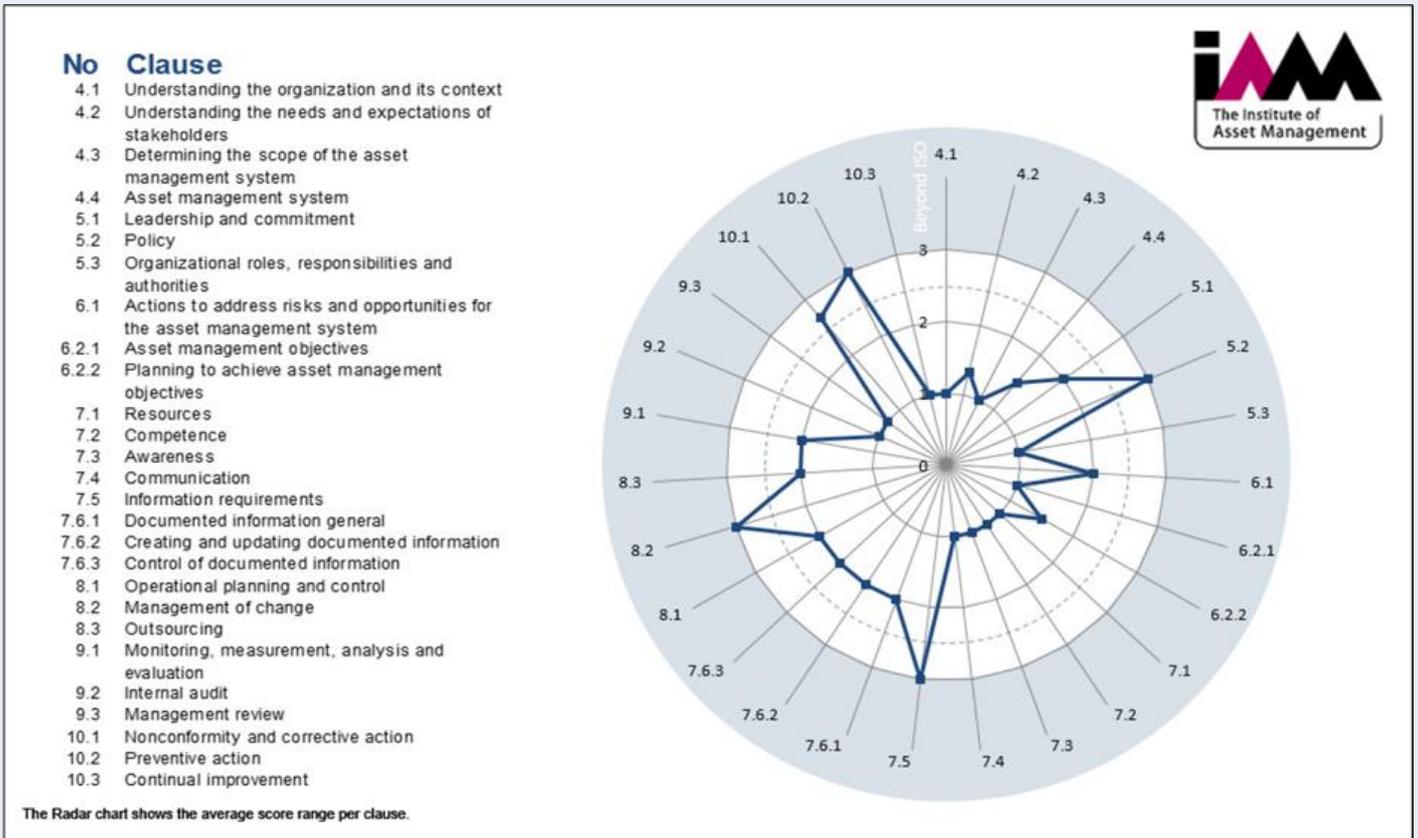
- Facilitates effective management of the asset life cycle – by detailed planning of all the life cycle stages.
- Confidently provides sustained performance at the lowest life cycle cost – the AM system facilitates whole of life cost benchmarking.
- Predicts future cash flows– the AM system facilitates whole of budgeting.
- Makes better investment decisions – by selecting optimum time to replace assets.

In addition, top management has confidence in using the asset management system to achieve corporate objectives.

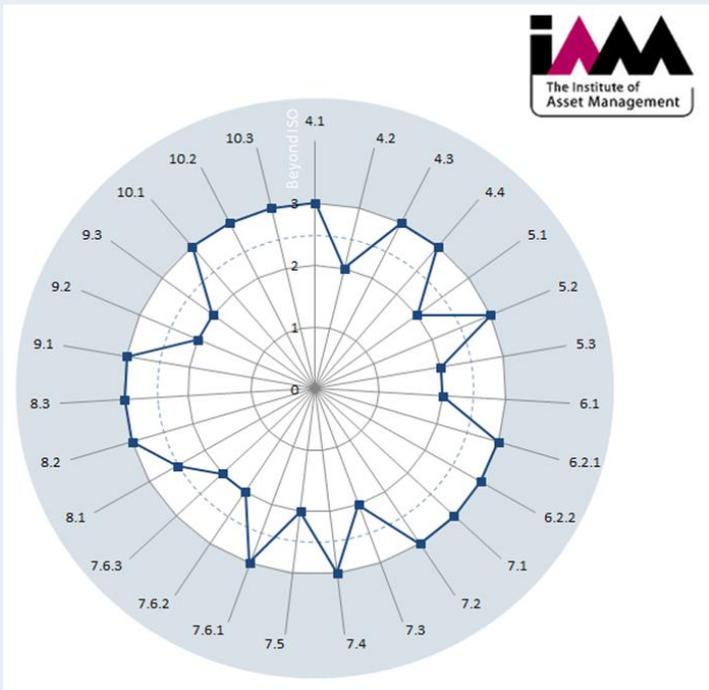
4. The following page contains spider diagrams of the state of ActewAGL's Asset Management System in 2014, 2015 and 2016. The scoring system used was developed by UK based IAM.

“Using the asset management system to achieve corporate objectives”

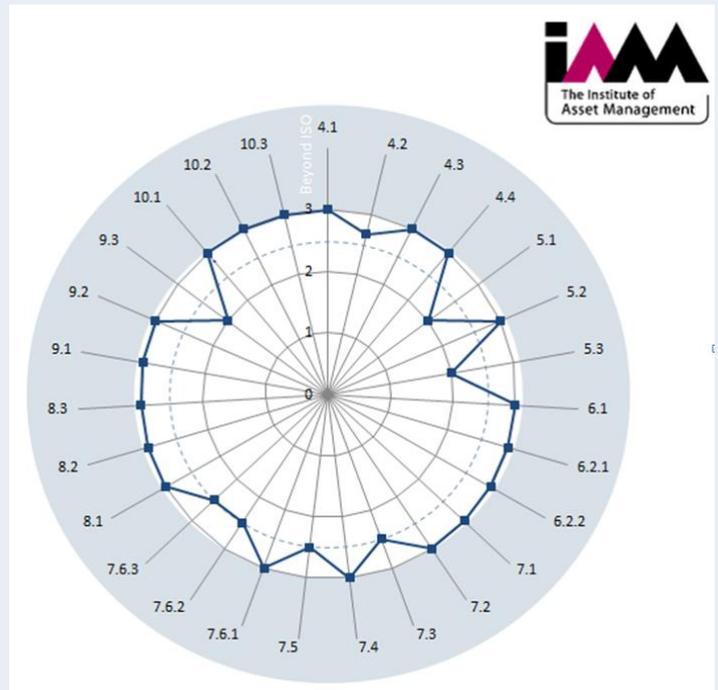
AMCL Assessment October 2014

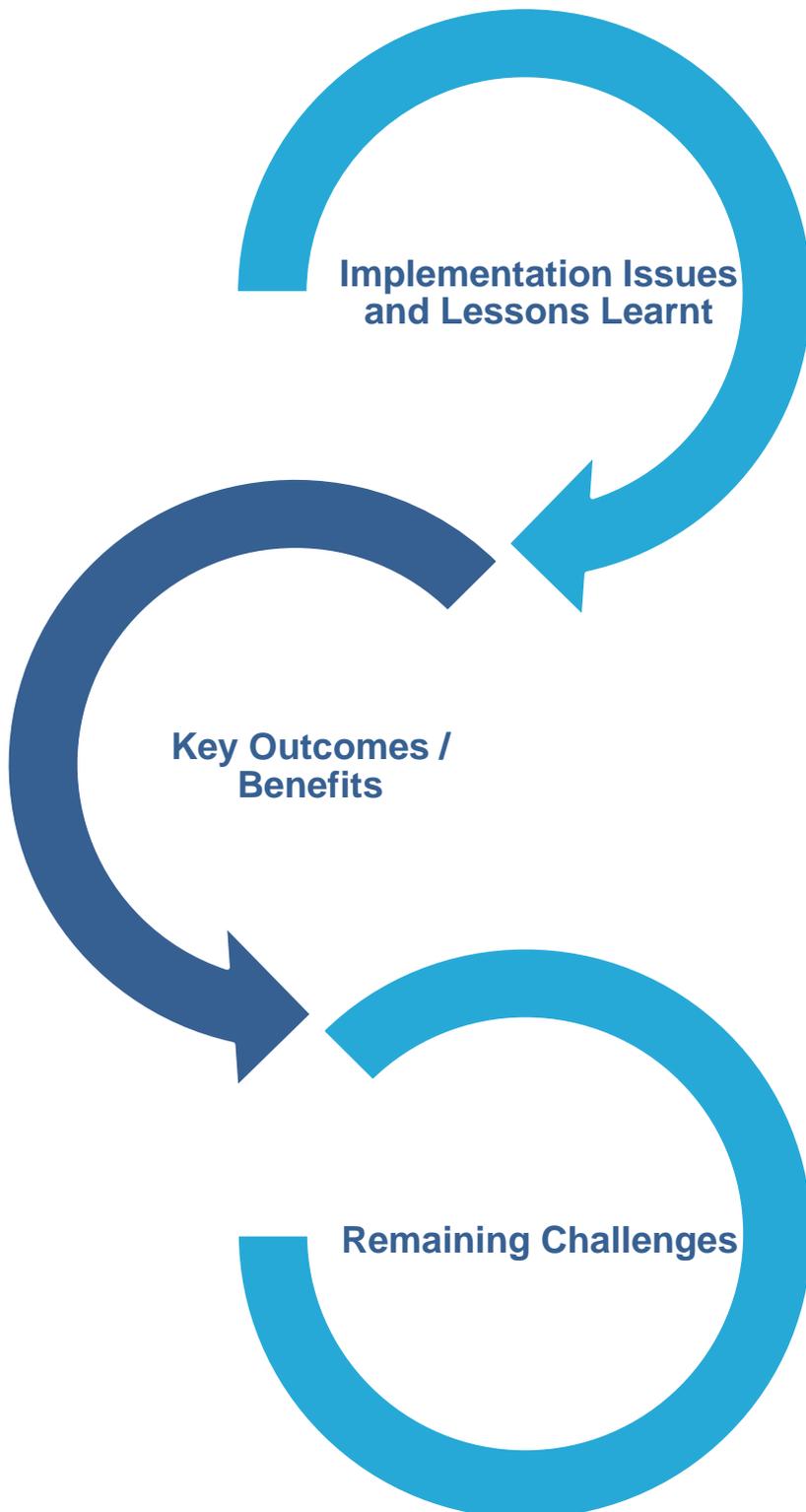


Self-Assessment October 2015



Self-Assessment October 2016





- Begin by mapping existing asset management functions against ISO 55001 requirements.
- Extend Asset Management Awareness further into non-technical areas.
- Introduce AM training earlier.
- Effectively manage the asset life cycle – asset creation, utilization, maintenance and disposal.
- Confidently provides sustained performance at the lowest life cycle cost.
- Predict future cash flows.
- Makes better investment decisions.
- Awareness – this improved within engineering-technical areas, but awareness still needs to be raised to help inform executives and field and workshop staff.
- Information requirements – Further improvement will occur as the Asset Information Systems mature and the mobility project facilitates high quality data entry from the field.
- Documentation creation and control – This has improved through the implementation of the AIMS project, and will continue to mature through familiarity and use.
- Management Review – a review of asset management issues should be coordinated with the Asset Management Committee.

Program Planning, Policy and Processes

City West Water: Human resources

Yarra Valley Water: Improving integration and commissioning of new assets

Seqwater: Program delivery project manager induction

Toowoomba Regional Council: Succession planning policy and processes

City West Water

Human resources

Shaun Begley
Asset Analytics Manager

Background and context

City West Water is a Melbourne based Retail Water Company serving approximately 900,000 customers with water, sewer and alternative water services. Its asset base is comprised of 4,700 km water main & 4,500 km sewer main.

Key business drivers

- Continuously improve our efficiency to deliver price benefits to customers; and
- Maintain levels of service at lower cost and manage the long term performance of our assets.

City West Water recently reviewed the employee performance review and feedback process with the aim to enhance the process, ensure greater collaboration and be more timely. It was felt that the historic, annual review did not cater for the needs and that a shorter review cycle was more appropriate. A team of staff and HR experts established a Monthly Conversation process which is now driven by the employees in conjunction with their manager. The Monthly Conversations are supported by a platform for employees and managers to discuss individual, team and business performance on a monthly basis and provide feedback against agreed objectives, values and areas of focus for development regularly throughout the financial year. The solution platform and approach has been in effect for one complete financial year and has recently undergone some adjustments as a result of learnings from the first year of use.



Shaun Begley,
Asset Analytics
Manager,
City West Water

Description of Leading Practice

1. Monthly conversations are held with staff, to manage personal objectives which are structured to align to the corporate objectives. The process is managed off of a simple worksheet.
2. Reviews are now performed monthly instead of annually, so faster feedback and control process where appropriate. The process incorporates a section that is used to manage the individual's Development Plan, this gets reviewed monthly as well.
3. Action is taken immediately instead of waiting for the annual review process, where discussion may no longer be relevant or situation difficult to recall. Monthly review of the goals and objectives assist in making small changes as necessary, ultimately ensuring that objectives are achieved. The process is driven by the employee, not management driven.



“Driving engagement and consistent review of employee engagement in a timely manner”



Monthly Conversation

Our Values >

Shaun Begley, please complete steps 1 to 5 before you meet with your manager

Step 1 *Import objectives from last review by clicking here >*

Step 2 *Update status of objectives in readiness for your conversation*

My Objective & Any Major Milestones	Progress	Comments	Support required
What is being delivered?	My individual objectives	Commentary to support your progress to date	Do you need any help?
	Please Select		

Step 3 *This conversation contained a meaningful discussion on safety matters in relation to the individual, role and team:* Please Select
 Meaningful discussion on safety matters included:

Step 4 *Provide examples of values demonstration (Review values by clicking the 'Our Values' speech bubble above)*

Step 5 *Review IDP & update as required (click IDP tab)*

Shaun Begley & Svetla Petkova complete Step 6 to 8 during the conversation

Step 6 *This conversation took place on:*

Step 7 *Shaun Begley has continued to display satisfactory performance in the role (manager to select from drop down list >)* Please Select

Step 8 *Other items discussed and agreed*

Comments	
Manager	Employee
<input type="text"/>	<input type="text"/>

Thank you for participating in the City West Water Monthly Conversations Program. Please ensure you save & check in the file.

Please ensure Steps 6 & 7 are completed to populate the data below

<i>Employee start date</i>	1/09/2014
<i>Length of service (months)</i>	Unable to calculate until the date is entered in Step 6
<i>If employee is on probation, information will appear here :</i>	
<i>Years of service to date is >></i>	Unable to calculate until the date is entered in Step 6



- Monthly is too frequent.
- Should not be seen as a “to-do list” for employees.
- Need a measure to be sure conversations are happening.

- Alignment to corporate objectives.
- Faster feedback.
- Deal with performance issues faster.
- Buy-in from staff.

- Use smarter technology.
- Change the cycle.
- Ensure objectives are easily translated to each layer of the organisation.

Yarra Valley Water

Improving integration and commissioning of new assets

James Goode
Integration Team

Background and context

Yarra Valley Water is located in Melbourne, Australia and is Melbourne's largest retail water utility. Our service area covers most of Melbourne's northern and eastern suburbs, across approximately 4,000 square kilometers. Yarra Valley Water provides water and sanitation services to more than 1.8 million people.

Yarra Valley Water's business drivers are:

- *The Way We Work Enables Extraordinary Performance,*
- *We Work In Harmony With The Environment,*
- *We Stand for an Exceptional Water Industry,*
- *We Provide Exemplary Services,*
- *We Are Safe, and*
- *We Make Every Cent Count.*

Why did YVW's asset integration and commissioning require improvement?

1. Operational input only at start & end of project.
2. Project manager not able to get advice from Operations or received inconsistent advice.
3. Late changes and reworks requested by Operations.
4. Prolonged commissioning & handover times.
5. Substantially increased capital works program.

James Goode,
Integration Team,
Yarra Valley Water

Description of Leading Practice

YVW established the Integration team to improve operational input into design and construction as well as improving commissioning and handover of new assets. Figure 1 below shows the parts of the capital delivery process that involve the Integration team.

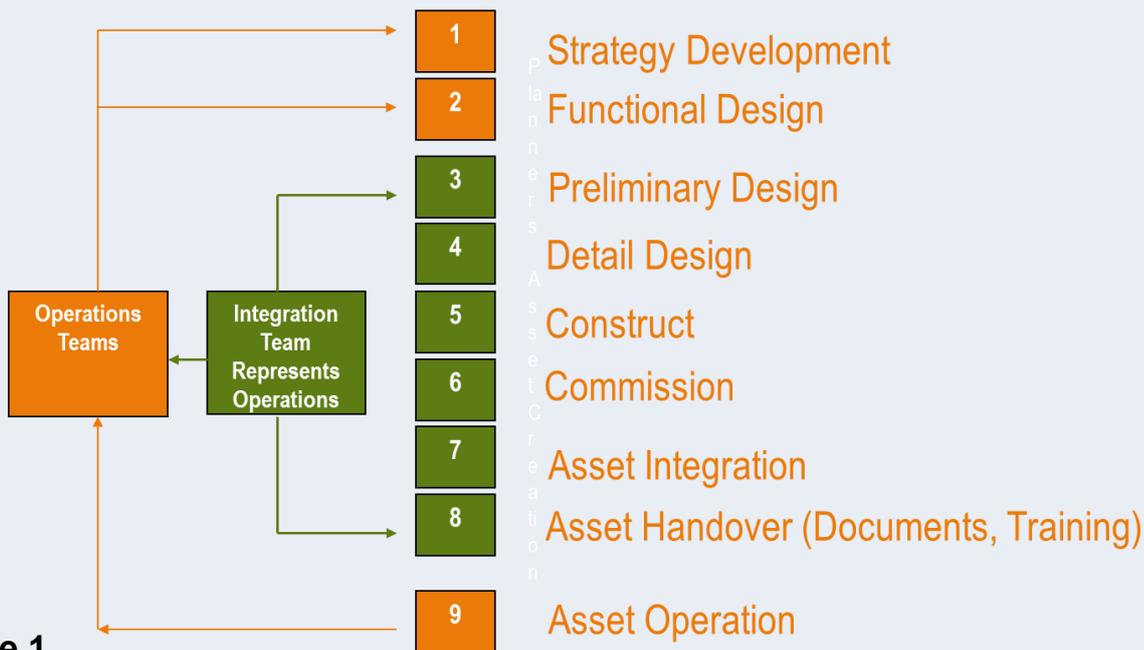


Figure 1

The key aim is to provide an operable asset. See Figure 2.

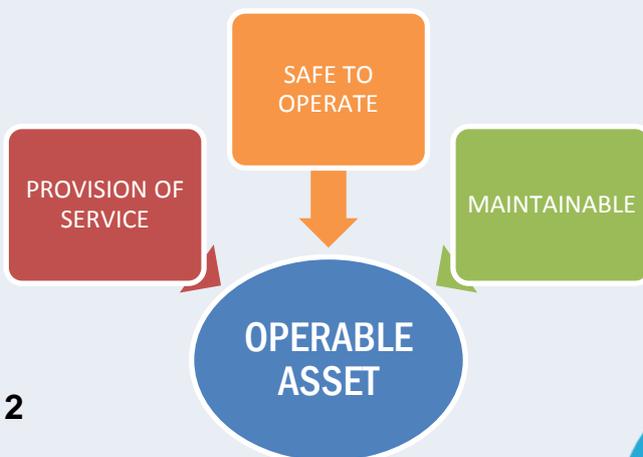


Figure 2

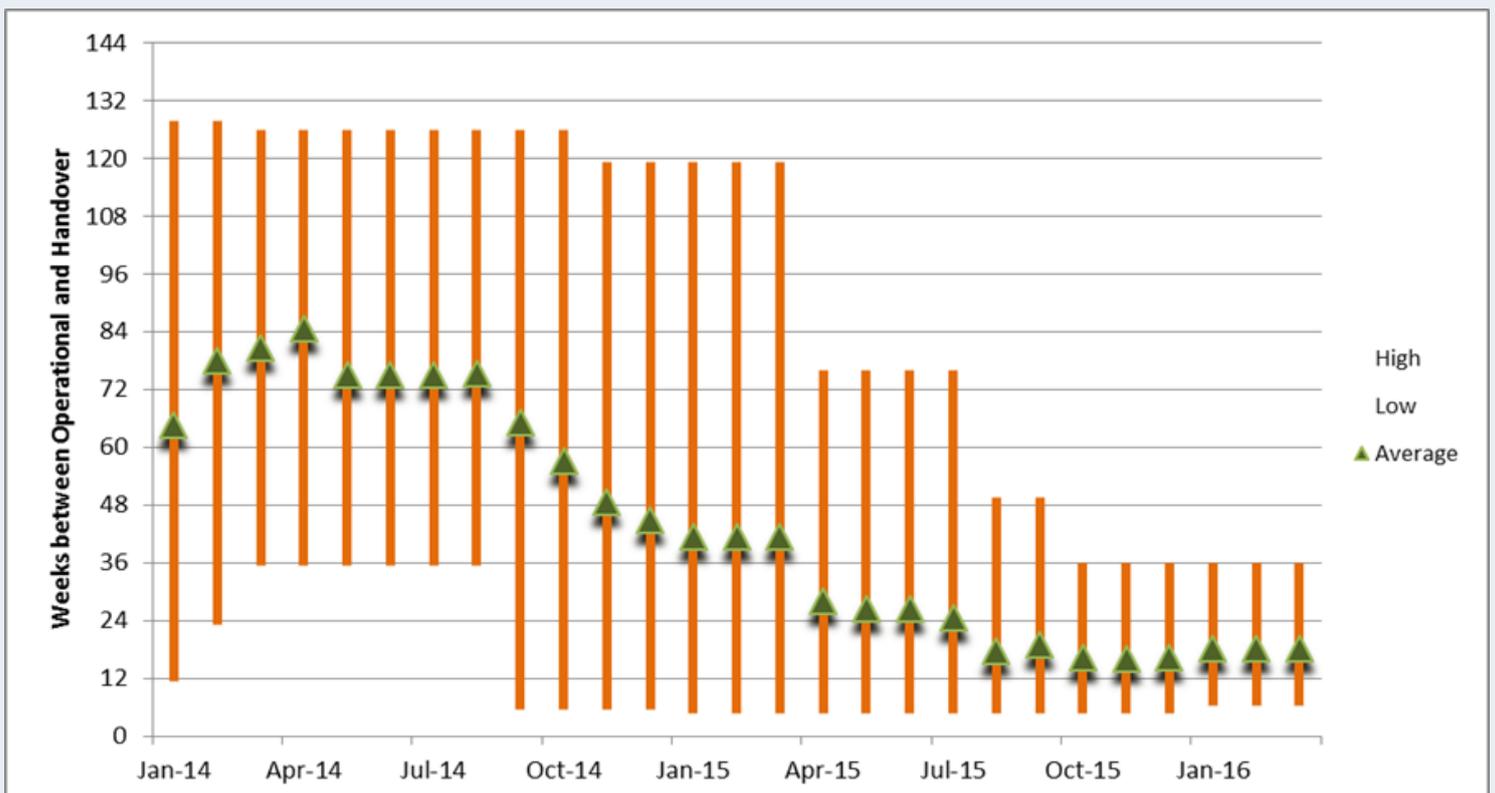
Delivering best practice in Design, Construction and Integration of new assets

The key steps to improving commissioning and handover are:

1. Project team: Operator/Planner/Project Manager
2. Simple asset function statement
3. Process to assess and approve risk of deviations from standards
4. Commissioning (handover) checklists completed prior to tender.
5. Documentation
6. Active measurement and categorisation of defects

The major improvements YVW has seen are:

- Shorter handover period
- Better assets
- Fewer defects





- Importance of resources with Operational experience.
- Clear definition of team role.
- Maintain Operations focus. This is where the value is added.

- Reduced handover period.
- Reduced defects.
- Better working relationships.
- Operational resources focus on Operations.

- Digital workflows.
- Consistency.
- Appropriate communication.

Seqwater

Program delivery project manager induction

Kathryn Lonergan
Principal Program Support & Controls

Background and context

Seqwater is responsible for ensuring a safe, secure and reliable water supply for more than three million people across South East Queensland. It manages more than \$11 billion of water supply assets including dams, weirs, water treatment plants and more than 600-kilometres of pipeline network.

The Program Delivery Project Manager Induction was developed to provide guidance to a Program Delivery team of 45+ Project Managers, delivering the annual Capital Infrastructure Program (400+ projects, worth between \$95 million – \$100 million).

Key Business Drivers - Consistency, governance, compliance, quality and obtaining best value in project management and delivery.

Seqwater was formed on 1 January 2013 through a merger of three state-owned water businesses - the SEQ Water Grid Manager, LinkWater and the former Seqwater. The businesses merged under an interim day one structure and six months later evolved into a day two structure. The merger brought together three businesses with very different operating systems, procedures, processes and cultures. The Project Manager Induction was developed to provide the project team with guidance on the way projects were to be delivered in the new Seqwater.



Kathryn Lonergan,
Principal Program
Support & Controls,
Seqwater

Description of Leading Practice

The Project Manager Induction is a readily accessible intranet site that provides a reference point for all processes and documents, including procedures, templates and forms, a Project Manager may require to perform their function efficiently.

Reporting tools have been developed within the induction framework to track procurement activities, contract administration and key project metrics including safety and financial performance. The intranet site is used to support face to face inductions which are conducted in two parts.

Part 1 - Week 1

One on one sessions with the Program Support and Controls team are conducted before access is given to corporate systems.

- Project Support covers project management templates, project management plans, scope of works, risk assessments and provide guidance on procurement and contract administration processes, use of the Procurement Decision Matrix, RFQs & RFOs, variations, purchase orders, payment claims, invoice processing, EOs, PC certificates.
- Program Controls introduce the new starter to Daptiv, the Portfolio Management system used by Seqwater. The training incorporates an overview of managing projects in Daptiv, including key milestones, forecasting, budget and financial management including cost plan templates, monthly accruals and reporting, and scope and budget change management procedures.
- Digital Records provide an overview of the corporate records management system (TRIM), project record keeping, project audits and project close outs.



“Accessibility,
Consistency,
Compliance & Quality”

Part 2 - Completed within the first month of employment.

- When a new project manager starts, key internal stakeholders including Work Health and Safety, Environment, Water Quality, Project Communications, Strategy and Risk, Legal, Commercial Services and Engineering & Technical Support are notified, and one on one inductions are scheduled with each of these teams. They take the new starter through their section of the induction and provide guidance on where the touch points with their teams will occur during the project lifecycle. This ensures that the project manager understands how and when they will interact with other teams.
- The original project manager induction was developed as a simple spread sheet with links to key documents and templates, with training delivered by Project Support. It has now evolved to a point where our internal project stakeholders are a key part of the induction process.
- Feedback has been extremely positive with all teams reporting that the face to face induction process has significantly improved communication and engagement between project managers and internal stakeholders.
- Completion of the Project Manager Induction is mandatory. The intranet version went live in July 2015 with 100% of Program Delivery Project Managers inducted using the intranet site.
- In the workplace, finding information in corporate systems is often time consuming and difficult. The PM induction bridges the gap between the 2016 personal device information finding ability (smart phone/Google) that we are all used to, and the multi-platform, multi system complicated and frustrating information finding capabilities of modern corporate environments. Simple, easy to access information equals user acceptance, consistency and compliance.



- Ensure that internal stakeholders are engaged in the induction process.
- Conduct regular refresher training for Project Managers.
- Improved communication and engagement between internal stakeholders and the project team.
- Improved compliance with internal governance processes and the ability to demonstrate documented processes to internal and external auditors.
- Consistent approach to how we do business.
- Positive feedback from project managers on how we can further improve the site and provide support to them.
- Transition to a new intranet platform.
- Building automated workflows to support the project processes.
- Ensuring that the purpose of the induction site remains project focused and is a project manager's go-to site for project related procedures, processes and templates.

Toowoomba Regional Council

Succession planning policy and processes

Bianca Rice
Coordinator Organisational Development

Background and context

Toowoomba Regional Council consists of 1805 full time permanent staff and spans the geographical region of 12,973 km².

The Key Business Drivers were:

- ✓ An ageing workforce population
- ✓ Retention of the knowledge base
- ✓ Skill Shortages in some of the Engineering disciplines
- ✓ The need to build our leadership pipeline

TRC's Generator Program was established in 2009 and continues to be improved aligned to best practice each year. This program consists of 29 positions for undergraduate and graduate students in Engineering, Information Technology and Human Resource roles. The program consists of job rotations, mentoring and a professional development program including support for Chartered Status with Engineers Australia as a pathway for RPEQ for our Graduate Engineers. We have reaped major organisational benefits in terms of an 80% retention rate of our Generators since 2009 into permanent roles.

In 2016, TRC have also introduced a 'Transition to Retirement' Policy, in order to provide a phased pathway to retirement as well as effective knowledge transfer by ensuring the mentoring of new or existing staff as part of the workforce/succession planning strategy for Council. TRC has recognised the possible loss of tacit information held by their long serving staff and as such have developed policy and procedures to ensure up to 12 months of shadowing and mentoring in key roles to ensure continuity of knowledge.



Bianca Rice,
Coordinator
Organisational
Development,
Toowoomba
Regional Council

Description of Leading Practice

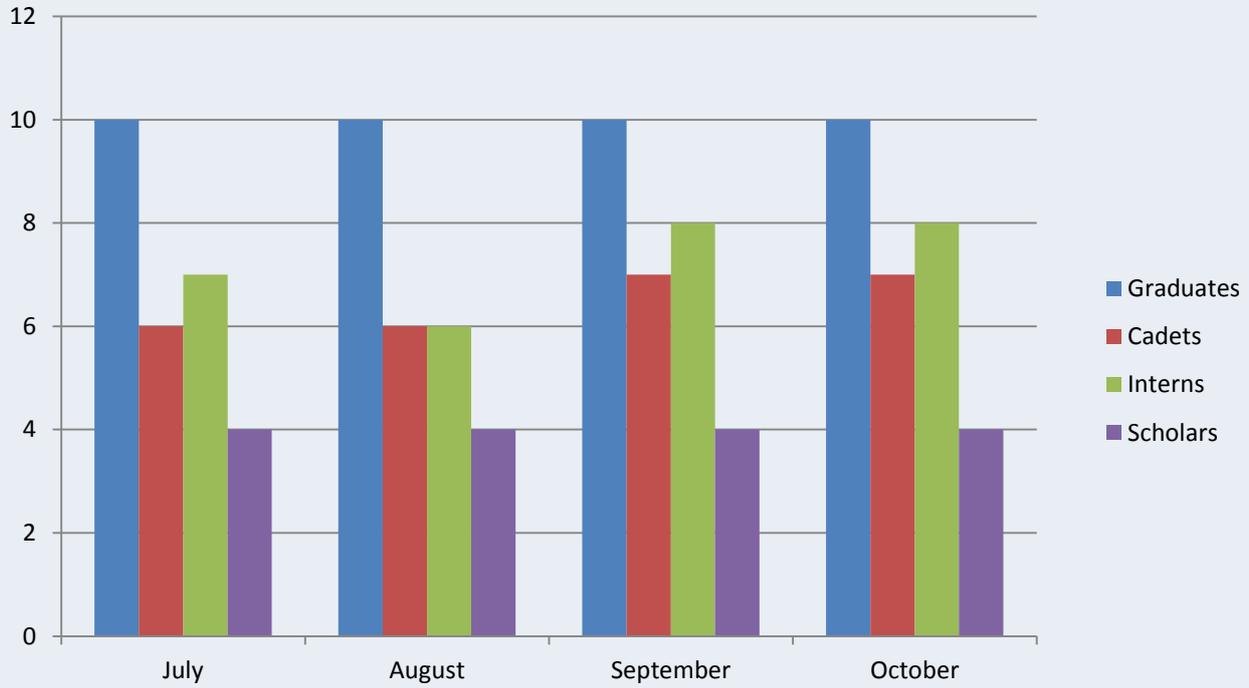
TRC's Succession Planning Policy and Processes include the Generator Program, our formal mentoring program and the Transition to Retirement Policy.

1. The purpose of the *Generator Program* is to build the competence and capability of the professional participants employed under this program enabling pathways for future pathways and as a succession planning initiative for Council. This program has been in place since 2009 and we currently work towards the continuous improvement of this program. 2016 also saw the launch of an organisational wide mentoring program as well as the development of the 'Transition to Retirement' Policy to enable more effective retirement transitions as well as transition and retention of key knowledge and information.
2. The key aspects of this leading practice are:
 - Options are available for staff to have a phased transition to retirement.
 - Mentoring program encouraging transfer of knowledge.
 - Career pathways and capability building programs.
3. This Leading Practice has made a difference in our business in the following ways:
 - Created ways to enable the transfer and retention of key knowledge and information.
 - Increased our talent pool of qualified Engineers and Technical Officers addressing any potential skills shortages.
 - Provided mentoring and shadowing to build capabilities to enable pathways.

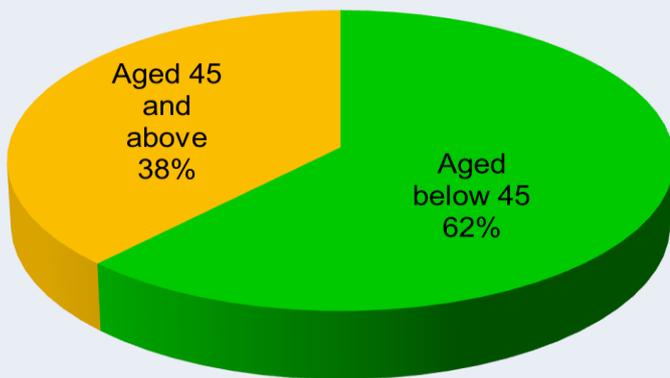


“Experience matters – flexible work practices and mentoring while also enabling pathways for our future generations”

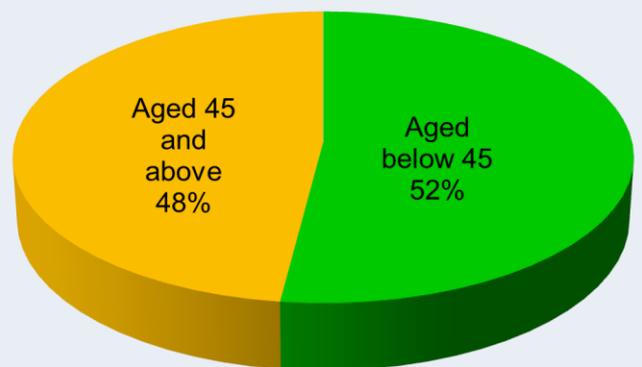
Generator Program 2016/17 (Undergraduate and Graduate Program)

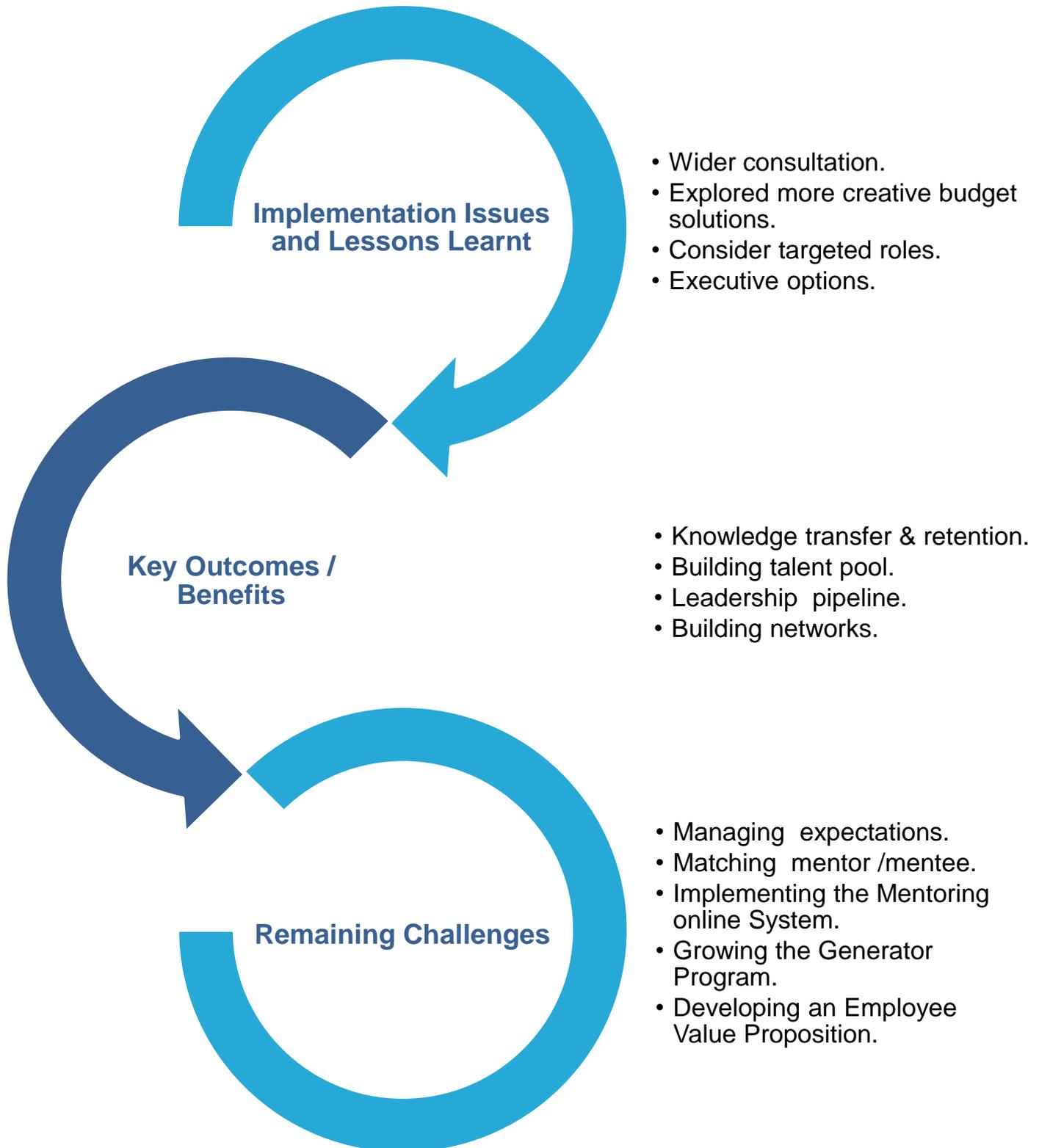


Australia's working age profile



Toowoomba Regional Council's working age profile





Asset Renewal Investment and Accuracy

ActewAGL: Automating asset-specific plans and renewals timing

City West Water: Asset failure forecasting and renewal investment

Melbourne Water: Timing of asset renewal

South West Water: Distribution network renewal and maintenance planning model that uniquely considers all relevant performance measures

ActewAGL

Automating asset-specific plans and renewals timing

Mike Schulzer
Principal Engineer,
Asset Management Systems

Background and context

ActewAGL provides electricity and gas services over an area of 2,358 square kilometres to 186,378 electricity and 145,532 gas customers, within the Australian Capital Territory (ACT). Our network consists of an interconnected 132 kV transmission network supplying eleven 132/11 kV zone substations, one 132/11 kV mobile substation, and two 132 kV switching stations, and a single 66/11 kV zone substation. All 132 kV and 66 kV connections have N-1 transmission security. There are three bulk supply points supplying the ActewAGL network which are owned and operated by TransGrid Limited.

ActewAGL is responsible for the operation, maintenance, planning and augmentation of the transmission and distribution system within the ACT.

Key business drivers:

Maintaining infrastructure/physical asset resilience, security based on understanding asset criticality; Promoting a safety culture; Evolving a risk management approach and policy; Regulatory compliance; Succession planning and training; and IT and cyber-systems resilience and security.

Factors which impacted on ActewAGL, automating the process of building asset specific plans

In the past, plans were created by raising or lowering budgeted expenditures on asset management activities in the previous plan. This practice was recognised as an insufficient way to provide the details necessary for a transparent and fully justified maintenance and capital expenditure budget. The process of building asset specific plans from a zero base forces every item of expenditure to be carefully considered, transparent and in context with the whole of the asset life and network.

The absence of the appropriate supporting computer applications and the building and rebuilding of these asset specific plans would be an onerous task by itself. However, the combination of an application that automatically compiles the plan text and has the capability of generating activities from a coded strategy, makes it possible to generate updated asset specific plans on demand, with minimum effort.



Mike Schulzer
Principal Engineer
Asset Management
Systems
ActewAGL
Distribution

Automating asset-specific plans and renewals timing

1. How it works and how it was achieved

- The application can facilitate text updates and automatic compilation of the description of the management of the asset. The text blocks are in database format which allow for seamless compilation. It is directly connected to the Asset Register and also contains condition information of critical assets. It is also programmed with the management strategy of critical assets.
- The application provides a comprehensive and up-to-date description of the management of the asset, on demand at the push of a button. It will also produce a comprehensive list of planned activities for any asset type, for any period and is useful for producing a program of works.
- The application facilitates better asset management by ensuring the Asset Specific Plans stay aligned with Asset Management policy, strategy and objectives.

2. Key aspects of automating asset-specific plans and renewals timing include:

- Allows for a more efficient use of time. It also reduces the time required for document editing and publishing.
- In addition to generating documents, the application can be used as a working platform.
- The application greatly assists with Asset Management alignment and compliance with ISO 55001.
- Asset Specific Plans are an excellent reference material for regulators and other external stakeholders. These plans detail the strategies for managing assets, and subsequent activities.

3. Automating asset-specific plans and renewals timing has made a difference by:

- Top management has built confidence in using the asset management system to achieve corporate objectives.
- Helping facilitate effective management of the asset life cycle – by detailed planning of all the life cycle stages.
- Confidently providing sustained performance at the lowest life cycle cost – the AM system facilitates whole of life cost benchmarking.
- Predicting future cash flows– the AM system facilitates whole of budgeting.
- Assisting in making better investment decisions – by selecting optimum time to replace assets.

4. The following page contains an extract from an Asset Specific Plan.

“OH Lines and Pole Hardware.”

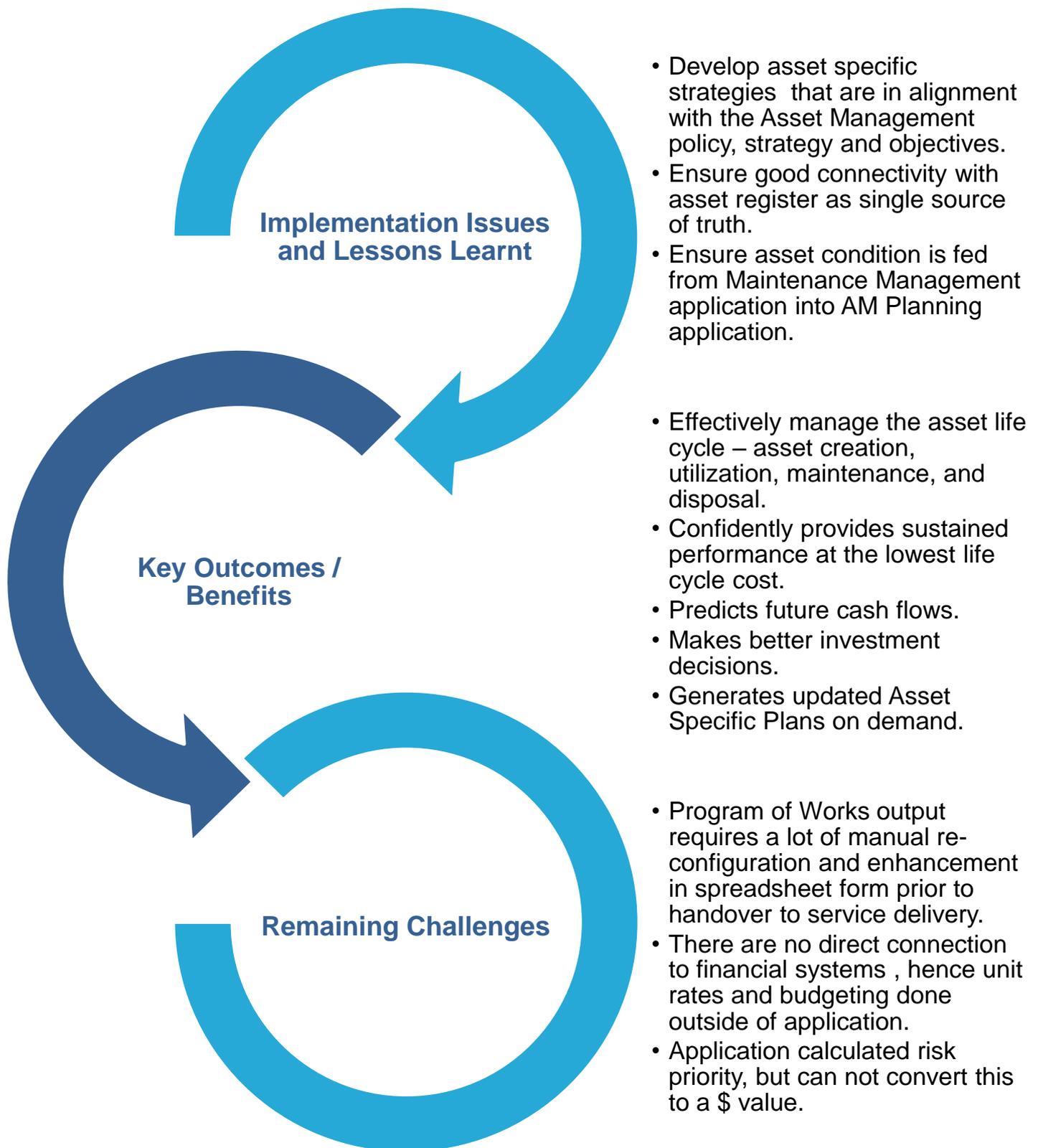
“Facilitates better asset management by ensuring the Asset Specific Plans stay aligned with Asset Management policy, strategy and objectives”

Failure Modes

These are the failure modes associated with each of the asset types.

OH Lines

FAILURE MODES						
TYPE	DESCRIPTION	OCCURRENCE	SEVERITY	DETECTION	RPN	UNIT COST
Physical Mortality	Asset deterioration	Inevitable Failures	Very High	Almost Certain	200	
Bush Fire	Bush fire destroying supports and lines	Relatively Few Failures	Very High	Almost Certain	50	
Aeolian Vibration	The aeolian vibration on long span, high tension and aluminium conductors causing fatigue breakage of conductor strands, or severe abrasion, and/or loosen other hardware. Consequence is a line down which poses a risk to public safety, employee safety, start bushfire and a loss of supply.	Relatively Few Failures	Moderate	Likely	37.5	
Sway oscillation	Conductor motion caused by gust which leads the conductor to sway in horizontal plane and causes conductor abrasion and potential conductor clashing.	Relatively Few Failures	Moderate	Almost Certain	25	
Thermal overload	Thermal overload of conductor causing the conductor to sag more than the clearance requirements. Low clearance poses a risk to public safety, employee safety and can start fires.	Relatively Few Failures	Moderate	Almost Certain	25	
Galloping	Galloping is conductor motion in vertical plane which usually occurs with ice formation on conductor. Results in breaking crossarms, toppling poles or structures, conductor clashes, or conductor failure. Probability of galloping is very low because ice is unlikely to form in ACT.	No Known Occurrences	Moderate	Almost Certain	10	



City West Water

Asset failure forecasting and renewal investment

Max Anderson
Asset Strategy Manager

Background and context

City West Water is a Melbourne based Retail Water Company, serving approximately 9000,000 customers. It provides water, sewer and alternative water services across 4,700 km of water main and 4,500 km of sewer main.

Key business drivers

- Continuously improve our efficiency to deliver price benefits to customers; and
- Maintain levels of service at lower cost and manage the long term performance of our assets.

City West Water is currently preparing for our 2017 Pricing Submission to the Essential Services Commission (our Regulator). As part of this work we need to demonstrate that the required level of asset preventative maintenance and renewal funding is appropriate to achieve the levels of service agreed with our customers and that there is not an excessive level of funding which would lead to unnecessary higher prices for our customers. With the regulator requiring price increases to be kept to a minimum in line with our customer's expectations we need to clearly communicate and demonstrate that the budgets being requested for the above works are necessary. CWW has developed a forecasting model which estimates future asset performance and the resultant responsive maintenance cost based on the analysis of historical data and the application of various scenarios of preventative maintenance and renewal investment. It has been applied to all water and sewer network asset classes comprising the pipelines, the property service connections, valves, hydrants, manholes and pump stations.



Max Anderson,
Asset Strategy
Manager,
City West Water

Description of Leading Practice

1. A description of the Leading Practice - how it works and how it was achieved.

CWW has developed a failure or activity forecasting tool (AFFIRM) based on the assessment of historical asset performance and the cost of managing key water and sewer asset classes. Using water mains as an example we have determined the rate of failure of 14 key water main cohorts when little or no renewal was undertaken in past years. The rate of reduction in failures was also determined for these cohorts when there were significant periods of renewal to them. The model is updated each year by including the failures and length of renewal for each of the cohorts during the past year. The benefit in terms of reduced failures for each kilometre of water main cohort renewed is determined through an annual re-calibration of the model. The business has set a target for water main failures and customer interruptions and through a process of iteration by applying various renewal lengths to each of the cohorts the performance or number of failures anticipated for each of the cohorts can be calculated. It is the cumulative benefit of the various lengths of cohort renewal that determines the overall expected performance of this asset class.

2. Key aspects

The asset failure forecasting and investment renewal modelling tool (AFFIRM) is a spreadsheet tool that utilises asset and failure data from the GIS and CWW's maintenance management system to analyse historical performance and predict future performance based on removing assets that have reached or are approaching an advanced stage of deterioration from the active asset stock through renewal. The user of the model inputs scenarios of asset renewal for each asset class or cohort such as the example of water mains.

3. Top areas where this Leading Practice has made a difference

The AFFIRM tool is assisting CWW compile the programs of work for the next Pricing Submission to the ESC. It is allowing the executive and Board determine the level of investment the business has to make to meet various standards of reliability and the associated customer service delivery targets. Other business benefits comprise:

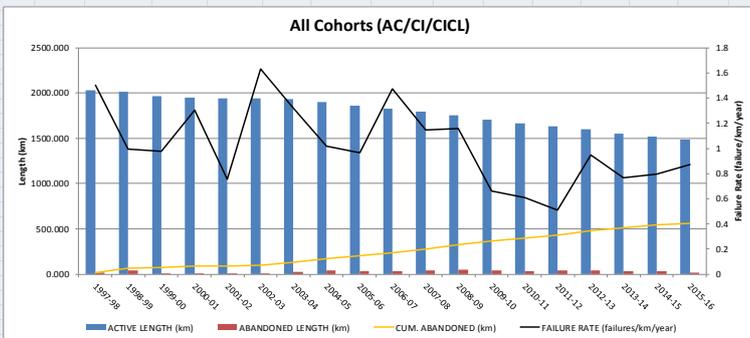
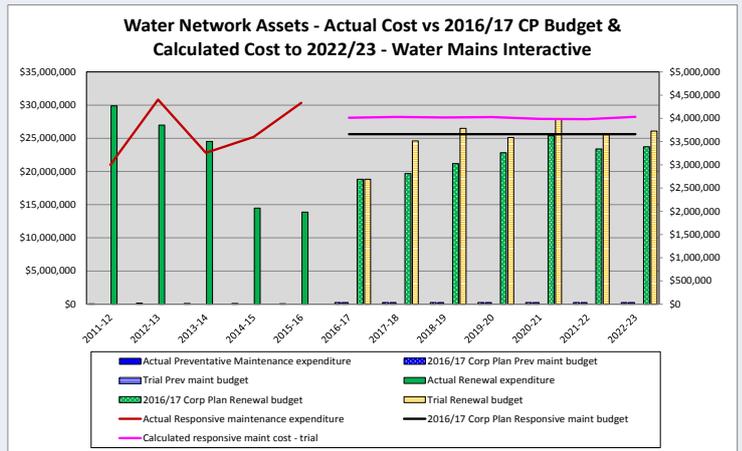
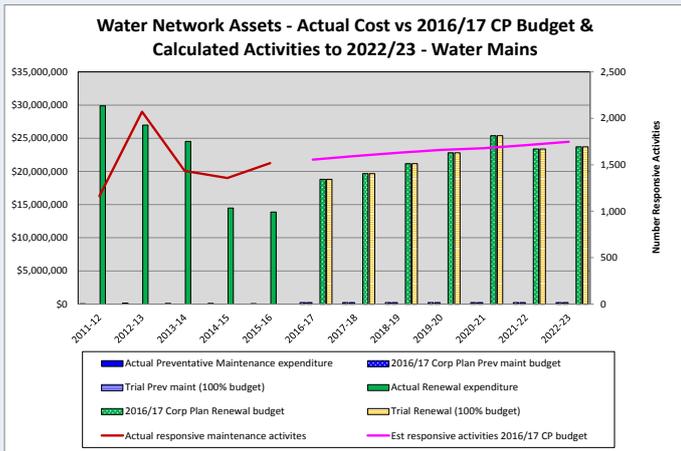
- Increased acceptance of the inter-relationship between planned maintenance and renewal on system performance
- Support for the proposed levels of budgeting
- Drives improved and rigorous asset and asset failure data capture processes and QA checks
- Introduces evidence based budgeting in lieu of traditional historical based budgeting
- Process trail for ESC auditors to follow



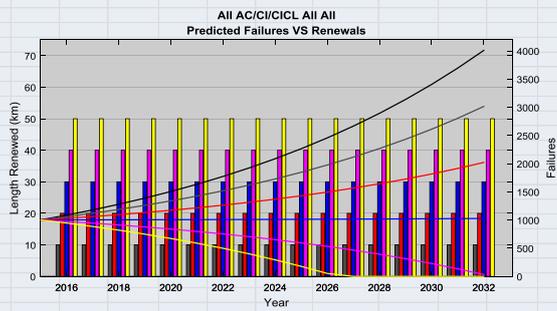
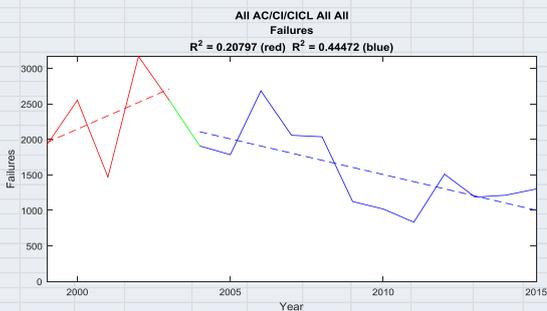
“Improving and defending investment planning decisions for the renewal of assets”

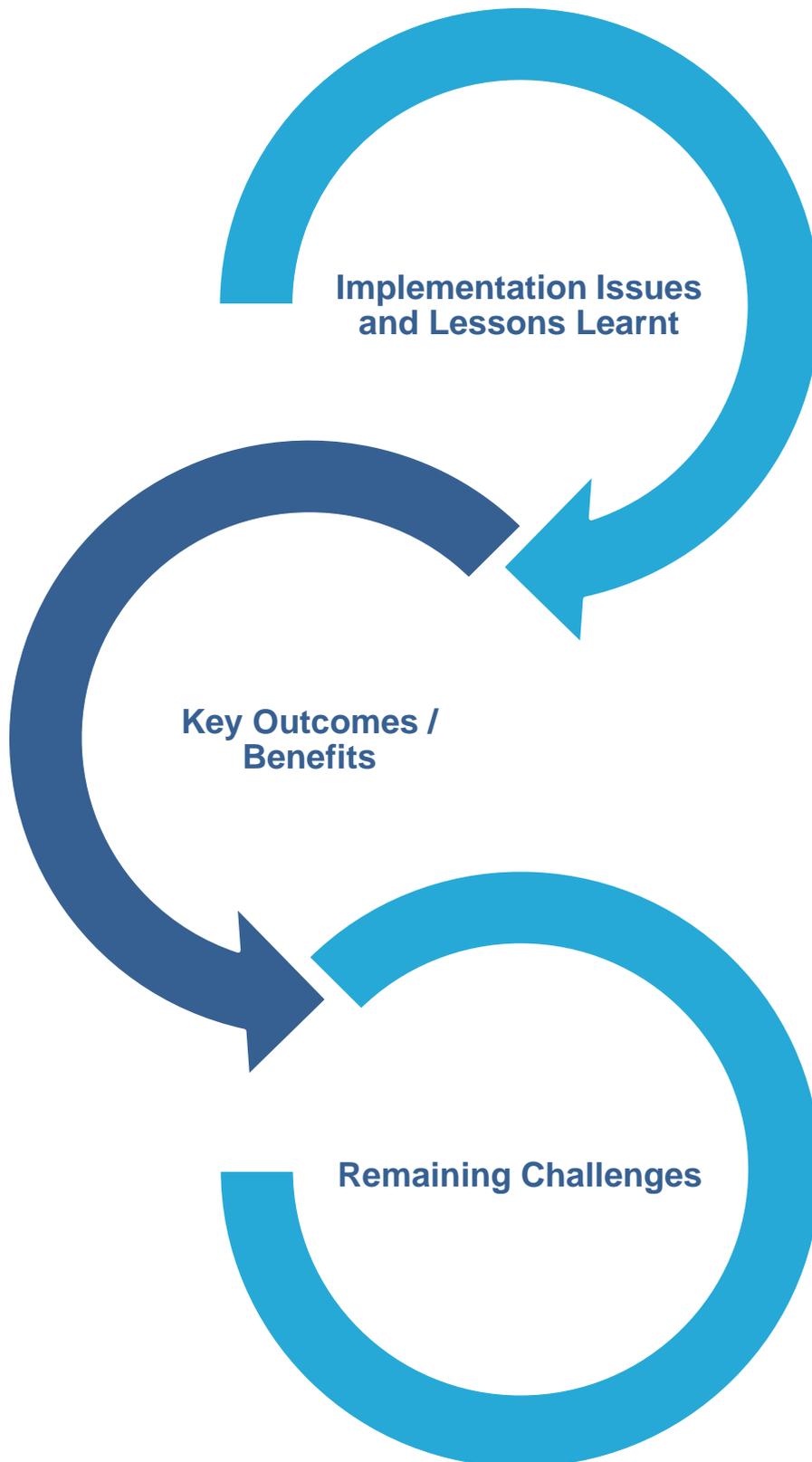
Basis behind activity forecast modelling

$$\begin{aligned}
 &\text{Responsive maintenance activities (Year n+1)} \\
 &= \text{Responsive maintenance activities (Year n)} \\
 &+ \text{Annual Est'd growth in RM activities} \\
 &- \text{Responsive maintenance activities reduced by PM} \\
 &- \text{Responsive maintenance activities reduced by renewal}
 \end{aligned}$$



All	2003	Remaining Length (2014)				
Year	Length_KM	Abandoned	CumAban	Failures	Fail_Rate	1489.13
1997-98	2030.909	20.568	20.568	3056	1.5047	1489.13
1998-99	2010.341	44.950	65.518	2004	0.9968	Average Abandoned Length (since break year)
1999-00	1965.391	12.535	78.053	1920	0.9769	35.973
2000-01	1952.856	8.699	86.752	2550	1.3058	Failure percentage growth each year
2001-02	1944.157	4.738	91.49	1469	0.7556	8.50%
2002-03	1939.419	10.662	102.152	3168	1.6335	Benefit of renewals (failures per kilometre)
2003-04	1928.757	28.073	130.225	2554	1.3242	-2.85
2004-05	1900.684	39.187	169.412	1930	1.0154	Length to renew each year (km)
2005-06	1861.497	37.114	206.526	1794	0.9637	29.796
2006-07	1824.383	31.587	238.113	2683	1.4706	
2007-08	1792.796	38.084	276.197	2057	1.1474	
2008-09	1754.712	46.052	322.249	2036	1.1603	
2009-10	1708.660	40.492	362.741	1125	0.6584	
2010-11	1668.168	33.061	395.802	1019	0.6108	
2011-12	1635.107	38.389	434.191	834	0.5101	
2012-13	1596.718	42.375	476.566	1510	0.9457	
2013-14	1554.343	33.946	510.512	1187	0.7637	
2014-15	1520.397	31.266	541.778	1213	0.7978	
2015-16	1489.131	20.123	561.901	1301	0.874	





- Focus on outputs of model more than detail of how the model works.
 - Document how the model works early in its development.
 - Train others in using the model.
 - Spell out all limitations and assumptions.
- Facilitated determination of budgets for Pricing Submission (PS).
 - Achieved preliminary acceptance by PS working group.
 - Contributed to modification of Asset Management Strategy.
 - Improved understanding by Executive and Board.
- Relate asset class activity levels back to customer KPIs wherever possible.
 - Achieve full acceptance of use of the model by the Executive.
 - Keeping the forecasting tool current and at the forefront of setting budgets.
 - Maintaining the expertise to improve the model over time.

Melbourne Water

Timing of asset renewal

Stuart Smith
AMMO Program Manager

Background and context

Melbourne Water manages bulk Water, Sewerage and Drainage and Waterways infrastructure for approximately 4M people. We operate within a highly regulated environment with increasingly stringent surveillance around expenditure from our stakeholders, customers, regulator and sole shareholder (the Victorian State Government).

Financial planning cycles (Pricing Submissions/Water Plans) are determined by the regulator but are typically 5 years. Dr Ron Ben-David (chair of the Essential Services Commission) observed in his address to the Victorian Water Association conference in September 2011:

“If Water Plan 1 was about learning to ‘do’ economic regulation; And Water Plan 2 was about doing more, with more (i.e. doubling prices); Then Water Plan 3 must be about doing more, with less.”

Following on from this the theme for Water Plan 4 is Service Delivery and Customer Values .

Operating within this evolving regulatory environment and managing portfolios of assets where the asset lives and failure modes vary dramatically requires a combination of robust business case development processes to secure the funding, and a flexible approach to delivery to appropriately manage the risk and extract the maximum benefit from investment.

In order to manage both risk and financial constraints appropriately, Melbourne Water needed to develop the ability to reprioritise works, rather than being locked into a fixed delivery program.



Stuart Smith,
AMMO Program
Manager,
Melbourne Water

Description of Leading Practice

Melbourne Water has developed a portfolio of processes and software which enables us to identify and manage key risk, develop business cases to respond to those risks, and supports the ability to prioritise works.

- The State of the Assets process allows the identification of risks which need to be managed.
- Our capital works processes require the construction of business cases which go through a series of approval gates requiring progressively more robustness.
- Our capital prioritisation processes assess the risk reduction provided by the projects and review the timing of delivery.
- Our customers are directly involved in the program challenge discussions
- Our project delivery determination process looks for the appropriate delivery mechanism.
- Ongoing condition assessment and risk assessment can then be used to prioritise the work.

In 2005, deterioration in condition of the remaining sections of the M039 (wrought iron lead jointed built 1890), 40 and 41 (mild steel lead jointed built 1920) water main system was identified. This series of mains extends from Preston Reservoir down to St Kilda Junction and is of high criticality as it supplies the Melbourne CBD including the hospital precinct. The system is supplied from both ends with the direction of flow changing from morning to evening.

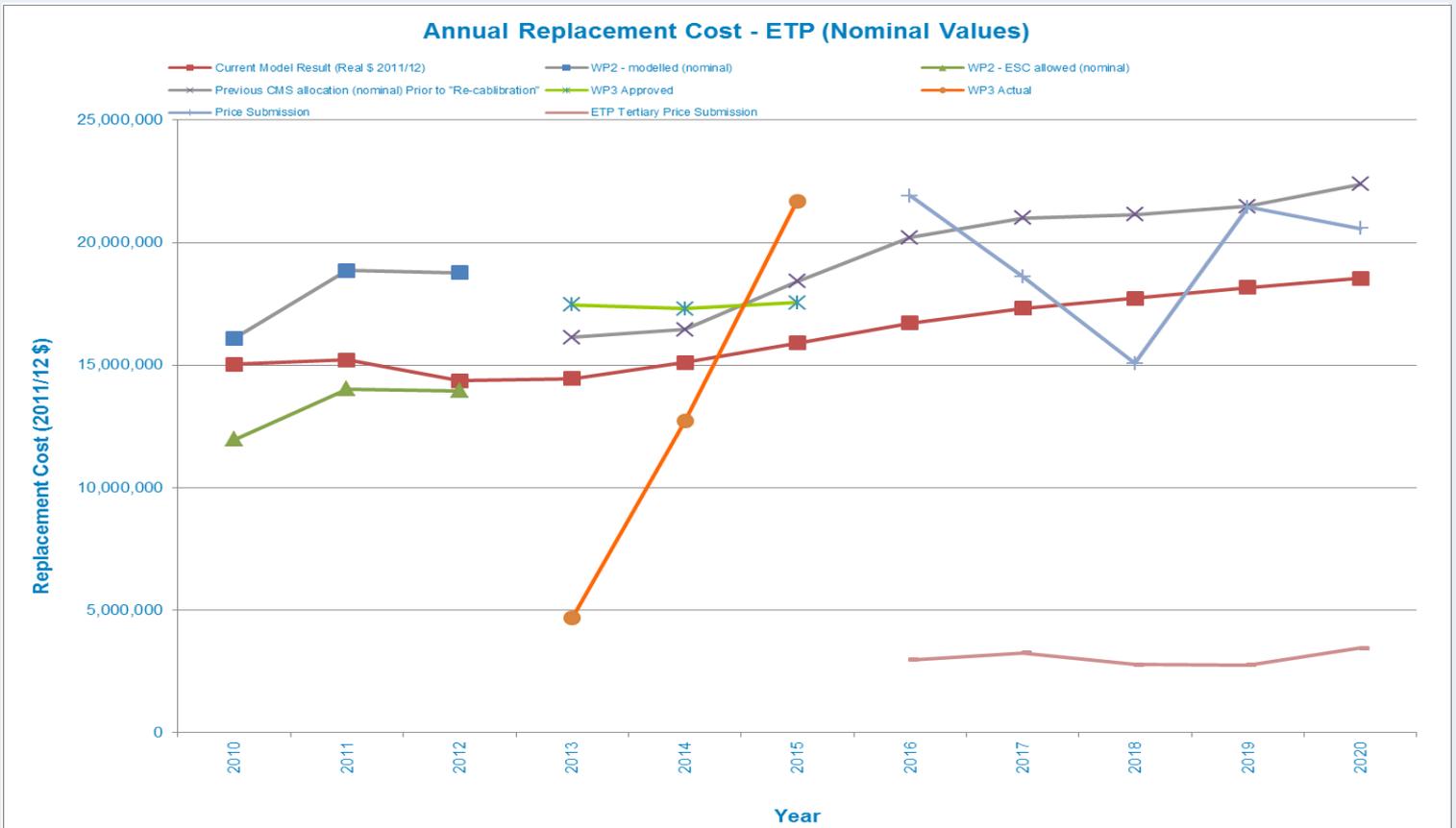
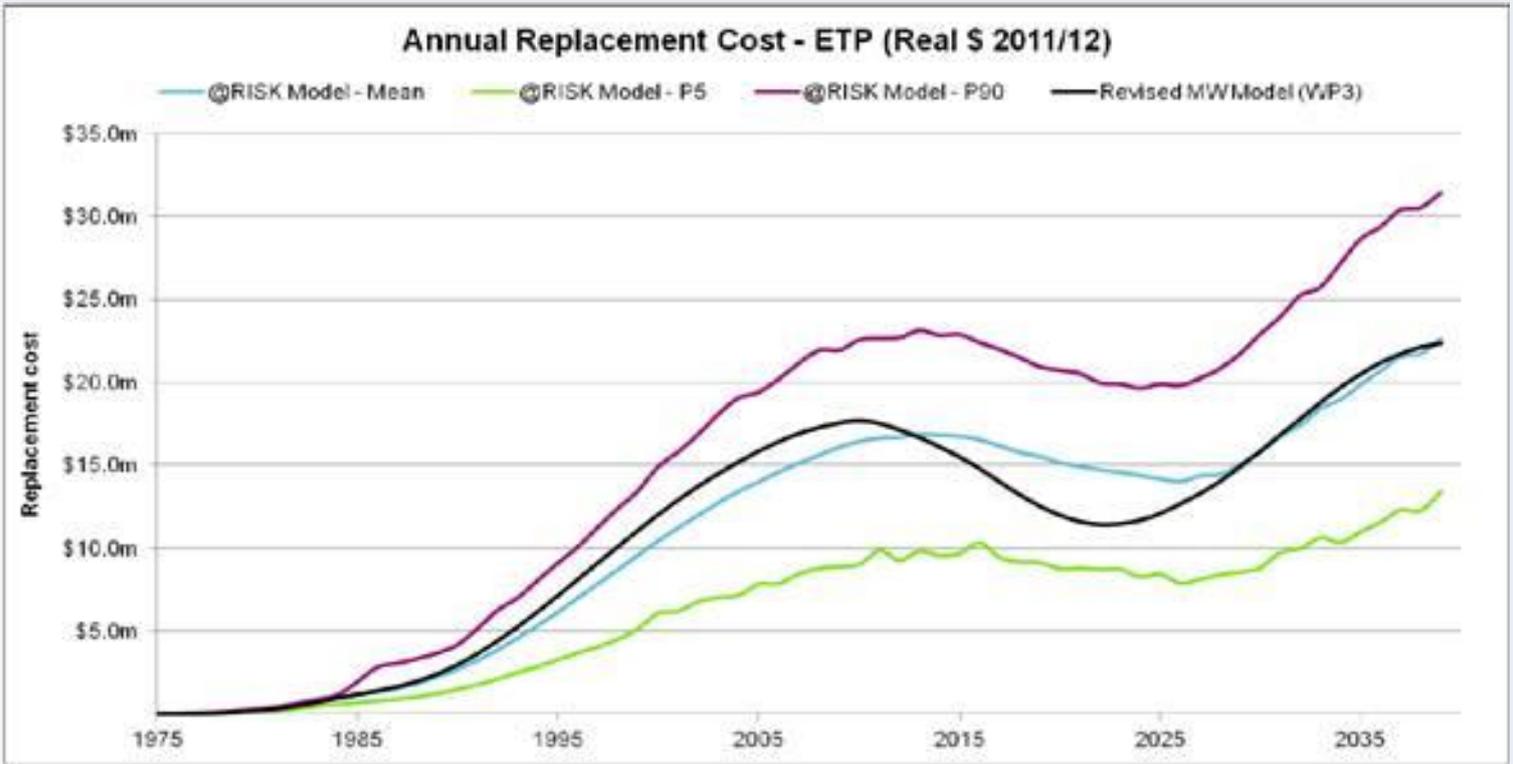
The first business cases were completed in 2008 for the M039 and 2010 for the M40/41, for completion of the renewals in 2015. The potential for catastrophic failure under a main road meant the M39 works were prioritised and locked in for delivery.

In contrast, ongoing assessment of the condition/risk of the M40/41 post initial business case development led to the project being split into a number of stages. A failure of a section of the M40 in St Georges Road which required slip-lining of a 150m section locked in the delivery timeframe for the rest of the M40. Management of the M41 through pressure reduction has meant that it has not been demonstrating a significant increased rate of failure and has been prioritised out for progressive delivery in 17/18-19/20.

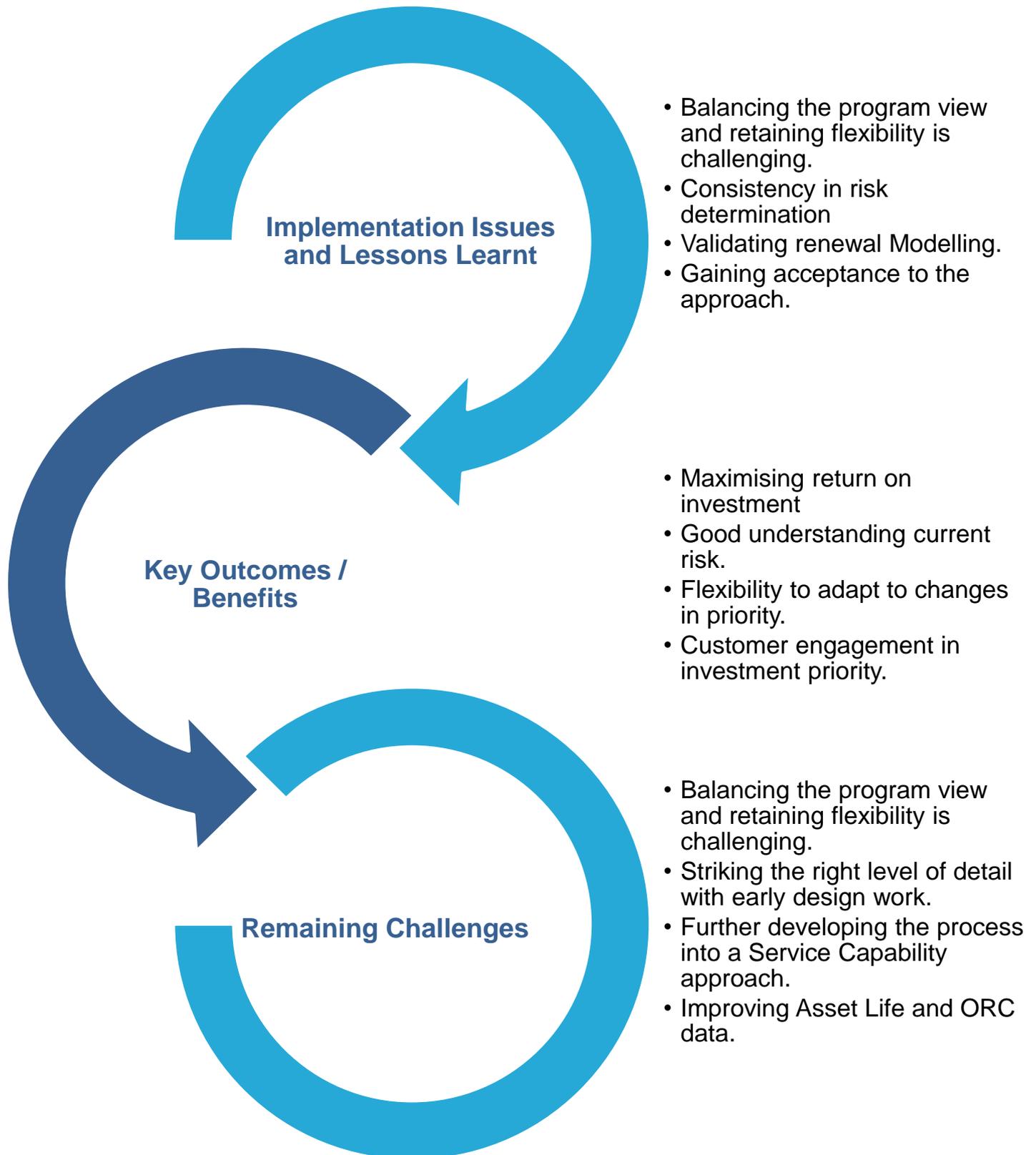
Mitigations have been put in place around these works through significant design work being completed early to enable us to bring forward construction if necessary. The deferral of the M041 also included a provision to undertake valve insertion works.

The Mechanical and Electrical renewal model works in a similar manner. An allocation is developed based on a probabilistic projection of asset failure using the expected asset life of the asset base, the installation year and the Optimal Replacement Cost of the asset base. Individual renewals then are planned based on condition data or performance history.

“Striking a balance between robust forecasting and return on investment”



Timing of asset renewal



South West Water

Distribution network renewal and maintenance planning model that uniquely considers all relevant performance measures

Julian Collingbourne, South West Water
Mark Randall-Smith, Mouchel

Background and context

South West Water provides Water and Wastewater services (including Sludge Treatment) to a population of 1.6million people.

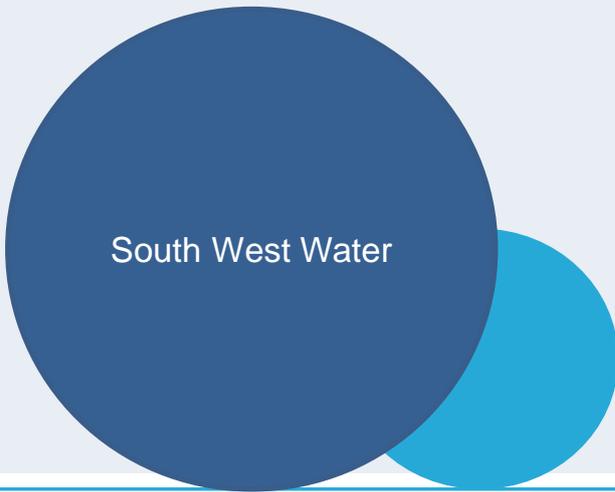
Our key business drivers include:

1. Providing affordable, value for money services . customers.
2. Ensuring required standards of performance are met now and in the future.
3. Maintaining and develop a resilience and security infrastructure that enables the South West economy to thrive.

We operate over 15,000 km of potable water mains, a significant proportion of which is made up of aging cast iron, uPVC and asbestos cement mains which are failing with increasing frequency. These failures often result in adverse impacts on customer service through interruptions to supply and discolouration, and contribute to increased losses through hidden leaks.

In a climate where delivering a high-quality service to customers at affordable prices is paramount, an investment programme to maintain potable water mains so that we limit mains failures and their consequence is essential. However, renewing these assets is expensive and we therefore have to be selective, making sure that we target assets for renewal intelligently. We also need to complement mains renewals with other capital and operational interventions, so that performance objectives are met within an affordable budget by applying a balanced investment programme.

South West Water has developed DEAM (Distribution Economic Assessment Model), an integrated asset deterioration model to support water mains investment and maintenance planning. DEAM has fulfilled a business planning need to determine and justify how much investment is required, in which assets, to achieve performance targets.

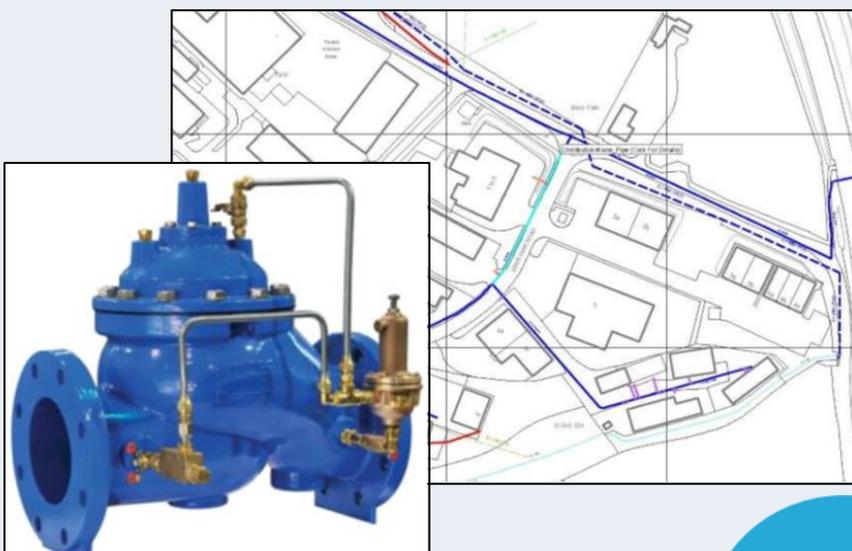


South West Water

Description of Leading Practice

DEAM is built upon a regression-based deterioration model that predicts the rate at which failures will increase in the future for different cohorts of pipes based on material, size, age, soil conditions, operating pressure and density of connections. The failure likelihood component is complemented by a comprehensive failure consequence model that determines, on a pipe-by-pipe basis, the impact that pipe failure will have on a broad set of performance measures. These measures include interruptions to supply, discolouration, leakage, traffic disruption, biological water quality and customer contacts. In determining the impacts of failure DEAM draws on the outputs from a suite of bespoke modelling elements covering the discolouration risk presented by individual assets, pressure management scope and benefits within each area, and the extent of leakage control required to meet leakage targets.

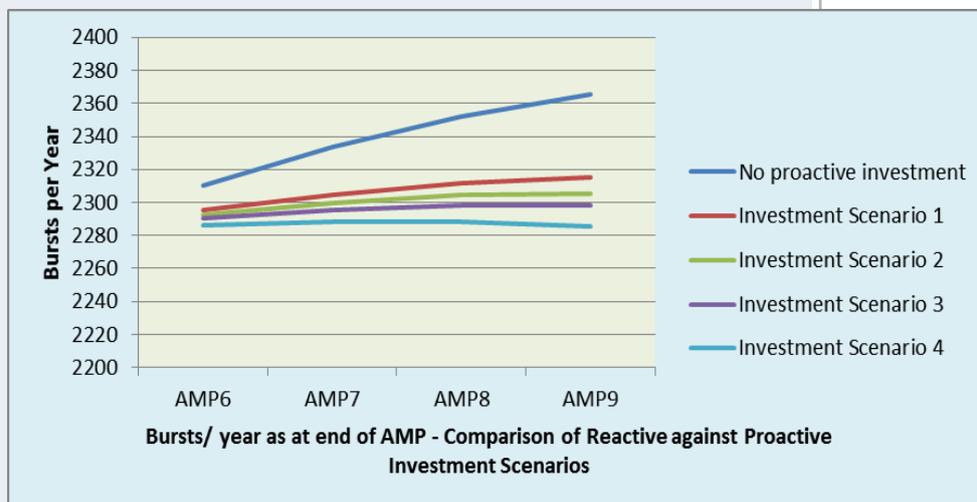
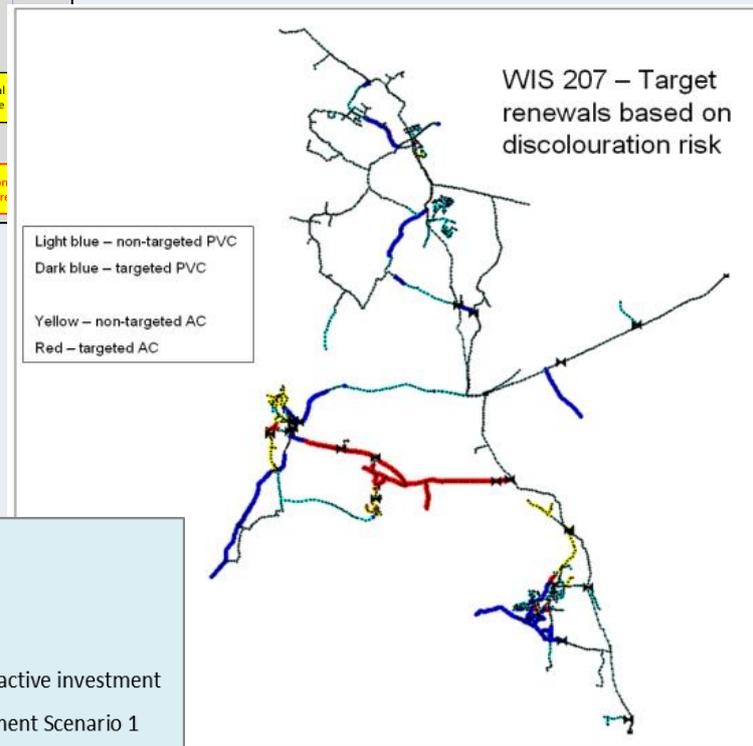
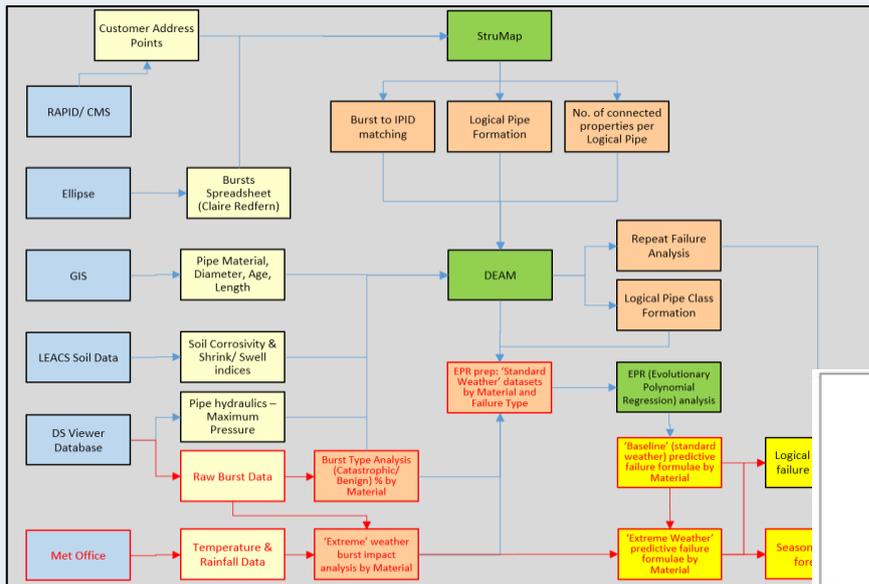
From a starting point of how asset performance and service levels will deteriorate in a 'no investment' scenario, DEAM then identifies the assets and geographical areas that most warrant interventions of various types on a cost: benefit prioritisation basis up to a range of scenario budget limits. It allows a variable investment profile to be applied over a period of up to 40 years, so that the timing of individual interventions is determined such that long-term stability is achieved as well as short-term best value. The intervention types modelled include, besides mains renewals using various techniques, pressure management, trunk main flow conditioning and active leakage control.

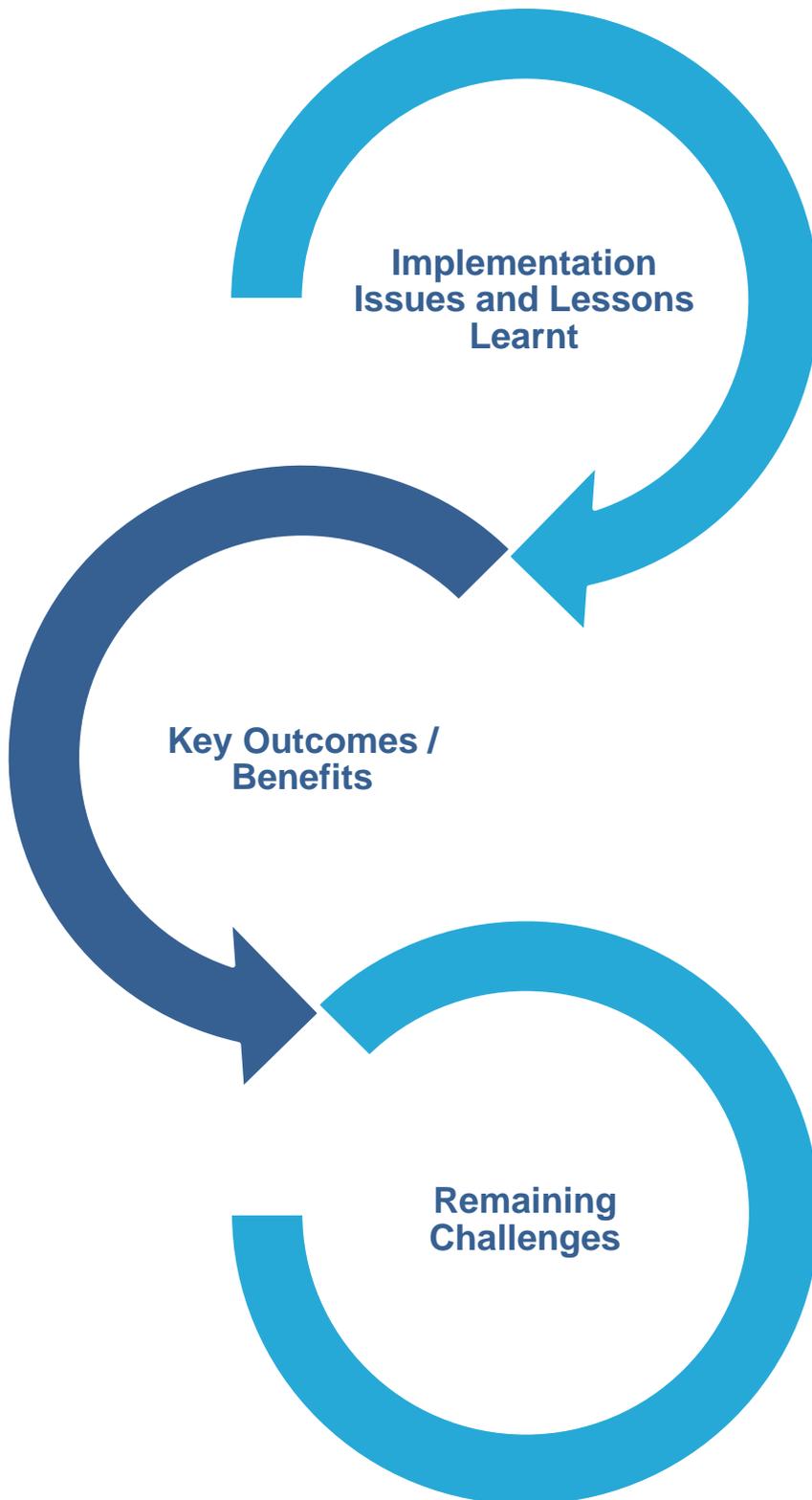


“Providing clear visibility into the risks to service presented by individual water mains, and the mitigation of those risks that would be expected following intervention”

The outputs from DEAM have informed the water infrastructure element of the Business Plan submitted to the UK Industry Regulator, Ofwat, at the 2009 and 2014 Price Reviews. Besides these strategic applications, ongoing improvement and validation have progressively increased its value as a tool to support tactical and operational planning activities.

Developed as a South West Water corporate system, DEAM is now largely updated automatically on a regular basis through direct database links to data input sources; and its outputs are accessible through an intranet-based 'Viewer' alongside a broad range of other information relating to asset characteristics and performance.





- A combination of statistical analysis, bespoke modelling and pragmatic interpretation creates a powerful capability for managing underground water main assets effectively
- Validation with Operations staff and 'calibration' against anecdotal and case-based incidents is essential to delivering credible outputs
- Substantial savings through more effective potable water infrastructure maintenance investment targeting
- Better understanding of our assets and their performance
- Effective support to improve operational efficiency through prioritisation of leakage control and distribution flushing activities
- Sensitivity to data errors, for example in GIS referencing on DMA meters which can distort supply interruption consequence of failure analysis outputs
- Develop a more systematic approach to specific conditions in which more cost-effective techniques, such as no-dig mains installation, may be practicable

Asset Life Prediction, Planning and Modelling

Session 7

Barwon Water: Water and sewer main renewal planning

Water Corporation: Modelling for future integrated water supply scheme services

Yarra Valley Water: Maintenance service linked to Yarra Valley Water 2020 Strategy

Hunter Water: Operational resilience

Barwon Water

Water and sewer main renewal planning

Peter Brown
Asset Management Coordinator

Background and context

Barwon Water

Barwon Water's region is located southwest of Melbourne in Victoria. It's main population centre is Geelong but the region covers many smaller townships across a total area of 8,100 km²

A permanent population of 290,000 residents are provided with water, sewerage and recycled water services across 140,000 connections.

10 major water supply reservoirs	13 groundwater bores
11 water treatment plants	39 service basins/tanks
10 water reclamation plants	>6000km water and sewer pipes

Key Business Drivers

Regulatory compliance - New and changing service standards and levels of operational performance being approved and monitored by an external regulatory body in areas such as product quality, service reliability, customer response and asset performance.

Determination and regulation of prices - Increasing economic regulation in the form of price submissions being assessed by an external regulatory body.

Development

Water and sewer reticulation networks account for approximately 50% of Barwon Water's total asset value and their performance is critical in achieving customer commitments relating to water supply and sewerage services.

Investment in renewal of these assets has a major impact on price determinations. There is therefore an expectation from our customers, the business, and the Victorian regulator that the relationship between service levels and investment is well understood.

In response to these needs, Barwon Water has developed an in-house model, SIMS, to assess sewer reticulation risks at a network level and prioritise re-lining and maintenance programs. For water reticulation mains, PARMS Planning software is used to determine appropriate renewal rates for the required service levels.

Peter Brown,
Asset
Management
Coordinator,
Barwon Water

Description of Leading Practice

Water Main Renewal Planning

The PARMS (Pipeline Asset Risk Management System) Planning software was developed by CSIRO and allows a 30 year assessment of repair and replacement strategies for water pipe assets. The software is used to:

- Forecast the expected annual number of failures and interruptions.
- Assess replacement costs based upon the predicted number of failures in any one year.
- Calculate the cost implications of different management and operational scenarios.

Failure curves each pipe cohort are developed based on historical data from GIS and works management systems. These curves are used to model failure rates for each year in the forecast period. Intervention strategies (replace after “X” failures) are applied to determine the level of investment required to achieve service targets. This process is shown on the following page.

To identify which mains to replace, automated reporting of problem mains from the works management system has been developed (multiple failures in the last 12 months) and a risk assessment matrix applied to prioritise replacements. Information to assess the risk is readily available from existing information systems and a weighting is applied to recognise the importance of those parameters contributing most to risk e.g. failure history.

Sewer Main Renewal Planning

Historically Barwon Water had to manually review and interpret information within a number of data bases to determine works programs for sewer reticulation mains. This was extremely time consuming, subjective and increased the risk of problematic pipes going undetected. This manual approach left Barwon Water vulnerable to litigation resulting from sewer spills to the environment or customer’s property.

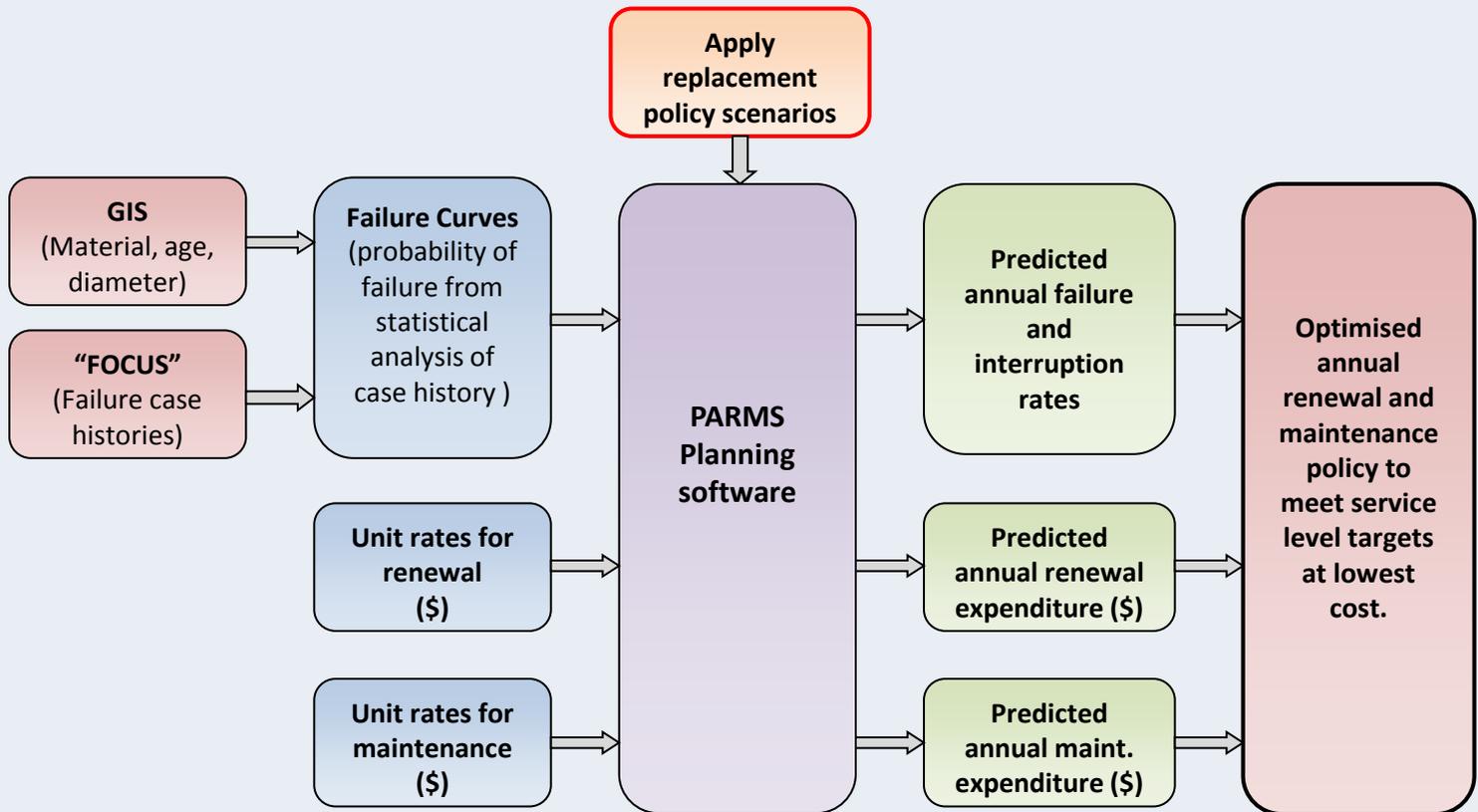
SIMS (Sewer Infrastructure Management System) was developed to automate the process of risk ranking Barwon Water’s reticulation sewerage pipes in a manner consistent with the corporate risk framework. SIMS extracts data from Barwon Water’s Geospatial Information System and works management system and automatically updates the risk rating for that asset along with subsequent maintenance and rehabilitation requirements.

The current works strategy is to ensure all Extreme and High risk pipes are included on a works program. This includes regular mains cleaning, CCTV (to confirm condition rating) and rehabilitation. To maintain operability of the pipes, regular mains cleaning is performed until rehabilitation works are completed.

An example of a consequence rating assessment is shown on the following page. All parameters have been extracted from existing corporate systems and will be updated automatically if they change.

“SIMS was developed to automate the process of risk ranking Barwon Water’s reticulation sewerage pipes”

Water Main Renewals Planning



Sewer Main Consequence Assessment – SIMS

Determining Factors		
Area	Determining Factor	Score
Health and Safety	Servicing minor trade waste customer	4
Natural Environment	1 reactive case/s (SSCP) performed within history where primary asset excluding where cause is Unknown blockage in HC drain	8
Customer Service	greater than 100 serviced by pipe	12
Organisational Integrity	Pipe diameter greater than 100 and up to including 150	4
Financial Cost	greater than 60M in length	8
	Total	36
	Consequence	Extreme



Implementation Issues and Lessons Learnt

- Importance of accurate source data in GIS and works management systems.
- IT resources will be available to provide ongoing support for in-house systems.
- Automation important for efficiencies when assessing large networks.

Key Outcomes / Benefits

- Better justification and acceptance of annual renewal budgets within business and from regulator.
- Targeted renewal programs ensuring highest risk mains are identified and prioritised.
- Annual performance targets achieved.

Remaining Challenges

- Ensuring failure data for decommissioned assets is included in creation of water main cohort failure curves.
- Implement longer term sewer main renewal planning to supplement risk approach.
- Automation of process to prioritise individual water mains for replacement.

Water Corporation

Modelling for future integrated water supply scheme services

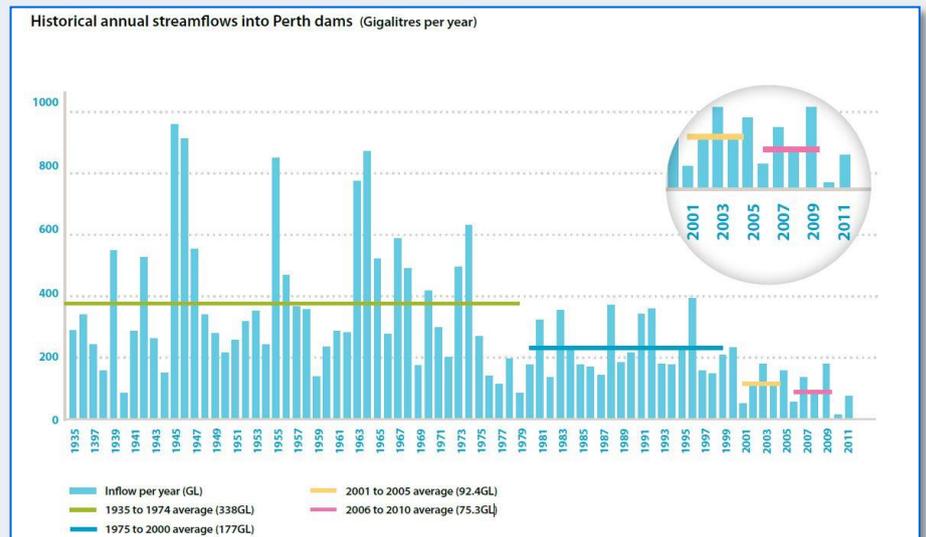
David Hughes-Owen
Manager Asset Investment Planning Regional

Background and context

Water Corporation is a “Supplier of water, wastewater, drainage and bulk irrigation services to hundreds of thousands of homes, businesses and farms across the State”. Located in Western Australia, it has an asset base of \$36 billion (replacement value). In 2015 Water Corporation supplied 370 billion litres of water, and collected 163 billion litres of wastewater statewide.

Owned by the State Government, Water Corporation’s main service area is Perth, but also services approximately 200 regional towns of varying sizes.

The impact of drying climate across the South West of Western Australia has resulted in a reduction of average inflow into Perth’s Dam Catchments of 338 GL/annum (1935-1974) to 76 GL/annum between 2006-2010. In 2015, Perth experienced its lowest inflow ever with just 11 GL flowing into our dams, whilst we supplied to our customers around 300 GL.



Change in Inflow to Perth Catchments

David Hughes-Owen, Manager
Asset Investment
Planning Regional,
Water Corporation

Description of Leading Practice

In the late 2000's the Corporation adopted an “adaptive planning” model to develop a long term portfolio of water supply options for Perth. The Corporation now use the model to assess water supply options for all supply schemes across the state.

The planning model focused on three key target areas to improve our resilience to our drying climate and increasing population. These were to build Climate Resilience by:

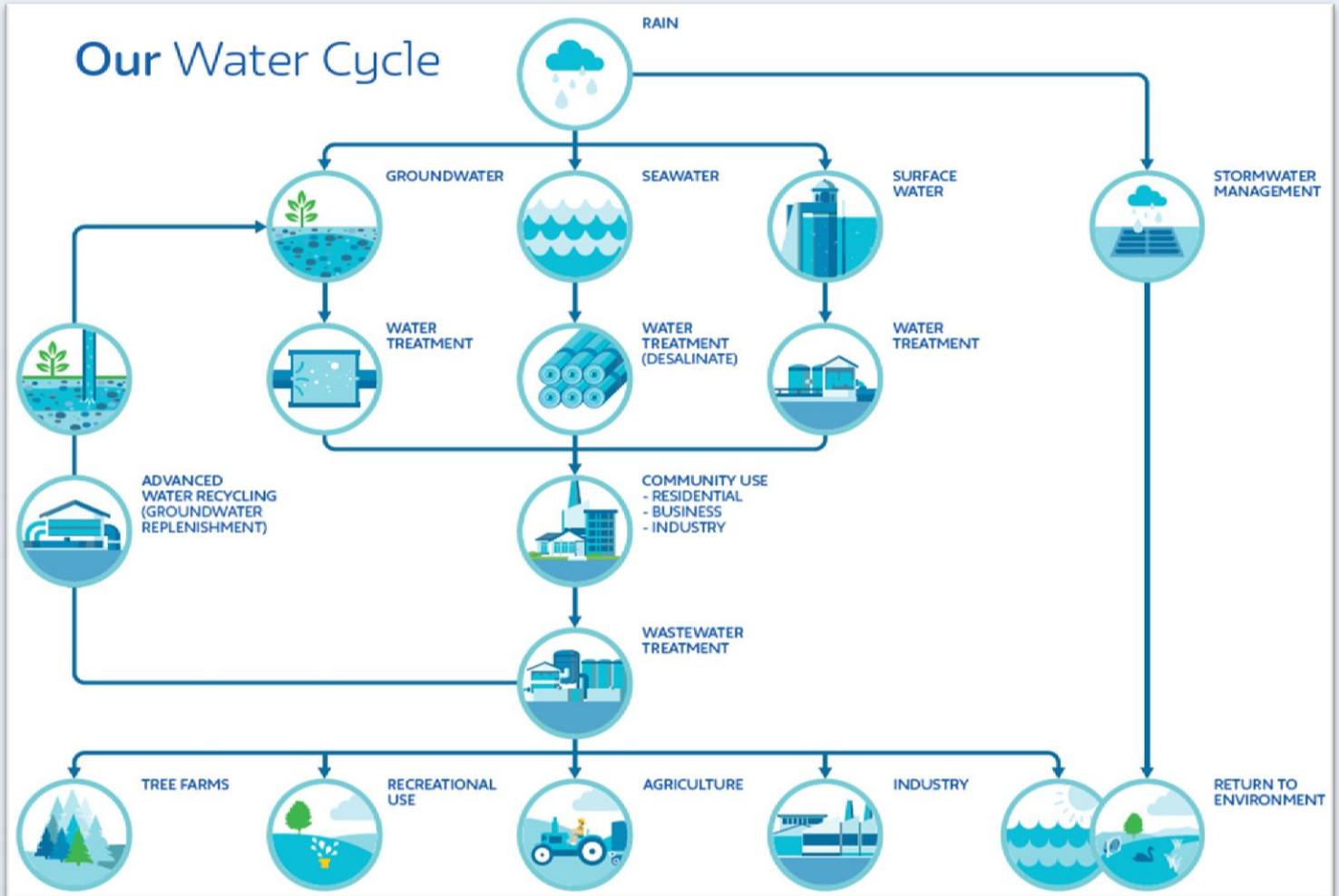
- Developing New Sources up to a 100 Billion litres of new water source by 2030.
- Increasing Water Recycling in the Perth metropolitan area to 30% of our Wastewater.
- And Reducing Water Use by 15%.
- Building “local” Community Partnerships and Managing our Environmental Responsibilities.



We have recently combined our growth, regulatory, renewals and maintenance planning and aligned these to our Metropolitan and Regional portfolios. This recognises the challenges and differences in modeling integrated water supply schemes services (“place planning”) across metropolitan and regional Western Australia.

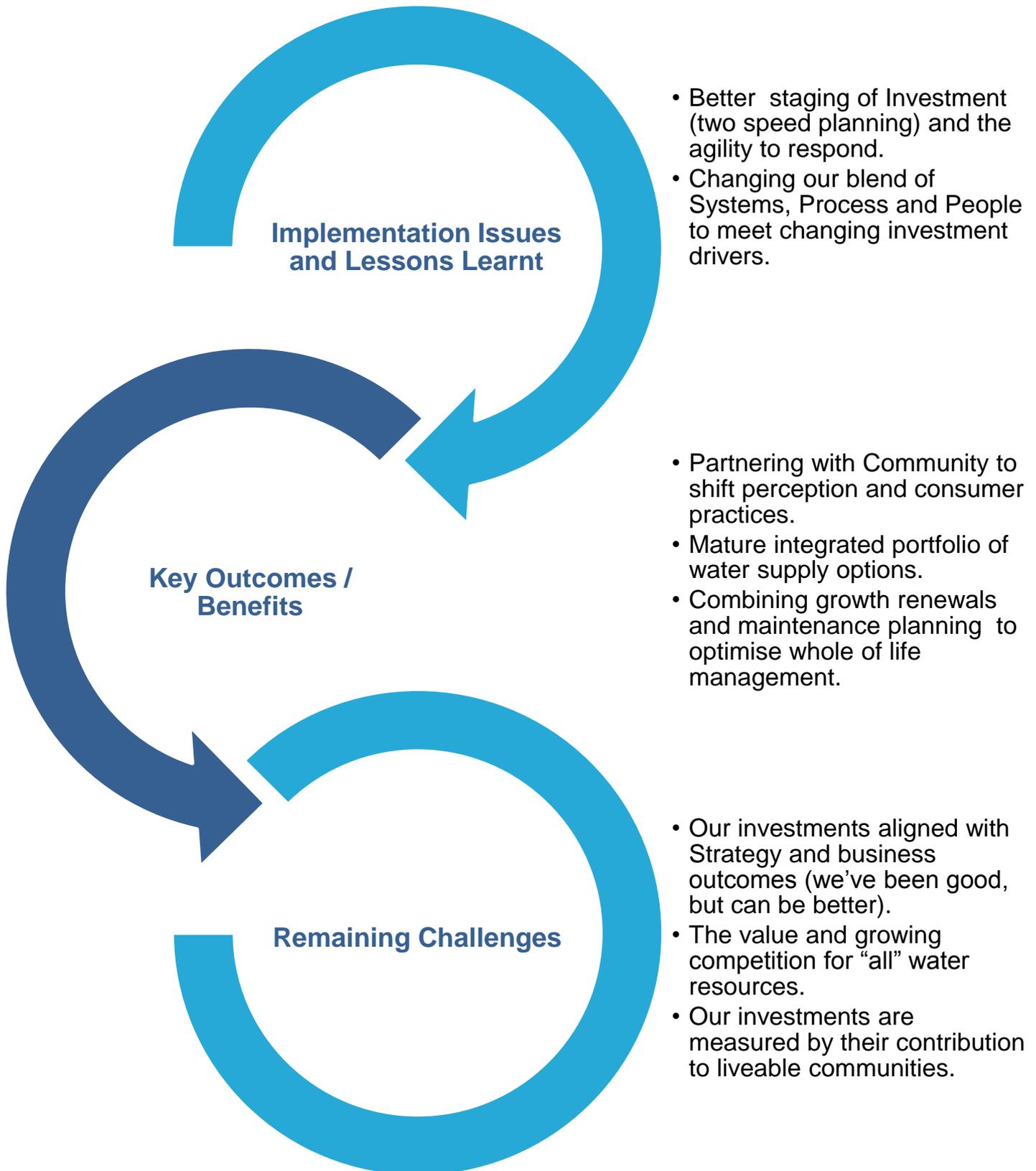
In developing a portfolio of options the Corporation recognised the need for strong partnership with community in order to change the way water is used and develop sustainable new water sources which maintain our environmental values

Our Modelling for Future integrated water supply scheme services considers a portfolio of “water cycle” options tailored to the different expectations and economic, social and economic drivers within each community or supply system.



Our modelling for the future Integrated Water Supply Scheme Services supports our Asset Management Objectives:

- Our assets and services are safe for our employees, customers and community.
- We provide reliable and sustainable water services that meet our customers' and the community's needs.
- We are compliant and meet our regulatory commitments.
- We are cost effective and optimise investment decisions considering both operating and capital options.



Yarra Valley Water

Maintenance service linked to Yarra Valley Water 2020 Strategy

Alberto Vela, Team Manager
Contracts and Procurement

Background and context

Yarra Valley Water is located in Melbourne, Australia and is Melbourne's largest retail water utility. Our service area covers most of Melbourne's northern and eastern suburbs, across approximately 4,000 square kilometers. Yarra Valley Water provides water and sanitation services to more than 1.8 million people.

Yarra Valley Water's business drivers are:

- *The Way We Work Enables Extraordinary Performance,*
- *We Provide Exemplary Services,*
- *We Work In Harmony With The Environment,*
- *We Are Safe, and*
- *We Stand for an Exceptional Water Industry,*
- *We Make Every Cent Count.*

YVW main maintenance contract model was coming to an end after nearly 10 years working together with the same contractor. As the maintenance contract accounts for nearly 20% of YVW's operational budget, impacts directly our service level agreements and it is YVW's contact with our customers it was time to reflect on what was working well and what areas needed improvement.

What was working well?

The majority of work carried out under the pain/gain framework has proven to be an effective cost control mechanism.

Contract KPIs in its majority were working well, especially on individual jobs.

What needed improvement?

The remaining portion of work performed by the Contractor on a time and materials arrangement did not have the same efficiency as the work carried out under the pain/gain framework, requiring significant YVW oversight.

Alberto Vela, Team
Manager Contracts
and Procurement,
Yarra Valley Water

YVW went through a change of strategy during the tenure of the previous contract, the outcome was a slight strategy change. And the previous contract was not flexible enough to change with YVW's vision and strategy.

	<p>The way we work enables extraordinary performance</p> <ul style="list-style-type: none"> • We have highly skilled staff and exceptional leaders who love working here. • Individuals and teams are challenged and supported and have achieved extraordinary outcomes. • Our work environment fosters collaboration, candour and confidence. 		<p>We make every cent count</p> <ul style="list-style-type: none"> • We have prioritised our efforts, improved our productivity and reduced waste every year. • Our finances are in great shape and customers believe our prices are fair and reasonable. • We make investment decisions that achieve best community value and inter-generational equity.
	<p>We provide exemplary service</p> <ul style="list-style-type: none"> • External and internal customer satisfaction with our services is at a record high. • Customers say we provide a service experience that is second to none. • We have significantly reduced service failures year on year. 		<p>We are safe</p> <ul style="list-style-type: none"> • Safety exists as each person's responsibility • We make our Workplaces safe • We carry out our work without harming ourselves or others.
	<p>We work in harmony with the environment</p> <ul style="list-style-type: none"> • All our services are provided within the carrying capacity of nature. • We have actively engaged others for positive environmental outcomes. • We have redefined for the whole water industry the possibilities in sustainable water and sanitation services. 		<p>We stand for an exceptional water industry</p> <ul style="list-style-type: none"> • Our achievements and insights have enhanced water industry performance. • We have adopted others' best practices and innovations. • We have actively worked with others to achieve extraordinary outcomes.

There was scope to improve contract KPIs to better align with YVW outcomes. Most KPIs prescribe outcomes for contractor performance on individual jobs and the connection to Yarra Valley Water's overall network performance was not very strong.

At the end the previous contract was heavily focus on costs.

To be achieve our 2020 strategy we needed to aligning the Maintenance Services to our strategy. This was achieved by having at the forefront our strategy during the tender phase and linked to contract KPIs.

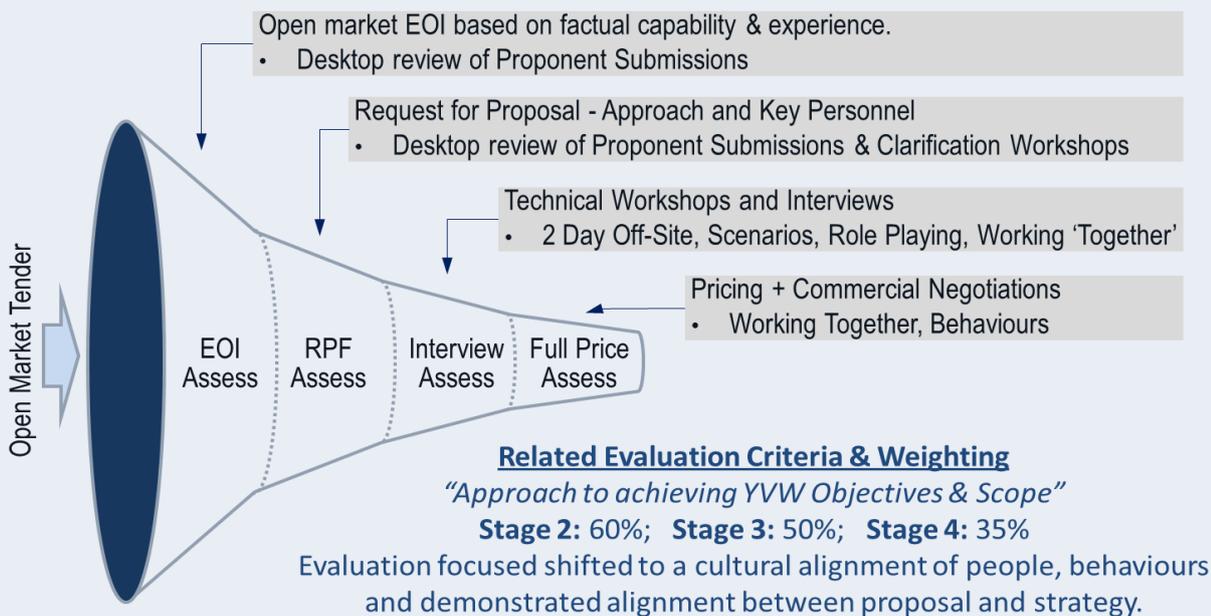
Through a series of work shops and interviews we successfully narrow down on potential contractors who understood our strategy. Creating an environment of collaboration and common goals.

Alberto Vela, Team Manager Contracts and Procurement, Yarra Valley Water

Description of Leading Practice

In order to encourage alignment between both companies, YVW developed a 4 stage process to engage the most suitable contractor, this was achieved by:

- **Stage 1:** Open market Expression of Interest (EOI) based on factual corporate track record and capability, leading to desktop selection of a pre-qualified shortlist.
- **Stage 2:** Request for proposal (RFP) detailing the tenderer's proposed approach to YVW's work. Submission of proposed delivery team, leading to desktop selection to refine the shortlist.
- **Stage 3:** Workshops with shortlisted teams to examine their approach and values in more detail, leading to identification of a final shortlist.
- **Stage 4:** Analysis of pricing submissions from shortlisted tenderers and negotiation of terms and conditions in conjunction with pricing.



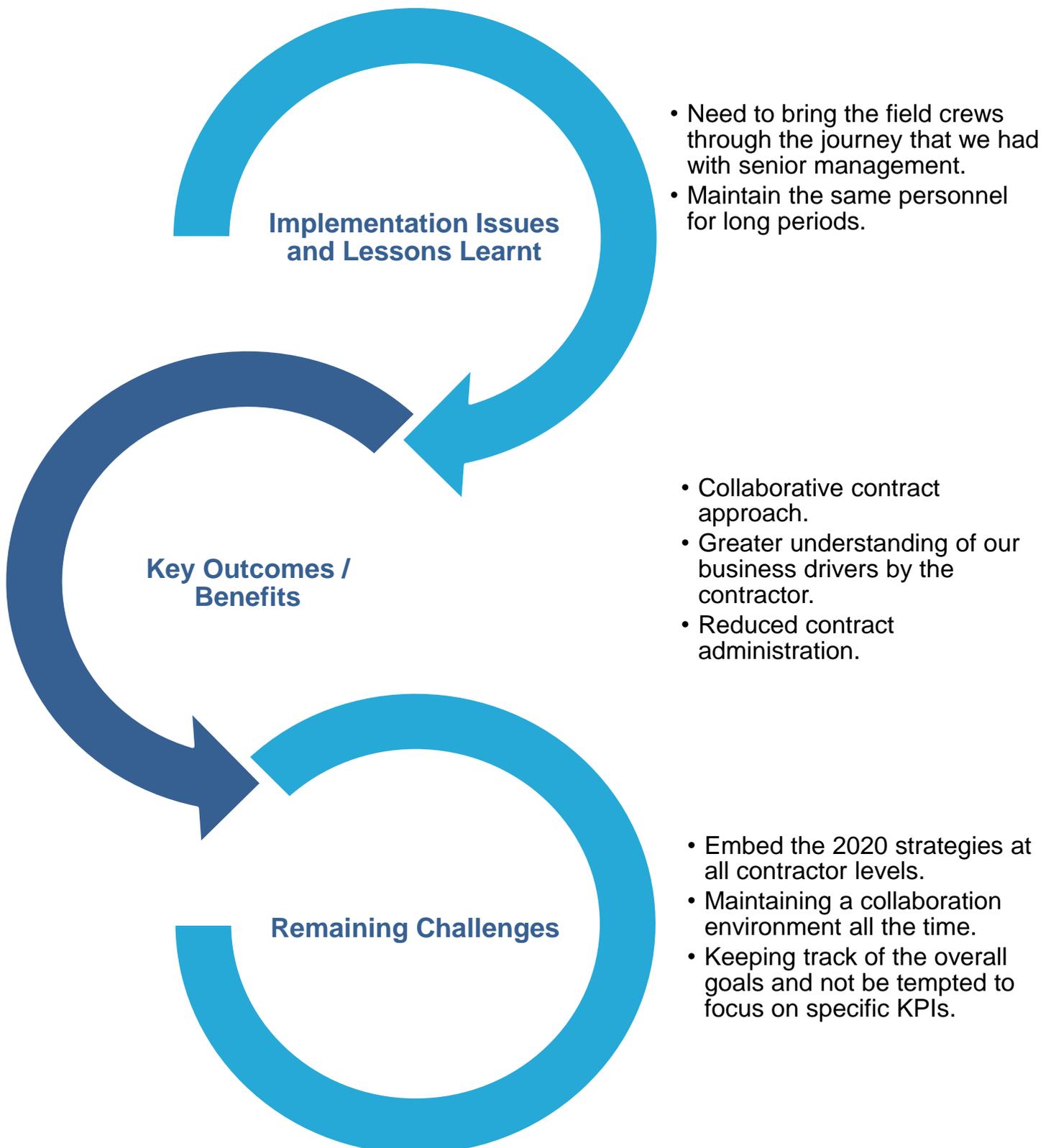
"improved
contract
collaboration and
strategy
alignment from
tender onset"

The main stages of the Maintenance Service Alignment was carried out during Stage 2 and 3 of the tender process, where Evaluation focused shifted to a cultural alignment of people, behaviours and demonstrated alignment between proposal and strategy.

	YVW Inputs	Process	Outcomes
Stage 1:	<ul style="list-style-type: none"> Issue request for EOI Broad description of YVW objectives / scope / volumes 	<ul style="list-style-type: none"> Open market EOI 	<ul style="list-style-type: none"> Identify proponents who pass mandatory hurdles Identify best-qualified candidates to proceed to Stage 2
Stage 2:	<ul style="list-style-type: none"> Issue RFP Full description of workload, challenges, expectations, etc. Provide YVW's strategy and linkage to contract 	<ul style="list-style-type: none"> Responses limited to 30-40 pages plus attachments Criteria: proposed approach to achieving YVW's objectives; track record of proposed team 	<ul style="list-style-type: none"> Identify strongest proposals Finalist candidates for Stage 3
Stage 3:	<ul style="list-style-type: none"> Issue request to attend technical workshops Briefing papers setting out workshop objectives, agenda, process, and required attendees 	<ul style="list-style-type: none"> 2-day workshop with each shortlisted team Work on aspects of proposed approach, improvement plans, transition process, etc. Criteria: strength of proposed approach; quality of leadership and collaborative behaviours in action 	<ul style="list-style-type: none"> Deeper understanding of proposed approach and strengths / gaps Assess collaborative skills and what it's like to work with them under pressure Form initial relationships Finalists to proceed to Stage 4
Stage 4:	<ul style="list-style-type: none"> Issue request for pricing & pricing template for all different activities Issue request to attend & briefing for commercial negotiation workshops 	<ul style="list-style-type: none"> Independent and internal reviews Financial Auditor reviews YVW conducts 1-day workshop with each contractor Criteria: value for money 	<ul style="list-style-type: none"> Assess proponent reasonableness in negotiations

This approach resulted in:

- A collaborative contract approach as both companies' visions are closely aligned.
- Better contract conversations regarding safety, customer communication and efficiency, improving and obtaining good outcomes for both companies.
- Reduce management of individual contract costs and increase focus on improvements.



Hunter Water

Operational resilience

Clint Thomson

Group Manager System Operations

Background and context

Context

Hunter Water is located in the Hunter Valley, NSW. Head Office is in Newcastle, approximately 160 kilometres north of Sydney. Servicing approximately 570,000 customers (240,000 connections) across 6+ LGAs and an area of 6700km², Hunter Water provides potable water, wastewater, recycled water and limited stormwater

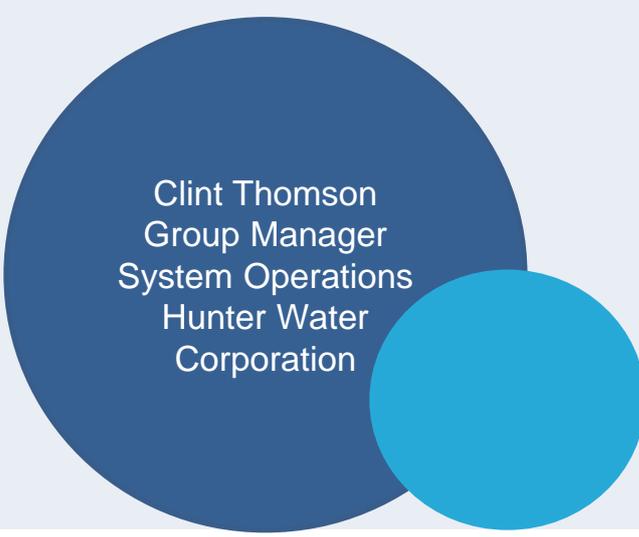
Key business drivers: At the time these changes were implemented the key business drivers were:

- Financial Sustainability
- Right Infrastructure

Background

In 2012, Hunter Water's strategy sought to maintain customer affordability and improve the financial sustainability of the organisation, whilst improving compliance in an increasingly challenging regulatory environment. These strategies are traditionally mutually exclusive, with the first response to improve compliance often being additional investment.

An optimised OPEX budget with a concurrent reduction in the planned CAPEX program, meant greater emphasis on other means to maintain let alone improve compliance. This led to a drive to improve operational resilience, after developing a clear understanding of necessary capability and capacity.



Clint Thomson
Group Manager
System Operations
Hunter Water
Corporation

Description of Leading Practice

Hunter Water sought to increase operational resilience through developing an incident prevention focus, improving the operational management of critical assets, implementing a clear escalation pathway for issues and incident response, and establishing a real-time, on-site after hours technical capability. A key initiative involved the establishment of a 24/7/365 System Controller role, facilitating a centralised go-to point for shutdown management, operational change risk management, real-time technical escalation and decision making, and incident management.

The System Controller is focused on identifying and acting on operational exceptions or trends, before they become incidents. The role functions in the same capacity both during and after business hours, enabling consistency in approach regardless of the time-of-day. The incident prevention focus has spread throughout the operations and front line customer service teams, and a competency tiered hierarchy has been embedded which sees exceptions or defects triaged and escalated according to the capability of the handling team. First (or earliest) contact resolution is a key driver in improving customer service outcomes.

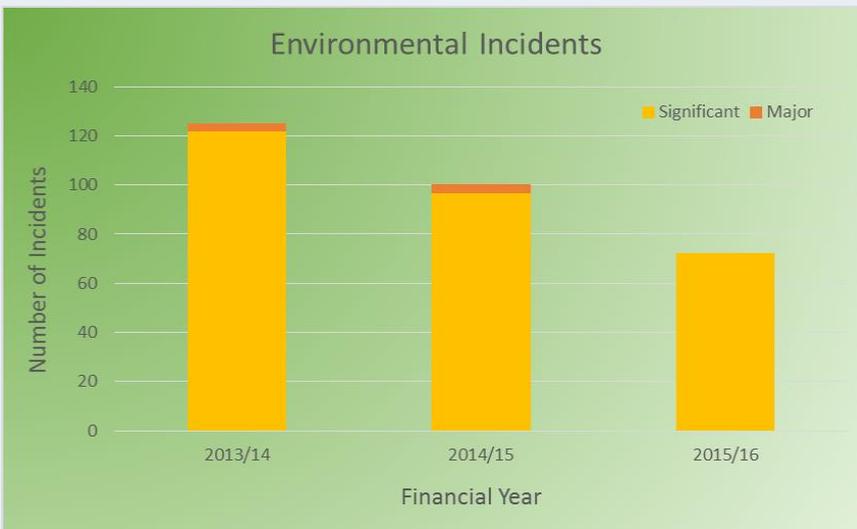
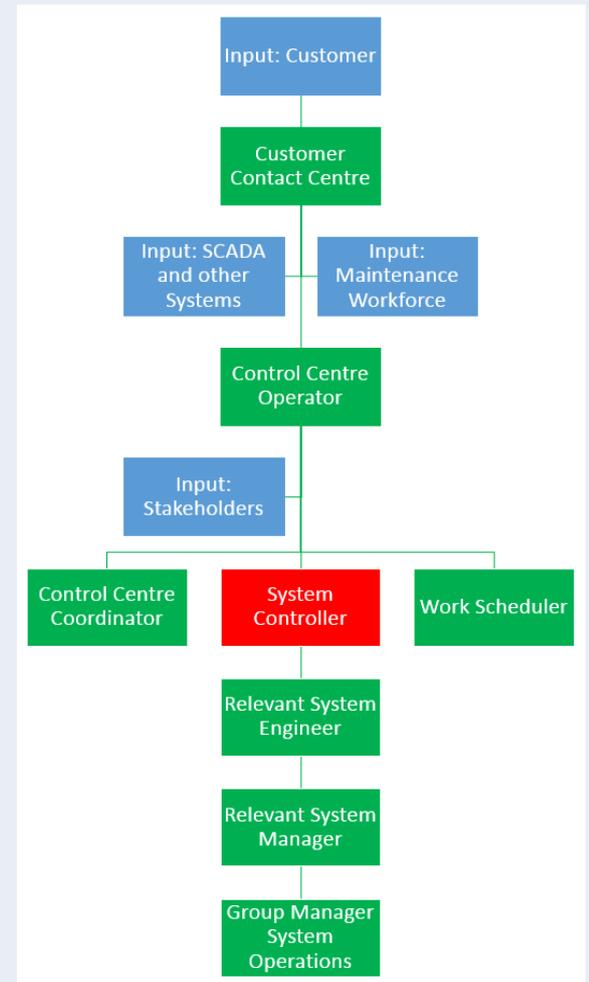
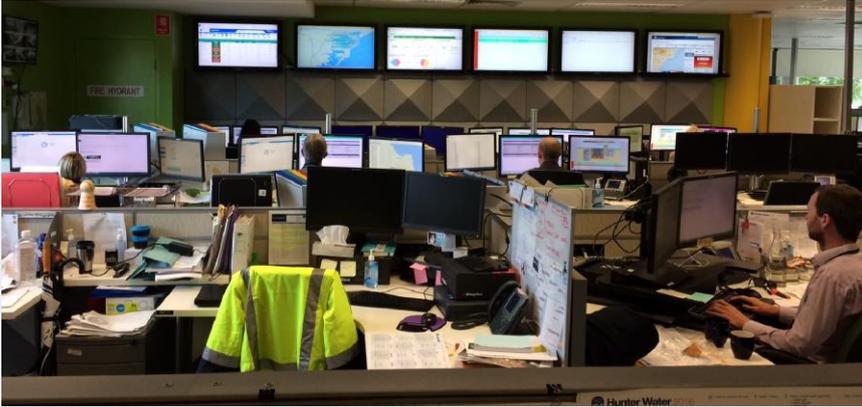
Complementary actions have included the categorisation of assets by criticality, implementation of an operational change management process, development of contingency plans for critical water and wastewater assets, the formalisation of procedures for operational activities, and redeveloping service level agreements with the maintenance service workforce. Enhancements have been achieved through incremental implementation of an alarm management framework, seeking to maximise the efficacy of alarm generation, prioritisation, and management. Further innovation includes smart reports from SCADA to support targeted investigation of pump station degradation prior to failure.

In addition, a revised holistic control centre management approach contributes through a collocated customer contact centre, and centralised scheduling and dispatch of first response and reactive work crews. These provide real-time communications capability (information in and out of the control centre), and the opportunity to triage and make informed decisions on whether alarms or other exceptions necessitate priority dispatch or call-outs.

These operational resilience improvements have been pressure tested through a number of major incidents including arguably Hunter Water's most challenging (the April 2015 Super Storm), have contributed to a year on year reduction in the number and severity of environmental incidents, and facilitate a rapid and consistent response, improving customer outcomes.

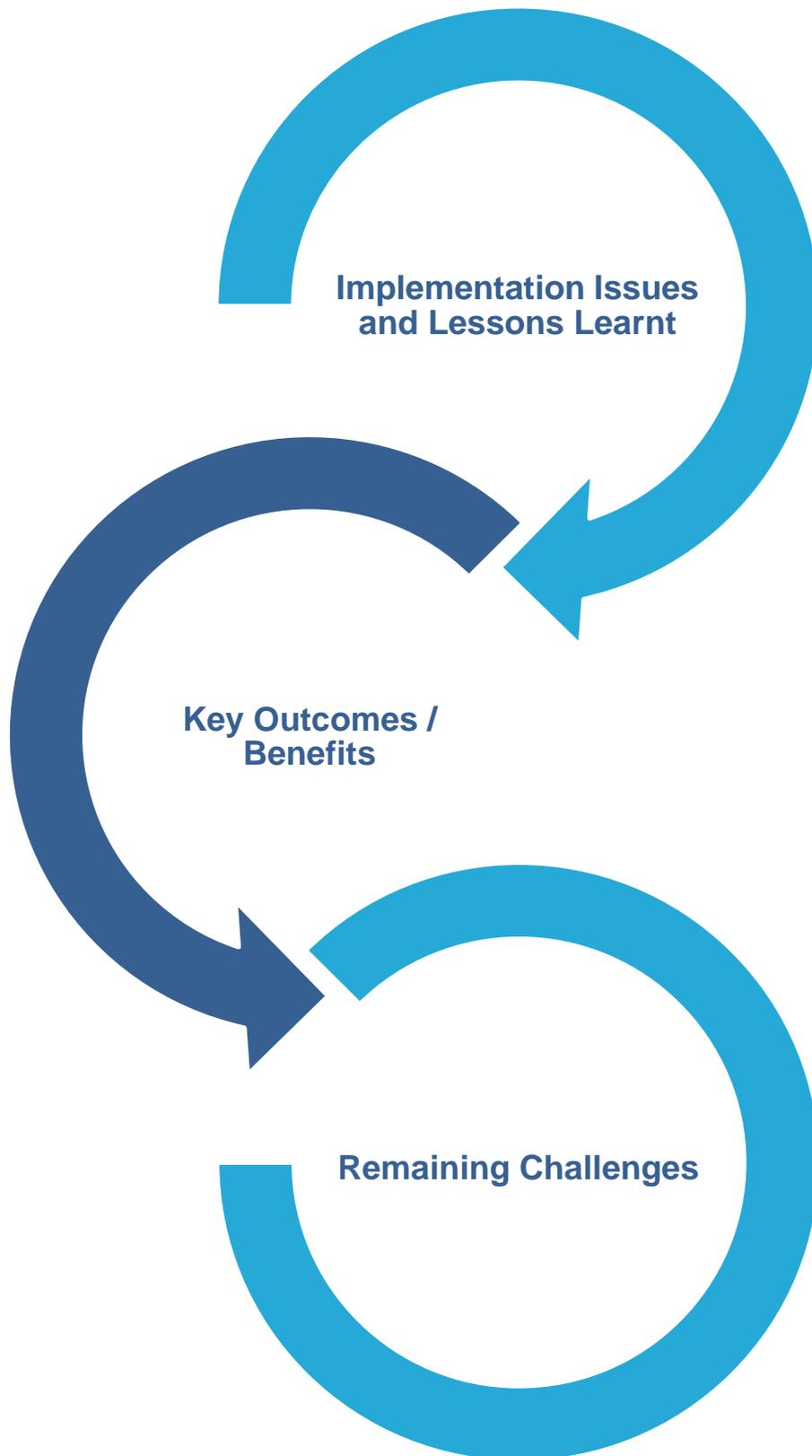
“Prevention is better than cure – though we can't prevent every potential incident...”

“Operational resilience relies on clarity of purpose, prevention, preparedness, and capability”



Images (top to bottom L, then R):

Hunter Water Control Centre under business as usual conditions, Expanded Control Centre during a major incident, Graph depicting an ongoing reduction in environmental incidents, Simplified process diagram depicting Control Centre workflow.



- Holistic approach was critical to a successful outcome.
- Clarity is essential – what, when, where, who, why, how.
- Incremental change management with all stakeholders is also essential – and must be consultative.
- For 24/7/365 roles, ensure the right conditions, and the right people.

- Incident prevention focus.
- Improved incident response.
- Improved customer service.
- Improved operational performance. and regulatory outcomes.

- Innovation – intelligent networks and advanced system control.
- Next generation mobility / work scheduling system.
- Asset proliferation and complexity (eg. LPSS).
- Streamlined access to asset information.

Customer Service and Engagement

Albuquerque Bernalillo County Water Utility Authority:
Customer interactions

Icon Water: Customer inclusive levels of service

Barwon Water: Customer interactions: Have Your Say on What You Pay

Yarra Valley Water: Determination of acceptable levels of service to customers

Icon Water

Customer inclusive levels of service

Lisa Quinn

Manager Customer and Community Affairs

Background and context

Icon Water is a medium-sized organisation, located in the Australian Capital Territory, It provides water and wastewater to over 170,000 customers.

Icon Water's Business drivers are:

- Excellence in asset management (ISO550001 certification)
- Meet customer needs, exceed customer expectations
- Customer values capture for business planning

Since early 2013, Icon Water (at the time known as ACTEW Water) has been through several restructures and a change to the entire executive team. The current organisation structure and strategic direction commenced in 2014, with a full rebrand in May 2015. This strategic shift was the catalyst for transforming the business on a path to becoming *the premier, most trusted water utility*. This would be achieved by focusing on four strategic goals:

- **Asset Management** – Excellence in asset management.
- **People** – A culture that protects engages and develops our people.
- **Customer** – Meeting customer needs, exceeding expectations.
- **Financial** – Sustainable financial returns and reduced gearing.

Icon Water understands the value of adopting a greater focus on the needs and expectations of the customer. Countless studies have documented the link between organisational culture and organisational performance.

Specifically, many studies show that a customer-centric culture drives superior service and value for customers resulting in an experience that creates customer satisfaction and advocacy. This in turn drives exceptional organisational performance in terms of productivity, innovation and financial performance.

One of our four strategic objectives is to achieve excellence in asset management. A key commitment is the revision of Icon Water's asset management framework to align with the international asset management standard *ISO55001:2014 Asset Management – management systems requirements*.

Understanding the needs and expectations of customer and stakeholders is an important input to strategic asset management planning. The CARE program underpins this endeavour.



Lisa Quinn,
Manager
Customer and
Community Affairs,
Icon Water

Description of Leading Practice



The program is designed to focus not only on providing excellent service to our external customers and stakeholders, but also target internal customer service and engagement.

When we think of customer service we immediately think of our external customers – the ones that buy our products and services. However, it is imperative to the success of Icon Water to provide great internal customer service.

For employees, internal customer service sets the tone on how our customers are treated. If internal customers are treated with kindness and respect, our external customers are more likely to be treated the same way.

The CARE program is practical, scalable and achievable. By focusing on connecting, assisting, reviewing and engaging, we can provide a continuous cycle of CARE for each other and our external customers.

	Element	Corporate initiatives (External focus)	Team-to-team relationships (Internal focus)	Personal commitment (Brand, reputation and trust)
"Delivering the customer experience"	Connect	Provide contemporary channels for quick and easy access.	Defined contact channels; clarity of roles; removal of bureaucracy.	Accessible and available; honour commitments.
	Assist	Ensure a seamless customer experience.	Ensuring interfaces are agreed, procedures documented and KPIs set.	Empowered to find solutions and willing to make appropriate decisions.
"Knowing and reaching the customer"	Review	Analysis and review of service delivery processes and customer values.	Agile and collaborative approach to continuous improvement informed by stakeholder requirements.	Flexible and open to change.
	Engage	Multi-channel approach to community engagement and education.	Knowledge sharing and solutions focused interactions.	Positive attitude, which ensures constructive and courageous conversations.

The key areas that CARE has made a difference in Icon Water include:

1. Strengthening our understanding of stakeholder views and priorities for services.

During the regulatory determination process for the 2013-2018 regulatory period, it was evident that ACT stakeholder views were unquantified. As part of developing the Business Plan for the 2018-23 regulatory period, Icon Water is engaging with stakeholders through our *Talking Icon Water* program to understand how customers want us to balance service and price, and determine their views and priorities with respect to the long-term delivery of water and sewerage services.



This program of work will demonstrate to the economic regulator over a period of time that engagement with stakeholders is an important part of developing Icon Water's Business Plan, and that our submission is likely to be acceptable to stakeholders. Some key desired outcomes we are seeking:

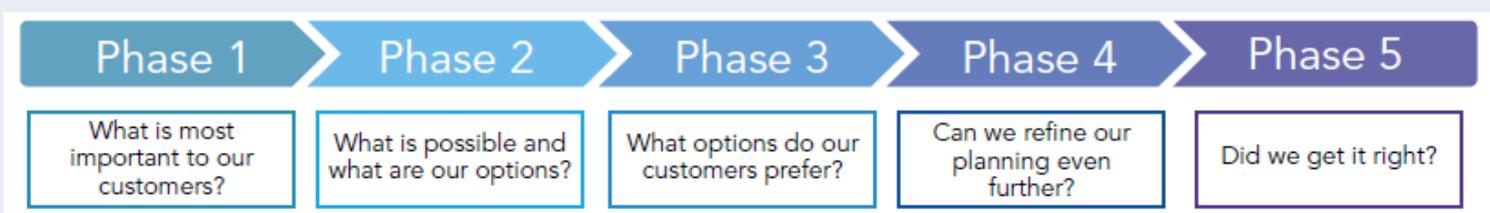
Define priorities and measurable outcomes

Measure willingness to pay for outcomes

Consider expenditure / service scenarios

Consider a range of target service levels

Our approach:



2. Appropriate customer and stakeholder engagement and awareness during projects

The Investment Planning and Approval framework (IPAD) is entirely focussed on ensuring that the right stakeholders are engaged at the right time with the right information. All projects in IPAD are tracked and managed in Icon Water's Project Management Information System (PMIS) which serves as a single point of truth that the entire organisation has access to. Engaging stakeholders early and providing ease of access to key information ultimately saves each project time in the long run by fast tracking reviews, approvals and delivery schedules.

Since implementation, the business has seen a reduction in customer complaints with relation to capital and business projects of 17.9% (as at 30 June 2016).

3. Root-cause analysis of service complaints

Icon Water takes a collaborative approach to continuous improvement which is informed by feedback through analysis of trends in customer complaints. Root-cause methodology is adopted to ensure there is a sustainable resolution and/or improvement in service delivery.

Two examples of such analysis have seen a 38% reduction in repeat sewer blockage complaints and a 26% reduction in sewer reimbursement complaints. Both are attributed to a business-wide approach to finding the root-cause, which has not only resulted in a number of internal efficiencies but most importantly a positive impact on customer service and experience.



- Meet with executives individually before formally proposing the strategy.
- Ensure the importance/priority of implementation of the customer management system was better understood.
- Cross-organisational consistency ensures a seamless customer experience.
- Empowerment at the point of interaction drives a solutions oriented approach.
- Engagement, segmentation and understanding customer values leads to better services.
- Community trust and high customer satisfaction.
- Implement the Customer Management System (ICT solution).
- Collect the right level of data.
- Refine internal service delivery KPIs.

Barwon Water

Customer interactions: Have Your Say on What You Pay

Betsy Anderson
Senior Regulatory Analyst

Background and context

Barwon Water is Victoria's largest regional urban water corporation and is located southwest of Melbourne and includes many smaller townships across a total area of 8,100 km². Barwon Water services the city of Geelong. In addition, a permanent population of 290,000 residents are provided with water, sewerage and recycled water services across 140,000 connections.

10 major water supply reservoirs	13 groundwater bores
11 water treatment plants	39 service basins/tanks
10 water reclamation plants	>6000km water and sewer pipes

Barwon Water decided to involve customers and stakeholders in the development of its 2018 Price Submission to the independent economic regulator - the Essential Services Commission, by asking – *What do you value most about your water and sewerage services and what do you expect in the future?*

Key business drivers for this decision included:

- **Customer focus** - A requirement of the organisation is to engage with customers in the development of levels of service, definition of problems, creation of solutions and through the understanding of costs and trade-offs.
- **Regulatory compliance** - New and changing service standards and levels of operational performance are being approved and monitored by an external regulatory body in areas such as product quality, service reliability, customer response and asset performance.
- **Determination and regulation of prices** - Increasing economic regulation in the form of price submissions being assessed by an external regulatory body.

The engagement program was an opportunity for the community to influence the services Barwon Water proposes to provide customers. It also provides an opportunity to influence the prices it proposes to charge in return for the five year period commencing July 1, 2018.

Betsy Anderson,
Senior Regulatory
Manager,
Barwon Water

Description of Leading Practice

Barwon Water structured its approach to engagement for the 2018 Price Submission over three distinct phases, each with its own objective:

- **Test Phase** – Engage with a small, representative sample of the community to confirm the content and methods by which, they would like to be more fully engaged.
- **Main Phase** – Engage more deeply with the community on those issues that are critical to the development of the 2018 Price Submission, based on the outcomes from the Test Phase.
- **Draft Submission Phase** – Release a draft of the 2018 Price Submission to the community for review, before it is finalised and submitted to the Essential Services Commission.

The Test Phase gathered information about front-of-mind issues that are of most importance to customers and tested community views around topics that Barwon Water had identified as potentially relevant to the 2018 Price Submission. The Test Phase showed there are many elements of Barwon Water’s business that the community has shown interest in. The Test Phase also identified how different parts of the community would like to be engaged in relation to the topics of interest to them.

The Main Phase was branded “Your Say on What You Pay”. It represented a multi-faceted approach to engagement which reflected outcomes from the Test Phase. A broad range of community views were sought via focus groups, surveys, one-one-one briefings, an interactive website and community information kiosks hosted around the region. These broad community views will be considered by a Community Panel to be convened in early 2017. The Panel will comprise of thirty randomly selected, representative customers from across Barwon Water’s service region, who will meet over four days to consider a wide range of information. The Panel will present its recommendations to Barwon Water’s Board and influence its decisions about future prices and services.

The Draft Submission Phase will allow the community to review and provide comment on the decisions taken by Barwon Water, prior to finalisation of the 2018 Price Submission.

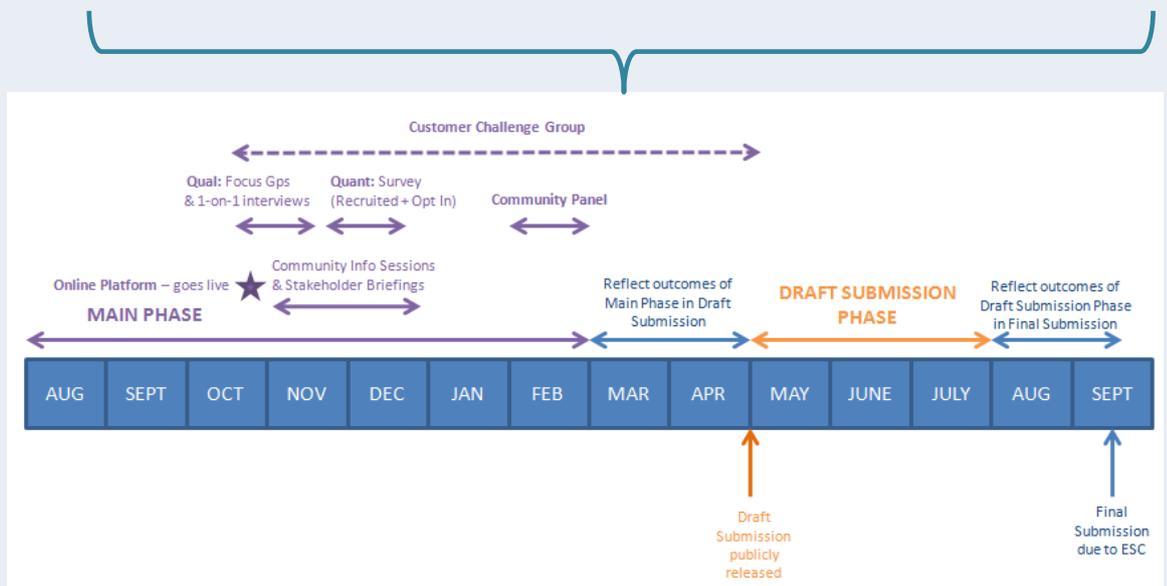
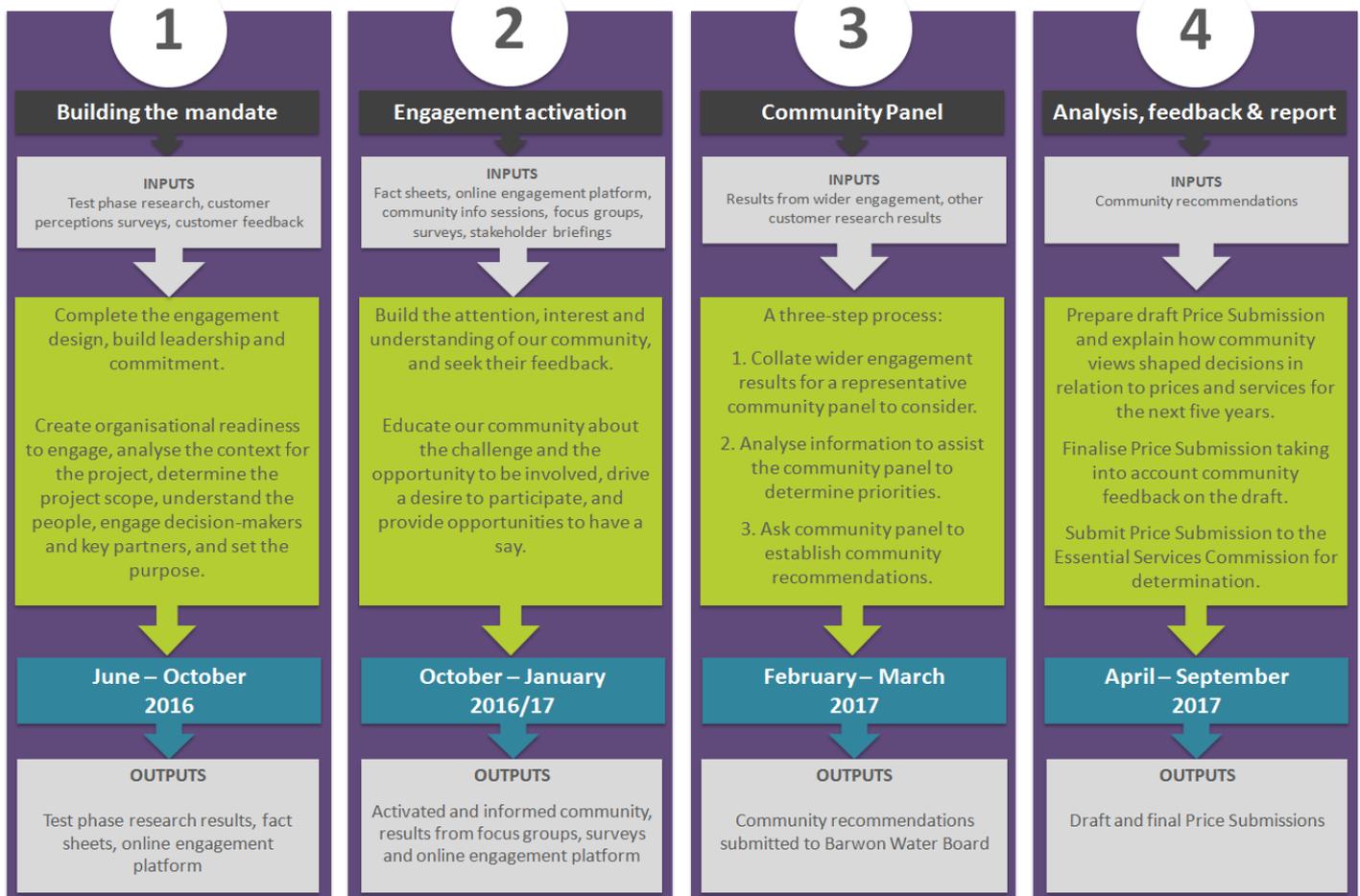
The engagement program has made a difference to Barwon Water by:

- Strengthening the voice of the community – by involving them early in the development of the 2018 Price Submission and by committing to listening and acting upon what they say; and
- Encouraging the business to think differently – by using new innovative ways of engaging and by challenging “business as usual” approach to service delivery.



“Community engagement can drive greater customer value”

Barwon Water, 2018 Price Submission – Engagement Roadmap





- Doing engagement “properly” takes a significant amount of time, effort and resources.
- A good rule of thumb – don’t ask the question if you’re not prepared to listen to the answer.
- Building commitment and support within the business, to both the process and the content, is a crucial first step.
- Understanding who you are engaging with is important – in our case, it is our “community of customers”.
- Fully equipped to navigate the new water pricing framework and approach of the ESC.
- Voice of the customer is being embedded throughout the business, not just for “key projects”.
- Customers feel like they genuinely “have a say”.
- Convening the Community Panel – uncharted territory for the business.
- Finding the balance between giving the community what it wants and keeping prices affordable and financially sustainable.
- Translating engagement findings into meaningful actions for the business.

Yarra Valley Water

Determination of acceptable levels of service to customers

Tarnya McKenzie
Manager Marketing

Background and context

Yarra Valley Water is located in Melbourne, Australia and is Melbourne's largest retail water utility. Our service area covers most of Melbourne's northern and eastern suburbs, across approximately 4,000 square kilometers.

Yarra Valley Water provides water and sanitation services to more than 1.8 million people. Our business drivers are:

- The Way We Work Enables Extraordinary Performance,
- We Provide Exemplary Services,
- We Work In Harmony With The Environment,
- We Are Safe, and
- We Stand for an Exceptional Water Industry,
- We Make Every Cent Count.

YVW manages \$3.6B worth of assets, has an operational budget of around \$100M and a Capex that can be \$300+M. We are a State Government owned corporation providing an essential service to \$1.8M people and are a monopoly operator in our business area.

Therefore, our performance has a significant impact on large proportion of Melbourne's population and reflects not only our company's reputation but plays a vital impact on the liveability of Melbourne. Being a monopoly business means that customers can't simply 'silently' switch providers if they are not happy with us.

Understanding what customers want and need from our services is vital for us to be able to provide the services they require.

What needed improvement?

It is easy for Engineers to talk about 'number of bursts per 100km of pipe' and to benchmark ourselves against other authorities...but do our customers care about that or is something else more important for them.

Tarnya McKenzie,
Manager
Marketing
Yarra Valley Water

Description of Leading Practice

A continuous Customer Engagement approach that enables us to create value by taking a thorough, curious and collaborative approach.

We attempted to contact over 90, 784 customers for performance feedback last financial year via phone and web.

4,291 Complete Responses via Phone and Web (approx 5% Response Rate)

28,540 Customer responses from Quantitative Research methods

Approx. 800 hours of engaging with customers on preferences, choices, attitudes, needs and service expectations.

We use the information from our customer research in the design of our infrastructure works programs.

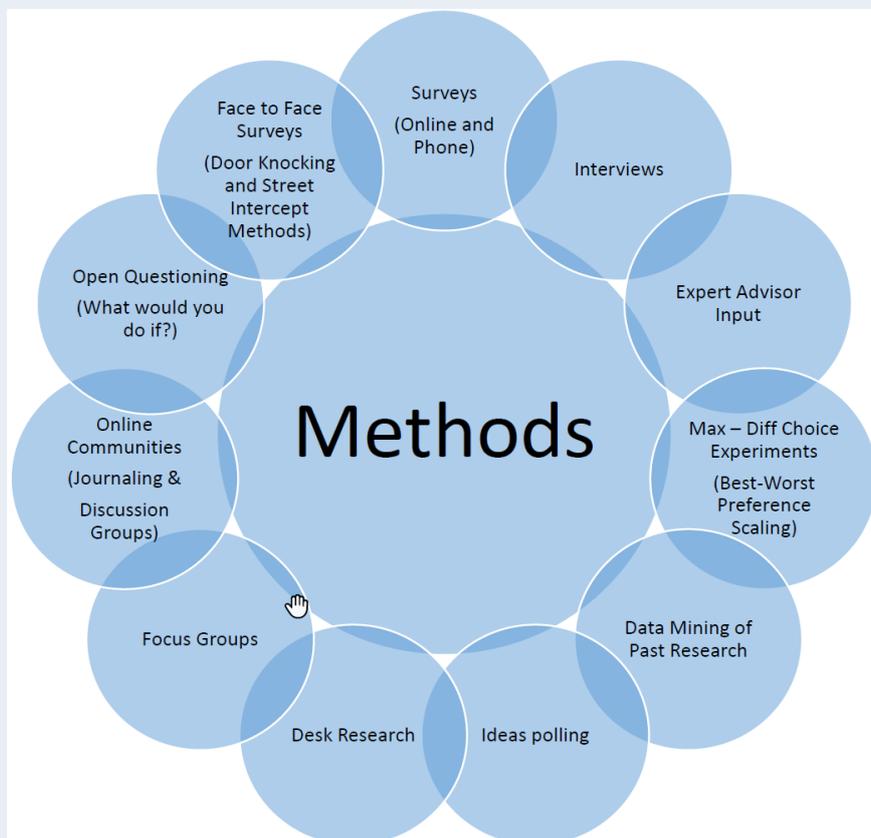
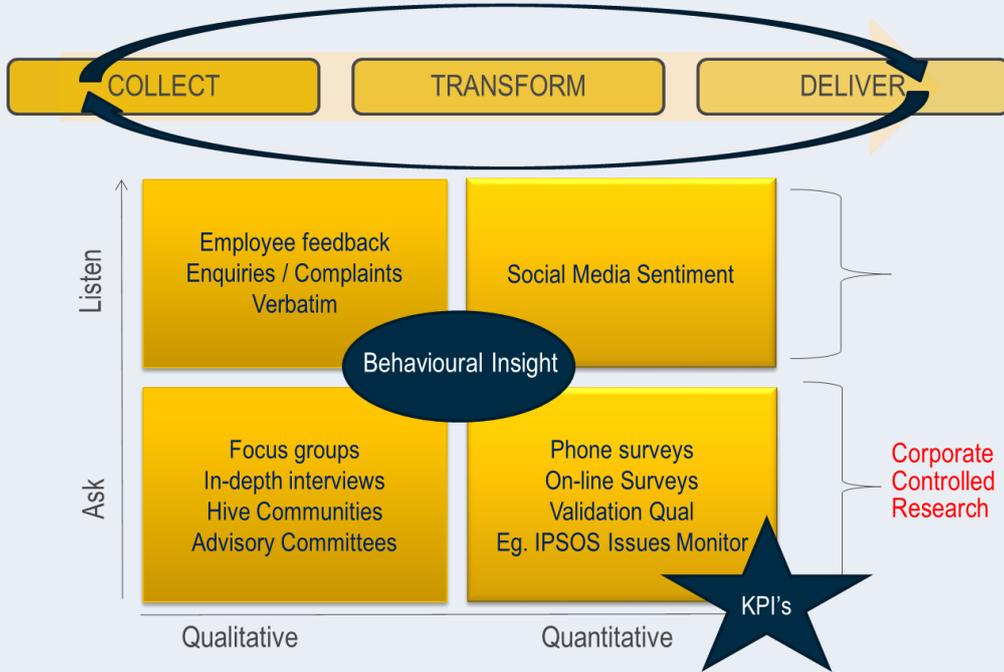
Customers are accepting of 1-2 service interruptions but become frustrated when there are repeat failures of the same issue. Therefore we have prioritised our efforts into preventing repeat service interruptions.

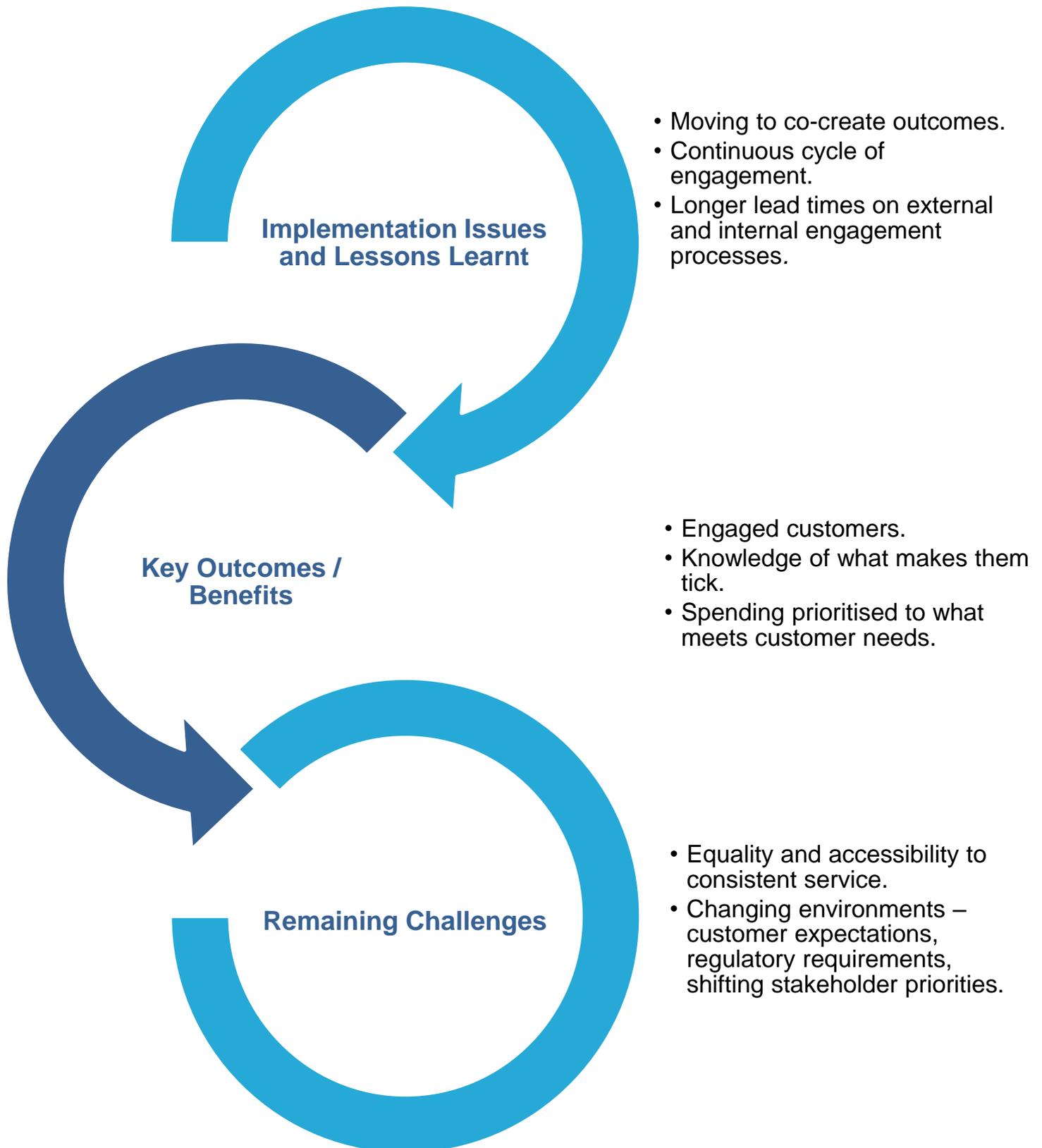
Customers have no appetite for a bill price increase regardless of an improved level of service.



“customers want us
to do what we say
we will dothey
want us to “be
consistently
consistent

SNAPSHOT OF YARRA VALLEY WATER VOC





Technological Advancements Within the Water Industry

Power and Water Corporation, Water Services: Rapid mobile application for meter replacement design

Queensland Urban Utilities: QHub access

South East Water: Prioritisation and traceability of maintenance work

Auckland Stormwater: Use of rainfall radar to predict system performance in real time

Power and Water Corporation, Water Services

Rapid mobile application for meter
replacement design

Thiru Waran
Manger, Asset Management

Background and context

Darwin NT

Power & Water Corporation provides water and sewerage services in the Northern Territory across five major centres. Also, water is supplied in 13 minor centres and sewerage services in five minor centres. Power and Water serves in total of 48,100 water customers and 59,300 sewerage customers (i.e. installations).

Power & water is progressively adopting mobile computer devices for the management of its assets using three applications:

- Water Meter replacement Program
- Maintenance of Linear Assets (currently being trialled)
- Responding faults and outages (currently being trialled)

The application for the Water Meter replacement program is presented here.

Key business drivers include:

- Operational efficiency gains in the end to end processes.
- Improvement in recording of assets and attributes in real time.
- Improvement in the governance of works.
- Improvement in customer satisfaction.

Power and Water Corporation has embarked on an accelerated meter replacement program to comply with the in-service compliance to meet the WSAAs guidelines and the Australian Standards 3565. The accelerated program required some 12,000 customer and commercial meters to be replaced over two years.

The original paper based manual system that was used in the meter replacement program required about a week from the time the meter was replaced for the information to be recorded in the billing system. With the number of water meters that are required to be replaced in a week in the replacement program, we expected that there will be significant backlog of meter information to be recorded in the retail billing system if we had continued with the current system. Hence we required a more efficient/mature process to capture meter data in order update customer records as quickly as possible to reduce any impact on the customer and to account for the correct billing of customers.

Analysis of determining which meters are to be replaced involved querying meters age and throughput. This was completed using ETL (Extract Transformation & Load) tools to query data and establish the meter replacement program.

Description of Leading Practice

- Mobile Application Built using Esri Products ArcGIS Online Capability.
- Database created to capture information regarding meter replacement program.
- Analysis Performed to determine the replacement program based on age and meter throughout.
- Contractor Captures details at each address takes photographs of Old Meter, New Meter and captures condition of upstands etc.
- Project Manager Monitors the progress of meter replacement in real time from the Dashboard (See Below).
- Reports on Meters replaced are forwarded on a daily basis to Customer Service and Billing Division.

Key Aspects:

Operational efficiency: The deployment of the solution took under two weeks – and its rapid adoption across the enterprise meant that Power and Water Corporation realised operational efficiency through more efficient use of resources. This had the added benefit of increase in the revenue through timely information received by the Billing Division.

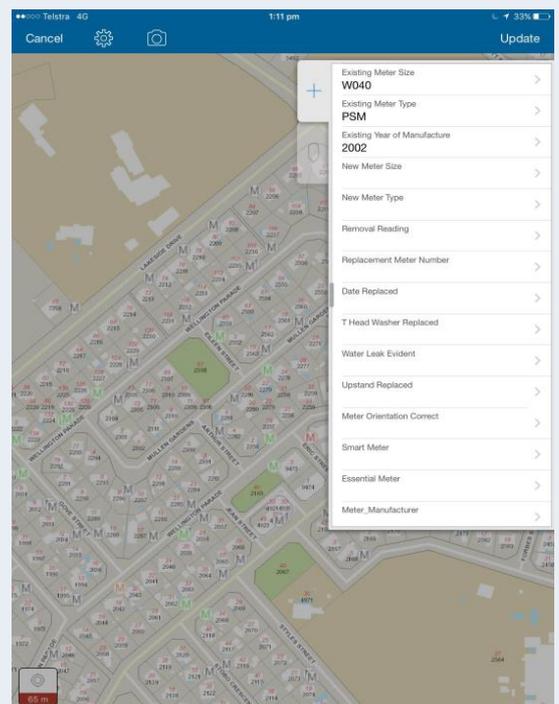
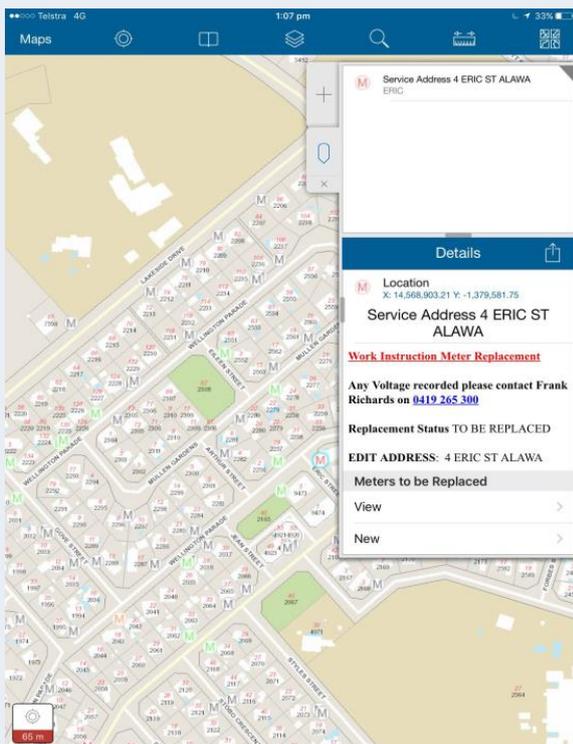
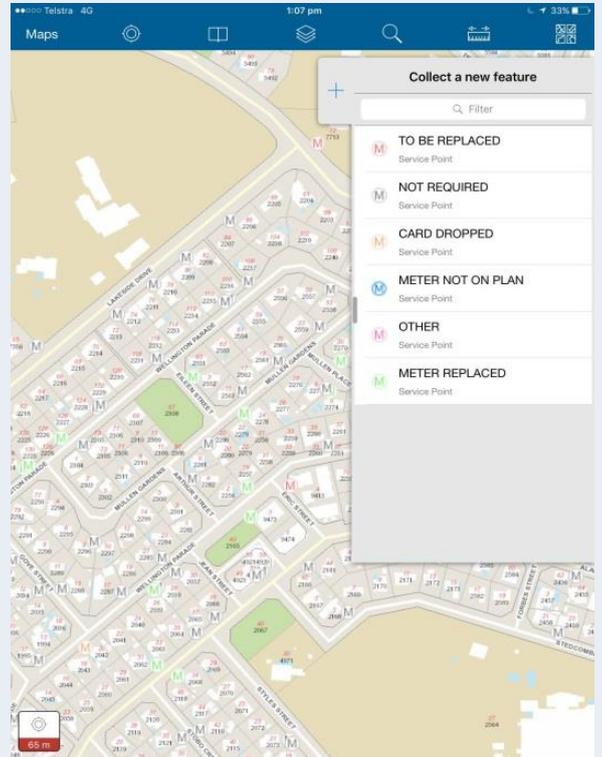
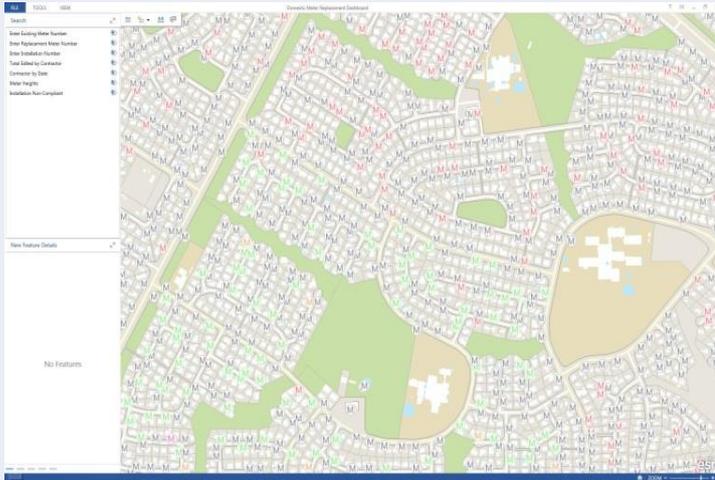
Automated reporting: The solution provides all stakeholders across the organisation with quick and easy access to quality data and a real-time view of operations.

Seamless, secure access for contractors: Contractors were given secure access to the app and able to log updates to the central system in near-real-time. Security parameters were set giving Power and Water Corporation the confidence to allow contractors to access and use their app out in the field.

Large efficiency gains: Broad gains were experienced across the workflow that enabled the project to be completed much quicker than expected. In some cases, it formerly took weeks to log data was reduced to mere minutes now. Additionally, while 20–30 meters were projected to be replaced each day, in practice there was an average daily replacement of 40–50.

Strengthened data integrity: As a single-point-of-truth, the solution strengthened Power and Water Corporation's data integrity by providing a streamlined data collection process that removed the risk of misallocated of data, data loss and duplication of data.

Easy information access: The system's user-friendly interface allowed the project manager and staff to make confident and timely decisions about the rollout, instantly visualise data gaps and rapidly access and analyse information pertaining to physical infrastructure and environmental assets by simply clicking its location on a map.



Implementation Issues and Lessons Learnt

- Ensure IT System Data is integrated, and IT Business Systems have one Source of Data.
- Don't assume everyone knows how to use an iPad.
- Having Mobile Device Management tools would make updating a number of Devices a lot easier.

Key Outcomes / Benefits

- More accurate data capture and completeness.
- More efficient processes.
- Better visibility of contractor performance.
- Efficient utilisation of resources and savings in operational costs.

Remaining Challenges

- Keeping up with demand for further mobile applications, e.g. Condition Assessments.
- Ensuring out IT architecture is adequately setup and resourced to support the development of Mobile. Applications, e.g. adequate resourcing
- What to do with Captured Data, What data gets stored where?

South East Water

Prioritisation and traceability of maintenance work

Declan McCreesh

Water & Sewer Civil Maintenance Manager

Sebastien Piquet

Acting Network Quality Manager

Background and context

South East Water covers the areas of Eastern Melbourne CBD, Eastern and South East Suburbs. Over 700,000+ customer connections / 1.7 million people serviced for water, wastewater and recycled water services.

Montage has been utilised by South East Water since its introduction in 2008. It is an in-house works management system which was introduced to manage the operations and maintenance activities. In 2013 the transition from an alliance model to out-sourced maintenance contractors meant that a number of changes were required to Montage including the development of supporting tools such as Mobile Field Capabilities and reporting systems. These changes have meant that resources including labour, plant and materials can be captured against each task so that the real cost of maintenance can be understood. In the time since the change in the contract model, a number of other enhancements have been implemented such as: the introduction of Insight, a BI reporting tool, a task monitor to allow easy prioritisation of work, improvements to the dispatch screen capabilities to easily identify task requirements such as traffic management, and the use of real-time information to improve the customer experience such as South East Water Live and water supply interruption notifications via text and email.

Declan McCreesh, Water
& Sewer Civil
Maintenance Manager,
Sebastien Piquet, Acting
Network Quality
Manager,
South East Water

Description of Leading Practice

1. With a large portfolio of assets requiring reactive and proactive maintenance activities, South East Water requires a mature works management system to allow the activities to be easily managed and supported by other systems to promote customer value and easy reporting. South East Water uses an in-house system called Montage to manage operations and maintenance tasks. This is integrated with Insight to provide powerful reporting capabilities and Pulse CRM to allow real-time information to be communicated to our customers through a live webmap and email/SMS notifications. The ability to report accurate and timely information is only possible by utilising robust and dependable field devices including laptops and mobile phones. This has been achieved by having in-house development staff working with operational staff to ensure that the system delivers the best value. It is through regular reviews and the flexibility of the system that regular enhancements and improvements are captured and delivered.

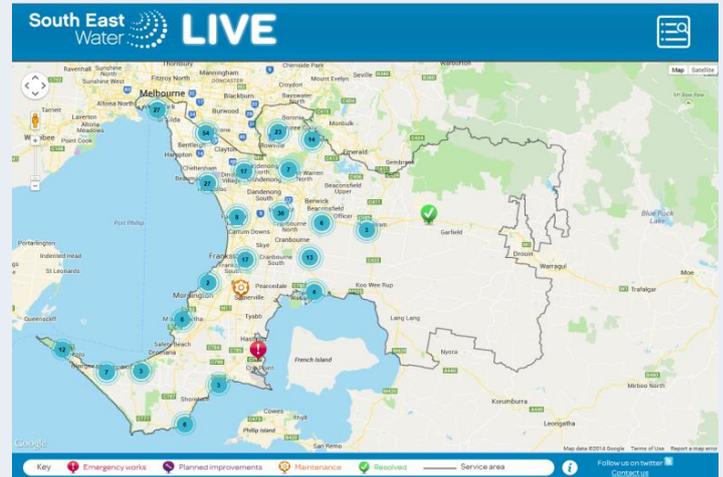
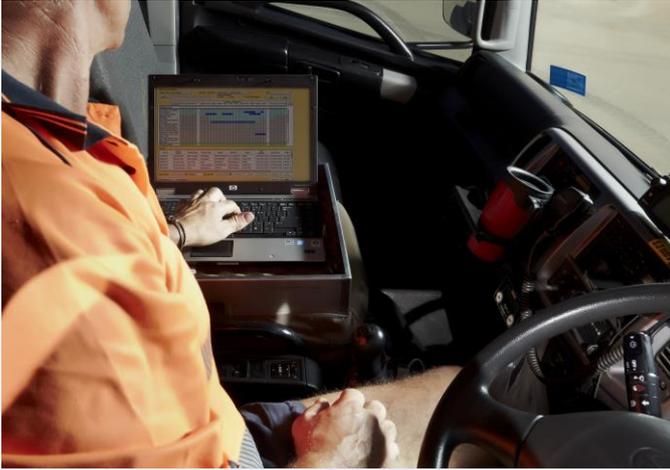
The screenshot displays the Montage system interface for a specific job. Key sections include:

- Job Details:** Job Number 456609, Problem Owner South East Water, Job CCT 1 Water Network - Water Supply - Restrict supply, Status Open, Priority, Creator Snell, Bemadette, Created Date 20/10/2014 11:56, Problem Address 17 HANNAH STREET, SEAFORD VIC 3198.
- Task 001:** Facility, Task Address (17 HANNAH STREET, SEAFORD VIC 3198), Request CCT Water Network - Water Supply - Restrict supply, Task Priority 10, Created Date 20/10/2014 11:56, PO Department, PO Supervisor, Contractor South East Water, Creator Snell, Bemadette, Department SEW PriorityPlumbing, Supervisor, Primary Allocatee, and an Allocated List table.
- Task Story:** [Snell, Bemadette] [20/10/2014 11:56] [AWARDED] Property Number:51N//11058/16
- Request Details:** PLEASE RESTRICT WATER SUPPLY, Outstanding amount : \$1177.90, Meter Number :SATM030947, Meter Location : 99 2T
- Action Taken:** Water Network - Water Supply
- Asset List:** A table with columns for Edit Asset, Asset, and Parent.
- SI List:** A table with columns for Edit SI and SI Name.
- Status:** AWARDED, CPA
- Buttons:** Task Detail, WSI, Attachment List, History, Key Events, Print.

“Leveraging the use of our in-house works management system to provide healthy water for life”

2. The system utilises a powerful works management system which is supported by field terminals and mobile field devices to allow information to flow seamlessly between the field and office.

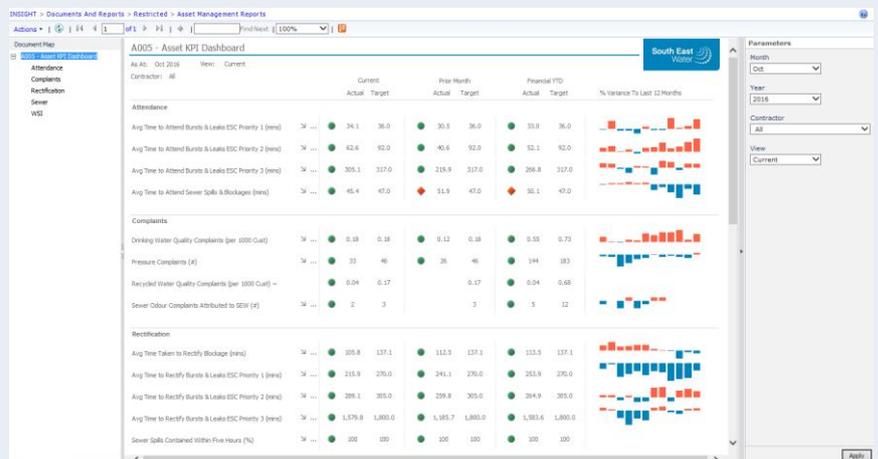
The ability to capture photos, status information, labour and plant resources and times and additional information is crucial in the management of the activities.

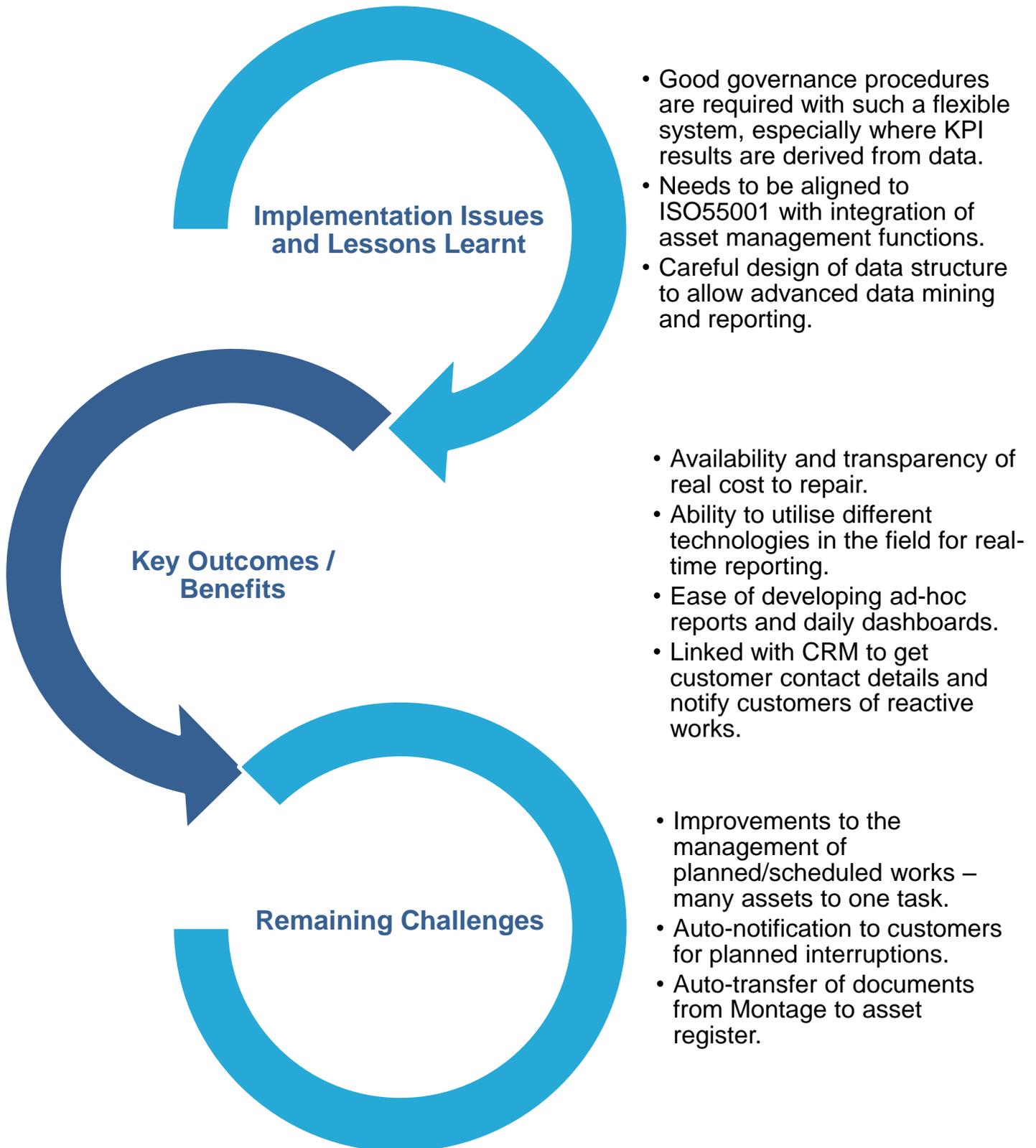


3. The ability to capture real time information has meant that relevant information can flow from the field to the office and out to customers including the South East Water Live website which allows customers to see information on tasks being carried out in their area and any water supply interruptions that may be in progress. Labour and plant is captured as resources in the task with rates which allows tracking of the real cost of the maintenance task.

Insight reporting has allowed the business to not only run regular reports and dashboards to monitor asset and contract performance but also to run ad hoc queries to make more informed decisions on a day to day basis.

Databases linked to Montage means that information collected on Routine maintenance tasks can be analysed and interrogated and maintenance regimes adjusted where required.





Auckland Stormwater

Use of rainfall radar to predict system performance in real time

Nick Brown
Flood Planning Manager

Background and context

Located in Auckland, New Zealand, Auckland Council employs 120 staff, servicing the Stormwater network of 1.5 million customers within a 6000km² area.

The core data needed to run and understand our business was difficult to access and available to only a handful of staff who weren't ultimately responsible for decision making.

As a stormwater utility some of our most important information is that related to extreme weather events. Where rain is falling, how much rain there is, what is happening in our streams and rivers, who has been flooded and where, and how they're affected – are the things we need to know as a rainfall event occurs. Without detailed information about the event and its' consequences we cannot hope to manage that event. In the Auckland region we have 233 relatively steep watersheds and no large rivers, with average watershed sizes of 2000 Ha, there is very little time between rainfall occurring and flooding of homes.

Our rainfall, stream flow and customer complaint data were all held in proprietary software which was locked down to a few staff and required specialist training just to access the software and view the data. Rain radar images from the national weather provider were provided after the event. Rainfall occurs at any time of day, outside of standard operating hours only a portion of the trained staff were available. Whilst the system worked it put pressure on a few key individuals every time a large rain event occurred.

In addition to the opportunities within our part of the council business the procurement strategy for the organisation changed. The strategy recognised that as an organisation with a \$380M per annum professional services spend we have the ability and responsibility to the NZ economy to support local businesses to develop and grow.

We explored the use of the cloud to store and visualise data for other parts of our business (CCTV condition data).

We recognised if we could make proprietary data visible via the cloud to a wide range of people in an intuitive GIS based environment we could better fulfil our function as a Stormwater Utility.

Description of Leading Practice

In order to make proprietary data visible via the cloud to a wide range of people in an intuitive GIS based environment “Storm-I” was created. Storm-I is the overarching programme which seeks to unbundle information from proprietary platforms and make the information available to more people. Storm-I has dramatically enhanced our ability to access, utilise and visualise key business information including; CCTV condition and connectivity data, Rainfall and Stream Flow Data and analysis, Rain Radar data and analysis, Request for Service customer complaint information, Capital works projects, Hydraulic models, floodplains, overland flow paths.

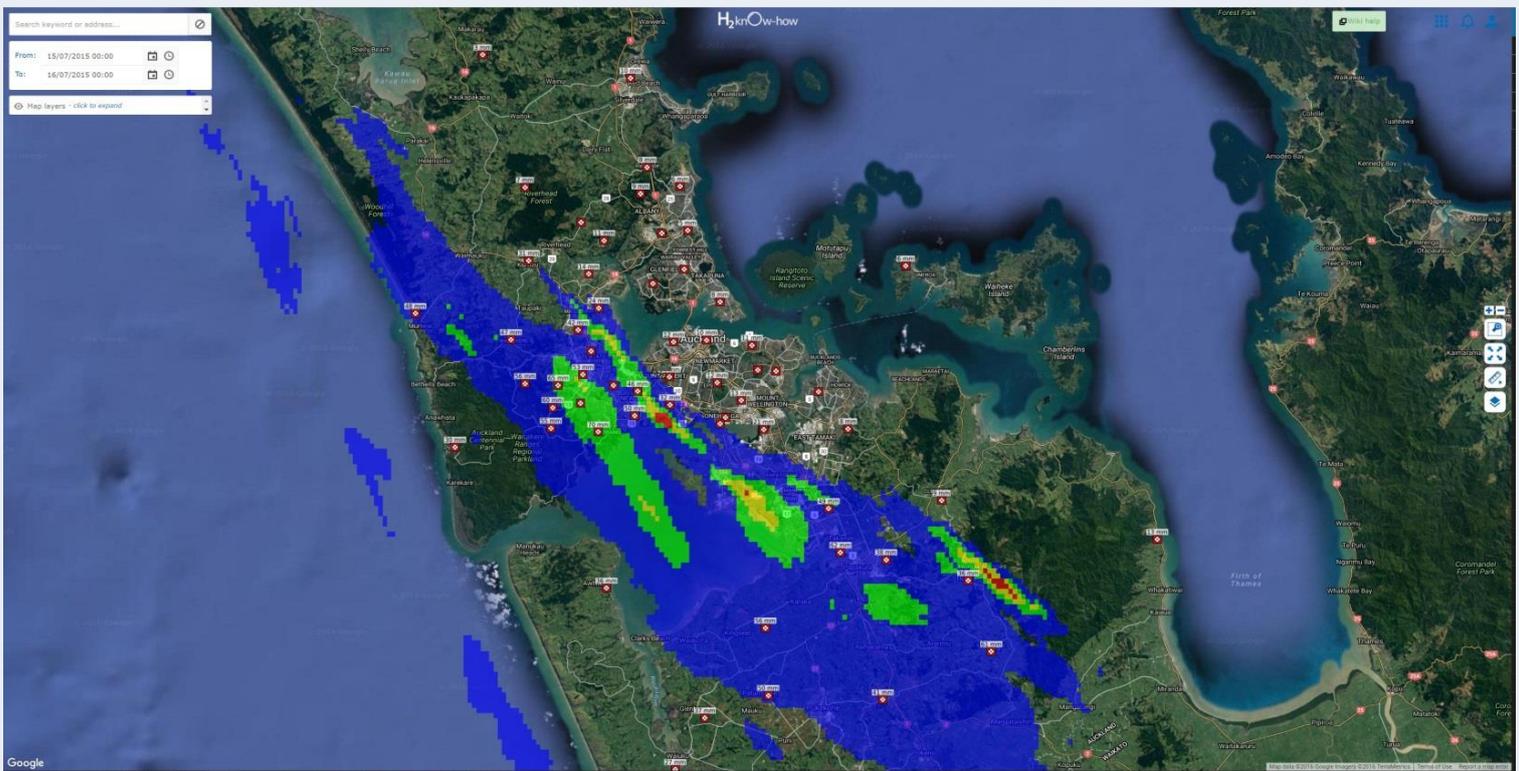
The rest of this case study focusses on the rainfall part of Storm-I. A strategic relationship was formed with a key supplier who was ahead of the rest when it came to serving up geographic data hosted from the cloud. A live feed was taken from our telemetered hydrographic data – Rainfall and Flow. A live feed of the national weather service providers (the MetService) rain radar was negotiated and ingested – the first time this data has been provided outside of the MetService. The rain radar reflectivity data was corrected using our rain gauges to gain estimates of rainfall for the region. Extreme rainfall statistics were incorporated into the system. As soon as the rain falls the recurrence interval is estimated and the spatial distribution plotted.

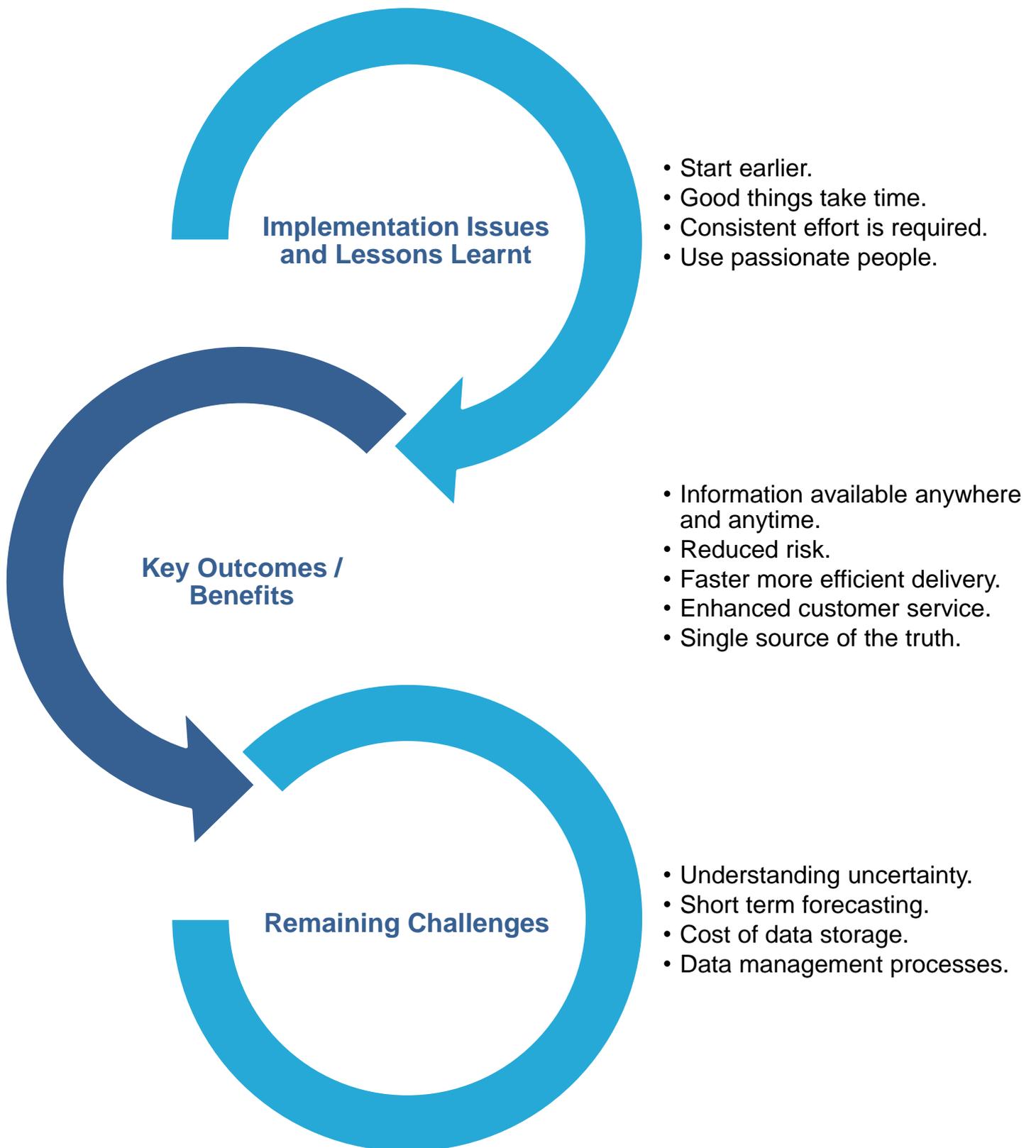
Moving from proprietary binary data to flat file format cloud based data not only allowed many more users to access the information it also allowed the data to be viewed spatially on aggregate for the first time.

The time taken to understand what rain has fallen and where is 1200 times faster than prior to the system being enabled. The information is used to reliably and consistently inform senior management on the magnitude of the storm event.

Estimates of rainfall in ungauged parts of the region are now available allowing proactive investigation of areas even if no complaints have been received.

The spatial distribution of rainfall is understood and is input into hydraulic models to validate flood events prior to determining capital works solutions to alleviate flooding.





Integrated System Planning and Investment Prioritisation

Sydney Water: Integrated system planning

Unitywater: Asset Criticality

DC Water and Sewer Authority: Linking strategic planning to process improvement

Icon Water: Investment prioritisation and decision-making process (IPAD)

Sydney Water

Integrated system planning

Anil Jaiswal

Collaborative Services Planning Manager

Background and context

Sydney Water covers all operational areas of Sydney, the Blue Mountains and Illawarra Region. It provides water, wastewater, recycled water and stormwater products, systems and assets.

Key business drivers: Infrastructure investment related to growth, renewal, reliability, regulatory changes, climate change, technological changes, liveability, customer expectations etc.

Sydney Water is tasked with the challenge of meeting the current and future needs of a rapidly growing city, and understanding the impact this has on complex and interdependent existing and aging assets. Customers now expect more than just clean drinking water when they turn on the tap or a wastewater system they don't need to think about. External influences such as changes in growth; climate change; a regulatory environment that continues to evolve; technological advances; and energy prices also need consideration.

Traditionally, planning was generally undertaken to address a particular investment driver and frequently did not look beyond the current operating environment. Planning was siloed, with a growth project not fully considering renewals or resilience and vice versa. Networks and facilities were planned independently without considering broader system impacts and opportunities.

Plans were frequently sub-optimal due to this siloed approach, or quickly out of date due to changes to key assumptions.



Anil Jaiswal,
Collaborative
Services Planning
Manager, Sydney
Water

Description of Leading Practice

As a result of an ambition to increase efficiency and optimal short and long term investment solutions as well as better informed communities and stakeholders, Sydney Water has developed - and continues to develop - an integrated and collaborative approach to planning. This will provide improved outcomes in an increasingly complex planning environment.

Sydney Water's recent planning journey has been an evolution from a single driver approach to one that considers multiple investment drivers, asset classes (network and treatment facility) and products (potable water, recycled water, wastewater and stormwater).

The first stage of this evolution involved integrating investment drivers at treatment facilities via the Facility Blueprint process, so that expenditure could be optimised based on an improved understanding of all risks, issues and opportunities faced at the facility. Subsequently, the Strategic Network Integrated Planning (SNIP) process was developed to achieve similar outcomes within the water and wastewater networks. The next advancement in planning was combining Facility Blueprints and SNIPs into System Blueprints. This approach brought together the network and facility into a whole of system approach to planning taking into account all the current/future drivers and both tactical and strategic drivers such as renewals, reliability, growth, liveability etc.

The most recent advancement in planning within Sydney Water has been the integration of drinking water, wastewater, recycled water and stormwater planning in order to facilitate even greater efficiency and improved delivery against corporate objectives.

One application of this process was during the strategic planning undertaken for the Greater Parramatta to Olympic Peninsula (GPTOP) Growth Area. The initial stage of the process focussed on understanding project objectives, and the specific risks, issues and opportunities relevant to the study area. From this, product specific "concepts" could be developed to maximise opportunities, minimise risk and address issues.

Taking a whole-of-system approach that considers all investment drivers and understands the system risks, issues and opportunities, enabled alternative servicing approaches to be identified. It is unlikely that these solutions would have been derived using traditional planning processes. Investment has been optimised across water products, asset classes and investment drivers. Key enabling actions have also been identified to ensure that solutions benefitting stakeholders and the community can be implemented.

Figure 1: Robust 5 year investment plan aligned to the 30 year strategy

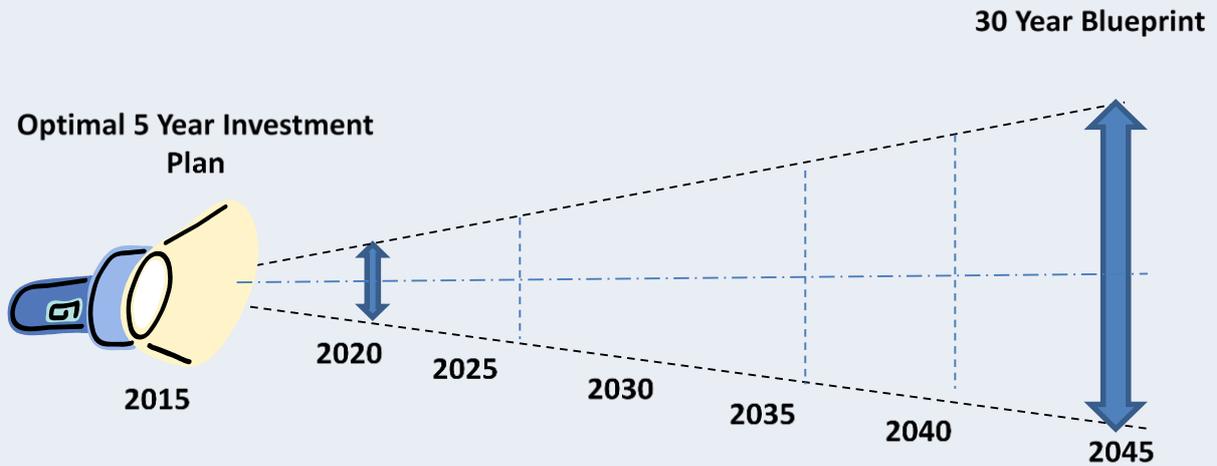
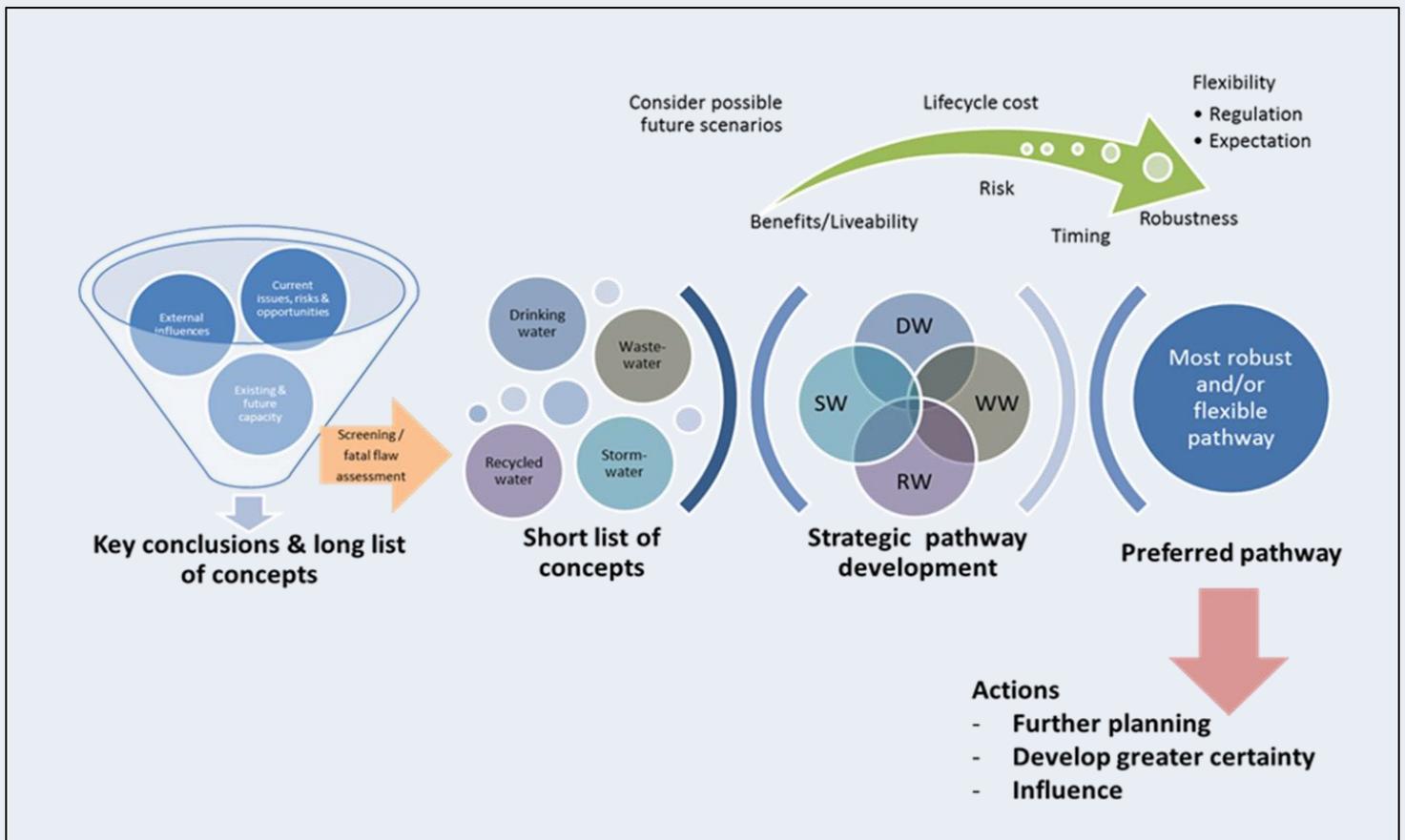
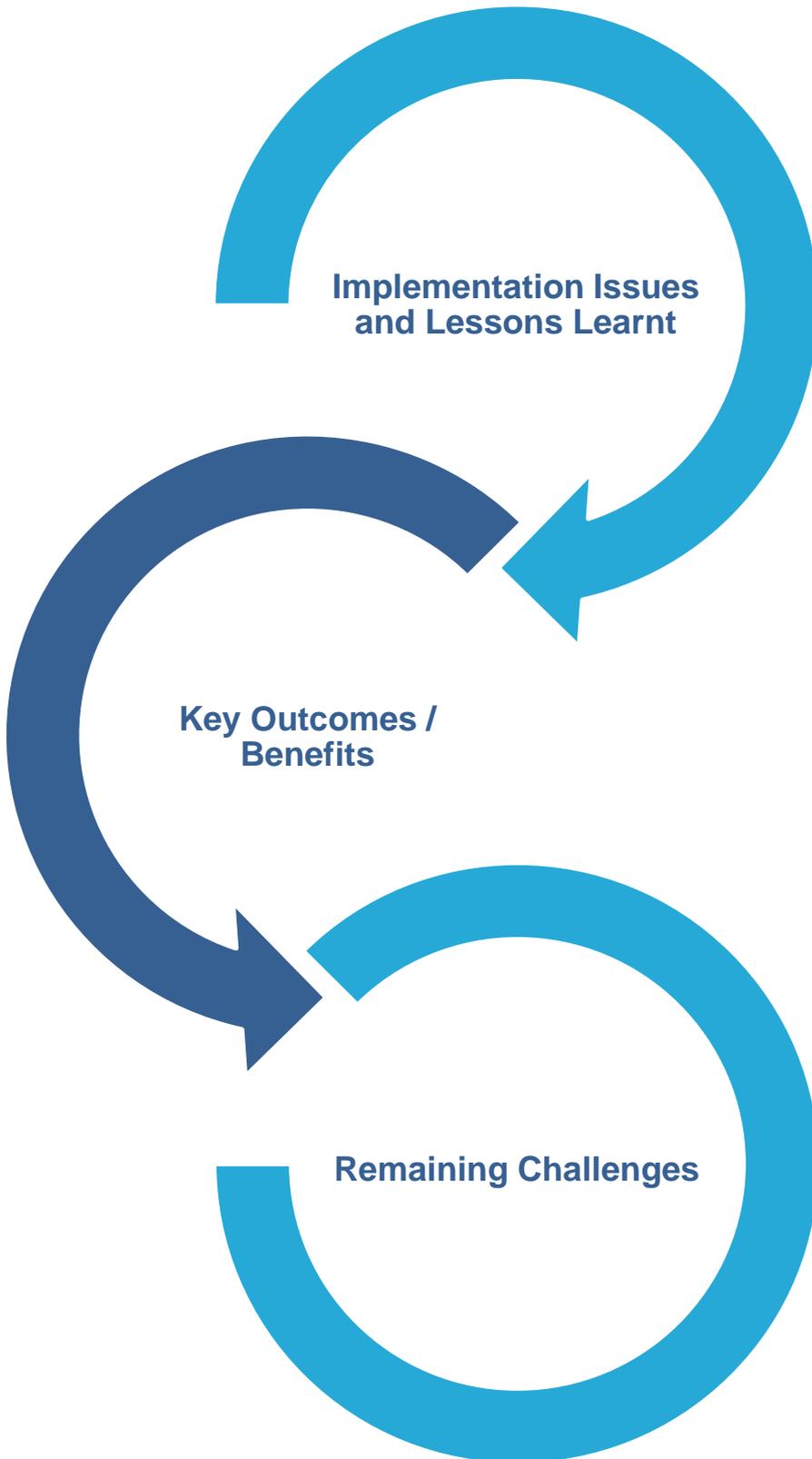
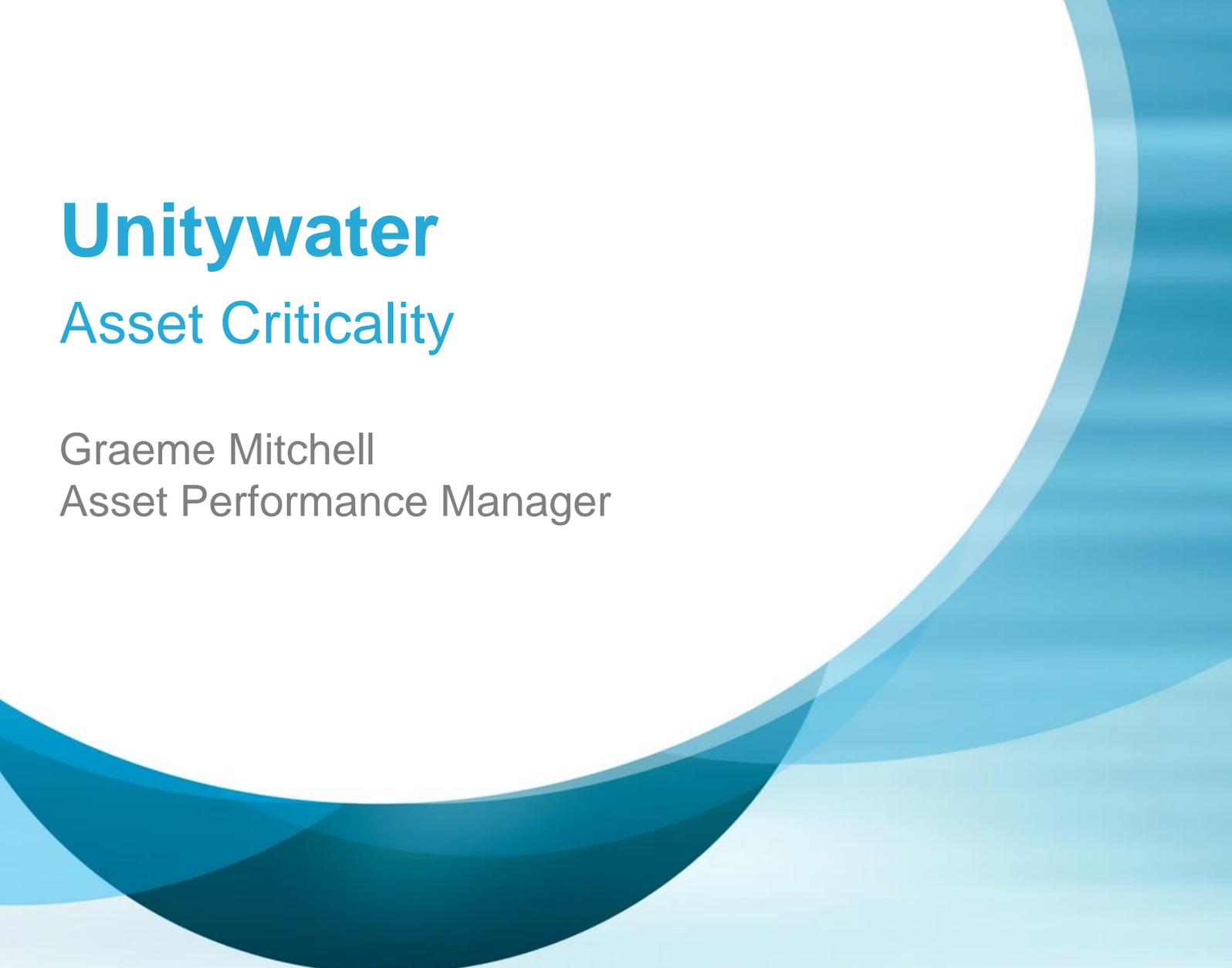


Figure 2: Planning process adopted for Great Parramatta to Olympic Peninsula project





- Start with an action implementation and governance framework.
- Use in-house resources for data mapping and problem definition.
- Maintaining currency of analysis and recommendations with rapidly changing growth rates and asset knowledge.
- Stronger collaboration, knowledge transfer and capacity building between asset operators and planners.
- Better portfolio management due holistic planning (less siloed).
- More robust investment plans due to better evidence base / data quality.
- More efficient capital spend and/or better service outcomes at equivalent cost.
- Embedding integrated planning process as core competency
- Improving maturity of geospatial data mapping for planning.
- Developing a mature feedback loops to ensure actions are implemented and new/emerging issues are logged early.
- Introducing more customer insights and preferences to the planning process.

A large, stylized blue circular graphic that is partially cut off by the right edge of the page. It consists of several overlapping semi-circular segments in various shades of blue, from light to dark, creating a sense of depth and movement.

Unitywater

Asset Criticality

Graeme Mitchell

Asset Performance Manager

Background and context

Unitywater is an asset intensive water utility service provider owning an asset base of \$3.1b in value. In order to meet its strategic goal to reduce the total cost to serve, prudent and efficient investment decisions are required to both maintain these assets and facilitate growth within the region.

For efficient and effective decision making and prioritisation, identification of critical assets will allow Unitywater to manage its asset base appropriately and at the right level to ensure continuity of the service at the lowest cost.

While asset managers endeavour to balance risk, cost and performance asset failures are inevitable and the impact of the failures will depend on the operating context of the assets, performance standards and the type of failure. Knowledge and understanding of the impacts on the business of failures is crucial to ensure prudent and timely asset interventions.

At present, resources are allocated based on the known asset performance or condition with some consideration to failure impact based on tacit historical knowledge. There is no systematic approach to assess impact of failures aligning with corporate objectives and risk management.



Graeme Mitchell,
Asset Performance
Manager, Unitywater

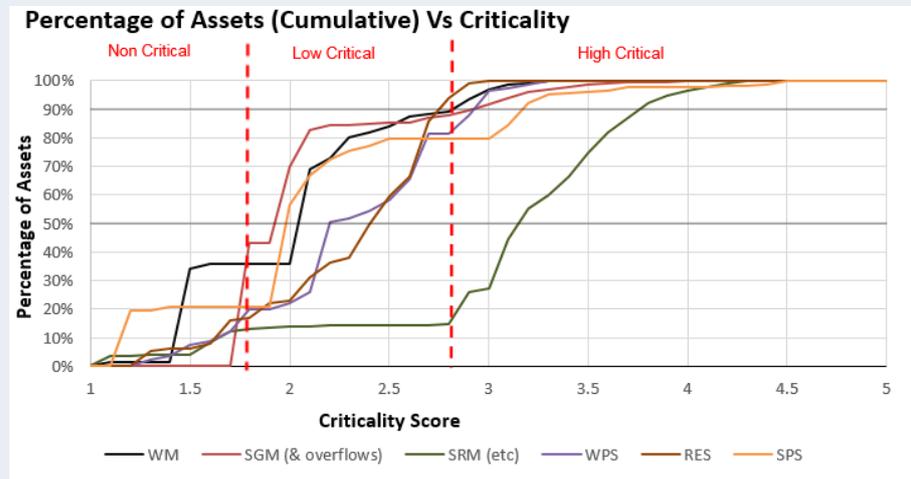
Description of Leading Practice

- ISO 55000 defines a critical asset as an “*asset having potential to significantly impact the achievement of the organisation's objectives*”.
- Unitywater’s approach to criticality assessment is utilising the existing Unitywater corporate risk framework. This approach was adopted because:
 - The assessment aligns with corporate strategic objectives
 - Organisational single view of risk (likelihood and consequence)
 - It enables the development of intervention programs reflecting the risk appetite of the business
 - It provides ability to monitor, report and improve the effectiveness in achieving the corporate goals
- The assessment of consequence is undertaken by assessing the impact of assets in its worst credible failure mode which incorporates the elements of FMECA methodology. Impact of failure is assessed against each of eight risk categories;
 - a. Financial;
 - b. Reputation;
 - c. Environment;
 - d. Health and Safety;
 - e. Service Disruption;
 - f. Compliance;
 - g. Business Interruption;
 - h. Strategic.
- A scoring system of 1.0 to 5.0 for each risk category was developed to assess the consequence in quantifiable manner across various asset types.



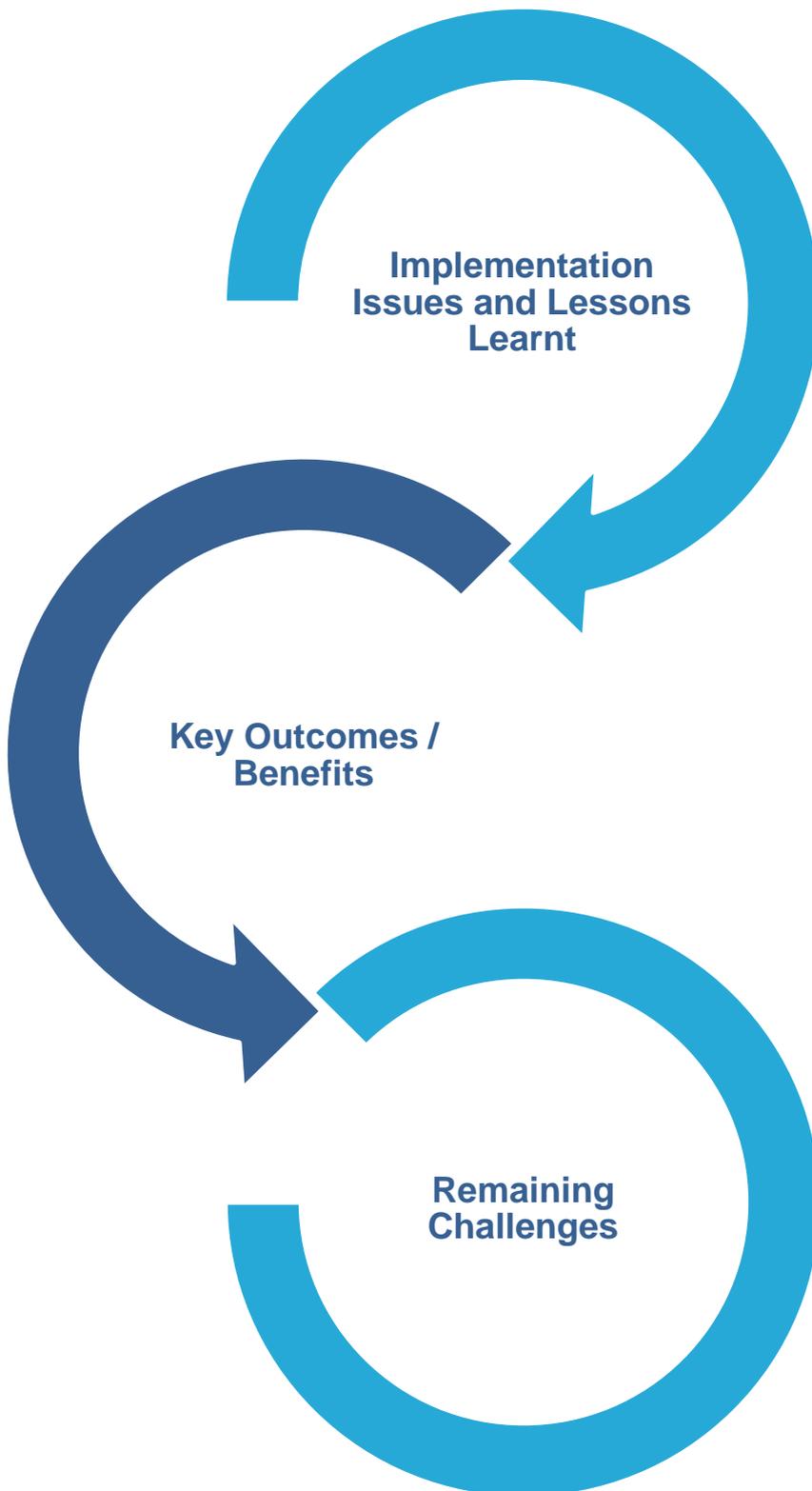
“Asset criticality enables Unitywater to deliver best practice asset management”

- Assets were categorised into three criticality categories based on their weighted scores, to keep it simple to apply and communicate the outcomes.



- Asset criticality has removed the subjectivity of which assets are critical, provides an objective analysis of critical ranking and enables prioritisation of asset related activities.
- All locational assets have a criticality rating in Unitywater's computerised maintenance management system (Maximo) and geographical information system (ArcMap).
- Criticality is currently being used to prioritise the following activities;
 - Corrective Works programs
 - Renewals Planning
 - Contingency Planning
 - Assessing Critical Creek Crossings
 - Facilities management
 - Cathodic Protection Strategy





- Communicating what criticality “is” and “is not”.
- Translating consequence.
- Quantifying tacit knowledge.
- Data collection.
- Workshops efficiency.

- Criticality methodology for all assets.
- Asset criticality ranking profile which is visible to all.
- A single view of critical assets.

- The business managing assets by criticality.
- Maintaining and improving data.
- Introducing risk analysis
- Potential changes to the corporate risk framework.

Icon Water

Investment prioritisation and decision-making process (IPAD)

Owen Gould
Asset Growth and Innovation

Background and context

Icon Water is a medium-sized organisation, located in the Australian Capital Territory, It provides water and wastewater to over 170,000 customers.

Icon Water's Business drivers are:

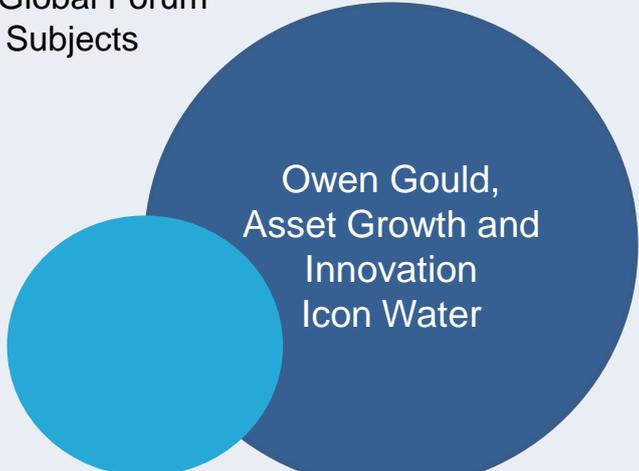
- Excellence in asset management (ISO550001 certification)
- Meet customer needs, exceed customer expectations
- Customer values capture for business planning

Capital expenditure projects are a vital component of Icon Water's asset management operations. They provide the infrastructure through which Icon Water meets its obligations under the *Territory-owned Corporations Act 1990 (ACT)*, achieve the service outcomes desired by its customers and meet the visions set forth in the organisation's *Statement of Corporate Intent*. They may also attract significant attention from shareholders, regulators and the regional community so it is imperative that these projects are prudent, delivered safely and within constraints.

In 2012, in response partly to criticism received from the regulators, a business improvement project was launched to map the entire project lifecycle, then document and communicate it through various templates and work instructions. The project, called 'Cradle to Grave', released the Investment Planning and Approval framework (IPAD) in 2013 and was a key driver in improving the prudence assessment of all new projects as it required comprehensive governance controls and stakeholder engagement expectations. The main focus area was to improve the quality of the project initiation process with a view to later improve the project implementation phases.

The business has also restructured and realigned roles with a review of the necessary competencies.

This has included introducing more rigour to the project planning process through the introduction of a Program Management Office (PMO) to provide specialised support and monitoring services. This has made use of industry wide frameworks, such as PMI's Project Management Body of Knowledge (PMBOK) and the Global Forum for Maintenance and Asset Management Landscape Subjects (GFMAM).



Owen Gould,
Asset Growth and
Innovation
Icon Water

Description of Leading Practice

The Investment Planning and Delivery framework (IPAD) is an investment and project management methodology that is applied to all project investments in Icon Water. The framework can be summarised by:

- A thorough process that ensures consistency and repeatability in decision-making by the governing Investment Review Committee (IRC).
- Cross-business review and endorsement ensuring broad support and input to solutions throughout the business.
- Documenting and tracking enabling early intervention by management if required.
- Feedback from the project so that similar projects in the future can learn from completed projects.

Icon Water has two major parts of the business that contribute to IPAD, one being the Asset Management Group (AMG) who performs the role of the Asset Manager, the other being Project Delivery, Operations and Maintenance Group (PDOM) who performs the role of the Asset Service Provider.

The IPAD framework has three phases and seven stages:

- **Initiate Phase:** This part of the framework is the responsibility of AMG.
- **Envisage Stage:** The problem and need are identified.
- **Evaluate Stage:** Evaluation of potential solutions to the identified problem including high-level concept designs, safety assessment, cost estimation and cross-business options assessment leading to a recommendation option and a high level scoping statement.
- **Implement Phase:** This part of the framework is the responsibility of PDOM Group.
- **Plan Stage:** The project scope and plan are defined and detailed estimates/schedules are developed.
- **Develop Stage:** Detailed design, construction planning and procurement activities occur.
- **Execute Stage:** The project is executed and contracts are managed to handover.
- **Integrate Phase:** This is the handover phase where the asset is transferred back to AMG.
- **Accept Stage:** Post implementation reviews occur and closure reports are developed.
- **Monitor Stage:** Defects are managed and rectified.

The key areas that IPAD has made a difference in Icon Water include:

Stakeholder Engagement and Awareness:

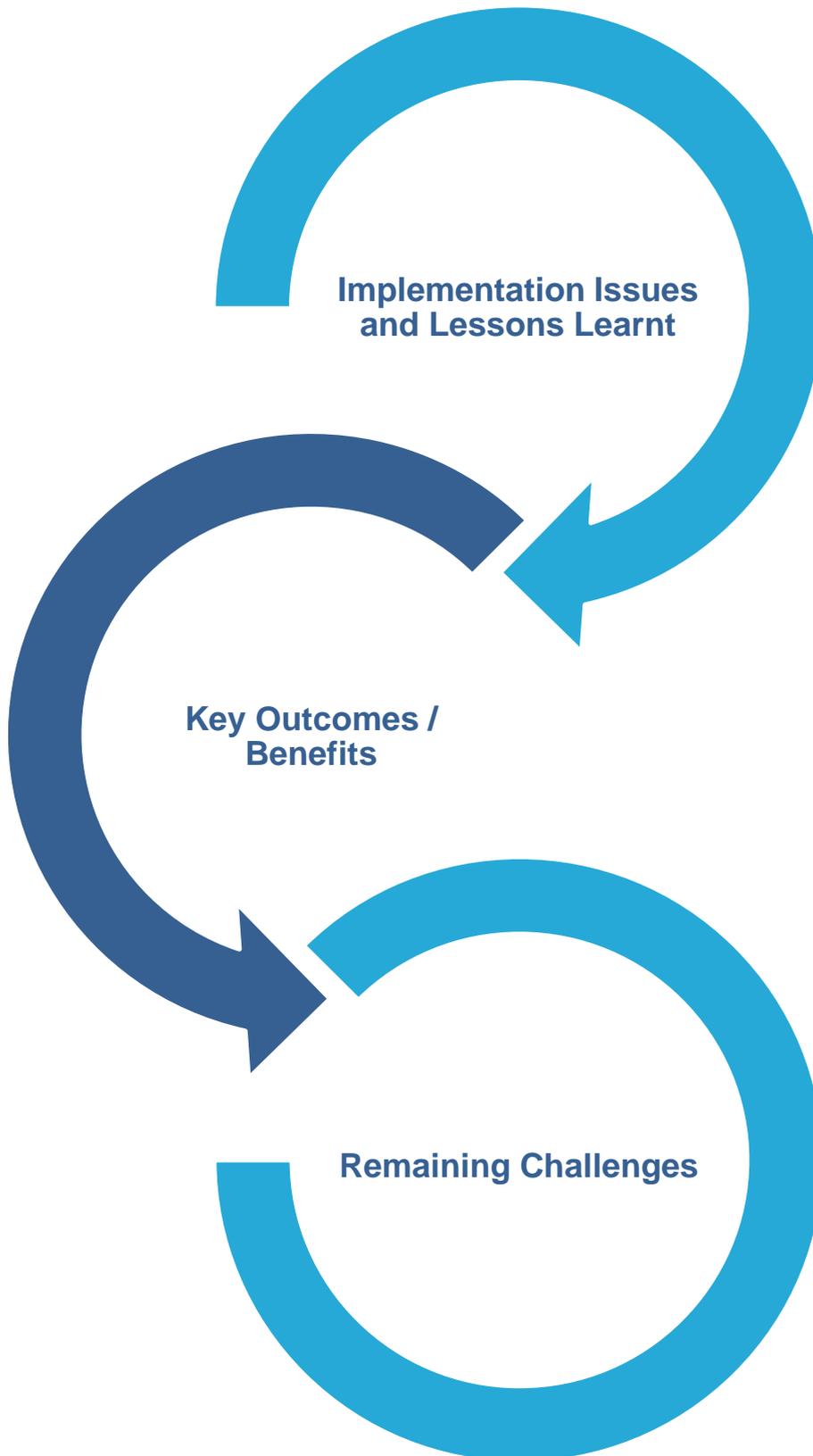
Stakeholder engagement and awareness is fully embedded into each stage of the IPAD framework. Each stage of documentation undergoes cross-business review to ensure the problem and proposed solution is fully understood and issues and risks which may arise during implementation are captured early. All information on the project is tracked and managed in Icon Water's Project Management Information System (PMIS), which can be accessed across the entire organisation.

Solution and Scope development:

The introduction of a specific and separate problem identification stage has allowed for a clearer enunciation of the responsibilities, accountabilities issues and risks at each stage. The introduction and communication of a more detailed asset design process has enabled better solution evaluation and consequently, greater scope definition to occur earlier in the project process. By following a prescriptive, repeatable process for defining and developing project scope, Icon Water is dramatically reducing late scope changes and ill-defined projects.

Tracking and Delivering to targets:

The framework has enabled more efficient and effective target delivery throughout each of the seven stages resulting in superior asset management outcomes around project acquisition. The consistency of processes and decision-making used to achieve the targets enables more efficient management of the program from intervention through to forecasting.



- Straw Man model works when redesigning a process map but approvers need to be known.
- Don't let the unknowns stop the knowns from being shown.
- Keep identifying and registering improvements.
- Document the process and then the responsibilities.

- Only prudent projects get selected - addresses highest business risks.
- Improved scope definition and reduction in late scope changes.
- Ability to track performance and remediate/reward immediately.
- Stakeholder satisfaction and credibility levels on the rise.

- Adjusting project prioritisation model to be flexible to moving business drivers.
- Matching demand with capacity to deliver.
- Measuring earned value other than time/cost (Strategic Value).
- Measuring the project success (Did the project solve the problem?).

Strategic Planning and Demand Forecasting

Seqwater: Asset portfolio master plan

Hunter Water: Maintenance productivity strategy

Seqwater: Annual operation strategy

Unitywater: Demand forecasting

Seqwater

Asset portfolio master plan

Dan Spiller
General Manager,
Asset Portfolio Development & Delivery

Background and context

The Asset Portfolio Master Plan (APMP) is a long-term investment plan, updated annually, that consolidates capital expenditure forecasts from all business areas into the same framework.

The APMP presents an integrated suite of infrastructure and non-infrastructure investments needed to meet Seqwater's service requirements and manage risk over the next 20 years. It is the point of truth for Seqwater's 20 year capital investment program, sourcing and referencing information from a range of planning documents. It covers infrastructure and non-infrastructure assets, including natural, storage, treatment, transport, purified recycled water, irrigation, recreation assets, and facilities and information, communication and technology assets.

Key business drivers

The key business drivers for the APMP was the need for a long term capital plan which can be used to optimise, prioritise and coordinate the capital program across the full range of projects. It also forms the basis for the recommended annual capital program submitted to the Board each year. Seqwater also reports to a range of external stakeholders including the Queensland Competition Authority (QCA). The QCA uses this document as a key input into their recommendation to the State Government for setting the future bulk water price for South East Queensland.

In 2013, the current Seqwater was formed from three separate operational entities with separate capital programs. Each entity had their own version of capital planning process and levels of documentation. The 2014 APMP produced a 14 years consolidated capital program, aligning investment drivers and established audit trails to the various supporting documents. The 2016 APMP extended out to 20 years and included all capital investment across the business. It also included a new prioritisation module considering risk reduction.



Dan Spiller, General
Manager Asset
Portfolio
Development &
Delivery, Seqwater

Description of Leading Practice

The APMP is the single point for truth for all future capital investments, ensuring that all projects and programs are considered within the same transparent review, audit and prioritisation processes, ensuring that short (1-5 years), medium (6-10 years) and long (11-20 years) timeframes are appropriately considered.

For each Strategic Asset Category (Water Treatment, Transport, Storage, Non-Infrastructure), planning activities are generally conducted through two parallel and interconnected processes, focused on the general functions of:

Renewals and upgrades. Investment programs developed from the two processes are periodically reviewed and integrated. Duplication and overlaps between the two programs of work are identified and resolved annually and the proposed investment profile is smoothed to ensure deliverability and eliminate financial “shock”, without introducing risk. Consideration is also given to: validation of business needs including timing, alignment with related activities, including realignment of maintenance, renewals and capital enhancements at a site specific level. Delivery risks, lead time and deliverability, including rephasing of cash flows and completeness of project documentation, including concept designs, planning studies and approvals to demonstrate prudence and efficiency.

Key Aspects

The APMP is updated annually as a business as usual process, resulting in a yearly capital program, which includes realignment of maintenance, renewals and capital enhancements at a site specific level. It considers the status of project in the delivery phase and their impact on the future capital program, particularly relevant for multi year projects.

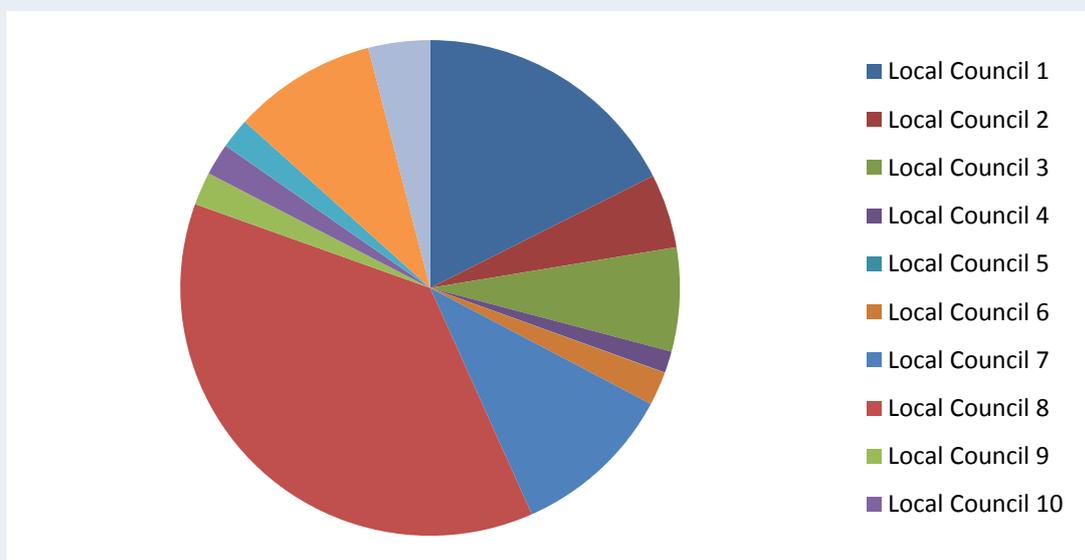
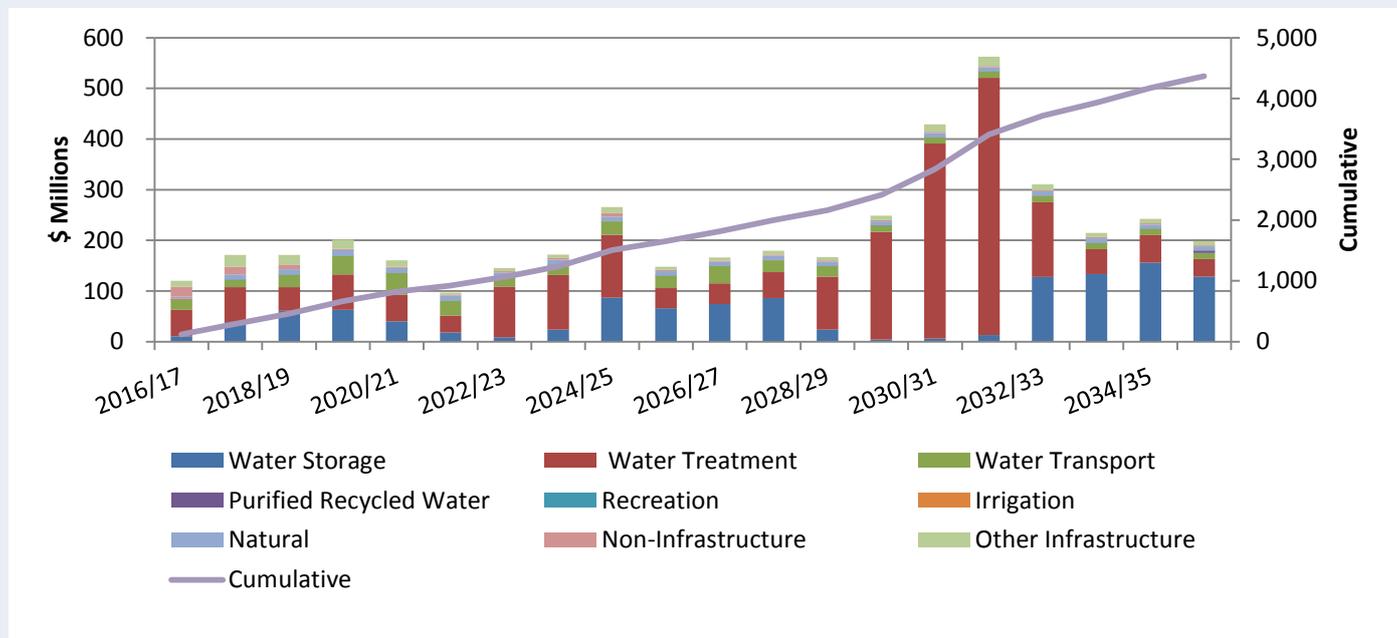
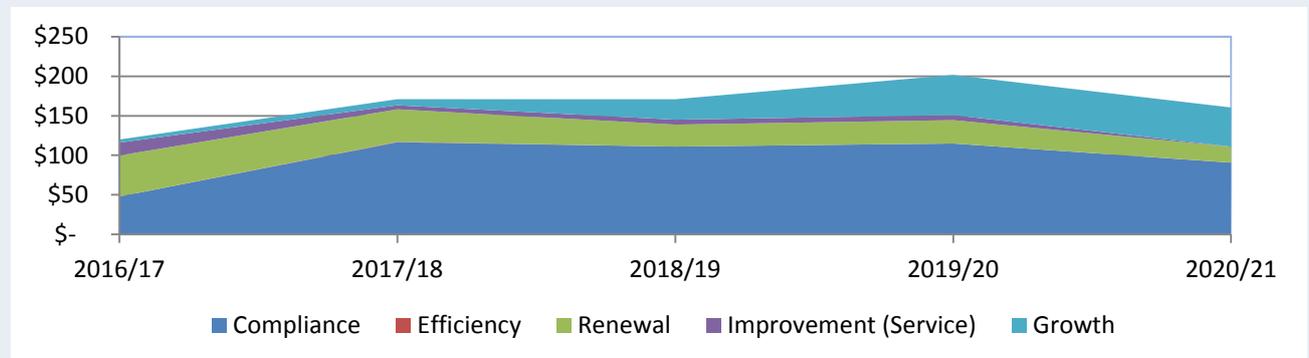
Top areas where the APMP has made a difference

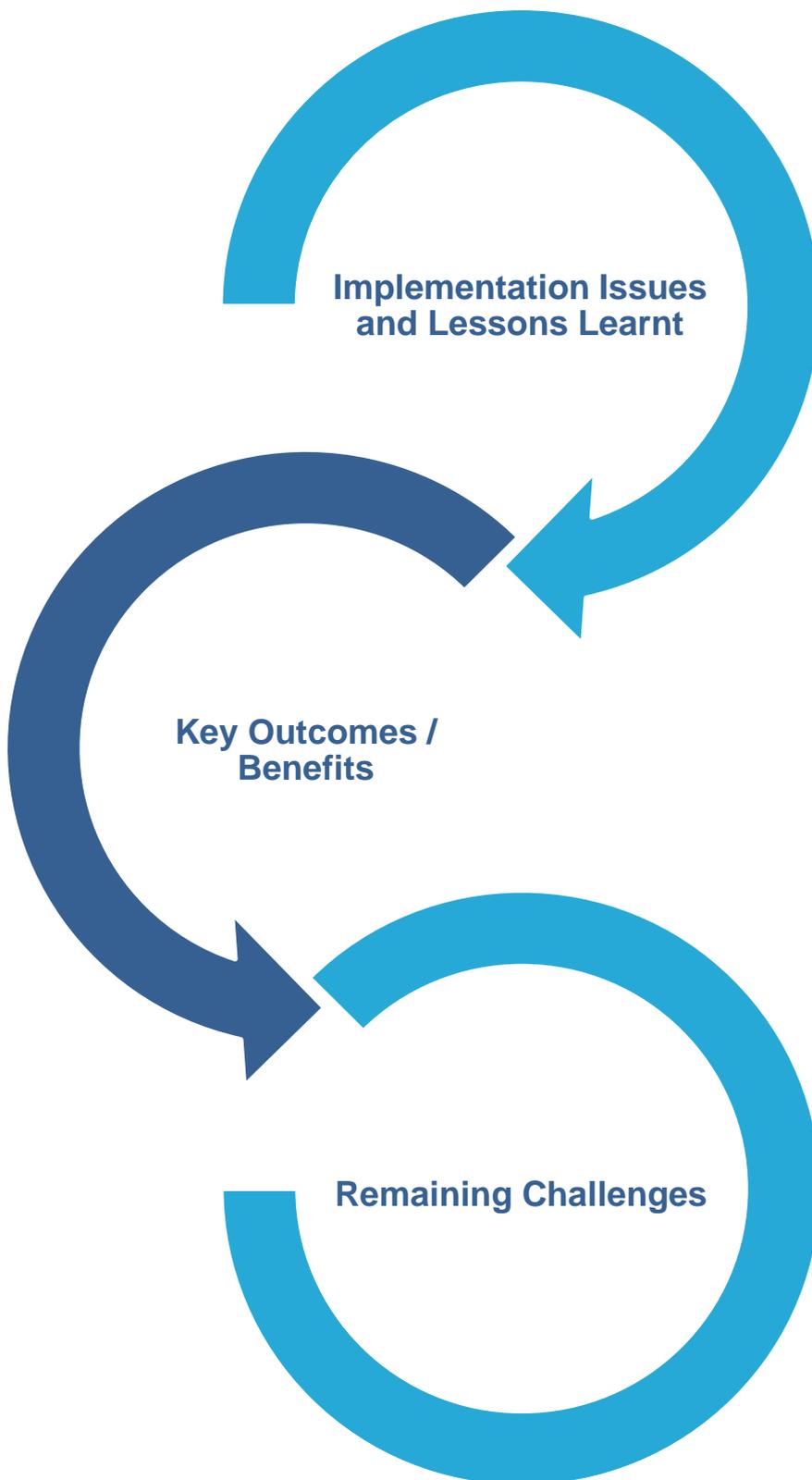
Having a visible single point of truth for all capital projects and programs for the next 20 years ensures that all business areas are able to plan effectively using the same basis. Capital program information is used by many sections of the business, to enable planning for financial sustainability, as a critical input for economic pricing models, to ensure long and short term infrastructure planning is effectively managed.



“Enabling effective
decision making,
planning and
prioritisation for all
assets”

The program contains a range of information allowing users to filter out information to suit their needs. Below is an example of information by driver, strategic asset category and local council area.





- Ensuring that all participants in the process are aware of the benefits to ensure commitment to program and schedule.
- The importance of bring people along for the “journey” .
- Ensure that the information produced is more easily accessible to all staff, via a webpage .

- Visibility of one central point of truth for all reporting.
- Ease of reporting to external stakeholders .
- Confidence in the capital program.
- Ability to plan for financial sustainability.

- Developing a system to enable the program to be live at any point in time, rather than annually updated.
- More automated data entry into the system.
- More standardised report for Government reporting requirements.

Hunter Water

Maintenance productivity strategy

Duncan Rayward
Group Manager Civil Maintenance

Background and context

Hunter Water is located in the Hunter Valley, NSW. Head Office is in Newcastle, approximately 160 kilometres north of Sydney. Servicing approximately 570,000 customers (240,000 connections) across 6+ LGAs and an area of 6700km², Hunter Water provides potable water, wastewater, recycled water and limited stormwater

Key business drivers: At the time these changes were implemented the key business drivers were:

- Financial Sustainability
- Right Infrastructure

Background

- Hunter Water's strategy seeks to improve the financial sustainability of the organisation to ensure that an affordable service can be maintained for our customer. At the same time the strategy aims to provide a safe and reliable service.
- The strategy to have the right infrastructure included improving maintenance practices on critical, statutory and high voltage assets, while not increasing the maintenance spend.
- A reduction in the planned CAPEX program meant greater emphasis on maintenance to provide a reliable service to the customer.
- Maintenance Services is 25% of Hunter Waters OPEX budget. Improvements in productivity has the ability to provide cost savings for the business or allow for increases in maintenance without increased costs or both.

Duncan Rayward

Group Manager Civil
Maintenance

Hunter Water
Corporation

Description of Leading Practice

The Maintenance Services Productivity Strategy was implemented to ensure that the internal Civil and M&E workforce could provide a cost competitive service that would produce savings while increasing output that was expected due to the reduction in CAPEX replacements and increase maintenance of critical and statutory assets.

A consultant was engaged to review maintenance spend areas, contractor utilisation, engage with key business personnel, undertake “day in the life studies” and compare performance to industry benchmarks. This process led to productivity targets of between 8 and 18% improvement for different functions of maintenance services.

This target was communicated to the workforce with a two year time frame to achieve the improvements. If progress wasn't being made within 1 year outsourcing models would be investigated.

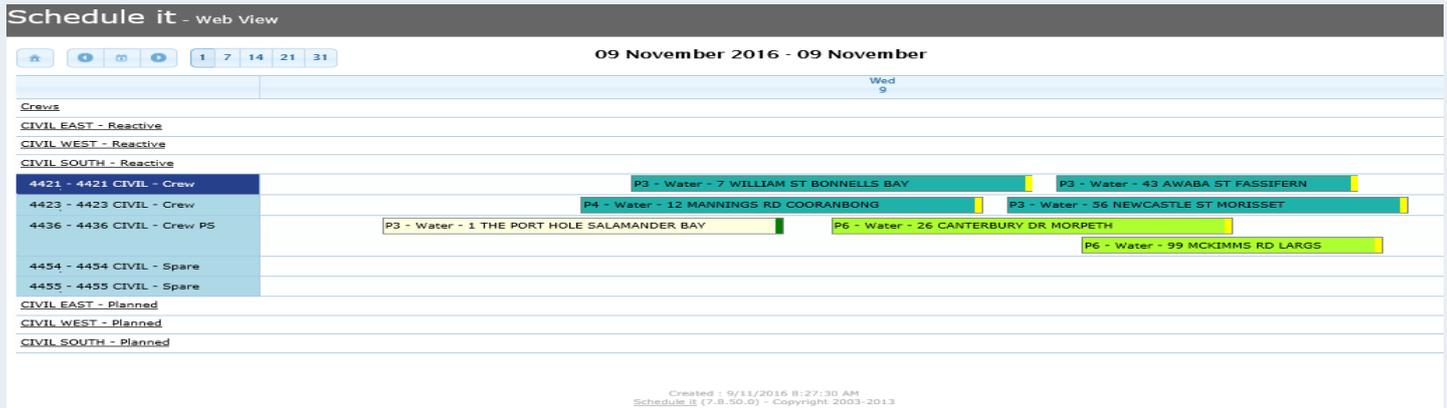
Hunter Water then commenced an initiative identification and implementation process. Over 30 initiatives were identified through workshops with the workforce, management, the consultant, as well as through a suggestion box and consultation with other leading practice utilities. Some initiatives had already commenced and others were new ideas. Implementation plans were developed and two productivity project officers dedicated to their implementation.

Regular involvement with the workforce through working groups, mini toolbox's and training around the changes were held. Reporting on performance to the Executive monthly and to the Board quarterly was required.

All targets were met with a 1 year period. Targeted spend such as increased internal labour productivity (jobs per hour) and reduced contractor spend were achieved. Unexpected benefits were improvements to communication within the maintenance teams, improvement in culture and improvement in data accuracy

New ideas continue to be captured and tools developed throughout project will be used to make continuous improvement business as usual.

“The three key points to implementing change are; communication, communication and communication”



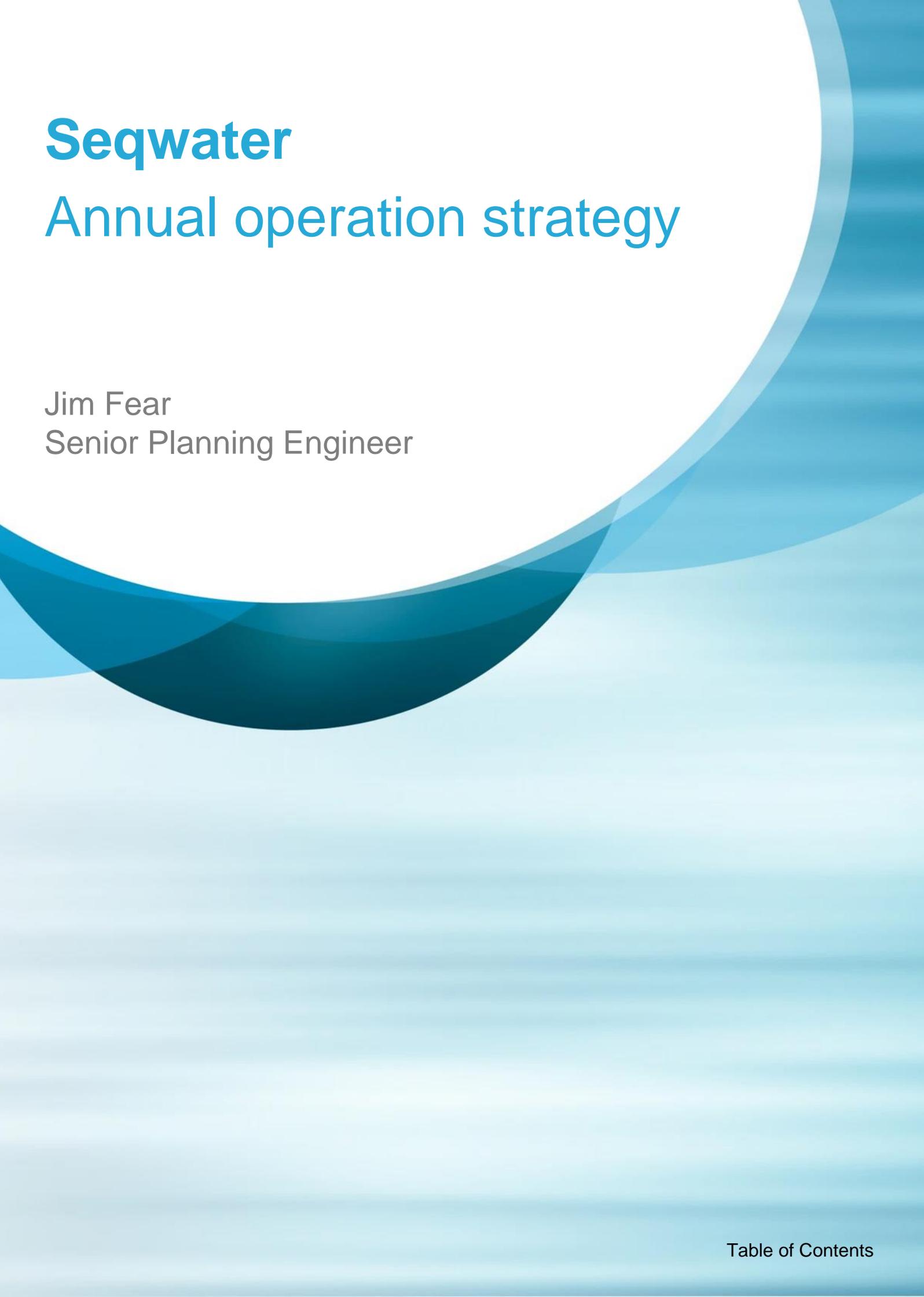
Clockwise from top; Reactive scheduling introduced to improve utilisation, improved spoil management (reduced volume by 24%), Well planned ganger with a weeks work, KPI visual display centre, fitter workshop established - 20% saving on contract prices and reduced lead times by 75%



- Provide dedicated “change managers”. Big changes are hard to handle as part of your day job.
- Communicate with stakeholders regularly and take on suggestions. Provide feedback.
- Set clear targets and report back on performance regularly.

- Reduction in maintenance spend.
- Increase in planned and preventative maintenance.
- Tools for a continuous improvement model developed.
- Improved culture.

- Streamline scheduling and planning processes.
- Make continuous improvement a way of life – no one likes change.
- Provide flexibility in the workforce to continue to change to be competitive.
- Find a benchmark that measures cost and reliability. Perform well, demonstrating value for money.

The cover page features a large white circle on the left side, partially overlapping a blue circular shape on the right. The background is a light blue gradient. The text is positioned in the upper left quadrant.

Seqwater

Annual operation strategy

Jim Fear
Senior Planning Engineer

Background and context

Seqwater is a bulk water supplier operating in South East Queensland. Seqwater services 3.1 million people, with over \$10B worth of assets covering 250 km (north to south) and 180 km (east to west).

Key business drivers

- Partnering – working collaboratively with customers, communities, governments and industry.
 - Safe, secure and cost effective – continuing to ensure water security, meeting regulated standards and minimising costs for businesses and communities.
 - Water services – effectively managing our catchments and infrastructure to source, store and supply water that is fit for purpose.
 - Catchment services – providing water source improvement, flood mitigation, recreation and land management services.
- The Annual Operating Strategy was initially created in response to not being adequately prepared during the Millennium drought. The Water Grid Manager, Seqwater and LinkWater were amalgamated in 2013, however the Annual Operating Strategy continues as a useful internal document and has been continually improved. The Annual Operating Strategy is seen as a critical process to ensure cost efficient operation whilst also ensuring longer term water security is maintained by following the drought response plan. The Annual Operating Strategy also assists with budget determination.

Jim Fear, Senior
Planning
Engineer,
Seqwater

Description of Leading Practice

The purpose of the Annual Operating Strategy (AOS) is to demonstrate how Seqwater intends to meet the forecast water demands of our customers for the following 12 months having regard to an appropriate balance between security and cost efficiency outcomes.

The AOS is published pre-summer each year to align with both the seasonal outlook as well as budgetary reporting requirements, which are based on production and transport volumes forecast in the strategy. An interim strategy will be produced in May of each year to assess the validity of the ongoing strategy in consideration of summer rainfall and other operational factors.

The Levels Of Service objectives that are relevant to the AOS are:

1. Each of the following dams will not reach its minimum operating level more than once every 10,000 years on average:

- Baroon Pocket Dam
- Hinze Dam
- Wivenhoe Dam

2. The bulk water supply system is to be able to supply enough water so that medium level water restrictions on residential water use:

(a) will not happen more than once every 10 years on average; and

(b) will not restrict the average water use for the SEQ region to less than 140 L for each person for each day.

A test of LOS compliance under the conditions set by the operating strategy is presented in each AOS report.

The Annual Operating Strategy has made the following differences;

1. Maintains a focus on drought preparedness at least every 6 months by reviewing current storage levels against what may happen if the worst case drought occurs.
2. Provides the probability of needing to change operation and when, so that increased operation costs can be budgeted for if required.
3. Considers maintenance implications on the combination of individual assets on operation of the system in regards to cost, quality, reliability and security with the use of system optimisation models and Wathnet Regional Stochastic Model.

“Optimising
operation
whilst
ensuring
drought
readiness”

Balance of water security and cost

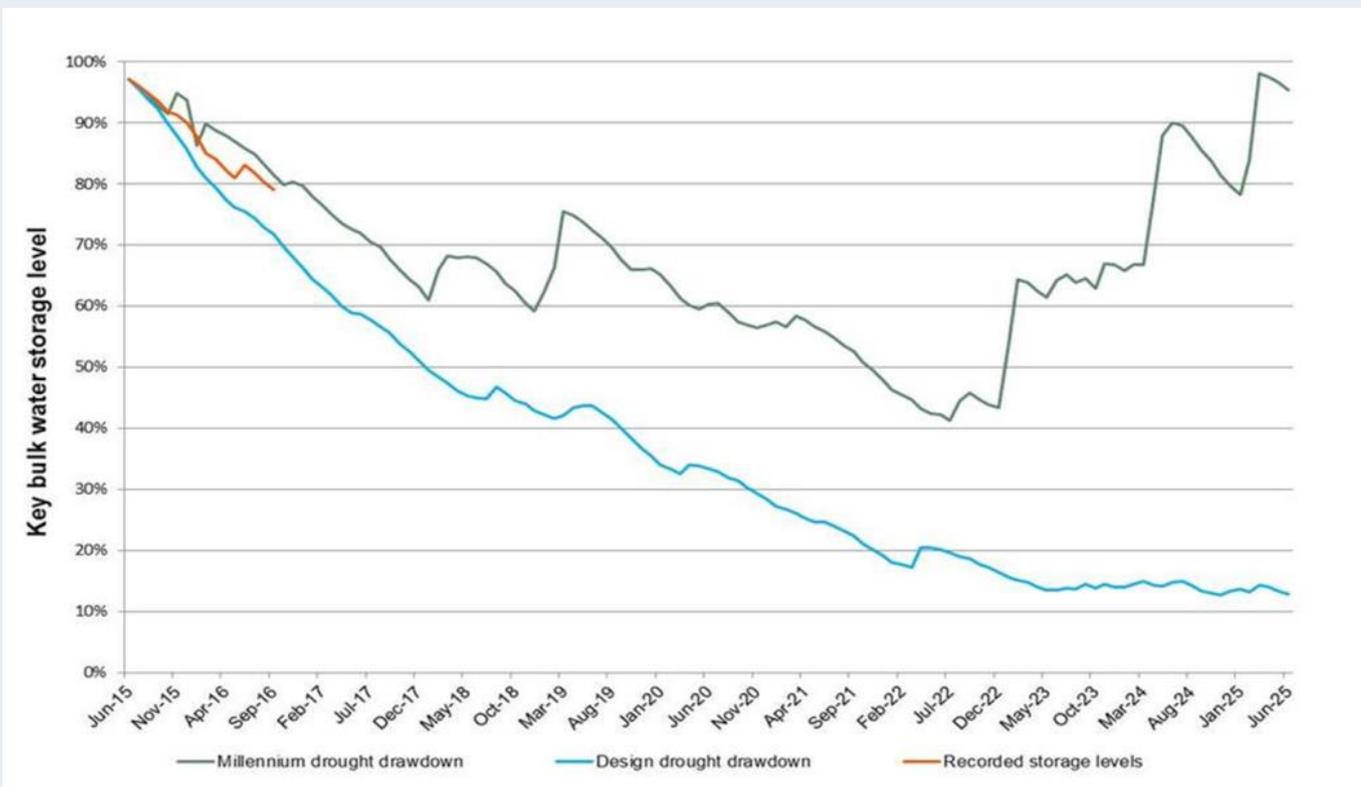
While key bulk water storage (KBWS) levels are high, meaning that short-term water security is at a high level, the system operation can be optimised based on cost alone. In this 'cost-mode' operation, production volumes from treatment plants with the lowest cost per ML can be maximised without adversely impacting on water security.

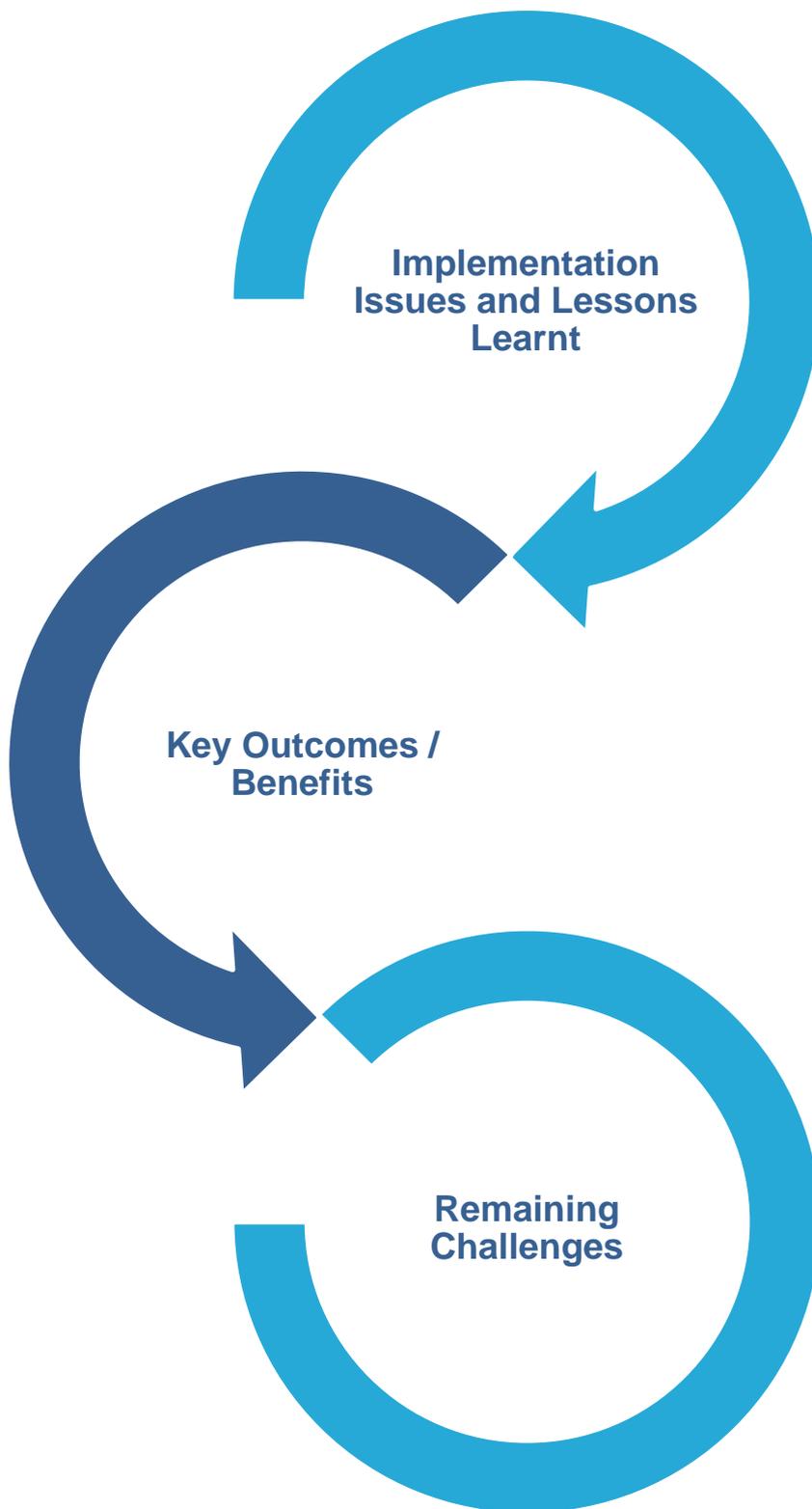
The relative cost of treatment is the key driver in determining the operating mode during times of high water security.

The method above is straightforward for determining the ideal cost-mode strategy. When water security is a factor in the balance then alternative methods need to be used.

The worst case drought has been selected from 121,000 years of stochastically generated inflow sequences to test and review the annual operating strategy to ensure that water supply is maintained utilising existing assets in an optimal way.

The graph below shows how SEQ storages or the KBWS will perform during a repeat of the Millennium Drought with current demands and Drought Response Strategy compared to the worst case drought and actual drawdowns as at 30 September 2016. This graph clearly demonstrates that all droughts start in a similar fashion and although it is highly likely that our storages will be full next year it is possible that we could be tracking along the worst case drought and we need to be ready to act for this possibility.





- Better true volumetric operating costs.
- Better model how the system is actually operated.
- Better knowledge of what assets are capable of during extended drought periods and lower storage levels.
- Definition of a reliability standard.

- Continual improvement in knowledge of the system.
- Better understanding of the models we use and what their underlying principles are and how they conflict with what we are trying to model.
- Much better understanding of how to operate manufactured water plants including need for readiness plans.

- Making the strategy more accessible and understandable throughout the organisation.
- Monitoring and documenting how we have or have not followed the strategy and why.
- Simplifying the process without losing the focus.

Unitywater

Demand forecasting

Chris Teitzel
Strategic Planning Officer

Background and context

Unitywater operates in one of the fastest growing regions of Queensland (>400,000 pop growth over 20 years) providing water and sewer services to the Sunshine Coast, Moreton Bay and Noosa Council areas in South East Queensland.

To meet the requirements of this challenge of projected growth, Unitywater must be smart in developing tools for strategic planning to support the efficient delivery of network infrastructure.

The key drivers for the development of Unitywater's Demand Modeller and Tracking Tool (DMaTT) are increasing the efficient utilisation of network assets by identifying the efficient sequence of development and where spare exists to serve new development. There is also a need for a credible and repeatable tool that could model network demand associated with population growth, changes in land use and approved development to inform "prudent and efficient cost" decision making in capital works planning.



Chris Teitzel,
Strategic Planning
Officer, Unitywater



Description of Leading Practice

- The purpose of the demand modeller and tracking tool (DMA^{TT}) project is to develop and implement an automated demand modelling, forecasting and tracking tool at Unitywater that is credible, consistent, transparent and repeatable.
- The project was initiated in 2012 and was developed in-house with the assistance of software vendor “Sizztech” and was deployed in early 2014.
- The DMA^{TT} tool has the ability to prepare baseline projected and ultimate development data for dwellings, population, floor space, employment and network demand (Equivalent Person, Equivalent Tenement or any other demand unit) at a property level that can be summarised and displayed at any catchment scale (i.e. locality or water supply catchment).
- A key innovation of the DMA^{TT} tool is the use of Bayesian Network (BN) for predicting the sequence of development and growth.
- DMA^{TT} also has the ability to run more than one forecast model based on “what if” scenario with changed growth parameters. This is very useful in understanding the impact of a new development front on the previous infrastructure planned and hence provides information for just in time delivery of the capital works program.
- For network modellers and consultants, the DMA^{TT} website interface has an export function where adopted forecast model demand at a property level can be exported for linking to external GIS property layers and network models.

Unitywater
Demand Modeller and Tracking Tool
Model Viewer Demand Viewer Model Builder Settings

Last Updated: 27/09/2016 09:52:59 by UNITYWATER\Chris.Teitzel
Return to Planning Versions

Planning Version - Sunshine Coast Planning Scheme 040416

Status: Available Growth Projections: OESR Medium Series with alternative SCC Scenario yearly projections
Charge Basis: Landuse Comments:

Mark Obsolete Release Version Copy Version Edit Version

GIS Layers Networks Future Service Areas Land Uses Land Use Parameters Planning Zones Local Planning Areas Zone Parameters

New Planning Zone

Title	Polygon Ref ID	Dev Allow	Buffer Allwnc	Min Area Buffer Applied	Use Catgy	Dev Density	Min Lot Size	Min Unconst Area	Avg Num Floors	Atch Dwell Split	Non Resident Populn	Em
Community Facilities Zone - Caloundra West Residential Community	SCCCFCWRES	✓	0%	m ²	Res	73.00dwell/Ha	1,000m ²	150.00	2.00	100%	50	
Community Facilities Zone - Child Care Centre	SCCCFCCC	✓	0%	m ²	NonRes	50%Cover	800m ²		1.00			
Community Facilities Zone - Community Use 21-25m	SCCCFCU21-25m	✓	0%	m ²	NonRes	70%Cover	800m ²		5.00			
Community Facilities Zone - Community Use 37.5m	SCCCFCU37.5m	✓	0%	m ²	NonRes	70%Cover	800m ²					
Community Facilities Zone - Community Use 8.5-12m	SCCCFCU8.5-12m	✓	0%	m ²	NonRes	70%Cover	800m ²					
Community Facilities Zone - General 8.5m	SCCCFCU8.5m	✓	0%	m ²	NonRes	70%Cover	800m ²					

“Increasing the efficient utilisation of network assets by identifying the efficient sequence of development and where spare exists to serve new development”



Demand Modeller and Tracking Tool

Model Viewer Demand Viewer Model Builder Settings

Demographic Growth Forecasts

Lot: 2RP868296

Details	2015	2016	2017	2018	2019	2020	2021	2026
Attached Dwellings	0.00	0.00	0.00	10.00	20.00	30.00	40.00	55.00
Detached Dwellings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Population	0.00	0.00	0.00	17.50	35.00	52.50	70.00	96.25
M2GFA	0.00	0.00	0.00	1,000.00	2,000.00	3,000.00	4,000.00	4,306.00
Employees	0.00	0.00	0.00	30.49	60.98	91.46	121.95	131.28

Legend: DwellingHouse&wellUnit, DwellingHouse&LowImpInd, DwellingHouse&RuralInd, DualOcc, MultiDwell, MultiDwell&Shop, MultiDwell&Office, MultiDwell&FoodnDrink, RetireFacility, ResCareFacility, ShorttermAcom, GardenCentre, OutdoorSales, FoodnDrink.

Adopted Forecast Model: SCC Light Rail Model

Demand Modeller and Tracking Tool

Model Viewer Demand Viewer Model Builder Settings

Demand and Charge Growth Forecasts

Lot: 161RP8424

Water Demand Assumptions								
Details	2015	2016	2017	2018	2019	2020	2021	2026
Residential Demand	2.54	2.54	2.54	2.54	2.54	5.25	5.25	5.2
Non-Residential Demand	0.00	0.00	0.00	0.00	0.00	0.00	7.06	7.0
Charge	0.00	0.00	0.00	0.00	0.00	19,555.50	0.00	0.0

Sewerage Demand Assumptions								
Details	2015	2016	2017	2018	2019	2020	2021	2026
Residential Demand	2.54	2.54	2.54	2.54	2.54	5.25	5.25	5.2
Non-Residential Demand	0.00	0.00	0.00	0.00	0.00	0.00	7.06	7.0
Charge	0.00	0.00	0.00	0.00	0.00	16,979.50	0.00	0.0

Legend: SCC Development Desirability Index, Development Approval, Sunshine Coast Local Planning Areas, Sunshine Coast DMaTT Constraints, Sunshine Coast Planning Scheme Dem.

Adopted Forecast Model: SCC Light Rail Model



- As with all models, the quality of the output is only as good as the quality of input information (no silver bullet).
- The DMaTT software will continue to evolve to add additional functionality to help users configure and run the software .
- It never stops, in high growth areas things change quickly.

- DMaTT provides consistent demand, customer and revenue forecasts across Unitywater's operational area.
- Also provides Unitywater with the ability to do scenario planning and track development and demand.

- Keeping pace with multiple development fronts and changing planning schemes.
- Buy in from Local and State Governments on the importance of a efficient sequence of development and the impact of opening up new growth fronts on infrastructure costs and network utilisation.

Strategic Asset Management

SA Water: Assessing AM maturity: using AMCV, ISO 55001 and IAM 39

Los Angeles Sanitation: “One Water” management

TasWater: Strategic asset management planning when several utilities form a new organisation

Melbourne Water: Portfolio, project and program planning

SA Water

Assessing AM maturity: using AMCV, ISO 55001 and IAM 39

Helen Edmonds
Manager Water Assets

Background and context

SA Water is an infrastructure-rich business with over \$22 billion (gross replacement value [GRV]) of assets across South Australia.

In 2015–16, 104 GL of wastewater was collected, treated and dispersed and 219 GL of water was supplied to over 680,000 properties which services more than 1.6 million South Australians. A complex array of water infrastructure assets valued at \$14.4 billion and wastewater infrastructure assets valued at \$6.4 billion was used to achieve this. The network asset base includes 24,767km of water mains and 8,853km of wastewater mains.

SA Water's Strategic framework includes a set of goals called 'Outcomes for Success' represented schematically as:



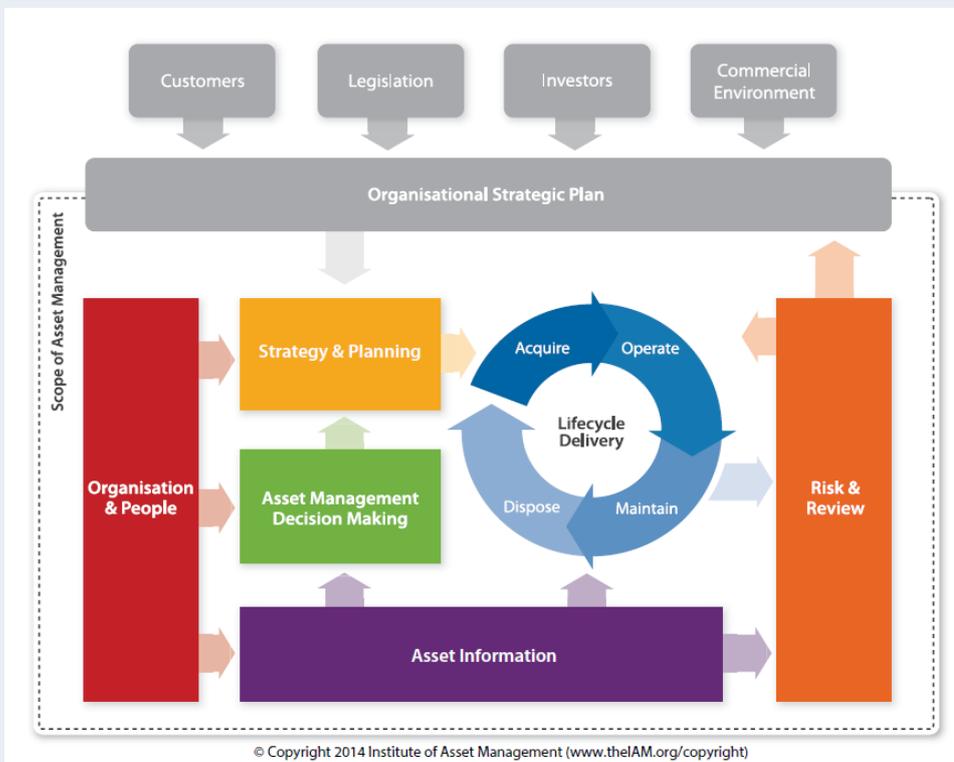
SA Water is an infrastructure rich business and as such wants to align with and conform to the requirements of ISO 55001. We aligned our 3-year asset management improvement initiative (MoA) with the Institute of Asset Management (UK) 39 Subject model (IAM39). We felt it was essential to map the AMCV results to both ISO55001 and IAM39.

Helen Edmonds,
Manager Water
Assets , SA Water

Description of Leading Practice

AMCV was designed to report results against ISO 55001 “shall” statements. This was important for SA Water but we wanted to see those same results through the lens of the IAM39 since we had already initiated an asset management improvement activity (MoA) that was built around achieving a maturity score under that framework.

For those unfamiliar with the IAM model it comprises 39 subjects under six Subject Groups shown in the schematic below.

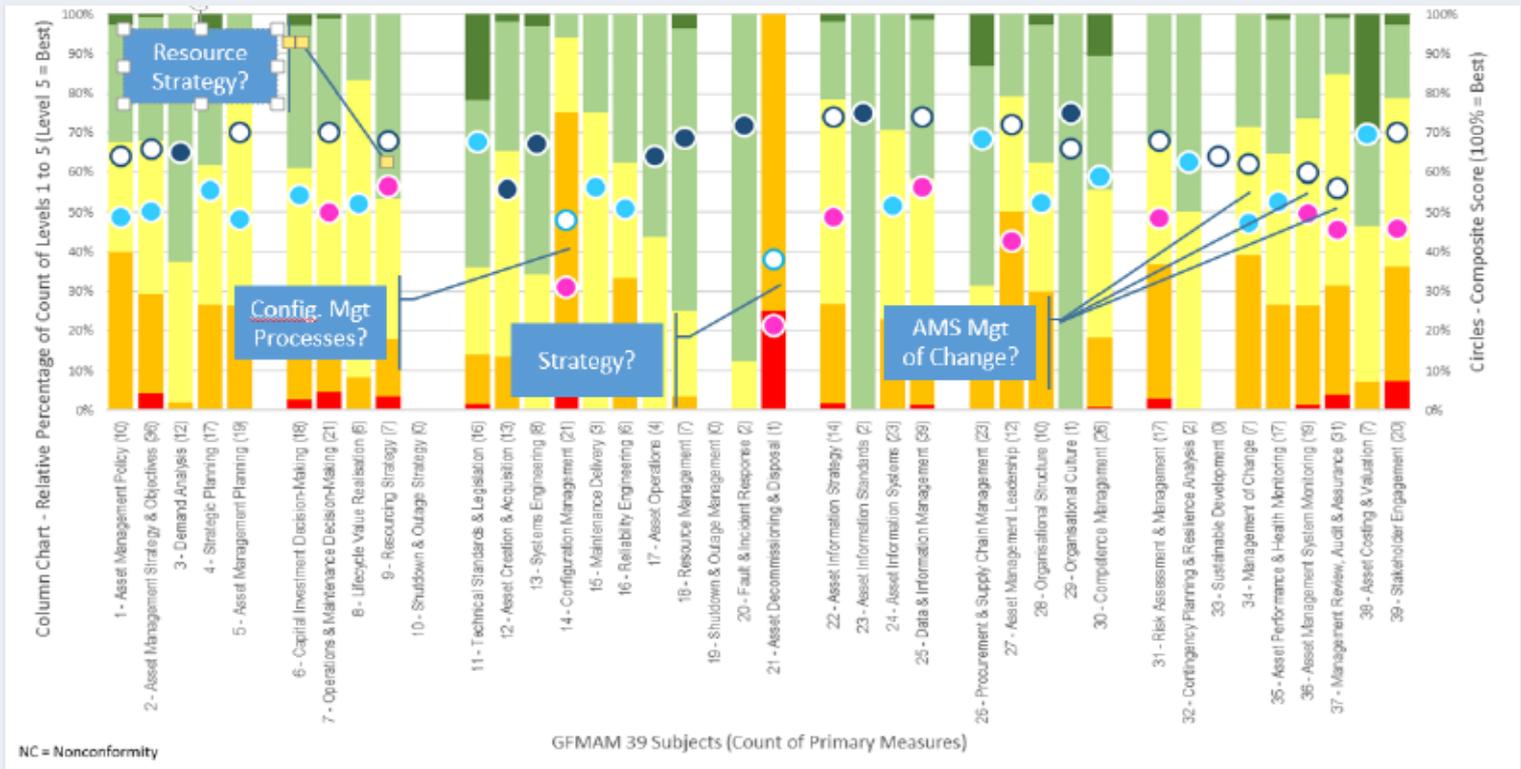


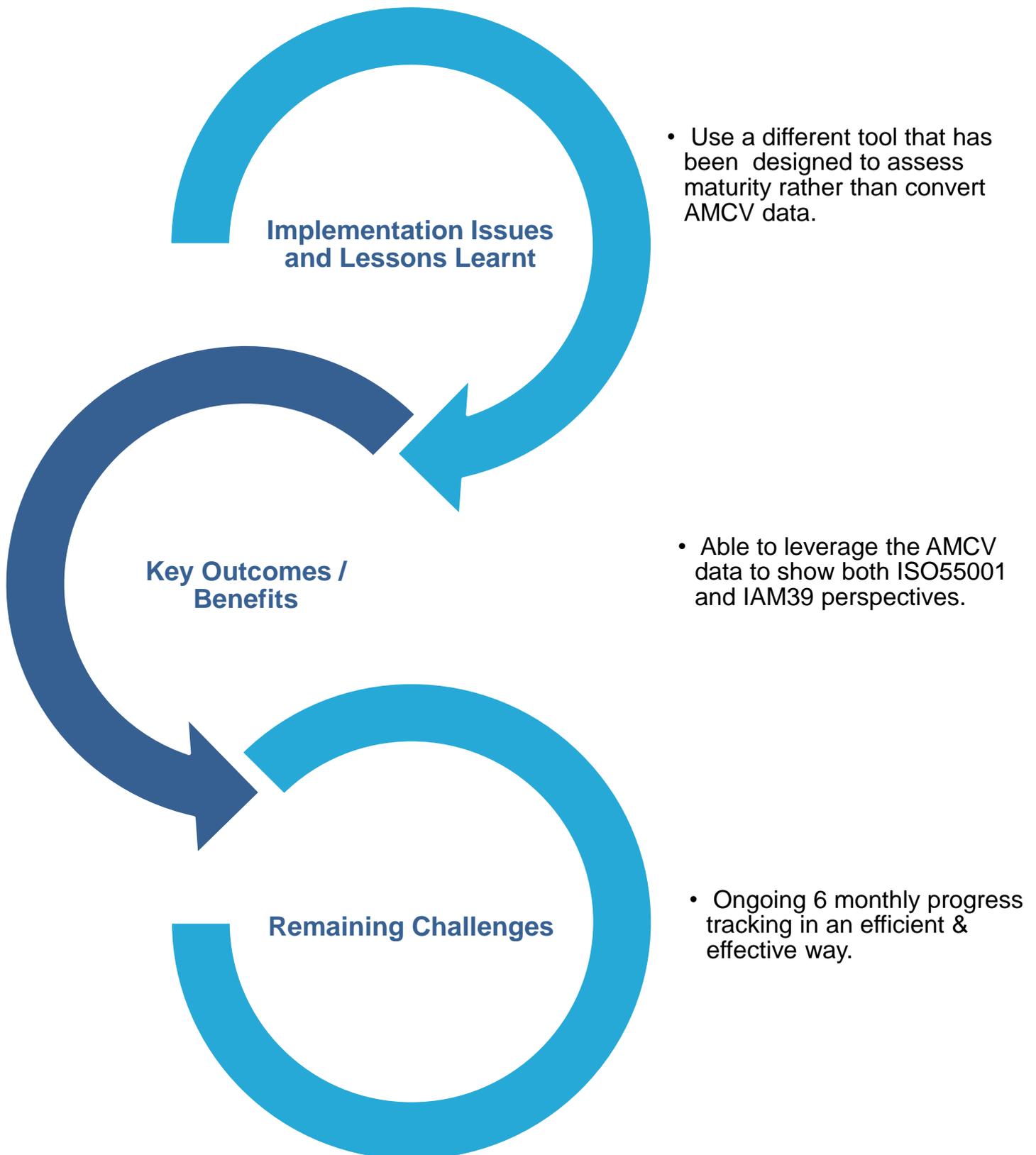
“Using the available AMCV information to better understand where we are at and how far we need to go”

It is our view that conformance with ISO 55001 represents a minimum standard to be achieved whereas IAM39 provides the opportunity to move beyond that in a considered way that can be measured and we wanted to leverage the valuable information that was being gleaned from the AMCV process and use it to provide a clear and robust indication of our current performance in relation to the IAM39 model

We engaged the services of AMCL who are very familiar with our organisation, the AMCV process and the IAM model to help us translate the results from AMCV into IAM39 subject scores.

The output was a report that identified areas where we were currently performing well and subjects where we were performing below target. The report included charts that mapped the results to both ISO 55001 and IAM39. They look really complicated but once you understand them they provide a great visualisation of what is quite a complex topic.





TasWater

Strategic asset management planning when several utilities form a new organisation

Glen Mackintosh
Senior Engineer Asset Management

Background and context

The Tasmanian Water and Sewerage Corporation Pty Ltd, trading as TasWater, was incorporated on 5th February 2013 under the Water and Sewerage Corporation Act 2012 (Tas) and commenced operation on 1 July 2013, with the Vision to be 'A trusted and respected provider of essential services that is making a positive difference to Tasmania'. To deliver this, TasWater focuses on the following Strategic Objectives:

- Build key stakeholders confidence and trust in us.
- Provide services that are affordable, positive for Tasmania and can be sustained.
- Provide safe drinking water and environmentally friendly waste water solutions.
- Build a culture and skill base that meets the long term needs of the business.

When it was formed, TasWater was built from the merger of 4 corporations, which in turn had been formed from the previous water and sewerage services of the 29 Local Councils across the state (Fig 1), who are now the owners of TasWater.

This resulted in assets, historical data, legacy systems and culture that varied across the state (Fig 2). Each of these corporations had produced Asset Management Plans and underlying decision methodologies that were directing the outcomes and expenditure for their respective businesses.

TasWater needed to “reset” its asset management practices to ensure a system was developed that would meet the needs of this new organisation, that considered work undertaken to date, but also provided a systematic methodology to allow TasWater to develop long term strategies and plans.

As regulated business, TasWater was also issued an Operating License by State's Regulator in July 2013. This included a requirement for TasWater to develop and submit an Asset Management Plan, which would be independently reviewed.

Glen Mackintosh
Senior Engineer Asset
Management
TasWater

Description of Leading Practice

As each of the three water corporations had prepared Asset Management Plans that were unique to each organisation's priorities and regional based drivers, it was intended to combine these into one document and present as TasWater document. However, as the organisation started this process, it was considered that it was timely to revisit the various asset management tools used, and build them into a systematic and whole of business approach for the new TasWater. With the release of ISO5500 suite of standards in 2014, it was decided to build the TasWater approach to align with these requirements.

High Level Engagement

Key to this direction forward, was the acceptance of the ISO approach by the Board and Executives. This was evidenced by the generation of a new AM Policy approved by the Board in 2015, which includes the key outcome:

To implement a vital, engaged and collaborative culture of asset management in TasWater, we will:

- Establish, agree and periodically review TasWater's asset management objectives and actively monitor performance against those objectives
- Implement, maintain and continually improve an AMS consistent with international standard ISO 55001:2014 *Asset Management – Management Systems - Requirements*

This was in turn followed by the establishment of a Strategic Asset Management Steering Committee (SAMSC) comprising of Department Managers from across the business, including not only direct asset lifecycle focussed departments, but also finance, customer/development services, corporate strategy, IT services and communications.

“Providing a solid foundation for effective asset management that is aligned to corporate objectives and stakeholder needs and expectations” – Independent Appraisal of TasWater AMS (2015)

Build the foundations

Fundamental to progressing Strategic Asset Management in the organisation, was the preparation of its first Strategic Asset Management Plan (SAMP) and Asset Management System Approach documents. These formed the structure and contents for TasWater's AMS and described the AM direction that the whole organisation would be heading in (Fig 3). Once again, these documents were approved by the CEO and Board, and provided to the pricing regulator. An independent appraisal was also conducted on behalf of the regulator to demonstrate their consistency with ISO55001, and effectiveness in guiding TasWater's planning processes. This also identified a number of opportunities for improvement. The simplified framework (Fig 4) also gave a visual representation and talking point for all staff, and showed a clear line of sight for how Corporate Outcomes, including Customer expectations, could be translated into OPEX and CAPEX work programs and long term lifecycle decision making. Staff could see where their work was contributing to overall improvements for the business.

Continuous Improvement

TasWater is now populating its framework, preparing key strategies and management plans, to improve the identifications of priorities based on quantitative and evidence based decision tools. These are already demonstrating possible improved splits between maintenance and renewals spending, which will in turn assist with clearly communicating requirements for OPEX funding for backlog and critical preventive maintenance programs. It is also linking outcomes from multiple drivers into packaged projects and is now leading the business to revisit its prioritisation of capital works, across asset classes and business drivers (compliance vs renewals).

“Providing a solid foundation for effective asset management that is aligned to corporate objectives and stakeholder needs and expectations” – Independent Appraisal of TasWater AMS (2015)

Continuous Improvement (continued)

The core of the ISO Management Standards is the continuous improvement journey, and this is reflected in the Asset Management Improvement Plan (AMIP) first developed in late 2015, and currently undergoing its first annual review and update.

TasWater is now speaking one asset management language, with the support and awareness both from the top down, but also across the breadth of the business. It is continuing its ongoing journey of making a positive difference to all Tasmanians, through effective and efficient management of the assets under its custodianship.



Fig 1 – History of TasWater



Fig 2 - From TasWater 2014-15 Annual Report



Fig 3 – SAMP and AMS Approach

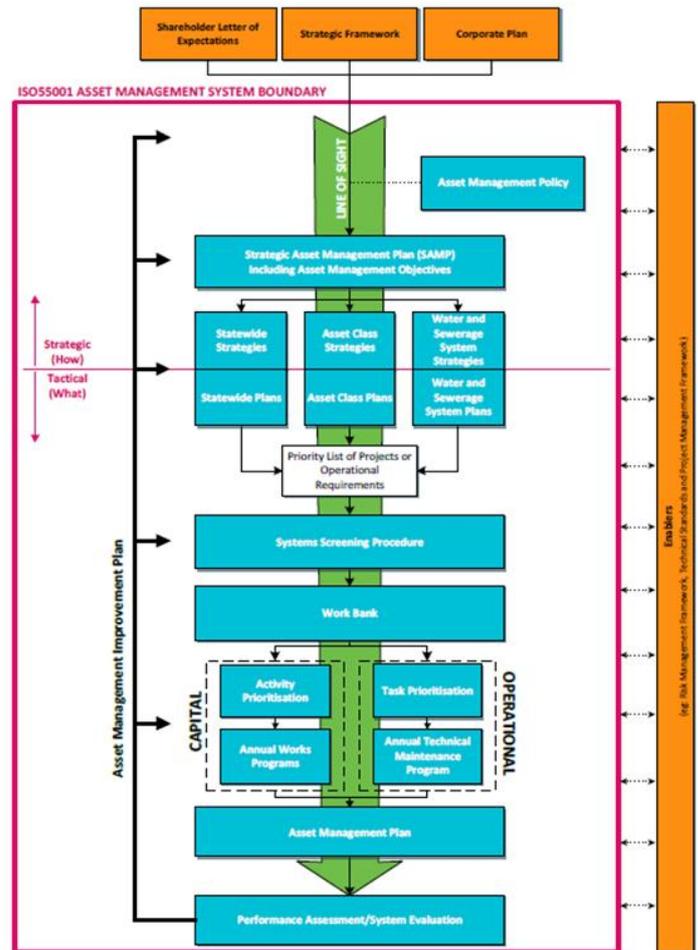


Fig 4 – AMS Framework



- Keep momentum going.
- Long term thinking needed, but allow for short term flexibility and priorities.
- Present AM framework alignment early, but ensure it includes non-infrastructure assets too.
- Periodic independent peer review.

- Good engagement and leadership from board and executive team.
- A structured framework for future asset decision making improvements.
- Recognition that asset management is not just about engineers, as reflected by Steering Committee membership.
- One TasWater System.

- Delivery of complete set of strategies and management plans.
- Business Process Mapping.
- Competency framework.
- Continued resourcing to implement asset management system.

Melbourne Water

Portfolio, project and program planning

Simon Pearce-Higgins

Portfolio Reporting & Analysis Manager

Background and context

Melbourne Water is owned by the Victorian Government and manages water supply catchments, removes and treats most of Melbourne's sewage and manages waterways across the Port Phillip and Westernport region. We are committed to achieving our vision of 'enhancing life and liveability' for the greater Melbourne region and our Strategic Direction describes our three pillars that together deliver our unique contribution to enhancing life and liveability:

- **Healthy People** - Strengthening the wellbeing of the community.
- **Healthy Places** - Co-creating the world's most desirable places to live.
- **Healthy Environment** - Enhancing the natural environment.

Melbourne Water operates within a highly regulated environment with increasingly stringent surveillance around expenditure from our stakeholders, customers, regulators and sole shareholder (the Victorian State Government).

Operating within this environment and managing diverse portfolios of assets from waterways to water mains to treatment plants requires robust business case development processes to demonstrate prudent and efficient capital expenditure. As our capital program is a combination of strategic business investment decisions responding to multiple business drivers it requires a diverse and flexible approach to delivery.

The robust way that Melbourne Water plans for its capital expenditure is via a gated approval process that requires key people to provide input to ensure whole of life and customer objectives are achieved.

Projects are subject to prioritisation based on quantified strategic benefit and risk reduction at multiple points along their lifecycle. This approach ensures the ability to reprioritise works in order to maximise strategic benefit and manage risks and financial constraints appropriately and in the most prudent and efficient manner.



Simon Pearce-
Higgins, Portfolio
Reporting & Analysis
Manager, Melbourne
Water

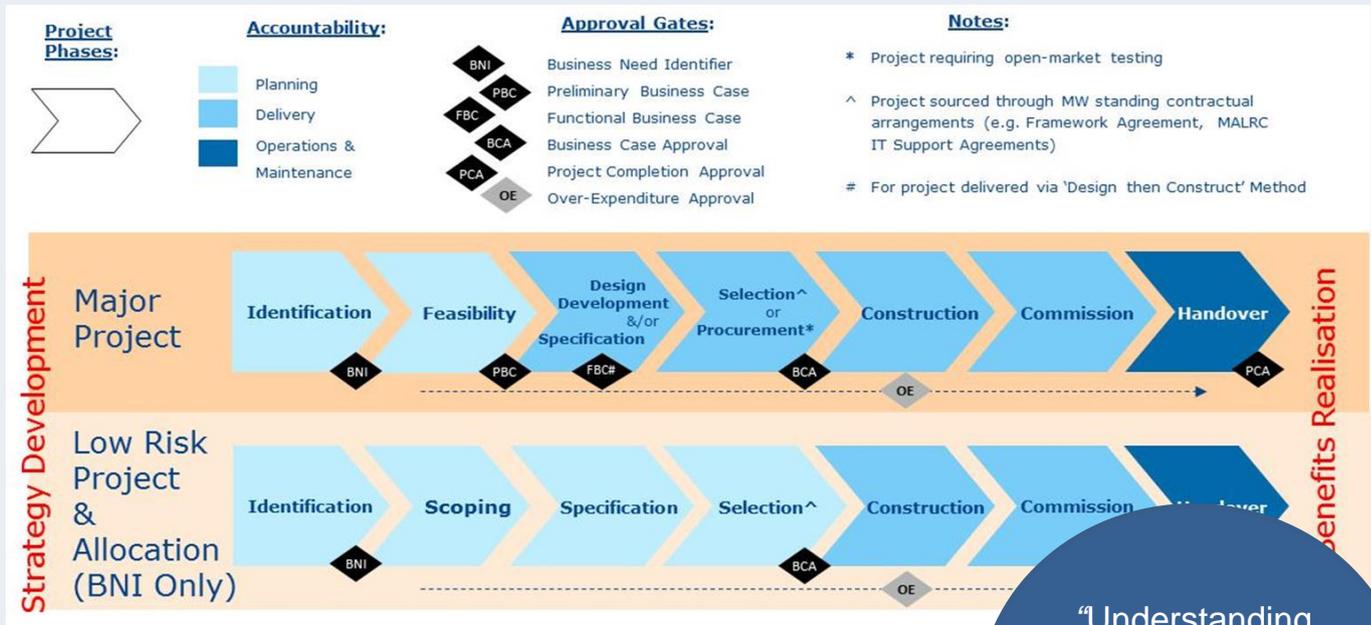
Description of Leading Practice

Melbourne Water has developed processes and procedure that enables us to develop business cases that demonstrate prudent and efficient capital spend responding to key business initiatives and supports the ability to prioritise these works as the external environment changes to maximise the benefit to the community.

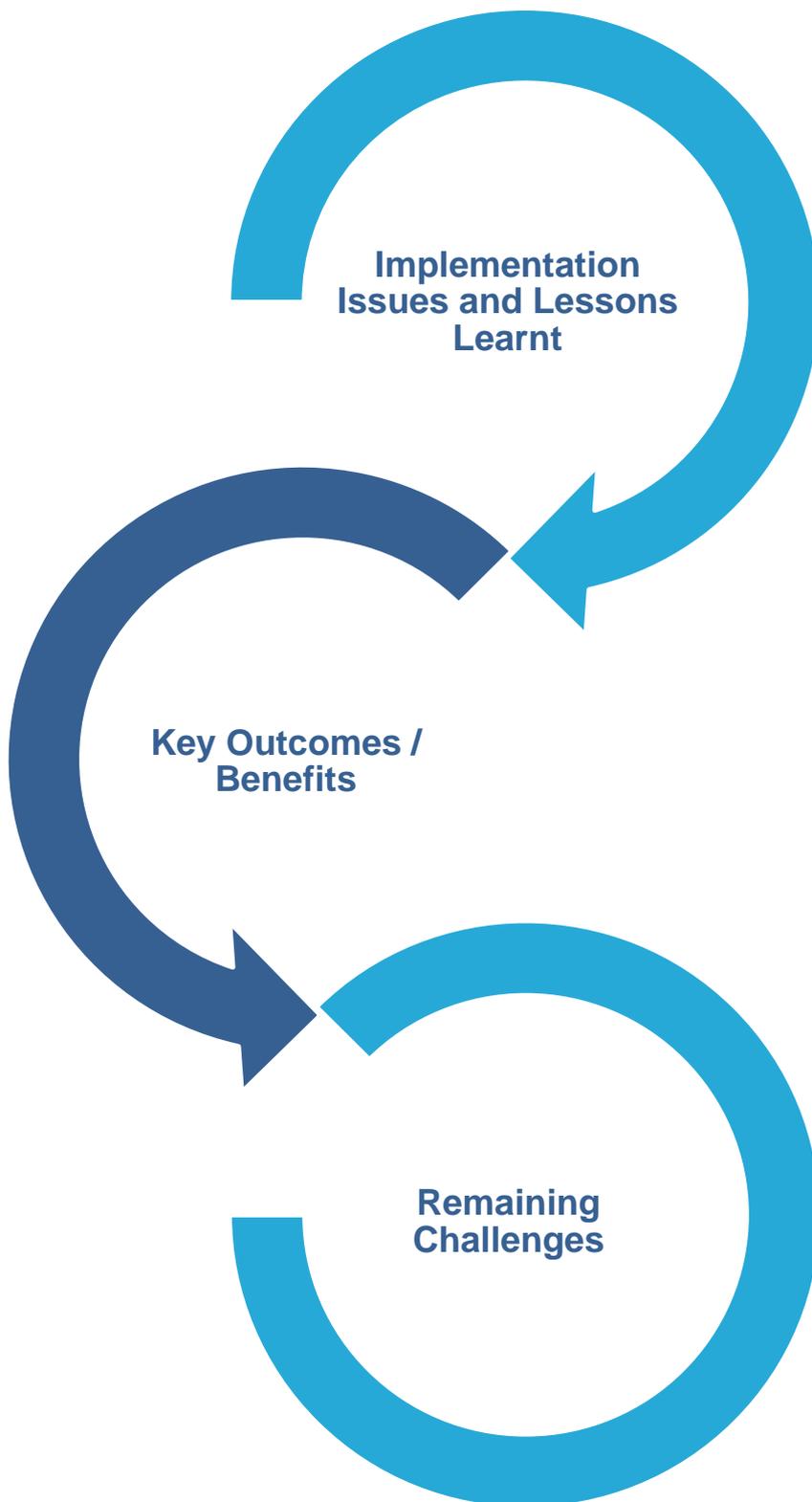
- Our capital works processes require the construction of business cases which go through a series of approval gates requiring progressively more robustness.
- The capital prioritisation processes assess the strategic benefit to the business as well as the risk reduction provided by the projects and reviews the timing of delivery.
- The project delivery determination process assesses each project for the appropriate delivery mechanism aligned to Melbourne Water’s Delivery Strategy to ensure efficient delivery.

Key benefits include:

- Melbourne Water has been able to consistently produce high quality Pricing Submissions for the ESC and Corporate Plans for the DTF and DELWP.
- Melbourne Water has been able to present the capital program to stakeholders in a meaningful and timely manner.



“Understanding the projects strategic benefit to the community”



- Create a standardised high-level Capital Process lifecycle that allows standardisation across all projects.
 - Develop clear accountabilities and responsibilities of relevant parties at each stage of the Capital Process lifecycle.
 - Adopt a single organisation solution for portfolio and program management.
-
- Increased visibility of the 20 Year Capital Program.
 - Ability to prioritise capital works.
 - Ability to share the capital program to stakeholders.
-
- Establish a best practice PMO.
 - Create a standardised high-level P3i Process lifecycle that allows standardisation across all projects.
 - Develop clear accountabilities relevant parties at each stage of the Capital Process lifecycle.

Poster Showcase

Unity Water: Asset acquisition processes

Sydney Water: Critical water mains replacement/renewal

Goulburn Valley Water: Capital program prioritisation

Auckland Stormwater: Capital investment 'gateway' process

Water Corporation: Managing a design panel to produce efficient design

Auckland Stormwater: Organisational alignment

Gippsland Water: Involving all stakeholders in asset acquisition and renewal

East Gippsland Water: Asset management system leadership and culture

Icon Water: Resource planning: novel approaches to long-term resource planning and understanding the value of stored water

Unity Water

Asset acquisition processes

Russ Manfield
Capital Works Planning Manager

Background and context

Unitywater operates in one of the fastest growing regions of Queensland (>400,000 pop growth over 20 years) providing water and sewer services to Sunshine Coast, Moreton Bay and Noosa Council areas in South East Queensland.

To meet the requirements of this challenge of projected growth, Unitywater must be smart in developing tools to demonstrate that its expenditure is “prudent and efficient”. Failure to do so may result in costs being excluded from the regulated asset base leaving the business unable to recover costs.

In 2010-11 Unitywater’s Five Year Average Annual Expenditure was \$226M/year. This level of expenditure was considered unsustainable for the business and needed to be reduced.

In 2011, an external review of capital planning processes was undertaken. Three key areas for improvement were identified:

1. Capital works processes needed to be developed and documented;
2. A suite of Tools, Templates and Guidelines needed to be developed to support the process;
3. A system for capital project data management and tracking was required.

The review ultimately led to the creation of the Capital Works Planning Manual which was developed to document processes and practices in Gate 1 (the planning phase) of Unitywater’s 5 Gate capital works delivery process.

The subject of this Case Study is Gate 1; the planning phase.

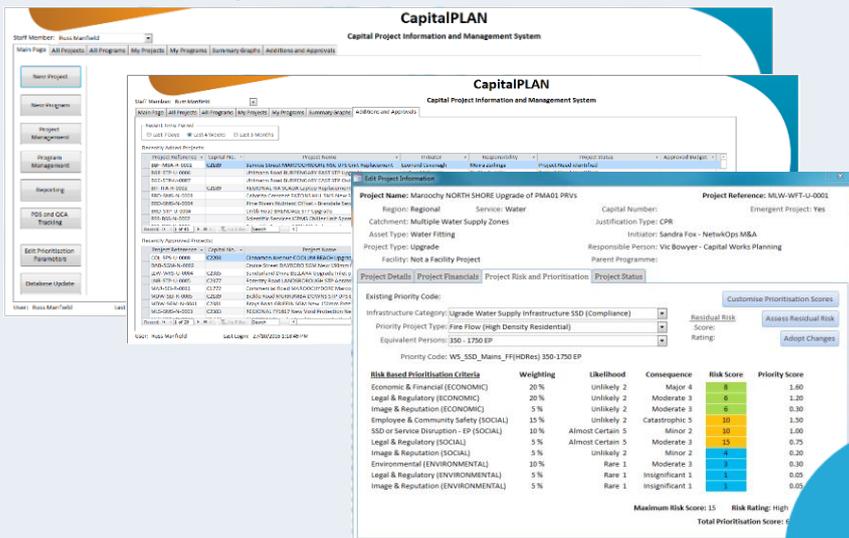


“The consistent application of the specified process has significantly contributed to a reduction in average annual capital expenditure over forward five year period from \$226.6M in 2010-11 to \$82.2M in 2015-16”



A suite of tools were developed to enable various project solutions to be assessed and compared and to allow individual projects to be ranked in order of business importance (i.e. prioritised) The suite of tools include:

- **Cost Estimation Tool** - cost estimates for the delivery of water supply and sewerage network infrastructure are typically based on estimates developed utilising a spreadsheet based cost estimating tool. The costing tool provides a standard format and methodology for the development of estimates for use throughout the capital delivery process. The costing tool utilises past construction panel rates where available and a confidence based contingency allowance. The costing tool is updated on an annual basis.
- **Net Present Value Tool** – business case financial evaluations are supported through the use of the net present value tool. The tool is used to compare different solutions and staging options. The tool includes greenhouse gas considerations for comparison of alternate pumping options and provides recommended escalation factors for future cash flows.
- **Multi Criteria Analysis Tool** – The tool ranks alternate options based upon allocated scores for environmental, social and economic criteria. The tool provides users with sample scores and points for consideration. The standard weightings for the triple bottom line criteria align with the project prioritisation tool.
- **Project Prioritisation Tool** – Using a TBL/risk based approach to determine the impact of delaying projects until the next budget cycle. Generic risk scores have been developed for each asset type to simplify the process and reduce subjective decision making. Generic scores can be adjusted to reflect project specifics.



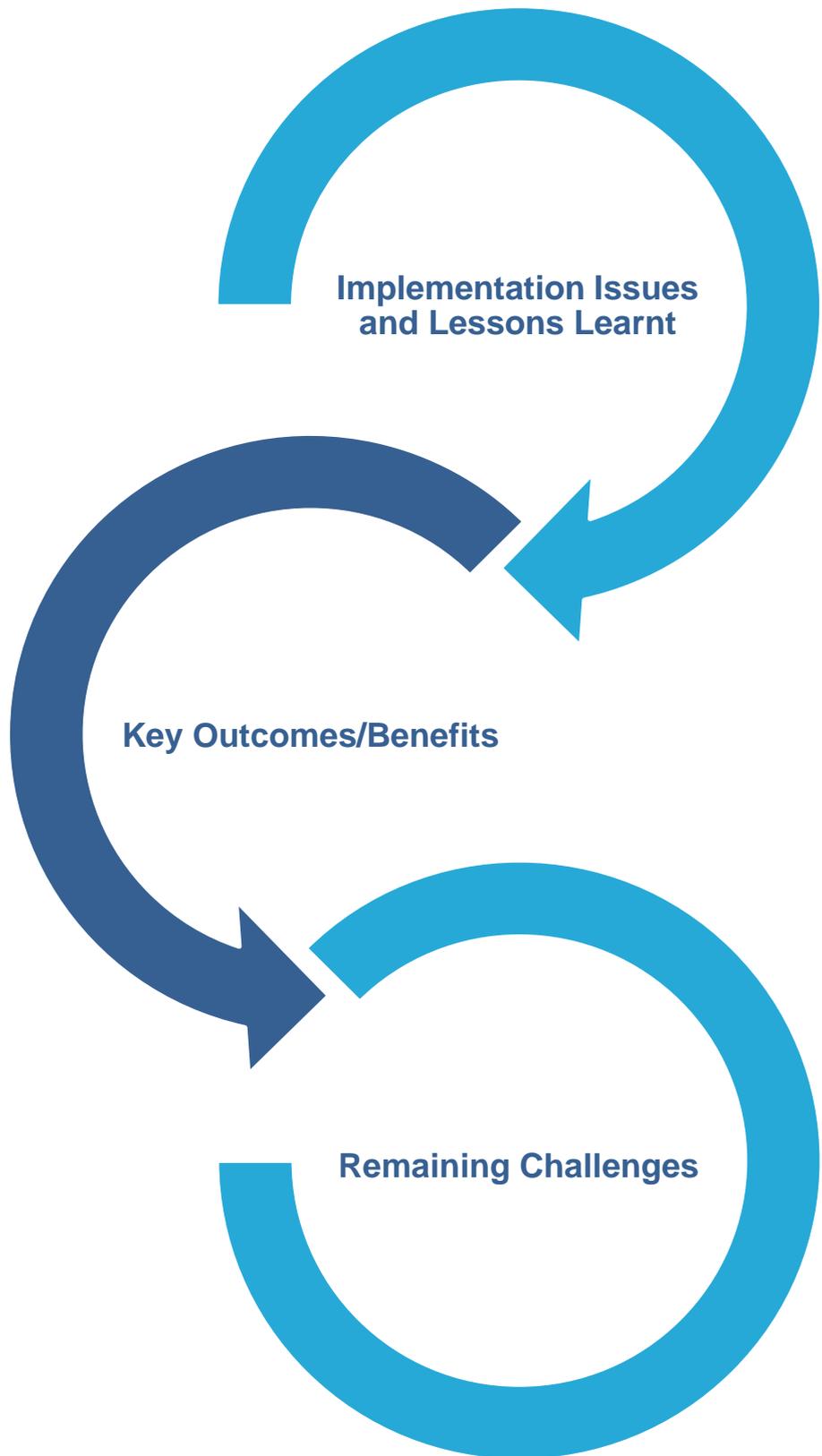
“The rigour associated with these processes ensure Unitywater achieves its strategic goals whilst maintaining value for our customers”

The Benefits

Key benefits of the capital planning process include:

- Consistent, repeatable and defensible decisions and outputs;
- A well documented and understood process across the business; and
- Significantly reduced capital expenditure partially as a result of a robust business case development process and application of the prudence and efficiency test.

Changes In Average Annual Expenditure		
Year	Forecast Five Year Average Annual Expenditure	Comments
2010-11	\$226.5M	Prepared by the former Councils
2011-12	\$156.7M	Start of STP Upgrade Program
2012-13	\$121.1M	
2013-14	\$100.9M	
2014-15	\$96.6M	
2015-16	\$82.5M	
2016-17	\$85.4M	



Implementation Issues and Lessons Learnt

- Earlier stakeholder education on the process and the use of templates and tools.

Key Outcomes/Benefits

- Consistent, repeatable and defensible decisions and outputs.
- well documented and understood processes.
- Reduced capital expenditure.

Remaining Challenges

- Integrating the capital works database with the financial and asset management systems.
- Developing an on-line capital project request process.

Sydney Water

Critical water mains replacement/renewal

David Zhang
Service Planning Lead

Background and context

Sydney Water covers all operational areas of Sydney, the Blue Mountains and Illawarra Region. It provides water, wastewater, recycled water and stormwater products, systems and assets. It owns 21,000 km of water mains, serving 1.8 million properties.

Sydney Water's aims are:

- Critical water main quantified risk management approach
- Deliver more with less to balance cost, service and risk

A key challenge for Sydney Water is to proactively manage its critical water mains - to minimise maintenance and replacement costs, supply interruptions to customers, and the public safety risks, major economic loss and inconvenience to the community (through traffic disruption, local flooding and property damage) that occur in the event of a failure. Sydney Water developed a quantitative risk-based approach for the management of critical water mains. This approach aims to prevent the critical water main failures in an economically efficient manner, as well as mitigate the impact of failures, should they occur.

A key element of the project was the development of an asset management decision tool to quantitatively assess pipeline failure risk (probability and consequence of failure). The consequence costs (and risk cost) includes both direct and indirect costs including financial, social and environmental factors. The tool provides a high level of sophistication, assessing risk quantitatively at an individual asset level. The tool is used to support a multi-pronged risk treatment program - to identify and prioritise condition assessments, maintenance programs and renewals; prioritise the development of shutdown operation manuals to better manage unexpected failures; and develop a process to minimise third party impacts on the network that might initiate failures. The tool provides a sound risk based approach to making renewal decisions for critical water mains, providing a more robust and defensible basis for investment.



David Zhang,
Service Planning
Lead, Sydney Water

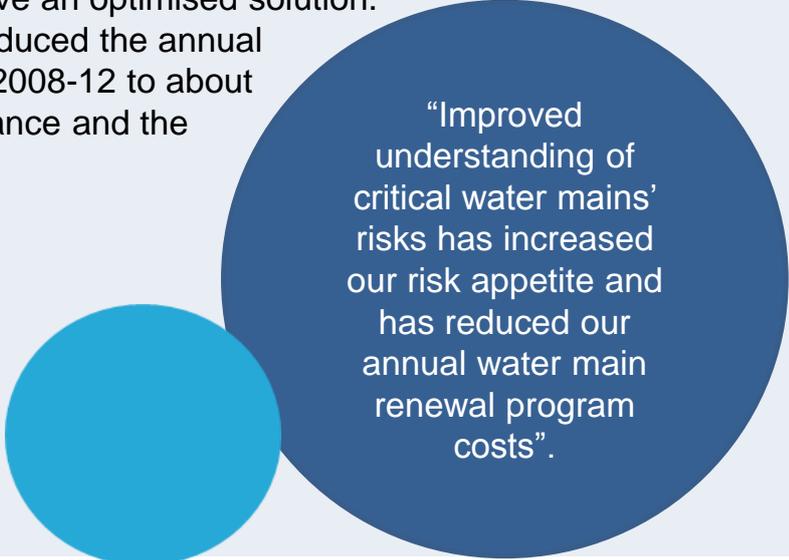
Description of Leading Practice

Utilities throughout the world face challenges to determine the optimal time to renew critical water mains (CWM) to balance risk, service and limited funds. To progress its proactive management of critical water mains, Sydney Water partnered with Consultants (SKM, now Jacob) to develop a targeted asset management strategy that integrates all relevant works programs for critical water mains; as well as a number of tools and decision frameworks that Sydney Water use to implement the strategy and an asset management implementation plan. A key element of the project was the development of an asset management decision tool to quantitatively assess pipeline failure risk and assist in proactive maintenance programs and renewal decision-making for individual CWM assets.

The quantitative risk-based tool provides a powerful approach to prioritise critical water mains by their risk profiles and to quantify risks in economic terms - using specific asset, condition and location data (linking with GIS data) to quantitatively determine the probability of failure and consequence of failure of each individual asset. In addition to the application of the quantified risk model and the improved critical water main strategies, Sydney Water also implemented the integrated system planning process to integrate renewals with growth and system reliability drivers. Since 2011, Sydney Water collaborated with research institutes to conduct the critical pipe research and development project to better understand pipe condition and now some of the learnings have been applied into critical water main management strategies.

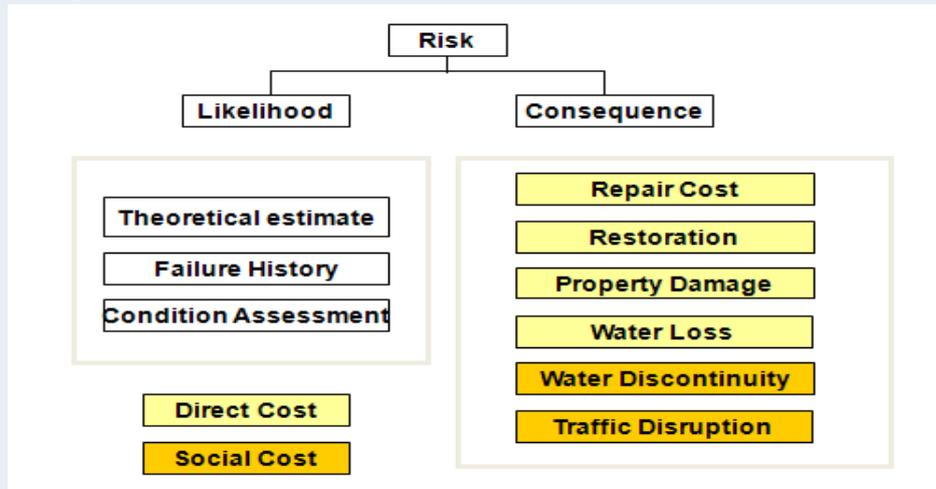
The quantified risk model has helped us to better understand critical water mains' risk profiles and helped us to communicate with the senior management to define the organisation's risk appetite. The application of the quantified risk model helped us to recognise the knowledge gaps and the technical deficiencies in understanding pipe condition. Most importantly, the improved understanding of critical water main risks has increased our risk appetite. With the improved knowledge, it guides us to apply the condition assessment tools and their results appropriately in our decision making to achieve an optimised solution.

During 2012-16 period, Sydney Water has reduced the annual water main renewal program from \$100m in 2008-12 to about \$65m, while maintaining the system performance and the maintenance costs.

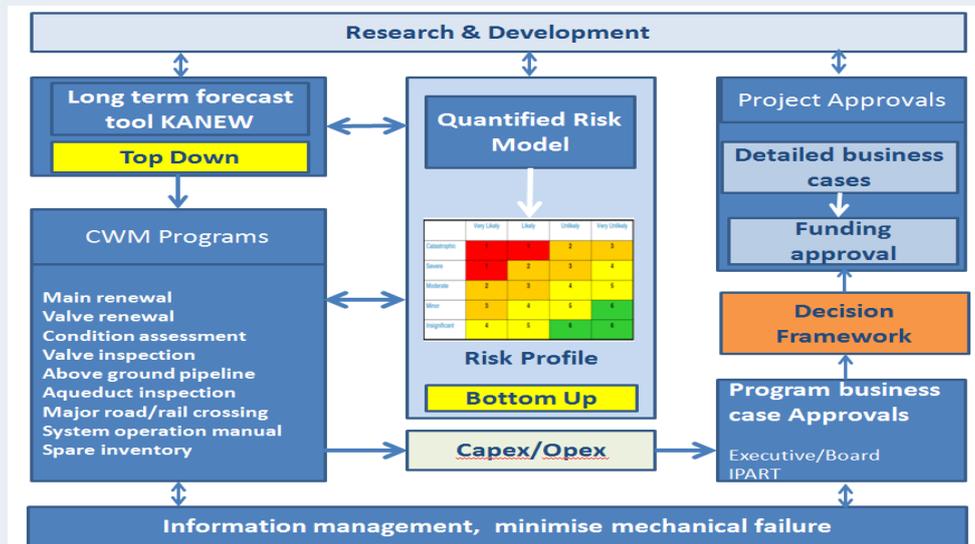


“Improved understanding of critical water mains' risks has increased our risk appetite and has reduced our annual water main renewal program costs”.

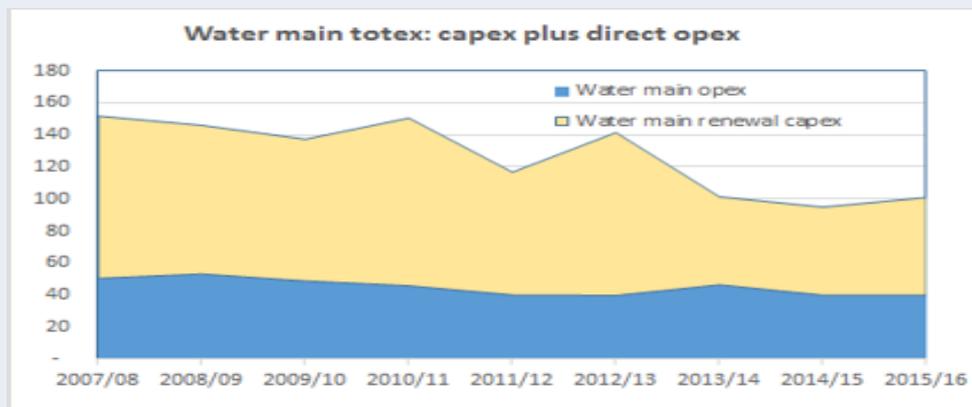
Critical water main quantified risk model



Critical water main strategies



Annual water main renewal programs against system performance





- A well documented project plan with significant details.
- Involve the end users of tools, strategies at the beginning so they can own these tools.
- An experienced project manager with strong technical background.
- Strong support from management.

- Better understand failure definition.
- Better understand likelihood of failure.
- Better understand consequence of failure.
- Better understand risk prioritisation.

- Definition of failure
- Assessment of likelihood of failure now.
- Prediction of likelihood of failure into the future.
- Accuracy of condition assessment techniques.

Goulburn Valley Water

Capital program prioritisation

Daniel Hughes

Acting General Manager Asset Development

Background and context

Goulburn Valley Water provides water and wastewater services to approximately 135,000 people in 54 cities, towns and villages across more than 20,000 square kilometres in northern Victoria. Goulburn Valley Water also services a large and diverse food manufacturing industry. These are defining aspects of the business, requiring 37 separate water treatment plants, 26 wastewater management facilities and thousands of kilometres of buried water mains and sewers.

The assets required to provide services to our customers are a major influence on our capital investment program, operational costs and customer service response times.

A robust capital program prioritisation process is required to manage competing priorities for investment from corporate projects, renewal projects, service improvement projects and growth projects. This is particularly important for Goulburn Valley Water due to the ongoing need for renewing and upgrading assets across a large number of individual towns with a large number of standalone treatment facilities.



Daniel Hughes, Acting
General Manager
Asset Development,
Goulburn Valley
Water

Description of Leading Practice

The capital program prioritisation process has been in place for over 10 years and has been continually improved over this time. Key aspects of the process include:

- A documented process that is clearly understood by all staff involved in capital program prioritisation.
- A robust project justification approach that is supported by templates and a clear understanding that business cases are required for investment decisions.
- Prioritisation of the program based on risk, multi criteria analysis and business objectives.
- A multi-step process for reprioritising the entire capital program on a yearly basis.
- Management input to the prioritisation process. This includes group decision making to refine the prioritisation outcomes.
- Alignment of the capital program prioritisation process with the Project Management process.

The capital program prioritisation process enables projects with a range of different business drivers (eg. growth, service improvement, corporate, renewal) to be assessed against each other and programmed.

The key benefits from the capital program prioritisation process include:

- The program is currently enabling level of service targets and compliance obligations to be reliably achieved. Significant funding for asset renewal (over 50% of the program expenditure) is currently achieved.
- In recent years the prioritisation process has enabled significant efficiency savings to be achieved through improved scheduling based on risk and identification of projects that could be subject to alternate innovative options.
- Projects included in pricing submissions to the economic regulator have been approved based on the robust justification that is demonstrated from this process.

The entire capital program is reprioritised on a yearly basis. The current year program is subject to monthly reporting to management and reprioritisation decisions can be made on a monthly basis.

A dedicated resource for Project Management Strategy has been introduced in recent years and will support the continued development and improvement of the capital program process.

“robust process that supports capital investment decision making and business performance”



- Dedicated resource to manage the process and support staff.
- Improved identification of project risks.
- Don't just rely on prioritisation criteria. Stakeholder reviews to refine prioritisation outcomes are important
- Communication with stakeholders.

- Robust approach for programming projects with competing priorities.
- Opportunities to identify efficiencies.
- Supporting regulatory pricing submissions.
- Maintaining a balance between renewal expenditure and expenditure on other project drivers.

- Continuing to improve the process as part of the Project Management Manual development.
- Identification of the top 5 projects risks for individual projects.
- Improved understanding of the delivery timeframes for individual projects.
- Alignment of the process with a new water pricing framework.

Auckland Stormwater

Capital investment 'gateway' process

Nina Sardareva

Asset Information Team Manager

Background and context

The gateway governance model is an Auckland based initiative, from and for the Healthy Waters Team.

On the 1st of November 2010, the Auckland Council became a unitary authority through the amalgamation of 1 regional council and 7 territorial authorities. Since then, it has placed increasing emphasis upon delivery, value, priorities, good governance, including a single sign-off and accountability point and delivering what we said we would do.

Capital investment is a key priority and value for money principle is a key objective. The process covering actions and decisions for implementing capital solutions is called "Issues to Solutions".

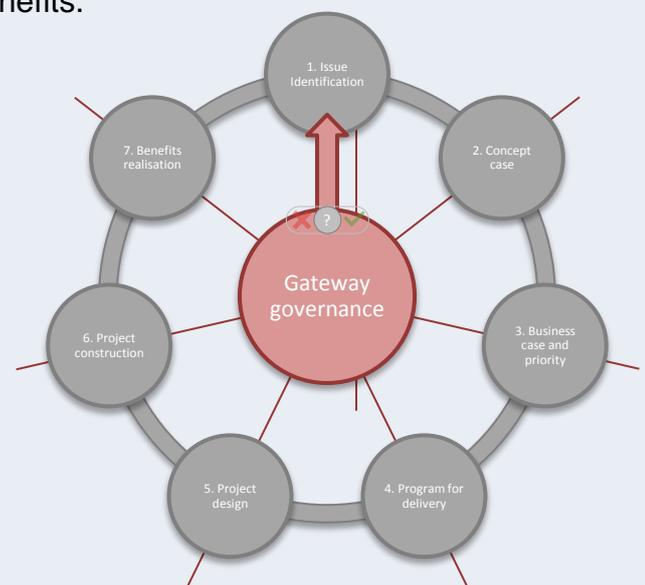
This "Issue to Solutions" process starts with the identification of a problem through to identifying the scope and timing of the most optimal solutions to implementing these solutions and assessing benefits.

In between each and every phase, the project needs to go through the "Gateway model". A Gateway is a 'phase appropriate' decision point where project managers review essential tasks to ensure that the objectives of the phase have been met and deliverables reviewed, and that the project is suitable and sufficiently developed to progress to the next phase. If the the project is deemed not suitable for the next phase, it will either be send back to a previous phase, added to a future project pol or simply cancelled.

The Gateway process is based on best practice and provides guidance for the execution of decision-making related to advancing projects from one phase to the next. Drivers are in place to ensure proper alignment with the organisation objectives and to assess the level of business risk.

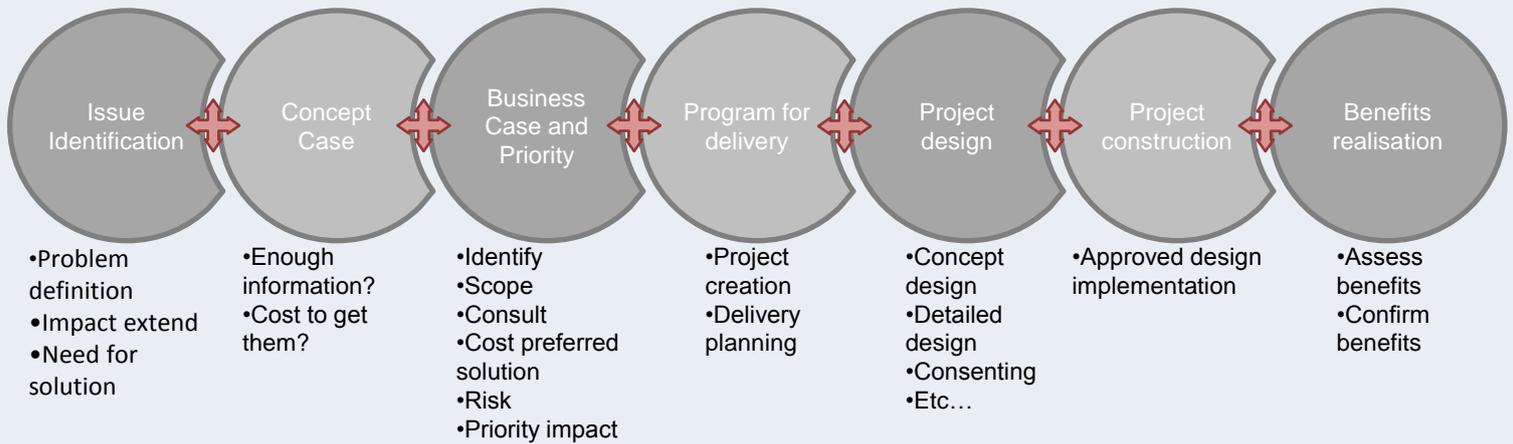
The key objectives of the issue to solution process are to ensure that:

- Problems are well understood and actioned upon appropriately.
- Solution options are well understood, comprehensively assessed.
- Preferred option has clear links to business risks and benefits.
- Solution delivery is planned and executed in the most optimal, efficient and cost effective way.

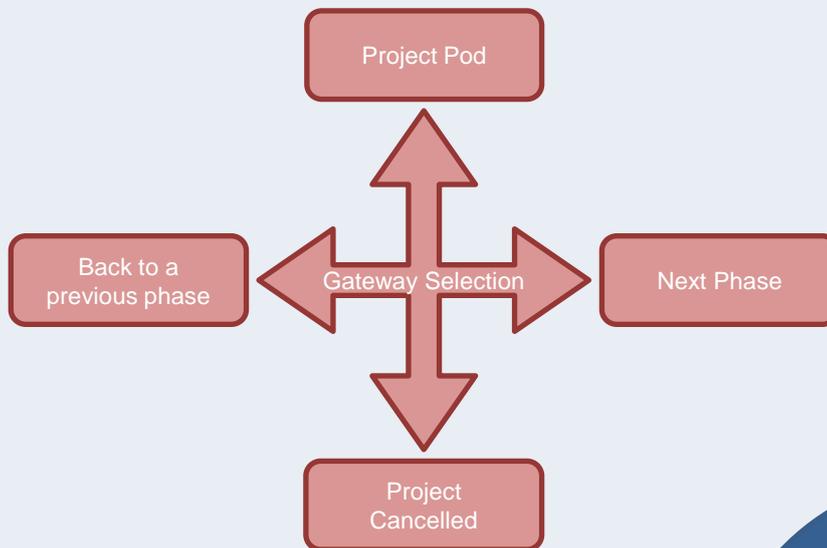


Description of Leading Practice

Issue to solution process & Gateway model:



The Gateway Process relies on the compilation and completion of reviewed and approved project documents by the project manager.



“Providing consistency, objectivity and transparency in issue and project management”

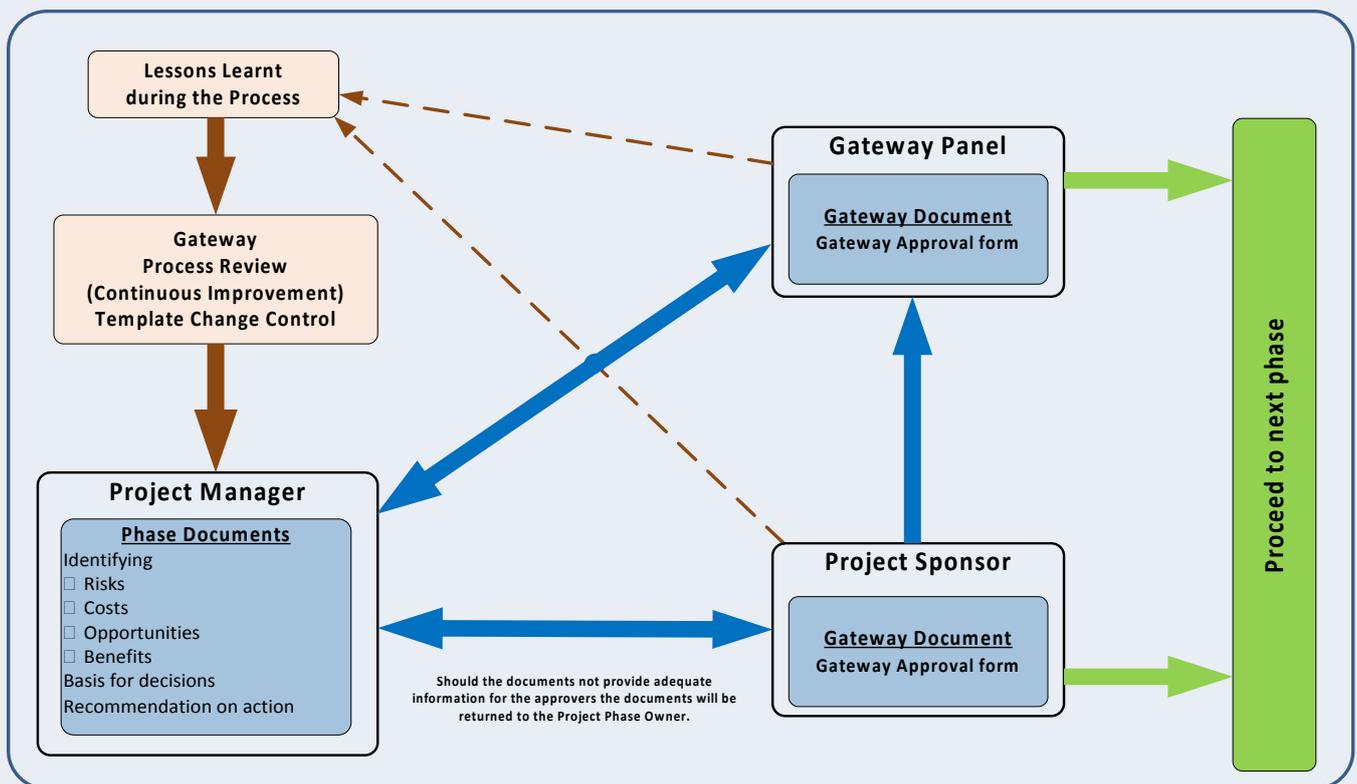
The Gateway Process allows for informed decision-making on the part of a project sponsor through the supporting documentation at a gateway. It will ensure that sign-off will release the project to the next phase when it is appropriate.

This model clearly outlines priority and support evidence based decision making.

The whole process provides consistency, objectivity and transparency in issue and project management.

“The Gateway Process is the next vital step to give Project Managers and Project Sponsors more ownership of decisions made in projects, and allow more structured support to be available for high risk projects or difficult decisions. It will help us manage our risks better, and help build a ‘no surprises’ culture.” – Sarah Sinclair, Gateway process owner.

The Healthy Waters department has pioneered this process, which is now an established practice in Auckland Council.



“Providing consistency, objectivity and transparency in issue and project management”



- Have a clear vision on what happens to issues that are not resolved and projects that do not progress through the gates.
- Ensure that the responsibilities in the process are allocated to roles in the Issue/Solution process rather than teams - teams scope change over time.

- Consistency in decision making.
- Increased ownership and responsibility – issue owners are in the project loop.

- Aligning project priority with programming of project delivery (needs vs feasibility and budget management).
- Providing a robust and consistent decision making in a changing environment.

Water Corporation

Managing a design panel to produce efficient design

Michael Somerford
Section Manager, Dams

Background and context

The Water Corporation typically build \$500m of assets each year that are designed by a team consisting of internal resources and two consultants GHD and the Worley-Parsons– Jacobs Joint Venture. The design cost are typically \$35m per year. The core work of the design team are asset types that the Water Corporation builds often; and learning from each project are important for future projects. Large projects like desalination plants or large wastewater treatment plants are mostly designed outside this arrangement through alliances. Management of this design team to produce efficient designs is described in this paper.

The current design team has been operating since February 2013. Prior to this the Water Corporation had entering into a range of consultancy panel agreements since 1995. These had mostly been successful but the learning from these previous panels where important in establishing the current panel.

The objectives in setting up the design team were clearly defined by senior management; as efficient design, on time and budget, fit for purpose and safe to build and operate.

A key principle in establishing the current design team arrangement was to be able to build and maintain a local engineering capability in the design of water infrastructure assets. Previous panel arrangements had spread the work too thinly over too many consultants so they were not able to build teams to support Water Corporation's design needs. The first consultancy agreement was with only one consultant and although generally it was effective the need to demonstrate value for money was always questioned.

The current panel includes two only consultants, GHD and the Worley-Parsons – Jacobs Joint Venture. The workload is sufficient for the consultants to build and maintain capability across the range of engineering disciplines required to design Water Corporation's assets. Having two consultants allows comparisons to be made to establish value for money is being achieved.

Water Corporation also retain some in house capability with workload roughly split equally across each party. The in-house resources focus primarily on design management and concept design with the consultant resources on detailed design but there is some cross over.



Michael Somerford,
Section Manager,
Dams, Water
Corporation

Description of Leading Practice

In setting up the design team the three parties collaborated to write a management plan to describe how we would work together, measure our performance and continuously improve. Management of the team is overseen by a management committee consisting of senior members from each party.

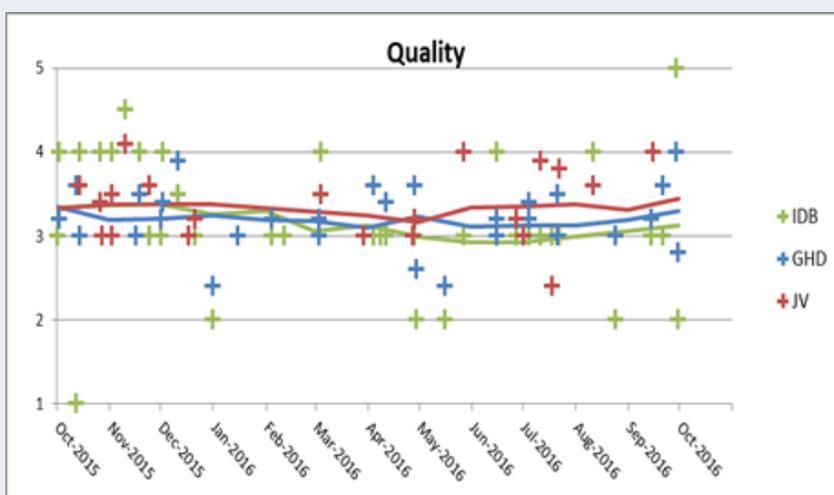
Two key issues to resolve were established early:

- The consultants advised that a predictable and consistent workload was the most important factor for them to be efficient.
- A review of previous panels had shown providing feedback to the consultants on their performance was rarely done.

The consultants are given an estimated forward workload that is updated monthly. 50% of the workload is directly allocated to provide some certainty of workload to build and maintain capability. 50% is competitively bid to be able to demonstrate value for money.

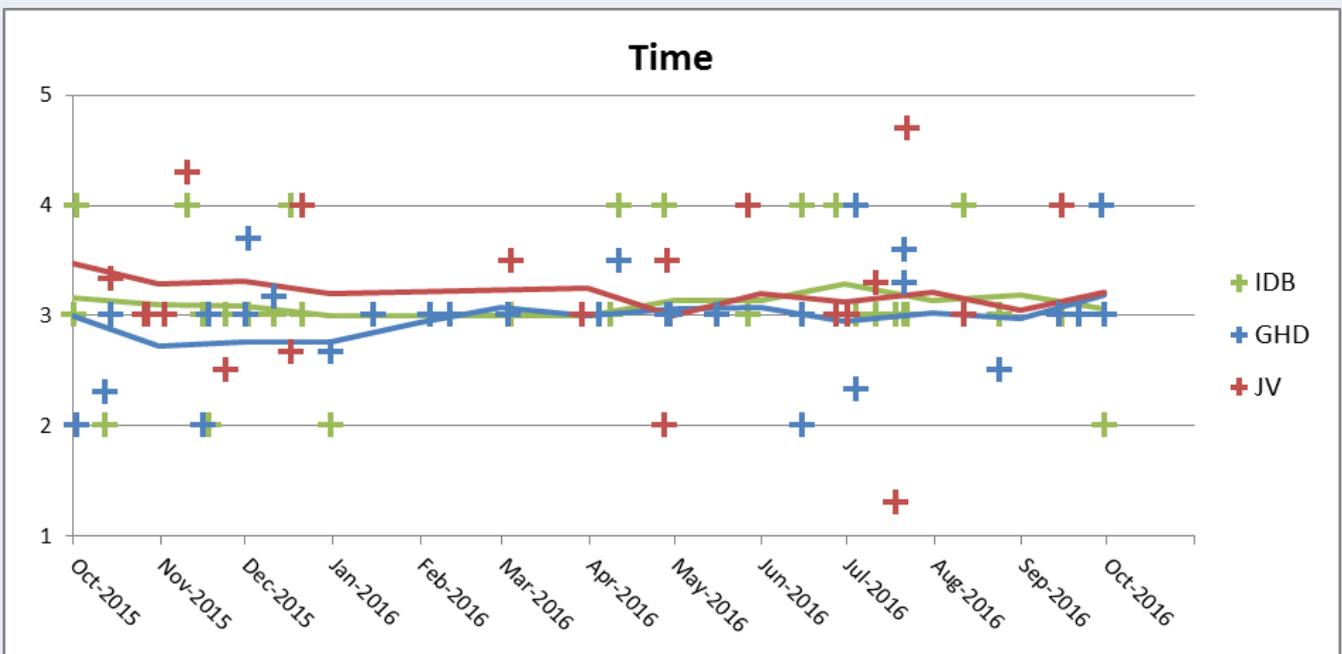
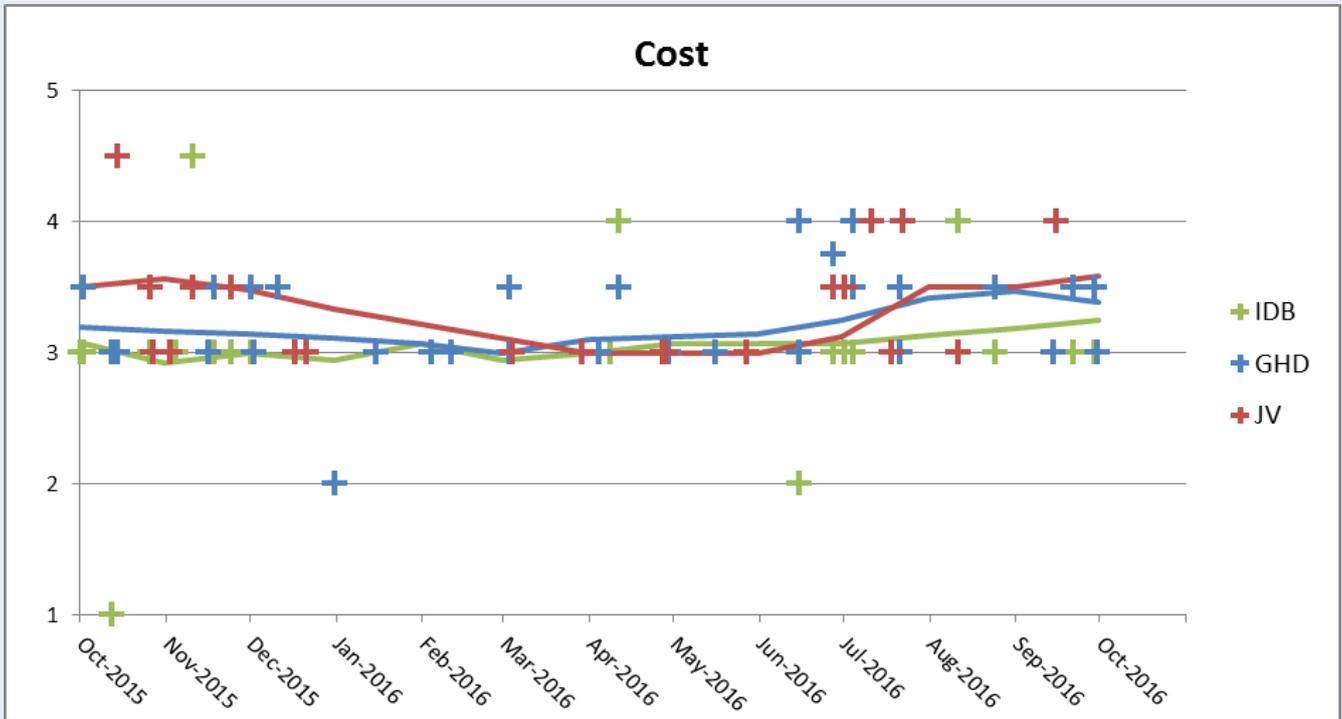
Each job is subject to a two way performance assessment at completion where both the consultant and the client are assessed. The feedback at these meeting allows the consultant to make changes on future jobs where issues were identified and continue good practices where successes are identified. The scores from the performances assessment are rolled up and discussed at the three monthly management committee meetings. We are looking for trends so we can make improvements to our processes. Performance assessment scores are plotted below.

The scoring is: 1 Unsatisfactory, 2 Needs improvement, 3 Fully Effective, 4 Exceeding, 5 Outstanding



Forecast workload so that resourcing can be planned.

Measure performance and provide feedback





- A predictable and consistent workload facilitates efficient design.
- Performance must be measured.
- Face to face feedback is important.
- Celebrate successes.

- Efficient design costs.
- Good design driving significant project cost savings.
- Few problems during construction.
- Safe assets to build and operate.

- Continuous improvement.

Auckland Stormwater

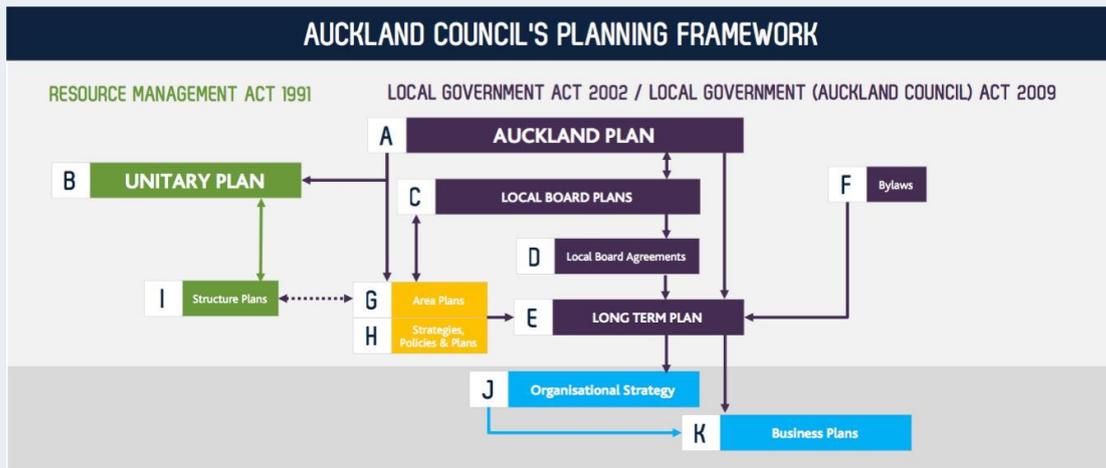
Organisational alignment

Nina Sardareva
Asset Information Team Manager

Background and context

On the 1st of November 2010, the Auckland Council became a unitary authority through the amalgamation of 1 regional council and 7 territorial authorities. Auckland is the home of one third of New Zealand's population and is the fastest growing region in the country.

The Auckland Plan vision is to become **'the world's most liveable city'** and sets Auckland's direction for the next 30 years including a growth and development strategy. The long term plan and annual plan set funding and expenditure priorities to support the implementation of our core functions and the Auckland Plan. Internally, the council has operational policies and procedures to follow and a set of core values to work – Accountability, Teamwork, Innovation, Pride, Respect, Service.



The Auckland region has a unique natural environment with volcanic cones, hundreds of kilometres of coastline and an extensive marine environment. It contains a wealth of beaches, harbours, estuaries, wetlands, lakes and streams that provide many benefits to the people of the region and beyond. Water is of special value to **Tangata Whenua**.

To achieve our vision we must be a **“Water Sensitive Community”**

The appropriate management of stormwater and freshwater is integral to a liveable city and ensuring we meet Council's statutory obligations and objectives.

Quick Facts

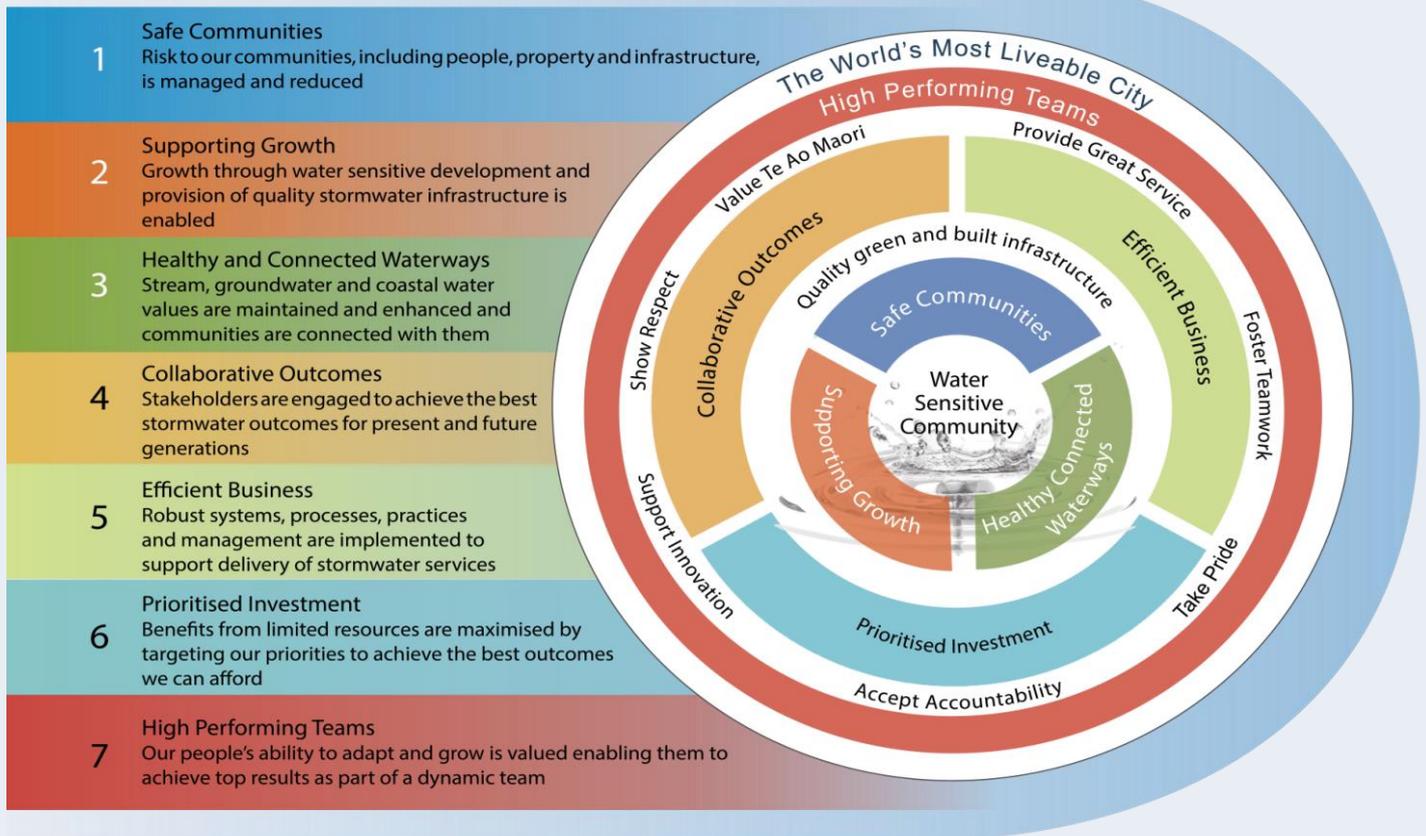
- Area: 5,600 km² area
- Population: 1.6 m
- Streams: 20,000km
- Pipelines: 6,000km
- Channels: 377 km

“Water is of special value to Tangata Whenua”

Healthy Waters - Strategic Objectives

We work closely with the Strategy and Policy Department and other infrastructure providers to ensure that the infrastructure strategy and stormwater decisions are aligned.

To focus our business on achieving our vision, we have established three core and four supporting objectives which are strongly connected to the Auckland Plan’s transformational shifts and strategic directions.



The strategic objectives guide us to ensure:

- strong support to the vision of the Healthy Waters Department;
- prioritisation of the expenditure over the short, medium and long term;
- contribution to the delivery of the regional outcomes; and
- good quality and green infrastructure for present and future generations.

The strategic objectives are reviewed every three years as part of the Long Term Planning process. To ensure these strategic objectives are being met, tactics and performance objectives are developed and reviewed annually. Monthly reporting across the group allow teams to keep track on the progress. The high level objectives are cascaded in a pyramid down the business to every team and individual and in alignment with our supplier KPIs. A summary wall poster is overleaf.

Healthy Waters - Performance Objectives

Healthy Waters Performance Objectives



OBJECTIVE 1

Safe Communities

- #4 Ensure our staff and stakeholders are safe
- #4 Respond to emergency events
- #4 Manage and reduce flood risk through resilient Infrastructure

Risk to our communities, including people, property and infrastructure, is reduced

Efficient business

- #6 Lead excellence in asset management
- #6 Monitor and upgrade assets for optimum network performance
- #4 Deliver projects and programmes on time

Robust systems, processes, practices and management are implemented to support delivery of stormwater services

OBJECTIVE 5

OBJECTIVE 2

Supporting growth

- #4 Provide quality, accurate and timely information
- #5 Generate increased revenue
- #3 Collaborate to enable growth and development

Growth through water sensitive development and provision of quality stormwater infrastructure is enabled

Prioritised investment

- #6 Plan, programme and deliver CAPEX
- #6 Plan, programme and deliver OPEX
- #6 Projects are adequately scoped, risks fully understood and benefits realised

Benefits from limited resources are maximised by targeting our priorities to achieve the best outcomes we can afford

OBJECTIVE 6

OBJECTIVE 3

Healthy and connected waterways

- #4 Fully meet our legislative obligations
- #4 Take action to improve our waterways
- #4 Identify areas for improvement and drive best practice

Stream, groundwater and coastal water values are maintained and enhanced and communities are connected with them

High performing teams

- #4 Promote staff wellbeing
- #4 Be an employer of choice
- #6 We are a resilient, self-sufficient organisation
- #6 Healthy Waters is recognised as industry leaders

Our people's ability to adapt and grow is valued enabling them to achieve top results as part of a dynamic team

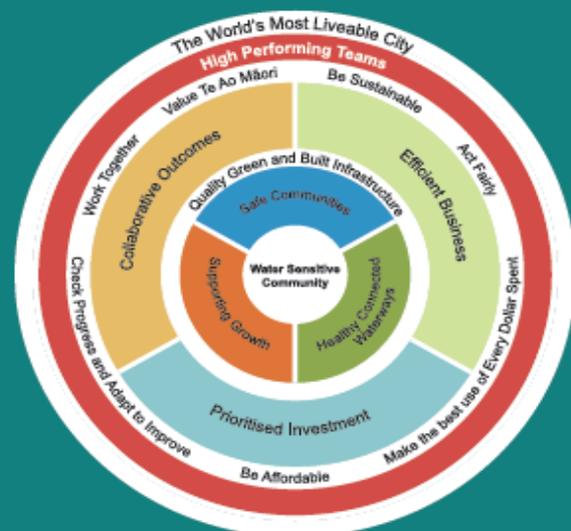
OBJECTIVE 7

OBJECTIVE 4

Collaboration

- #1 Provide high-quality customer service
- #3 Deliver on time, every time
- #2 Proactive and genuine engagement with partners
- #4 Set national benchmark in leading water-related functions

Stakeholders are engaged to achieve the best stormwater outcomes for present and future generations



Teal

Your license to operate:
TEAL high performing team

- ▶ We understand what we are here to achieve
- ▶ We support each other to achieve success
- ▶ We empower our people to get the job done
- ▶ We inspire others through our leadership

Healthy Waters - Virtual Teams, Talent Pool, Supplier Collaboration

VIRTUAL TEAMS

COMMUNICATION IS KEY

- Weekly line management meetings (in/formal, lunch, stand-ups, morning tea)
- Minimum monthly conversation with manager
- Monthly combined management (middle then senior) meetings
- Quarterly roadshow with staff and supplier to share objectives and actions

TALENT POOL

- All specialists (senior or principals) easily moved between teams to increase collaboration and knowledge sharing
 - Technical area champions and principals right across the business.
 - Virtual teams are in place to focus on initiatives and continuous improvements.

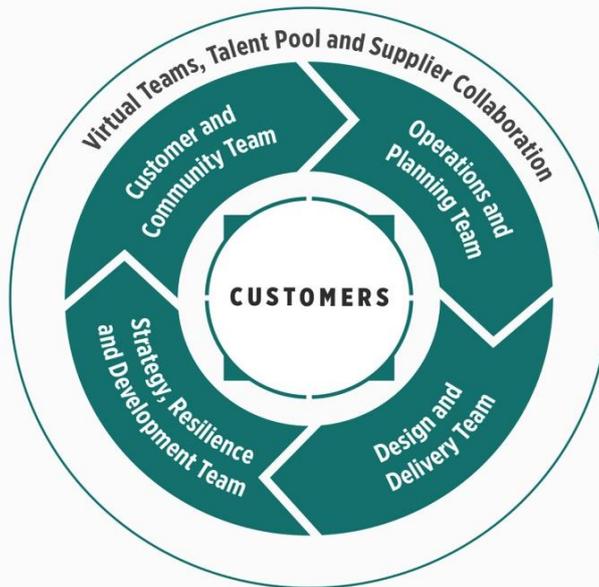
- Sit right across the business with a TOR, leader, members and deliverables
- Report to senior management sponsor

CASCADING ACTIONS

- The high level objectives are cascaded in a pyramid down the business to every team and individual and in alignment with our supplier KPI's
 - Tracked and reported monthly across the department

CONTRACTORS & SUPPLIERS COLLABORATION

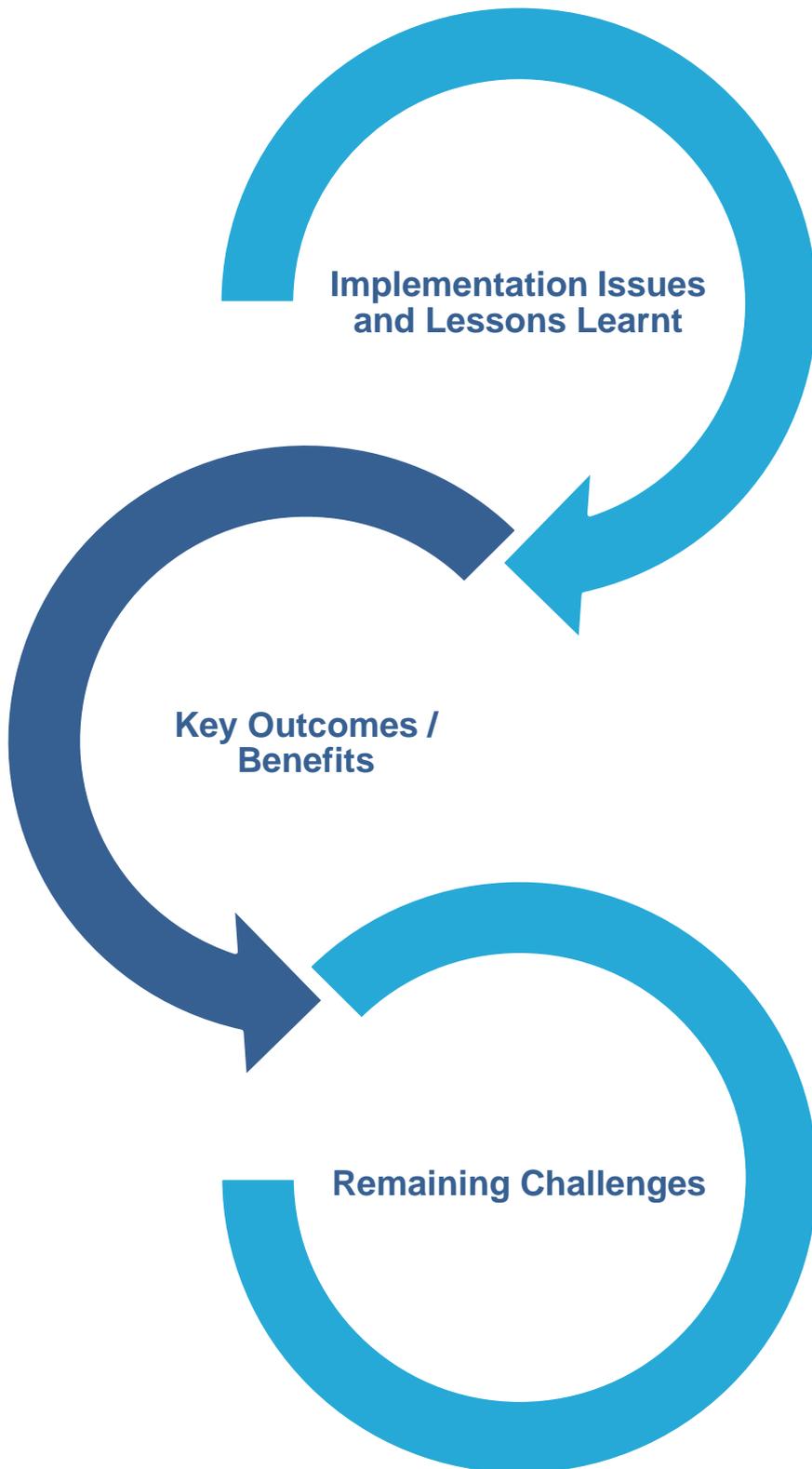
- Relationships are critical, and they need investment. Joint supplier meetings are held quarterly to focus on improvements, innovation and share knowledge which can be implemented across all the contracts
 - KPIs are openly shared allowing a 360° feedback loop
- Working across the organisation and CCOs – SLAs, regular meeting, joint projects and virtual teams sitting across several areas



OUR BEHAVIORS UNDERPIN OUR SUCCESS

- Our values are used to hold each other accountable. Above and below the line behaviours are discussed at every meeting.
 - Our behaviours are modelled at all levels and we know what good behaviour looks like.
- All of our teams were involved in developing below:

	ACHIEVE	DEVELOP	SERVE	COLLABORATE	RESULT
HOTTER	Take collective ownership. Deliver outcomes. Do it, don't talk about it. Be agile. Be resilient.	Allow others to shine. Be inspirational. Innovate.	Ask for help. Go the extra mile.	Active listening. Hold each other accountable.	CENTRE OF EXCELLENCE
HOT	Own your decisions. Agree roles and responsibilities. Finish what you have started. Think ahead.	Share ideas, achievements, lessons learnt. Be approachable. Empower other. Be positive. Accept and give honest and constructive feedback.	Do what you say you will. Celebrate success. Be clear, focused, responsible, accurate. Be honest. Accept decisions and outcomes.	Speak up. Know your team. Be transparent. Bring everyone on the same journey. Back each other. Effective two way communication.	GOOD
I CAN MAKE A DIFFERENCE					
NOT	Blaming. Spreading & Acting on rumors. Gossiping. Undermining. Being lazy. Defending. Being self-centered. Having a hidden agenda. Covering your arse. Sabotaging. Being deceptive				FAILURE



- Communicate and communicate some more
- Keep messages simple
- Commitment at all levels

- Clearly supports the vision of the Auckland Council
- Engagement of our people is at 86%
- Guides expenditure over the short, medium & long term
- Contributes to the delivery of the regional outcomes

- Communication will need to continue to be stepped up to meet expectations
- Continued focus on modelling the behaviours

Gippsland Water

Involving all stakeholders in asset acquisition and renewal

Graeme Bartle-Smith
Senior Engineer, Asset Management

Background and context

Gippsland water is located in Victoria, Australia. With over 69,300 customers billed, it provides water and sewer services to the Gippsland region

Key business drivers:

- Determination regulation of revenues and/or prices/rates
- Customer focus and invited stakeholder involvement
- Aging infrastructure
- Continuous improvement commitments

As little as five years ago, there was little communication between the project planning and delivery group and other stakeholders across the organisation. Some projects were delivered that did not adequately meet the needs of the business, were not the highest priority or did not consider interdependent projects.

In preparing submissions for the 2013 pricing submission to the financial regulator it became clear that Gippsland Water needed to ensure that all projects were adequately prioritised by risk to all elements of the business. This could only be achieved with full cooperation across the business.

Graeme Bartle-Smith
Senior Engineer
Asset Management
Gippsland Water

Description of Leading Practice

1. Gippsland Water has developed processes that ensure that all stakeholders to an investment have been identified and are involved in decisions from project identification to detailed design and delivery. A procedure called 'Asset Planning & Delivery Project Management Procedures Manual' is a checklist of all tasks in the process, required to be followed throughout all projects. Initially, stakeholder workshops were cumbersome but, with time, participants developed an appreciation for the importance and value of communication. They are now an expectation.
2. For all phases in the project lifecycle (business needs, strategic assessment, business case, detailed design, tender, delivery and review), we identify internal stakeholders and we form a project consultative group. Project officers can discuss issues with individual PCG members at any time and can bring them all together in workshops. Approvals after each phase require sign-off by stakeholders' managers.

Problem definition

Business needs

Benefits

Risks

Options

Preferred concept

Recommendation

Approvals

Delivery

Each step is workshopped by the project consultative group to make sure that everyone's needs are met as we seek the best outcome for the business.

3. Benefits

- Everybody knows **that** their project is progressing.
- Everybody knows **how** their project is progressing.
- Projects are assessed by common criteria.
- Risks and opportunities are identified.
- Projects are prioritised.
- Everybody can see how their project fits in the grand scheme.
- Complete picture provided for approvals process.

“ensuring all risks are controlled with thorough communication through the life cycle of a project”



- When people feel included, they will bring issues to the table for discussion.
- When people feel included, they will not complain.
- Provide advance warning of meetings – at least two weeks.
- Be respectful of the work stakeholders have to do in their normal role and fit in to their schedule.

- Risks and opportunities are identified early.
- There will be fewer surprises later to interrupt or delay the design process.
- Stakeholder meetings have become shorter, sharper as people develop a clear understanding of their purpose.
- Projects are delivered closer to time and budget.

- Processes and communication can always be improved so keep working on it.
- Keep your eye on the ball.

East Gippsland Water

Asset management system leadership and culture

Georgina Kingsbury
Senior Assets Engineer

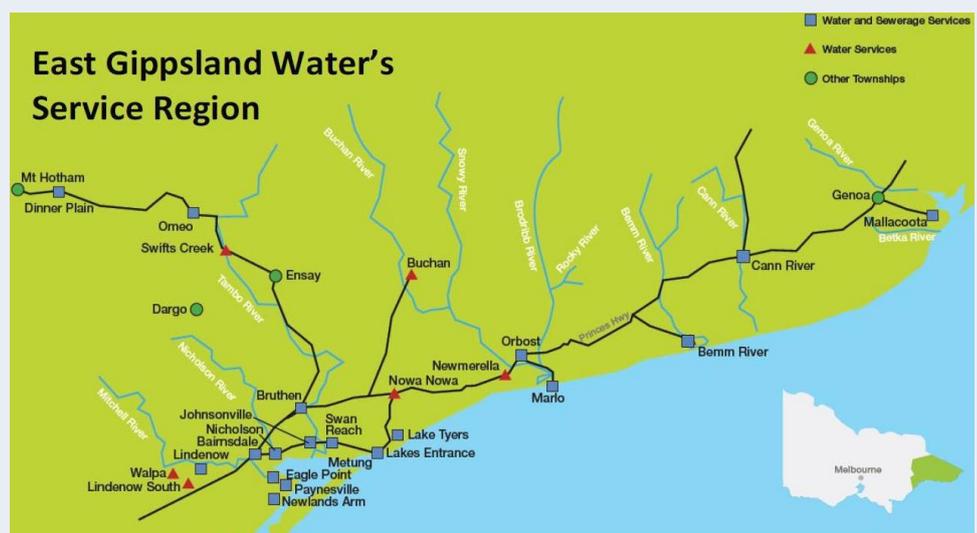
Background and Context

East Gippsland Water (EGW) provides water and sewerage services to communities in eastern Victoria extending east from Lindenow, through to the region’s capital Bairnsdale, the holiday hotspots of Paynesville and Lakes Entrance, and on to the Wilderness Coast and Mallacoota near the New South Wales border. It also serves customers as far north as Dinner Plain in the High Country of the Victorian Alps. This is a total of approximately 24,000 customer connections across an area of 21,000 square kilometres.

EGW delivers its services with approximately 100 staff members across four departments – Corporate, Operations, Business and Infrastructure. Its key business objectives are:

- To meet the needs of our customers and stakeholders
- To enhance the liveability, development and resilience of our region
- To innovate and achieve whole of business sustainability
- To optimise the efficiency and affordability of our services
- To maximise the potential of our people.

The size of EGW, the broad range of locations it serves, and the number of customers serviced means that EGW must continue to drive improvements in Asset Management across all areas, not just focusing on a particular area of improvement. To enable this to occur a strong asset management culture is required, that is well supported by both the Executive Team and staff.



Georgina Kingsbury, Senior Assets Engineer, East Gippsland Water



Description of Leading Practice

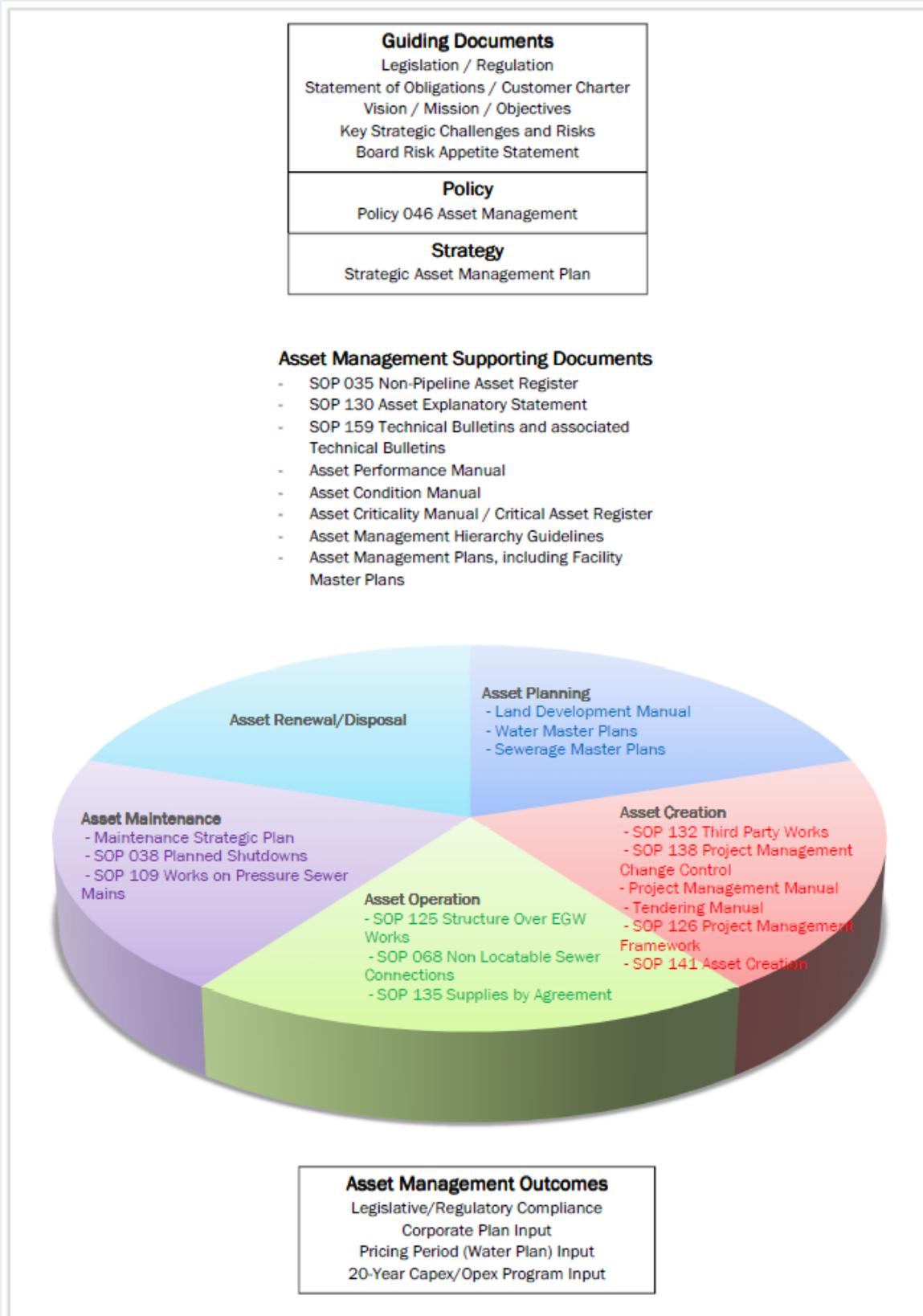
EGW's Asset Management System leadership and culture has developed over time as a result of the EGW service area being geographically diverse, with the population concentrated in small towns over a large geographical area. The nature of the EGW business means that we must continue to drive improvements across all asset management functions, not just one specific area. While we may not have the processes and systems set up yet to be ISO 55000 series compliant, we do have the knowledge and capabilities that make us good managers of our infrastructure so that we consistently meet the needs of our customers now and into the future.

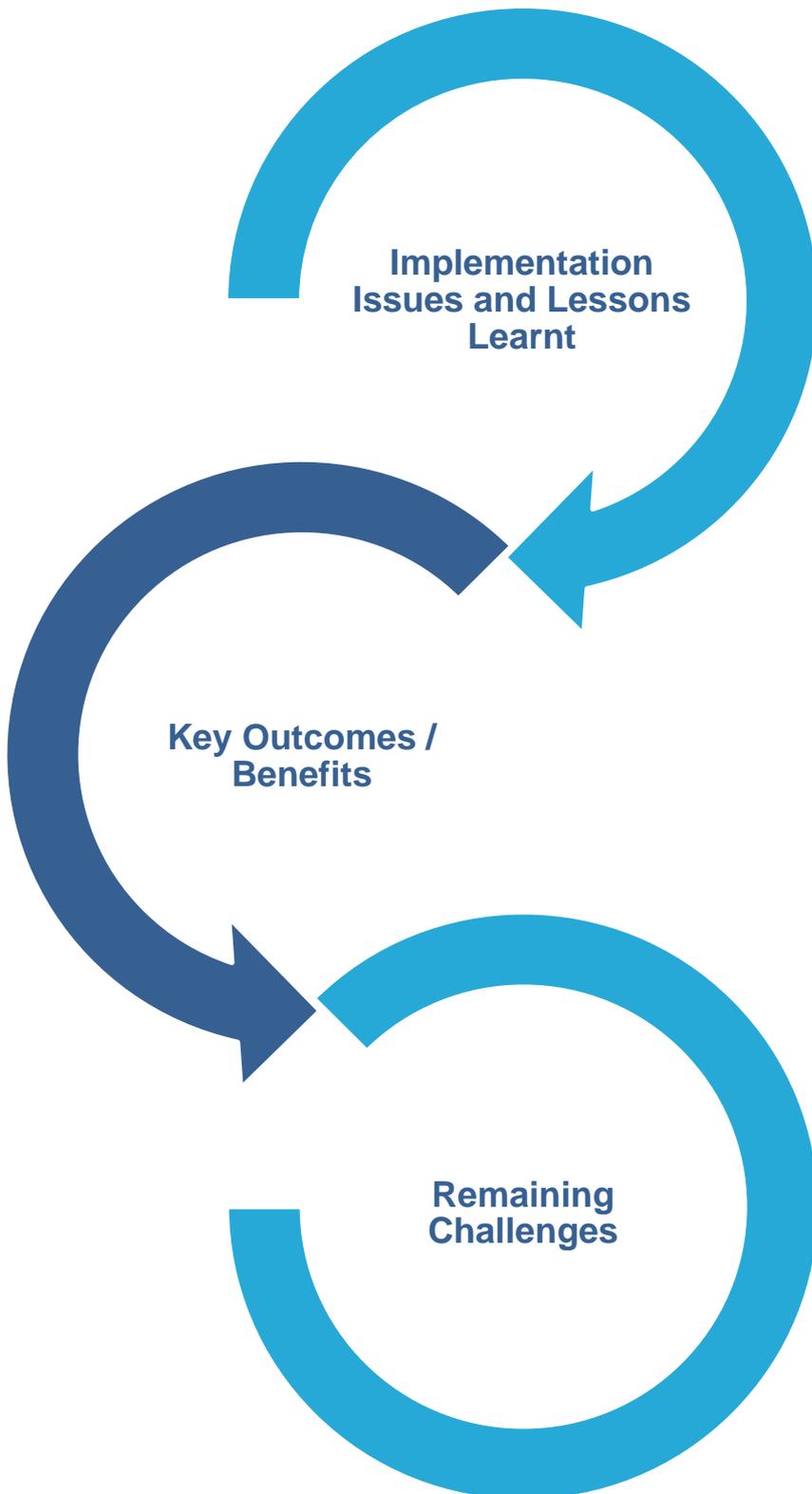
The strong Asset Management System leadership and culture at EGW has been and will continue to be crucial to EGW delivering services to its customers. Asset Management System leadership, and asset management culture, starts at the top with the Board and Executive Team understanding the importance of asset management to the long term delivery and sustainability of our services. Establishment of a specific team responsible for the ongoing development of the Asset Management System at EGW is a key example of this leadership. The team drives the progress of the Asset Management System forward across all areas of the business with passion and enthusiasm, while providing support to those who may need it. A key focus of this team in recent years has been to take EGW on the Asset Management journey, to realising that everyone is involved in asset management, whether they recognise what they are doing as asset management or not. The AMCV project has helped to strengthen this realisation and understanding. Engaging the organisation and improving their understanding of Asset Management is important to continuing to develop the asset management culture at EGW.

In many ways EGW's strength is its smaller size, which allows innovations to flourish, to take up opportunities as they present themselves, to continuously drive improvements in the way we deliver our services to our customers, and nowhere is this more important than in Asset Management. The diagram on the next page outlines EGW's Asset Management System in a nutshell, from the Policy to the asset lifecycle and on to the key Asset Management outcomes, which are important to EGW meeting the needs of its customers.

“a strong asset management culture drives improvements across the asset lifecycle”

East Gippsland Water's Asset Management System in a Nutshell





- Engage with the leadership team early.
- Take the organisation on the journey – why are we here, what are we doing, what will we achieve, how are we progressing, did we achieve what we set out to, what are the next goals? Repeat.
- Develop a plan before taking action rather than developing solutions to problems as you go.
- Alignment of actions to corporate objectives, policy etc. means improved buy in to actions, and better outcomes for the organisation.
- Starting to make informed decisions based on the Asset Management System and the data within it.
- Staff are becoming self-motivated to use the Asset Management System, including the processes and data.
- Completion of the ‘groundwork’ required to have a robust Asset Management System so that it is resistant to personnel changes.
- Ongoing development of the asset management culture – not everyone has been ‘converted’.
- We are using data to make decisions for today, but what else might this data be able to tell us? Building on the asset management culture with more of an analytics approach.

Icon Water

Resource planning: novel approaches to long-term resource planning and understanding the value of stored water

Owen Gould
Asset Growth and Innovation



Background and context

Icon Water is a medium-sized organisation, located in the Australian Capital Territory, It provides water and wastewater to over 170,000 customers.

Icon Water's Business drivers are:

- Excellence in asset management (ISO550001 certification)
- Meet customer needs, exceed customer expectations
- Customer values capture for business planning

Icon Water looked at many options to augment water security during the drought. Decision-makers requested a Net Economic Benefit (NEB) for all feasible options to contribute to final decisions. The benefit of each project was to be measured as reduced time in restrictions and given a dollar value, while the costs included construction and operating expenditure.



Description of Leading Practice

Icon Water created a model that could estimate the NEB of any water security project. While the model has since undergone many refinements, the overall model structure remains unchanged. The model is made up of:

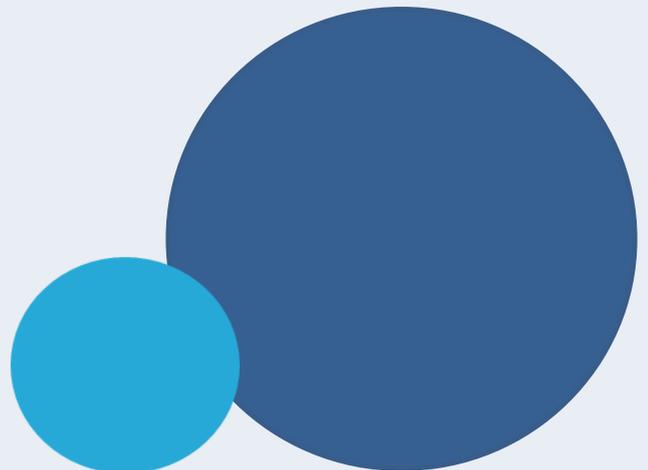
- A large number of climate changed adjusted synthetic rainfall and evaporation weather replicates over 50 years at a daily timescale.
- Hydrological models that convert the weather data into river flows and dam inflows.
- A demand model that takes into account the weather data, population growth and consumption behavioural features.
- A water resources model of the Canberra raw water system including operating rules, flow constraints and operational costs for each water source.
- An economic valuation of the cost to the Canberra community of experiencing each stage of water restrictions.

Two scenarios can be created; a control scenario that has the current business as usual raw water system and a system that incorporates the proposed new asset.

The two scenarios can then be compared by averaging the expenditures and time in restrictions over all the different weather replicates. The time in restrictions could be compared to a water security KPI; however, this does not provide an NEB. Instead, the dollar value for the reduced time spent in restrictions measures the benefit of the proposed project.

The above description is somewhat oversimplified and other complexities were involved in the modelling. For example, opportunity costs for money spent earlier in the 50 years were included to allow comparisons of capital and operational dollars.

The NEB output from the model was invaluable for assisting decision-makers on various options to augment the ACT and Queanbeyan raw water supply.





Benefits:

Optimisation of Operating Rules

The water resources model was not discarded at the completion of this intense asset acquisition period. The model has been found to have applications that have provided additional benefit to Icon Water. Operators need to select which raw water source to access, taking into account water security and operational costs. The trade-off between operational costs and time in restrictions can be determined by using a genetic algorithm optimisation routine to determine operating rules for each water source. The operational triggers for using each water source can be determined to minimise the total cost to the Canberra community (including the cost of water restrictions).

Value of Stored Water

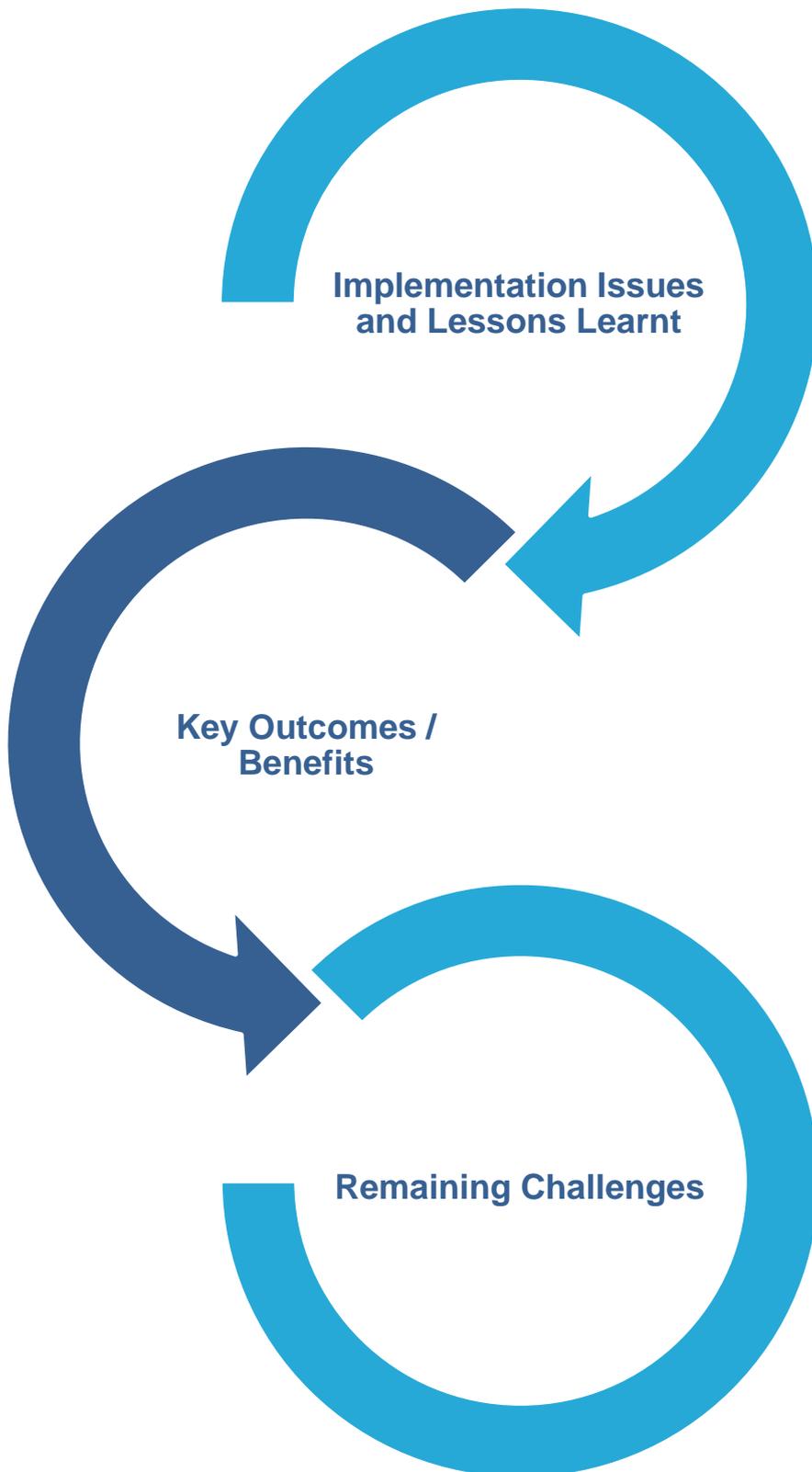
During rain events, particularly soon after the drought broke, Icon Water received criticism for spilling water over the dams. Journalists or politicians would use the retail value rate of water and multiply it by the volume of water lost to value the spill at about \$5 million/GL. Clearly, this is an overvaluation of the water; it is only worth that much if someone consumes it. When dams are full, water stored is not as valuable since it is likely to be spilled. When dams are low, water is extremely valuable as each drop makes it cheaper to operate and less likely to enter water restrictions all depending on future weather. The question is; how can this water be valued quantitatively?

Once again, two scenarios can be setup; one at say 100% storage and one at 90% storage. The model can be run and the average costs of each scenario over the next 50 years compared. The average difference in costs of the two scenarios can be used as the value of the additional 10% storage of water. Note that some weather replicates will spill the additional water immediately making the stored water worthless while in other weather replicates, the water prevents severe water restrictions, saving the community millions of dollars. By averaging all of these possibilities, a better estimate of the value of the water can be made.

Application of valuing water

Valuing stored water might sound like an academic exercise with no real operational value. However, Icon Water recently recommissioned a mini-hydro at the outlet of one of the dams and an operational strategy was required. At what storages should it be run to generate revenue at the expense of water security?

Depending on the circumstances, the return on the electricity generated changes. By knowing the value of the stored water at each level, triggers can be set for operational guidelines that are logically optimised to, on average, return the greatest value (including operational and water security costs). The mini-hydro has returned a savings/revenue of over \$250k since recommissioning earlier this year.



- Getting the synthetic weather data right.
- Communicating the model.
- Communicating the limitations of the model.
- Including uncertainty around construction costs.

- Advice on NEB and potential improvements to water security of capital projects.
- Determination of an operating strategy that provides balance between water security and operating cost.
- Advice on projects that require valuing stored water in dams from the mini-hydro application though to environmental release initiatives.

- Upkeep of the model to ensure the required assumptions remain valid and changes are reported to management.
- Updating synthetic data regularly to incorporate updated climate change projections and historical data observations.
- Communicate how the model works to ensure outputs are accepted by relevant stakeholders at Icon Water.

Los Angeles Leading Practices Conference

Tuesday 29th to Wednesday 30th
November 2016

Session 1

Region of Peel: Policies, risk, strategy, strategic asset management plans

Portland Water Bureau: AMPs

Rancho Water District: AMP framework and AMP groundwater production wells

Region of Peel

Policies, risk, strategy, strategic asset management plans

Troy Mander
Manager,
Corporate Asset Management Section

Description of Leading Practice

Objective

To outline organizational planning practices that support strategic decision making on existing capital infrastructure at the Region of Peel.

Background and context

The Region of Peel is a large Canadian upper tier municipality with approximately 1.4 million residents. The Region of Peel owns over \$24 billion of infrastructure (not including land values) that provide water, wastewater, solid waste, transportation, social housing, paramedics and long term senior care services.

With such a broad mix of assets and services, the Region of Peel requires a strategic approach to understand overall infrastructure needs and investments, and identify the asset management priorities that will sustain Peel's service objectives.

Peel's Corporate Asset Management Program began in 2007 and evolved to improve organizational asset management processes, support strategic asset management decision-making and to maintain Corporate and Service Program strategic asset management plans.

The Strategic Asset Management Plan (SAMP) is the organization's compass for deciding the direction on infrastructure priorities. Without this high-level perspective, it is difficult for decision-makers to have the proper context to strategically map the course for asset investments in the organization's priority areas in order to meet corporate service objectives. Peel's Enterprise Asset Management Strategy uses an enterprise risk management approach to assess the state of Peel's infrastructure, identify asset management needs to maintain Regional services and to prioritize those needs for reporting in the SAMPs.

The purpose of this presentation is to describe how Peel's risk-based asset management strategy is applied each year to update the Corporate and Service Program SAMPs for Peel's existing assets.

Process

Each year, the Region of Peel updates the Corporate and Service Program SAMPs to provide asset management recommendations that feed into the annual update of the 10-year capital plan. The key components of Peel's asset management program that facilitate the annual SAMP updates include:

Troy Mander,
Manager,
Corporate
Asset
Management
Section,
Region of Peel

Policy

Peel’s asset management policy sets the framework for Peel’s asset management strategy combining the application of approved asset levels of service, proper data and data management, risk management, regular reporting and asset management roles and responsibilities.

Risk

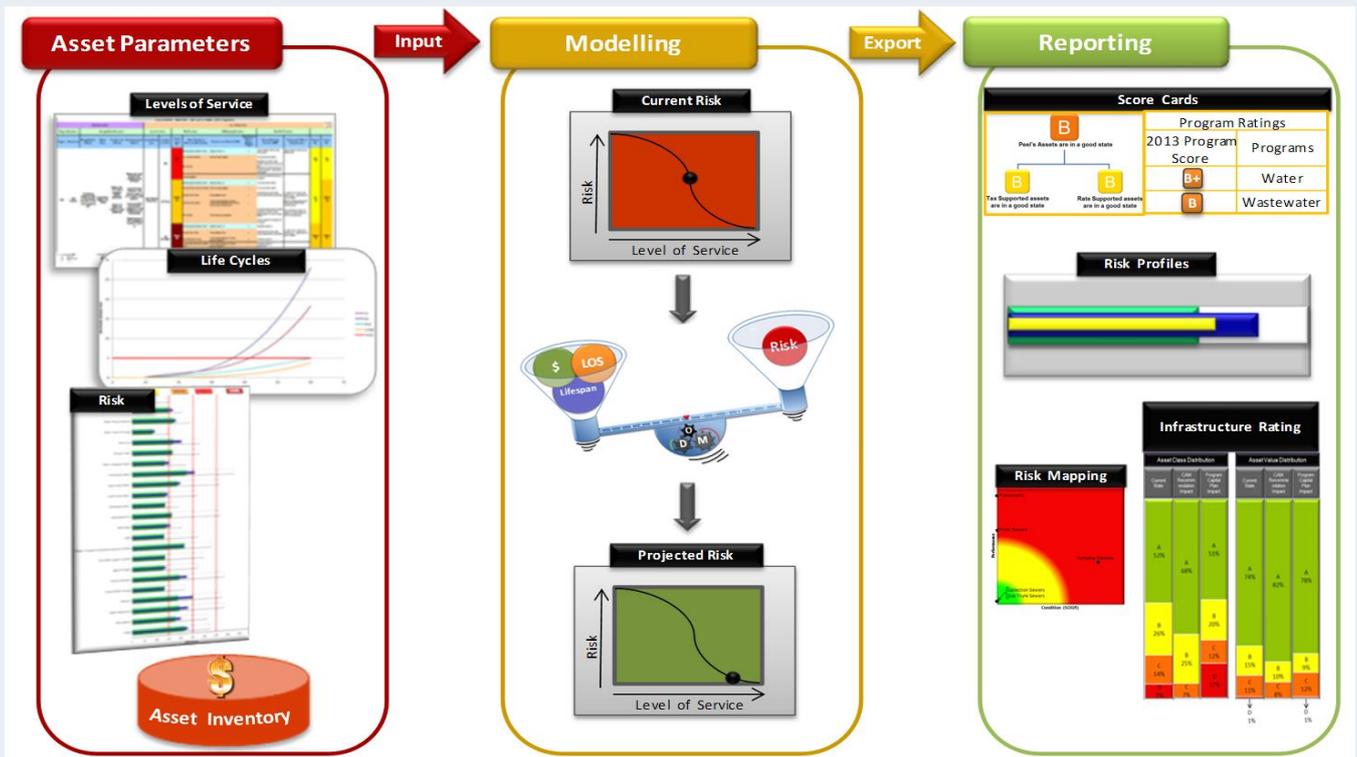
Risk is Peel’s strategic measure by which all assets are assessed. The asset management requirements and prioritization of those requirements are measured by the degree of risk to Peel’s public services as a result of assets failing to meet desired asset level of service targets.

Strategy

Peel’s Enterprise Asset Management Strategy details the processes and practices for developing the annual SAMPs including the life cycle strategies for each asset class to achieve acceptable asset levels of service and risk targets, data requirements, annual planning processes and validation of capital investment plans to meet Peel’s desired asset performance and condition targets.

Modelling and Reporting

Peel’s Optimized Decision Model is the tool that combines the available asset information with Peel’s asset management methodologies to assess the current and predict the future state of Peel’s assets to estimate the immediate and long term infrastructure and financial needs to sustain assets and services. The Optimized Decision Model outputs to various reporting formats that provide a simple, transparent overview on the state of Peel’s infrastructure, the asset priorities and to develop concise SAMPs.



Outcomes/achievements

Over the time that Peel's Corporate Asset Management Program has developed, asset management processes and practices have matured to better define Peel's infrastructure needs and to effectively report on those needs. Today, Regional Council and executive leaders now have an organizational perspective on the state of Peel's infrastructure and have trust and confidence that infrastructure investments are being made to the right areas of Peel's portfolio and that the revenues collected by the Region of Peel through taxes, utility rates, fees and grants are adequate to sustain the infrastructure over the long term.

Other outcomes stemming from the asset management program include:

- Improved definition of the gaps and requirements for asset data and information.
- New initiatives to develop more complete and comprehensive Service Program asset management plans.
- Detailed risk assessment programs on critical assets and asset groups.
- Renewed and more focused emphasis on capital programs to reduce organizational risks to Peel's services.



- Stakeholders must understand the value of Asset Management.
- Make it understandable & logical.
- Keep the momentum going, don't get bogged down in making the system perfect the first time – it won't be.
- Equality for all Programs (hard & soft services) in the development of the AM strategies.
- Allow significant time & resources to organize & screen the data to provide meaningful information.
- Keep the perspective: strategic planning is the Corporate objective; Component planning is the Program's expertise & domain.
- A transparent method to prioritize organizational asset needs & rationalize Program budgets.
- Demonstrates responsible stewardship of resources to the public.
- Increases credibility with Council.
- Moves the debate from short-term issues to long-term objectives & strategies.
- Better financial decisions.
- Clear & defensible information on state of the infrastructure, on asset & service risks; on organizational asset needs & priorities and on financing requirements.
- Better alignment of Capital Plans with SoGR needs.
- Resource Asset Management priorities.
- Develop an integrated asset management system (which includes capital project management and maintenance management)
- Develop full costing of assets, life cycle analysis and decision making.
- Develop better financial forecast and improvements for operations and maintenance activities and assets thus allowing us to link the useful asset life to our financials.
- Improve asset systems data quality.
- \$2.1 Million (CAD) .
- 4 years.

Rancho Water District

AMP framework and AMP groundwater production wells

Warren Back
Engineering Manager-Operations

Description of Leading Practice

Objective

Asset Management Plans at the Rancho California Water District (RCWD) are intended to kick-start implementation of a comprehensive asset management program that will provide and maintain an efficient infrastructure through prudent planning and maintenance excellence that meets or exceeds industry norms.

Background and context

RCWD is experiencing a shift from capital expenditures focused on new facilities towards capital and maintenance expenditures focused on maximizing the useful life of existing infrastructure. With few exceptions, the District’s distribution assets are adequately sized to accommodate existing and future growth, thus its focus is on preserving current levels of service at a least lifecycle cost.

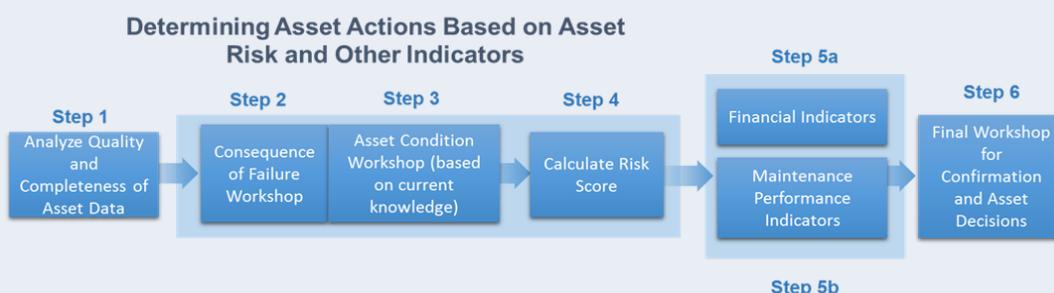
The District believes that focused use of Asset Management Plans (AMPs) will not only be very effective and efficient, but will also help the District increase collaboration across business functions, promote teamwork, facilitate good practice and proactively address its future needs.

The District’s current asset management planning work, with its consultant CH2M, involves the asset category specific planning that AMPs enable, and this provides a strategic approach ultimately needed for a transparent and sustainable Asset Management Program.

The AMP Framework was developed first to communicate the intent and help clarify the role of AMPs within RCWD, including their purpose and the framework within which they will be used as part of a comprehensive asset management program.

Process

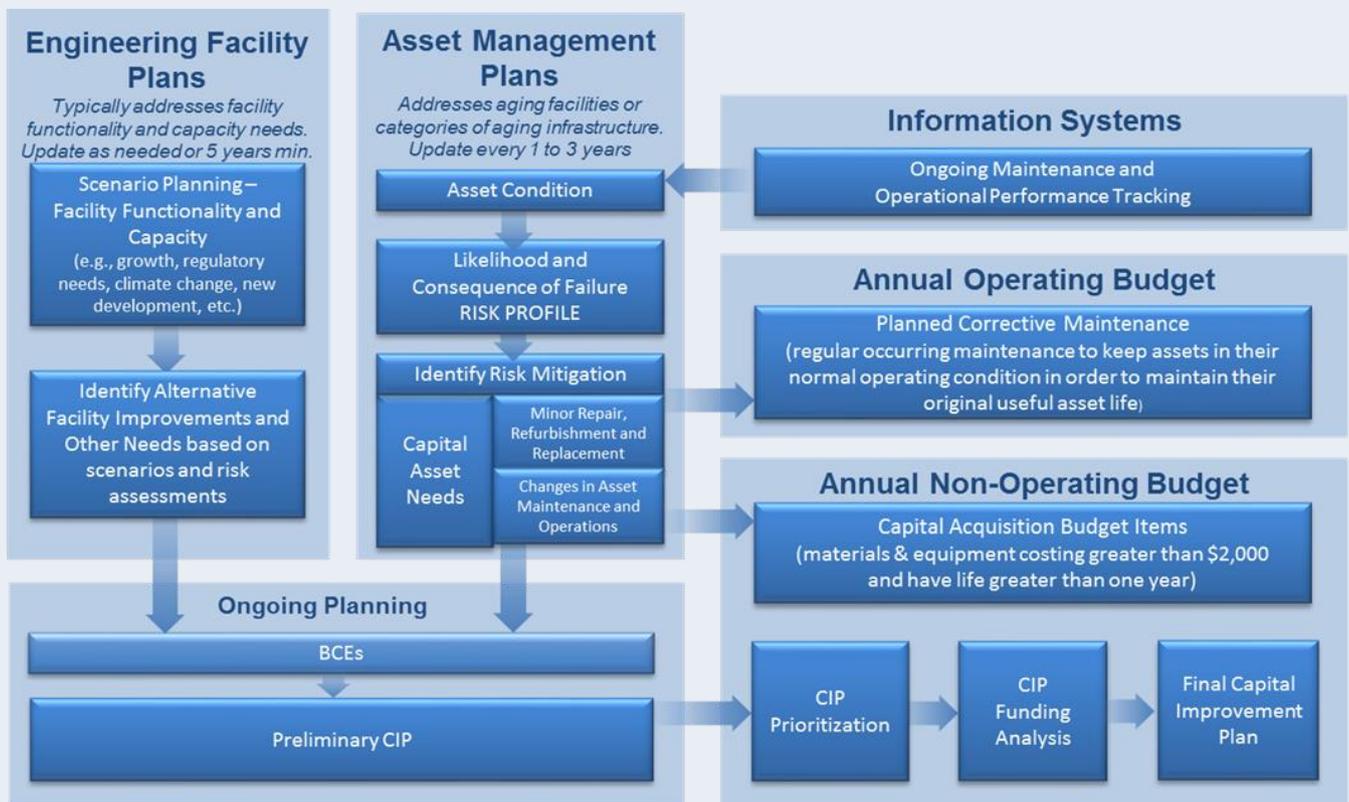
AMPS are guiding documents for assessing categories of assets and developing and enhancing risk management strategies, data management strategies, condition assessment strategies, operations and maintenance budgeting process, and CIP planning processes. There are six key steps involved in each AMP as illustrated and described below:



Warren Back,
Engineering
Manager-
Operations,
Rancho Water
District

1. Current asset register and equipment information from the CMMS is assessed for quality and completeness.
2. A workshop is conducted to evaluate the “consequence of failure” for each asset, considering several criteria.
3. Evaluation of the condition of each of the assets based on documentation as well as the knowledge and experience of staff.
4. The calculated risk associated with each of the assets is completed.
5. Consideration of factors other than the asset risk scoring is incorporated to help identify those assets that not only pose a substantial risk to RCWD, but further indicate a need for consideration for rehabilitation or replacement.
6. During a final workshop the results are reviewed and decisions are made RCWD staff for categorizing actions for each of the well assets.

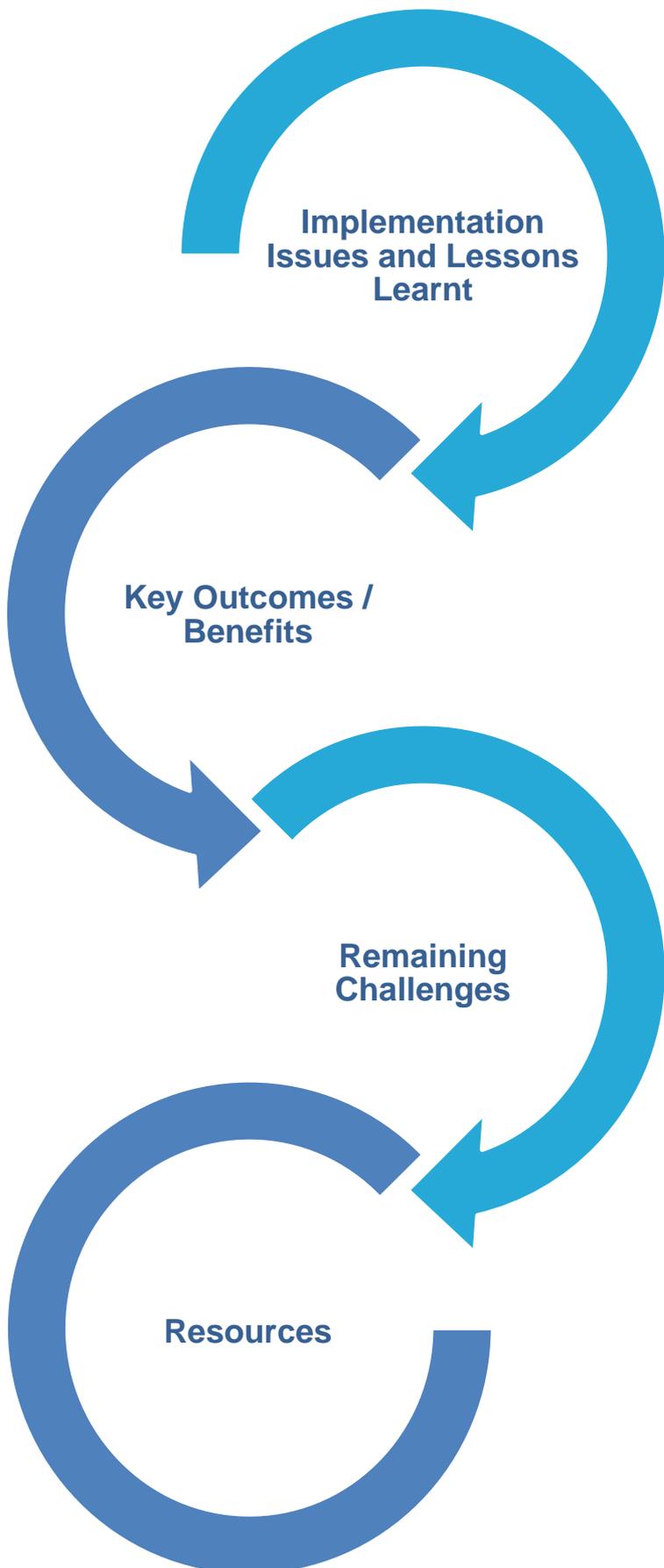
The following graphic shows how AMPs fit into the capital development process at RCWD and do not take the place of Facility Plans, but rather they are conducted in addition to Facility Plans and have a different focus.



In addition, AMPs at RCWD also document asset data needs and improvement initiatives. AMPs are intended to be continuous improvement documents. Because assets are continuing to age and customer expectations and regulations continue to evolve, there will always be new improvements in practices needed for assets.

Outcomes/achievements

The AMP Framework and development of the AMP for groundwater production wells achieved RCWD’s Asset Management Vision which is to “operate on a solid Asset Management foundation wherein services provided meet customer expectations for reliability, sustainability, and cost effectiveness, and that RCWD Asset Management Program is best practice model for other area agencies to follow”.

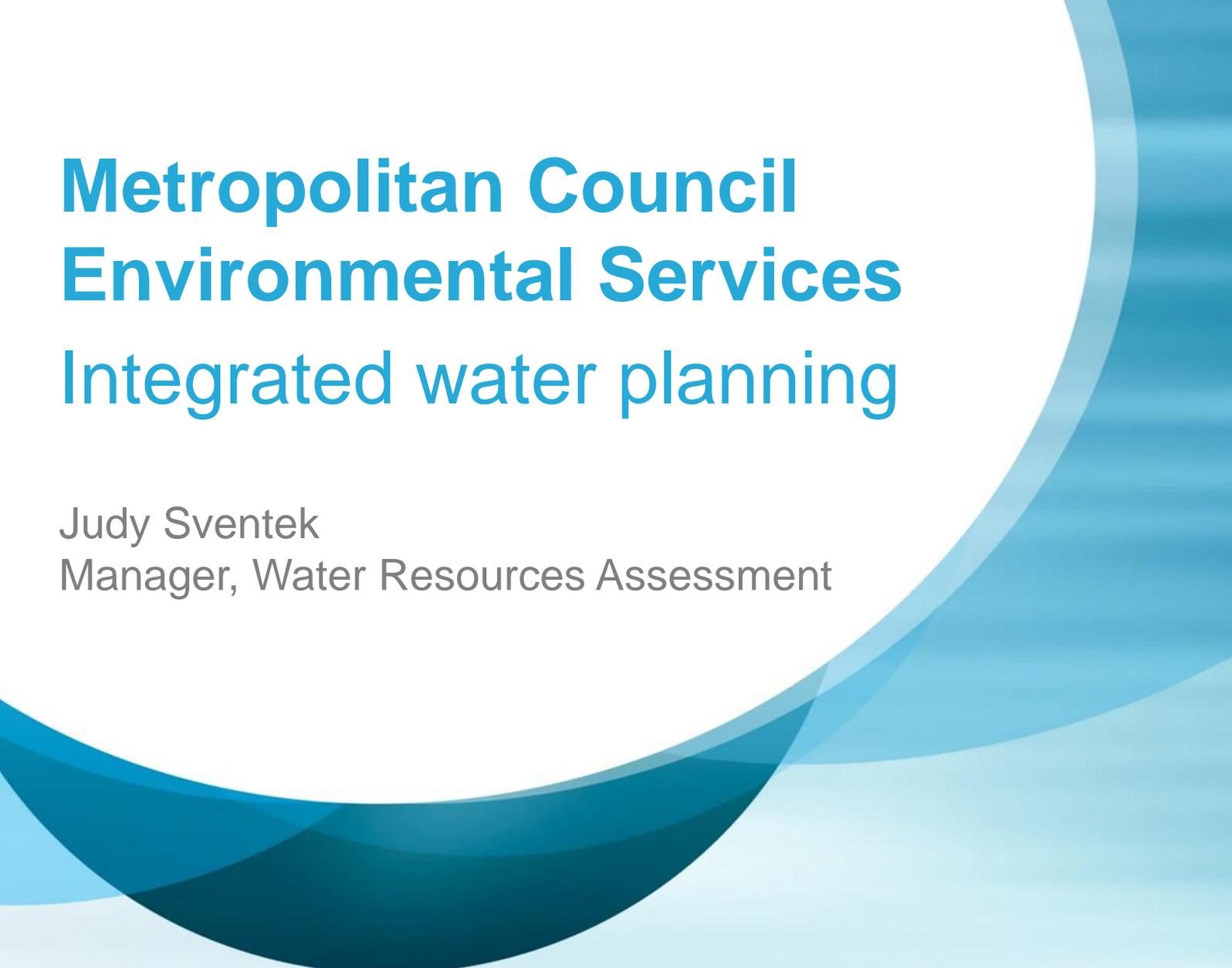


- Management and staff need to understand asset management generally and the way AMPs will be used in decision-making.
- An AMP Framework document and graphics help communicate the purpose and use of AMPs.
- AMPs should be developed as concise documents by staff with the expectation that they may not be 100% complete initially and so intended to be continuously improved with subsequent versions.
- Terminology can be a particular challenge since there is not consistent use of terms in the industry. Thus focused attention on the principles and the manner in which terms will be used is helpful.
- Future financial needs can be estimated using decision models and statistics for each AMP and this is critical for financial planning.
- Asset risk assessments are important tools for maintenance and investment planning and for determining where to conduct additional condition assessments.
- Maintenance staff generally have a good idea of asset risks and asset needs. AMPs help to document their knowledge and help to justify investment needs.
- Work on the first AMP uncovered some challenges with data quality and completeness, and use of the CMMS which is currently being addressed.
- Freeing up resources to complete additional AMPs.
- Completing improvement initiatives identified as part of the AMPs.
- Consistently completing Business Case Evaluations in situations where significant investments are needed.
- Consultant assistance was needed for the first AMP and will be needed for some of the future AMPs as well.
- The first AMP (which also included development of the AMP Framework) took about six months. It is hoped that future AMPs can be completed in about three months each.

Session 2

Metropolitan Council Environmental Services: Integrated water planning

Los Angeles Sanitation: One Water

A large, stylized blue circular graphic is positioned in the upper right quadrant of the page. It consists of several overlapping, semi-transparent blue arcs that create a sense of depth and movement. The colors range from a light sky blue to a deep, dark teal. The graphic partially overlaps the white background and the text area.

Metropolitan Council Environmental Services

Integrated water planning

Judy Sventek
Manager, Water Resources Assessment

Description of Leading Practice

Objective

Water sustainability for customers, stakeholders and their children by collaborating and integrating across our utility to deliver multiple benefit solutions.

Background and context

Water sustainability has different definitions for different organizations. For the Met Council, the term means abundance, quality, and affordability for safe drinking, industrial, recreational and ecosystem use. The ultimate goal is the prosperity and orderly economic development of the 180+ communities and over 3M people of the Twin Cities region of MN.

Integrated water planning helps suppliers, technologies, users, regulators and everyone else involved in the sourcing, use and disposal of water to collaboratively achieve their respective goals better together.

Integration must occur both internally and externally. The key elements are:

- A leading organization championing the effort over the long term.
- Strong, trusted relationships between collaborators (e.g. lack of litigation).
- Clarity and openness of the respective goals of each collaborator.
- Achievable, mutually beneficial goals and resources to achieve them.
- Willingness to value the overall process above specific results.

Planning activities must encompass water supply, surface water management and wastewater reclamation. Planning goals must extend beyond resource limits and costs to societal values and objectives (e.g. growth or economic development) and environmental considerations (e.g. habitat protection, ecosystem value).

The Metropolitan Council is structurally and legislatively set up to accomplish these objectives, but achieving them is a complex and difficult task.

Judy Sventek
Manager,
Water
Resources
Assessment,
MCES

Process

The Metropolitan Council's process involves strategic exploration and continuous development. It is iterative, as each incremental advance sheds light on new aspects and opportunities. The process can be described in 5 elements:

1. Structure

Internally: The Met Council has regional planning functions separated into these distinct groups: community development, transportation, water supply, surface water resources, and wastewater reclamation. Several cross functional teams coordinate work across groups. The economic competitiveness team has members from each function to further the region's ability to compete with other regions for business. The Integrated Water Planning Team identifies ways to encourage water use efficiency, water reuse (storm and reclaimed wastewater) at regional and municipal levels.

Externally: The Met Council is governed by the Council, a board appointed for terms by the governor of the state. A separate regional committee, called the Metropolitan Area Water Supply Advisory Committee (MAWSAC), sets regional water planning policy. It is composed of state regulators, regional water suppliers, and local government representatives. A separate technical advisory committee helps the MAWSAC identify regional goals, risks and solutions. It is composed of municipal water suppliers, scientists and technologists with water supply expertise. All three groups interface through a formal planning framework and coordinating system. They provide accountability to citizens and state authorities.

2. Strategy

Strategy is informed through collaborative efforts of state, regional and local entities including non-profit and citizen input. A 2016 statewide water summit provided a unified set of focus areas that are now the basis for ongoing coordinated work among partners. This links to regional strategies for storm water reuse, aquifer management, watershed management, wastewater service and more. The regional strategies link in turn to community plans through a comprehensive planning framework (see below).

3. Shared Values

Strategies require a vision to be meaningful. The Met Council is working to help the Twin Cities region identify an enduring vision of water sustainability. This is a long process of asking the right questions in the right forums, convening stakeholders and establishing a rhythm of dialog to build increasing insight. It involves everyone from the media, citizens, partners, state agencies, etc. The next step in our journey is to conduct a regional water sustainability visioning exercise in 2017, starting with Council policy makers this year. It will scale from there to include more regional and sub-regional forums.

Process

4. Planning Framework and Methods

The Council uses a regional planning framework that is increasingly integrated internally and externally. The regional planning framework, called THRIVE MSP 2040, focuses on how the region will further sustainability, stewardship, prosperity, equity and livability through the principles of collaboration, integration and accountability. It cascades to several regional policy plans including the Water Resources Policy plan, which contains the metropolitan wastewater system plan and the regional master water supply plan. That set of policies and system plans guides local community comprehensive planning. The Council works with the Dept. of Natural Resources (DNR) to approval local water supply plans. All of these plans are increasingly coordinated across jurisdictions, water uses, and desired outcomes. Together, they comprise an integrated framework for coordinating goals, work and achieving shared benefits on a regional basis and at all levels.

5. People

The Council's people approach is based on relationships, design thinking and convening. We intentionally explore and expand all of the interface points (connections between organizations) to exploit network and team effects where the whole is greater than the sum of the parts. Because no "part" can predict the potential of the whole, design thinking is necessary to build trust in processes and systems to deliver results even when the end is not clear. Convening skills, one example being the Collaboration Network, are built into every interaction internally and externally. The Collaboration Network is an excellent example of how the Met Council views processes and results as the same thing. An internal, informal cohort (self forming team!) of staff that have been trained in convening meaningful dialog is working together to shift the culture of how we relate, work together and solve problems internally. They are coming up with better ways with better outcomes.

6. Resources

Staff and budgets are necessary. The Council has authority to plan within a watershed context for the overall benefit to the region across water disciplines, without regard for who pays. This is truly integrated planning encoded in state statute but the ability to actively fund work with multiple benefits (multiple payers) has been more challenging. The Council is currently funding Integrated Water work in the region through incentive grants to encourage storm water reuse, water use efficiency and has a One Water pilot project planned.

Outcomes/achievements

The outcomes and achievements of this integrated planning approach are significant:

1. Separation of combined sewers for an area serving 1M people avoided numerous overflows. Currently, the sanitary sewer system averages an overflow event of any kind once every 5 years. Regulatory compliance is high.
2. Surface water resources in the most populous region (over 800 lakes) of the Land of 10,000 Lakes benefits the livability of the region by being highly fishable, swimmable, boatable. And they continue to improve.
3. Water for home, business and agricultural use is abundant, safe, affordable and reliable. The region has leveraged both surface and ground water and is now using storm water more. Combined water and sewer rates are in the lowest quartile nationally for regions of similar scale.

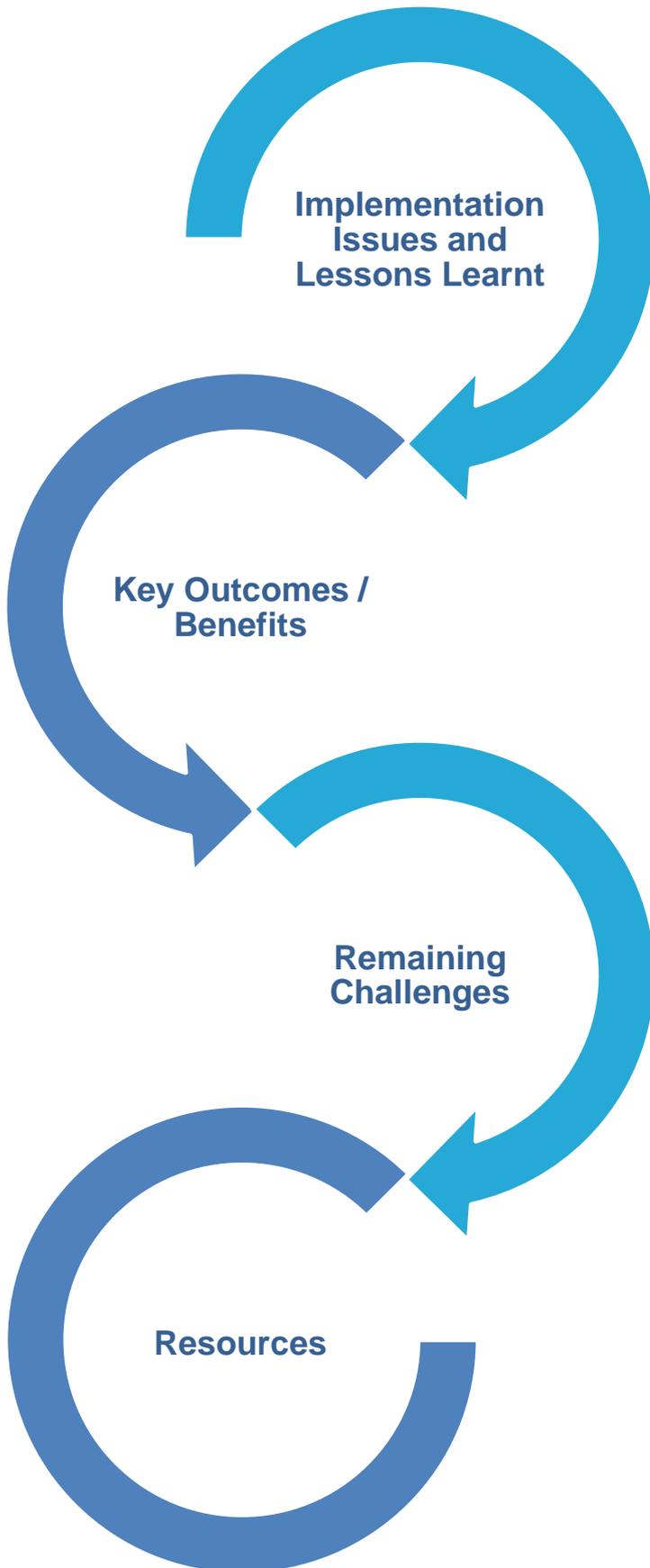
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Integrated water planning

- Work incrementally and sustain dialog. This is culture work.
- Problems can be opportunities if relationships, listening and transparency are paramount.
- There are no solutions that work right away. The real solutions come from diligent collaboration.
- The language of integrated water planning can be uncomfortable because it is so open and undefined.
- Siloed organizations can perceive this approach as a threat rather than an opportunity. Time to build collaborative muscle and a focus on “the why” helps.
- Results are hard to see because they can be so broad and far ranging. Leadership needs to adjust expectations and messaging.
- Better use of dollars.
- Better shared outcomes.
- Improved agility and ability to navigate the challenges of the future
- More fun!
- Governance is hard due to the informal nature of planning and doing.
- Each partner has built-in structural disincentives.
- Sustaining work through staff changes and political shifts is very difficult.
- Funding and even business cases rely on overly simplistic analyses.
- Staff time internal and external.
- Political and executive support.
- Policy, statutory and legal support
- Relationship capital.
- A public and growing “water ethic”
- Costs and new sources of innovative funding.
- Non-traditional skillset building – collaboration, convening, strategic thinking, visual facilitation.
- Time to implement (generations).



Los Angeles Sanitation

“One Water” management

Lenise Marrero
Environmental Engineer

Description of Leading Practice

Objective

Developing an integrated framework for managing the City’s water resources, watersheds, and water facilities in an environmentally, economically and socially beneficial manner.

Background and context

The One Water LA 2040 Plan provides a strategic vision and implementation approach to manage its water resources and build sustainable water infrastructure for the entire City. The Plan builds on the City’s 2006, Water Integrated Resources Plan (IRP) that resulted in significant achievements through implementation of its recommendations for better wastewater management, water recycling, and water conservation. However, the water landscape in the City has changed drastically with increased population, new regulations, a severe statewide drought, and increasing threats of climate change on water supply resiliency.

In response to these changes and to achieve water sustainability, the City initiated the One Water LA 2040 Plan. The One Water LA 2040 Plan takes a holistic and collaborative approach, to consider all water resources from surface water, groundwater, potable water, graywater, wastewater, recycled water, and stormwater as "One Water." The plan identifies multi-departmental and multi-agency integration opportunities to manage water in a more efficient, cost effective, and sustainable manner.

The One Water LA 2040 Plan reflects the City's improved way and unchanged commitment to proactively manage all its water resources and implement innovative solutions. The Plan will guide the City with strategic and multi-billion dollar decisions for water infrastructure projects that will make Los Angeles a resilient and sustainable City.

Lenise Marrero,
Environmental
Engineer, Los
Angeles
Sanitation

Process

Since its inception, in December 2013, the One Water LA 2040 Plan includes comprehensive stakeholder outreach to integrate multiple viewpoints from City departments, Regional Agencies and the Public. The Vision Statement, Objectives and Guiding Principles were developed during Phase 1 of the Plan completed in July 2015. The One Water LA Phase 2 process (*started in September 2015*) involves the ongoing inclusion of stakeholders to help determine the Plan’s final content regarding integration strategies for citywide projects and policies, funding strategies, development of Wastewater and Stormwater Facilities Plans and Special Studies. The multiple viewpoints feeding into the development of the overall One Water LA 2040 Plan are listed:

- **Steering Committee:** Over 30 representatives from City Departments and Regional Agencies established to guide the development of the One Water LA Plan. (9 meetings)
- **Focused Meetings:** Individual meetings held with City Departments and Regional Agencies to discuss water management strategies and opportunities for project integration. (30+ meetings)
- **Advisory Group:** A select group of stakeholder Advisors representing a diversity of groups and interests. This as an active group of stakeholders that meet on an as-needed basis to discuss key topics and provide input throughout the Planning process. (8 meetings)
- **Stakeholder Workshops:** Over 350 stakeholders representing over 200 Organizations. Workshops are conducted to provide the public at large with an open forum to share values and perspectives to help provide direction for the One Water LA 2040 Plan. (7 workshops)
- **Special Topic Groups:** Stakeholders who provide input on specific issues in the One Water LA Plan related to: 1) Funding and Cost-Benefit Analysis, 2) Decentralized/On-Site Treatment, 3) Outreach & Communication, 4) Stormwater Runoff & Management, and 5) Partnerships, Collaboration and Innovation. (16 meetings)

The One Water LA 2040 Plan identifies key projects and programs necessary to achieve the water supply goals as outlined in the City’s Sustainability Plan and the Mayor’s Office Executive Directive No. 5 (ED#5). The goal of ED#5 is to reduce the purchase of imported water by 50 percent by year 2024, while the Sustainability Plan takes this a step further with a goal of 50 percent local water supply by year 2035. The actions needed to achieve these goals are categorized as near-term and long-term projects and programs in the One Water LA 2040 Plan.

Outcomes/achievements

Process and System Improvement Benefits

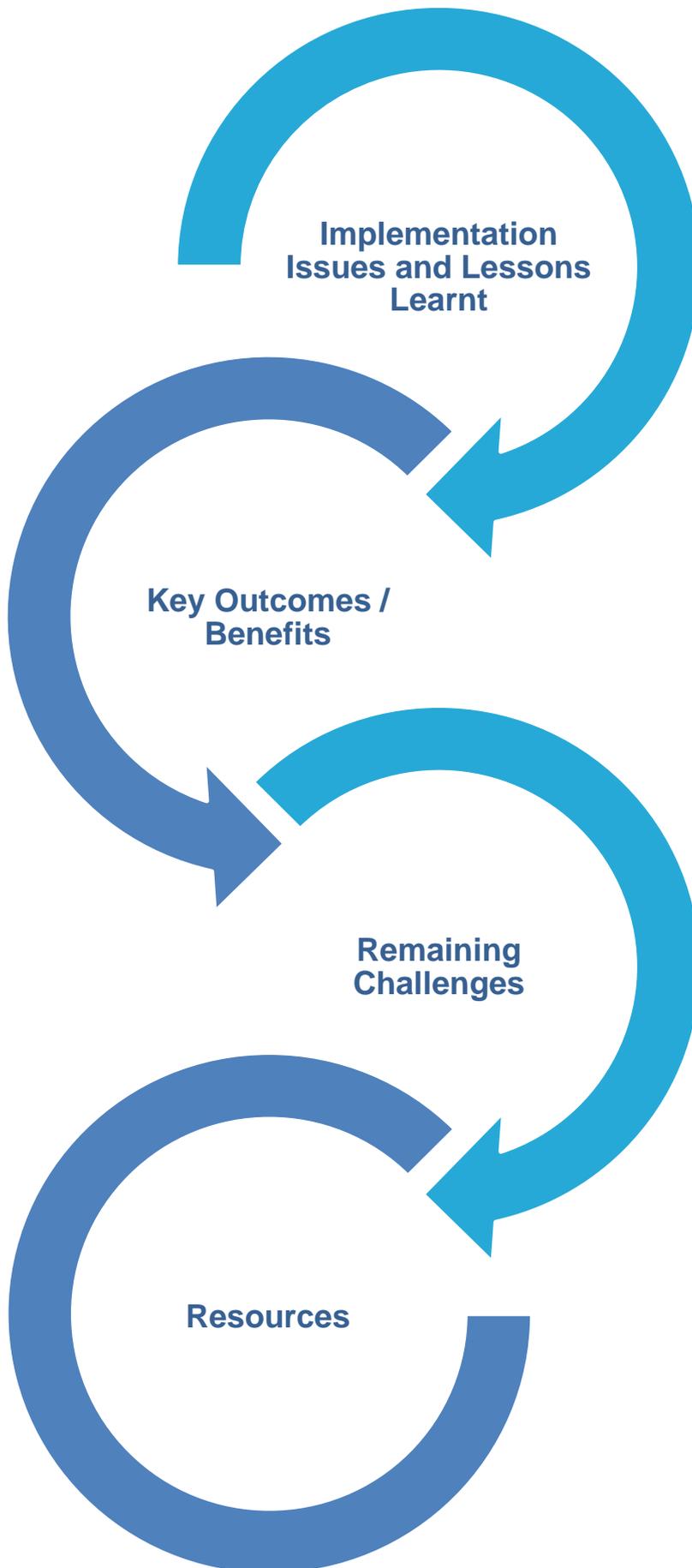
- Develops a Water Balance Tool that comprehensively accounts for inflows and outflows of the City to measure and evaluate water management options.
- Documents the existing level of service within the vast wastewater collection system (6,700 miles and 44 pumping stations) and the 4 water reclamation plants (570 MG capacity) that serve 4 million residents in Los Angeles and 29 other contract agencies.
- Conducts Long-Term Alternatives Analysis to identify the best implementation strategies including projects, programs and policies.
- Develops a Programmatic Environmental Impact Report to assess all impacts and identify mitigation measures.

Collaboration Benefits

- Identifies near-term integration opportunities (“Case Studies”) for existing and planned projects from City departments and Regional Agencies.
- Facilitates discussions of potential expansion of recycled water uses at the LA Zoo.
- Conducts ongoing meetings with Los Angeles Unified School District (LAUSD) management to determine potential for off-site stormwater storage and treatment options.
- Modifies City engineering specifications to allow recycled water in concrete.
- Modifies and changes the Los Angeles Department of City Planning’s codes related to water (re:Code LA).
- Reviews and provides recommendations for the City of Los Angeles’ Mobility Plan.
- Identifies climate-change resilient trees with local nurseries.

Outreach and Stakeholder Engagement Outcomes

- Partnership with Pepperdine University MBA students to develop marketing plan for One Water LA.
- Creation of the One Water LA curriculum for the Los Angeles Unified School District.
- Partnership with Charter Schools for their “Young Citizens Artist Project” challenging students to create new ideas to meet the City’s current water challenges and protection of public health.



- Get stakeholders (internal & external) engaged from the beginning of the planning process.
- Develop key messages to clearly communicate the program to stakeholders and to the general public.
- Identify specific areas/topics on which stakeholder input is needed and plan ahead as to how input will be obtained.
- Development of Wastewater and Stormwater Facilities Plans.
- Development of Short-Term and Long-Term policies focused on enhancing citywide water conservation, stormwater capture and recycled water use.
- Strategies to cope with impacts associated with Climate Change.
- Marketing and Outreach Strategy that expands stakeholder involvement and increases support for the plan.
- Increasing coordination at the regional level to optimize opportunities for integration.
- Addressing funding strategies for both implementation and Operation and Maintenance during the planning process.
- Staff time to review plan deliverables
- Stakeholder workshops, Advisory Group Meetings, Steering Committee Meetings and Special Topic Group Meetings.
- Existing Water-Related Planning Documents.

Session 3

Toho Water Authority: Asset acquisition, testing and acceptance processes

City of Vancouver, Washington: Operations and maintenance contracting

ActewAGL: Automating asset-specific plans and renewals timing

Toho Water Authority

Asset acquisition, testing and acceptance processes

Ray Biron

Manager Construction Inspection Services &
New Development

Description of Leading Practice

Objective

Ensure that assets acquired either through internally managed capital projects or through new development:

- Meet minimum stated requirements,
- Will deliver current and projected intended function,
- Are received through a formal acceptance process and,
- Deliver the required functionality at the lowest possible life cycle

Ray Biron,
Manager
Construction
Inspection
Services & New
Development,
Toho Water
Authority

Background and context

Significant growth has been a part of Toho Water Authority's areas services since its inception as a regional water services provider in 2003. Growth in the central Florida county that Toho serves is projected to more than double by 2020. The effect translates into expansion into areas not previously served and greater demands on existing infrastructure. TWA growth has come through purchasing neighboring utilities, expansion of existing infrastructure to meet needs and the acceptance of infrastructure installed by others as the result of new development. Acquisition of new assets require that standards, procedures and processes be formalized to enable competent management of the assets and integration into the existing asset portfolio.

Purchase of Adjacent Utilities – Growth through consolidation resulted in over a 50% increase in the areas and customers served. The opportunity for additional consolidation is limited, but developer related expansion is occurring.

Expansion of Existing Infrastructure – Expansion of existing facilities or extension / upsizing of conveyance infrastructure continues to be driven by the areas growth. These projects are typically managed by staff, designed by external consultants and constructed by external contracting firms. Requirements are typically identified through Master Planning. Design is performed in accordance with regulatory and industry standards (10 State Standard) and specification (Construction Specification Institute). Construction is inspected by Toho inspectors. Acceptance testing and acceptance is conducted by team of all involved parties.

New Development - The core components of this process have been in place since Toho was the Water and Wastewater Division of the City of Kissimmee, but there have been enhancements, training and documentation added. The process defines the submittal, review and acceptance of development designs. This process is supported by checklists, forms and procedures. Toho inspectors provide oversight during construction and participate in defined tests and inspections required for acceptance.

Process

Expansion of Existing Infrastructure

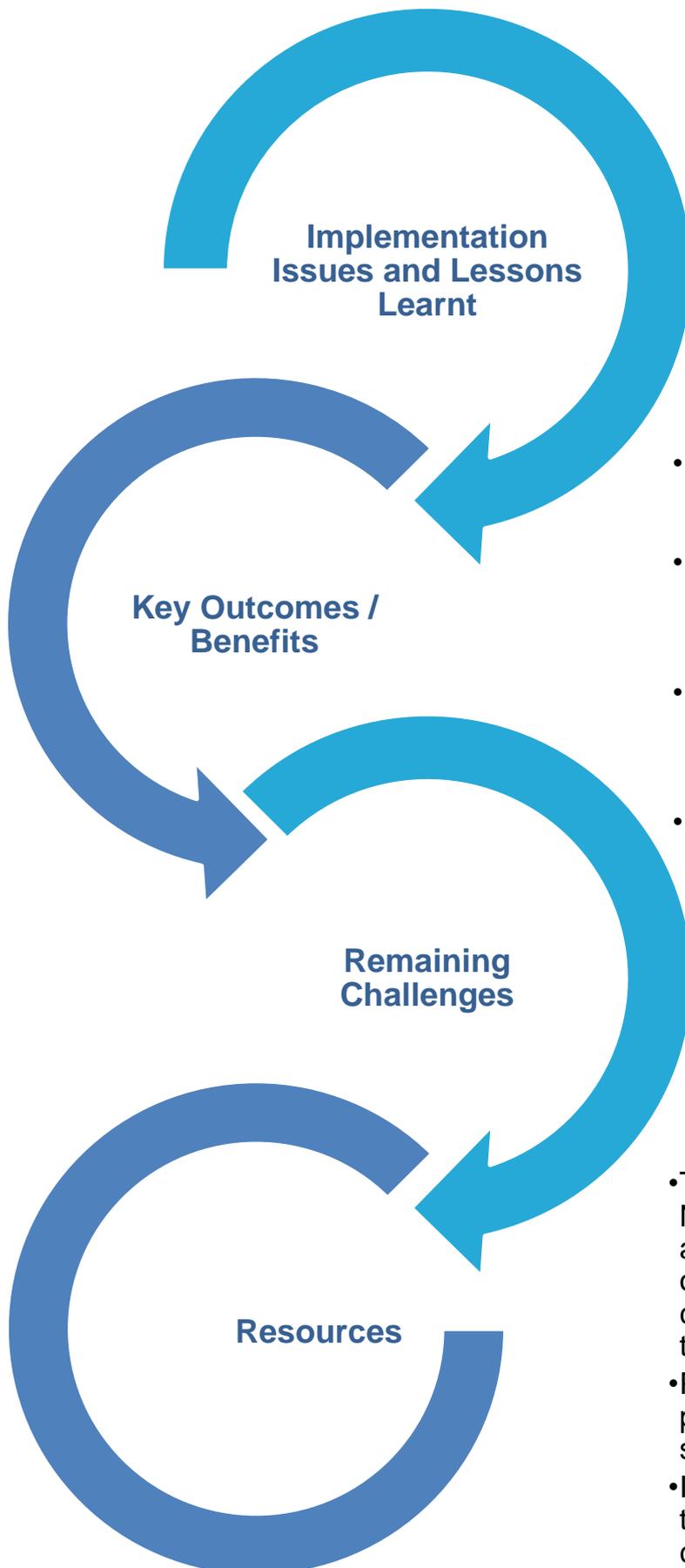
1. **Needs Identification** – Master Plans are used to predict the need for expansion of existing infrastructure. Current and trending utilization as well as new business or regulatory requirements are also used to identify needs that may not have been captured in long-term planning.
2. **Funding** – Funding is requested through the Capital Improvement Plan
3. **Design** – A sourcing option is selected. Procurement procedures and CCNA guidelines are followed to obtain the design consultant. Design is developed using applicable standards and specification. Design review is performed by Engineering and O&M staff.
4. **Construction** – Construction is awarded as per the Procurement policy and procedures. If applicable a Construction Manager at Risk (CMAR) model is followed to encourage further value engineering. Toho inspectors provide oversight during construction. Engineering and O&M staff participate in progress meetings.
5. **Inspection & Startup Testing** – All required testing is spelled out in the contract documents. Engineering and O&M personnel participate in this testing. Training is provided for new technologies and processes.
6. **O&M Ready** – O&M Manuals are provided to the Operations staff. Asset information provided by the consultant is entered into the asset registry. Operations and Maintenance staff identify the routine and periodic maintenance required and document in work schedules.

New Development

This process is outlined in the Standard, Specification and Details Manual. This manual is updated regularly with the input of Engineering, Inspectors, O&M staff, contractors and developers.

1. **Submittal** – The process is initiated with a Pre-Design Meeting between Toho and the Developer. This involves a walkthrough of the plan review process as well as the standards and specifications that must be adhered to.
2. **Design / Plan Review** – Includes submittal and review of plans, FDEP permits and fees. Standards, specifications, procedures and checklists have been developed to ensure consistent execution of the review process. Successful completion of this process will result in the execution of the Developer's Agreement, FDEP permits and plans. A pre-construction meeting is scheduled once this step is completed.
3. **Construction** – A pre-construction meeting is held with the Developer to review the construction requirements for the project. A standard checklist has been developed for this meeting. Toho inspectors provide oversight during construction.
4. **Inspection and Start up Testing** – Standard set of tests and inspections must be performed prior to acceptance. These include checklist, forms are standards to state required methods and results.
5. **O&M Ready** – A copy of the construction drawings are provided to the GIS group to be added to the GIS database. Pump station asset information provided by the developer is entered into the asset registry. Operations and Maintenance staff will identify the routine and periodic maintenance required and document in work schedules.

Asset acquisition, testing and acceptance processes



- Process improved through involvement of Stakeholders
- Checklist and forms lead to standard and consistent process implementation
- Ongoing training required to ensure consistency
- Involvement of O&M staff early in the process improves buy in at acceptance
- Important to pay attention where process “hands off” to others occur such as O&M Ready

- Outside review of process provided good input into process weakness and gaps.
- Increased involvement of stakeholders (O&M staff, Developers) provides improved participation in process and acceptance at start-up.
- Implementation of CMAR improves value engineering of projects and reduces risk of schedule or cost over runs.
- Continued refinement of checklist and forms help standardize lessons learned.

- Stakeholders looking for electronic access to new development plan submittal review process .
- Improve O&M Ready activities to shorten length of time between acceptance and representation of assets in registry and work order plans.

- These process have evolved overtime. New Development process is owned at a manager level. Review and revision of standards is a lengthy process that is completed over a 3 – 6 month period of time.
- Plans to implement software solution to provide access to review results and status are being evaluated
- Insignificant effort to meet twice a year to review completed capital project to capture recommended changes

City of Vancouver, Washington

Operations and maintenance contracting

Eric Schadler
P.E. Engineering Manager

Description of Leading Practice

Objective

To effectively and efficiently manage the wastewater treatment function by procuring outsourced services and assuring optimal performance of an Operations and Maintenance Contract for the City's Wastewater Treatment Facilities.

Background and context

The City of Vancouver extends along the shore of the Columbia River, 100 miles upstream from the Pacific Ocean in Washington State. Vancouver is directly across the river from Portland, Oregon and is the southern gateway to the State of Washington. Vancouver's sewer system serves a population of approximately 200,000 customers with over 730 miles of sewer pipe, 41 pump stations, 2 wastewater treatment facilities (28 MGD and 16 MDG), and an industrial pretreatment lagoon.

The City's wastewater treatment facilities, the Marine Park and Westside Water Reclamation Facilities, the Industrial Pretreatment Lagoon and several key pump stations, have been successfully operated and maintained through private outsourced contract services since 1978. Over that time period, the City and our customers have benefited with proven results of environmental excellence in treatment, professionally operated and maintained facilities, and cost-effective operations. A single vendor has been providing these services under several contracts and different company names for that duration. The most recent contract was amended January 2011 and was for a 5-year extension expiring December 31, 2015. When it was last extended in January of 2011, both City Council and staff agreed that it would be in the best interests of the City to undertake an open competitive procurement process for a new long-term contract prior to the expiration of the current contract

Process

The procurement process began in earnest in late 2013 and was designed to provide the City with the opportunity to obtain quality services for a competitive price (a "best value" selection) and allowed us to update and modernize the current contract by incorporating current best practices from a wastewater operations provider. As a first step in that process, the City sought the services of an engineering consultant with specialized expertise in assisting municipalities with procuring wastewater operation services to: assist staff in the development of the Request for Qualifications (RFQ); establish a short list of qualified operating firms and the follow-up Request for Proposals (RFP); review a draft service contract released with the RFP; provide input during the evaluation of the RFQ and RFP responses; and assist as needed during the final contract negotiations and contractor transition period.

Eric Schadler,
P.E.
Engineering
Manager, City
of Vancouver

Operations and maintenance contracting

In June 2014, the RFQ for the operations and maintenance contractor was issued and three responses were received in August 2014, all from qualified companies. The City also retained the services of a law firm, with considerable experience in drafting and negotiating wastewater treatment operations contracts, to assist City legal staff in the drafting of a new service contract.

The RFP, along with a proposed draft service contract was released in December 2014 to the three pre-qualified companies who were provided onsite access to the treatment plants and facilities and the City's operating records as they performed their "due diligence" during the preparation of their proposals. Issuance of the draft contract with the RFP gave the proposers the maximum opportunity to see what the City would be proposing in the contract negotiation phase. It also allowed them to present any objections or suggested changes with their proposals. All three proposers had only relatively minor suggested changes and clarifications to the draft service contract. Proposals from all three companies were received on April 15, 2015.

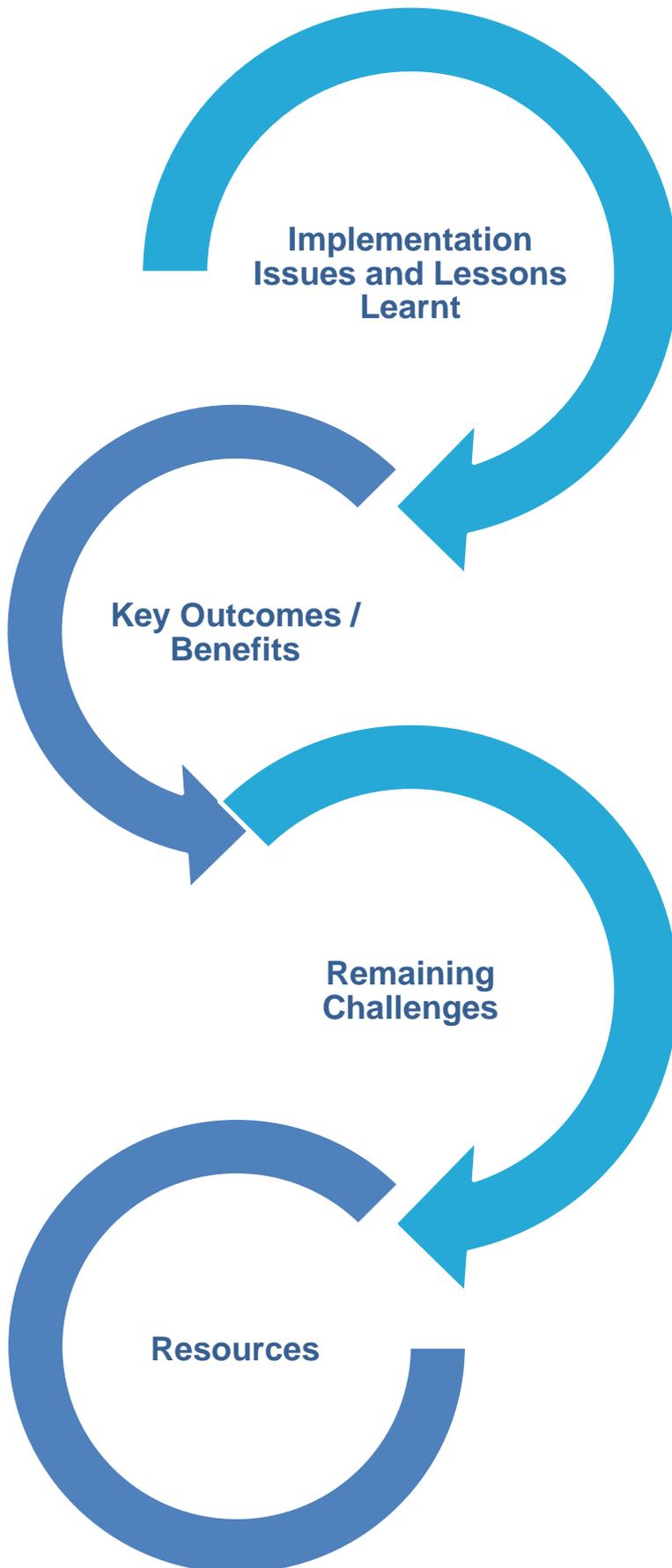
Proposals were reviewed, evaluated and scored by a six-member proposal evaluation committee in accordance with criteria established in the RFP including qualifications, experience, capability, technical aspects, scope of work, and financial (including a cost proposal). The evaluation and review process also included a structured presentation and interview process with all three proposers. The proposal evaluation committee consisted of four City staff members and an individual from Clark Regional Wastewater District and SEH America. Other individuals, including City staff from Public Works, Finance, Law, Risk and Procurement, the owner agent and a local business were also extensively involved in the detailed review and evaluation of the proposals. The review, evaluation and interview process was completed in early June 2015.

This process resulted in selection of a new service provider, through a unanimous recommendation of the evaluation committee. Due to the inclusion of a draft contract with the RFP, contract negotiations went smoothly and were concluded relatively quickly. City council approved the contract in July 2015 and on January 1, 2016 the new operations and maintenance of City facilities commenced.

Outcomes/achievements

1. The proposed contract provides for ongoing professional operations and maintenance of Vancouver's wastewater treatment system.
2. The new contract is an improvement over the old contract. The new contract contains current industry best practices for wastewater plant operations, asset management, cost controls and guarantees, risk assumption, continuous improvement, cost savings sharing, and transparency in and access to records and documentation.
3. The proposed contract offers a significant reduction in costs to the City's sewer ratepayers over the previous contract – the estimated reduction in the total operation and maintenance costs is approximately \$1.6 million per year.
4. Maintains cost-effective outsourced services and the ability to maintain highly competitive sewer rates for Vancouver.
5. No protests or claims occurred during the process and transition between contractors went smoothly.

Operations and maintenance contracting



- Don't be afraid to place the utility in the primary decision-making role
- Important to have experts involved in every area
- Access to facilities, records, and documents is critical.
- Having two consultants with differing approaches made for difficult conversations but we ended up with a better product.
- Keep council informed and the importance of their non interference in procurement process.
- Management of outgoing contractor, even though transition can be like a divorce.
- Main outcome is successfully obtained and a new O&M operator was selected.
- No protests or claims occurred during the process.
- Able to use existing contract employees.
- Savings of over \$1.6 million per year.
- Transparency in records and documentation.
- Whether to obtain ISO 55000 certification.
- Working together on CMMS and SCADA upgrades.
- Awardee project implementation proposal (bypass project).
- Staff time.
- Procurement consultant and legal advisor.

Session 4

Albuquerque Bernalillo County Water Utility Authority:

Managing performance

Region of Peel: Drinking water quality management system

Sydney Water: Operational optimisation using BI and data analytics

Albuquerque Bernalillo County Water Utility Authority

Managing performance

Frank Roth
Senior Policy Manager

Description of Leading Practice

Objective

The Water Authority utilizes performance measures or indicators to help guide the operating and capital budgets in prioritizing and allocating the Water Authority's financial resources. The Water Authority uses these measures to help improve its operational efficiency and effectiveness by identifying areas of improvement through metric and process benchmarking.

Background and context

Many performance measurement programs help organizations discover how well a service is being provided, but they do not always inform the organization's stakeholders about what results are desired. Organizations also face difficulties in figuring out what process to use for achieving the desired outcome. The Water Authority uses a combination of metric and process benchmarking to evaluate its operations and service delivery levels, determining if its performance measures are leading to the correct results.

Two fundamental questions a performance measurement system needs to address are "How well is the service provided?" and "What is the result of the service?" These were the questions the Water Authority faced when it was created in 2003. More importantly, the utility's governing board at that time also asked, "Where do we want to be?" and "How do we get there?" Because the organization was just starting out, it had the opportunity to develop its own goals and performance measurement system.

In 2004, the Water Authority adopted a budget ordinance requiring that a performance plan be connected to the utility's five-year goals. The plan was to contain performance measures that would guide the operating and capital budgets in prioritizing and allocating the utility's financial resources. The Water Authority wanted to use its performance measures to improve operational efficiency and effectiveness by identifying areas where quality improvement processes should be implemented, and to enhance decision making.

The Water Authority utilizes the American Water Works Association's (AWWA) Utility Benchmarking Survey in developing its Performance Plan. The Survey provides utilities an opportunity to collect and track data from already identified and tested performance measures, based on the same collection process and definitions. The most recent survey data was compiled in 2015 by AWWA from over 100 different utilities. The Performance Plan uses the survey data as a basis for its performance measures to track the Water Authority's performance year to year and assess its performance relative to other high-performing utilities.

Frank Roth
Senior Policy
Manager,
ABCWUA

Process

The Water Authority's strategic planning process starts with long-range goals and short-term objectives. These objectives are policy directives from the governing board to address the areas of improvement identified through the benchmarking process. The Performance Plan helps measure the progress of the Goals and Objectives and provides data on about twenty-five key performance indicators. In addition to benchmarking the utility's performance to other high-performing utilities, the utility also conducts biennial customer opinion surveys to gauge the customer's point of view on the utility's performance. Many of the questions in the customer survey are linked to the metrics in the Performance Plan. Other means for customer input include the Customer Advisory Committee which provides advice on the utility's policies, plans and programs on a monthly basis. More recently, the Customer Conversations programs was created to better understand customer interests, drivers, and needs and obtain input on issues facing the utility.

Effective Utility Management (EUM) incorporates the benchmarking performance indicators from the AWWA Utility Benchmarking Survey. Taken as a whole, the benchmarking performance indicators provide the Water Authority the ability to gauge progress in the Ten Attribute areas. In 2012, the AWWA discontinued the Self-Assessment and Peer Review components of the QualServe program. The Water Authority transitioned to utilizing the EUM framework in order to advance its continuous performance improvement process.



Components of Strategic Planning Process to fulfil the Water Authority's Mission

Performance Accountability. A performance measurement program cannot succeed without the support of elected officials and key managers. At the Water Authority, division managers are responsible for their respective goal areas and objectives, and for tracking their performance. Every fiscal quarter, the executive director meets with the division managers and their staff to review progress reports on the performance measures and objectives. The governing board also receives quarterly status reports on the one-year objectives and annually reports on the performance plan.

The annual budget review is another area where the utility uses performance measures and performance targets to improve accountability. The executive director and the managers integrate performance reporting with the budget process to focus the budget discussion on allocating resources and addressing performance gaps. Budget requests are based on either the performance measure targets or objectives. Integrating the objectives and performance measures into the budget process has moved the utility from simply measuring performance to managing performance. As a result, the utility has become more transparent and accountable to its customers and governing board.

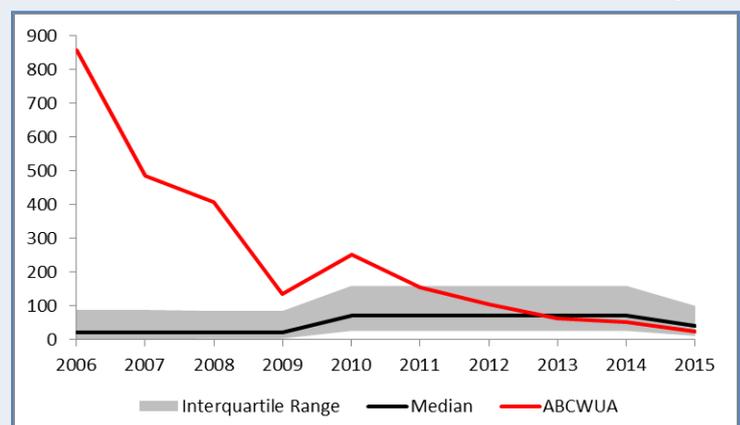
Performance measurement results and progress in meeting performance targets also have to be communicated to elected officials and customers, and to employees throughout the organization. Increasing employee understanding of the performance measures and the organization's long-term goals is a critical step. For example, during the final two months of the last fiscal year, the utility was trending slightly above its goal in reducing injury time. Making sure employees understood the importance of meeting this goal and making safety a high priority in the organization allowed the utility to meet the goal.

Outcomes/achievements

Managing Performance through Metric Benchmarking. A good example of the integration between a performance measure and objectives is employee lost time due to illness or injury. Since starting the benchmarking process, the utility noticed that lost workdays were on average ten times higher than at other utilities. Excessive lost workdays affect productivity and can cost utilities in a number of ways, including adverse effects on health-care premiums, insurance premiums, and overtime pay. As a result, the one-year objectives were used to reduce the number of employee lost days. To accomplish this objective, the Water Authority implemented an improved light-duty program to get employees back on the job safely. This new process has provided a clearer understanding of what needs to happen when an injury occurs, including the documentation, payroll coding and expectations for when injured employees will return to work. In addition, the utility created safety incentive bonuses for meeting the injury hour targets. Since 2006, there has been a 90% decrease in employee lost days, showing the organization is working smarter and safer.

Employee Work Loss Days

Water Authority performance compared to its peers through the Benchmarking Survey



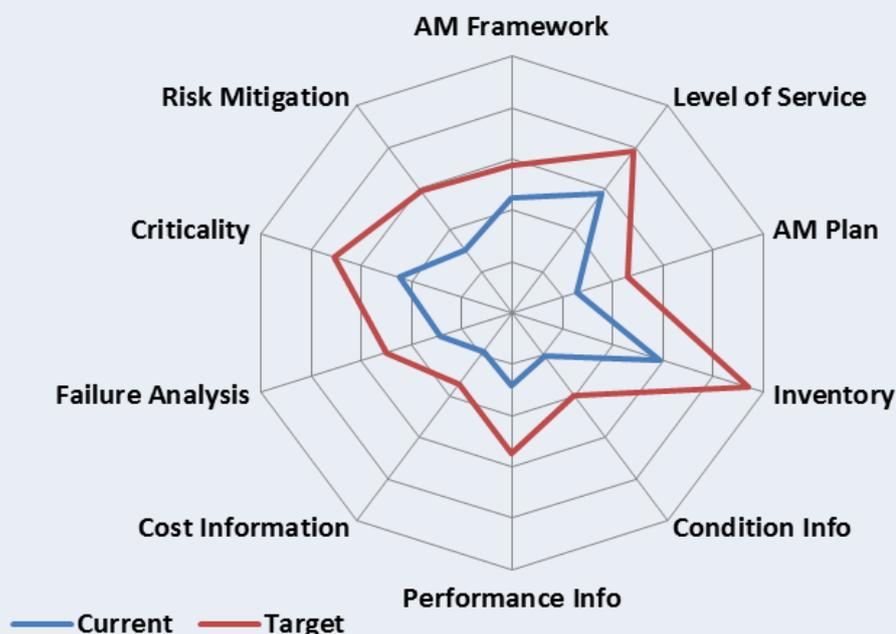
2) Managing Performance through Process Benchmarking.

In 2011, the Water Authority began working on incorporating Effective Utility Management into its strategic planning process. A large component of this integration was its work as a participating utility on the Water Research Foundation Project 4313. Participating utilities were asked to select three of the ten attributes to test the Project's benchmarking tool. The Infrastructure Stability attribute which focuses on asset management practices was one of the attributes tested in 2011. In 2014, the Water Authority decided to revisit the Infrastructure Stability attribute which is a recommended practice in the project guidance documentation.

One approach the utility used was to conduct a self-assessment on each of the major asset groups using the benchmarking tool. When testing the tool, one problem the utility encountered was assessing all five major asset groups which were at different stages of asset criticality. For example, a new surface water plant became operational in 2009 but the wastewater treatment plant built in 1962 had significant major rehabilitation needs. By conducting a self-assessment on each of five major asset groups, it allowed the utility to obtain a clear understanding of the performance gaps based on best practices.

Based on the assessment, the results showed that each of the major asset groups were at different levels of performance. This provided a direction on where utility managers needed to focus their attention not only at the asset group level but utility-wide as well. The practice area of Maintain Knowledge of Assets and Costs was one of major areas that needed attention in order make the asset management program more effective. This practice area assesses inventory, condition, performance, and cost information.

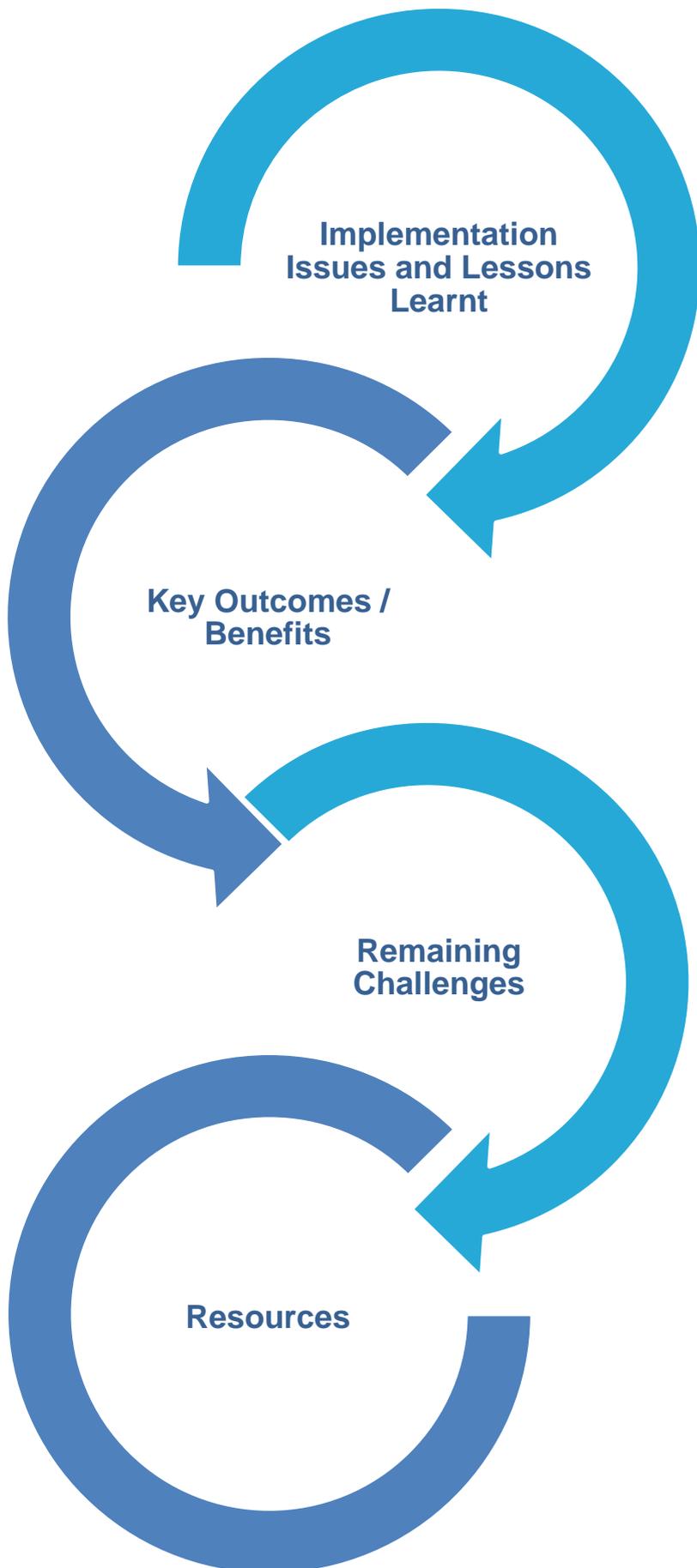
Through the utility's asset management steering committee, the utility was able to assess the performance gaps and develop recommendations to address those gaps. These recommendations will be beneficial for updating the organization's AMP over the next two years and continue to implement operational changes based on asset management best practices.



Infrastructure Stability Attribute - Performance Measures Assessment Results

Through metric and processing benchmarking, the Water Authority has been able to evaluate its performance and develop targets for continuous improvement. Incorporating the WRF/EUM Benchmarking Tool has helped to facilitate the discussion and obtain consensus on evaluating existing strategies and future targets and determine where we wanted to be in order to move to the next level. Overall, it has greatly improved communication throughout the utility. The recently completed AMCV process allowed the Water Authority to delve more deeply into practices and offers additional opportunity for improvement in priority areas.

Change is possible, and organizations can manage outcomes to achieve both short-term objectives and long-term goals. The Water Authority has been able to use performance measurement to achieve desired results and make operational and customer service improvements in the organization. Through its planning, budgeting, and improvement process, the utility has been able to show its stakeholders how it has implemented quality improvement processes and to explain the decisions it makes when prioritizing and allocating financial resources.



- Need better internal communication and understanding in reporting metrics.
- Need to improve vertical communication.

- Living, breathing strategic plan; not a shelf document.
- Program developed in-house.
- Improved performance in operations and service delivery.

- Integrate program through employee evaluation process to improve awareness and accountability.
- Need coordinator as a successor to the program.
- Leverage AMCV for additional practice improvements.

- Staff time for continuing benchmarking and reporting efforts.
- Workshops, conferences, and industry leadership.

Region of Peel

Drinking water quality management system

Justyna Burkiewicz

Supervisor, Water Quality and Compliance

Description of Leading Practice

Objective

Peel has implemented a Quality Management System (QMS) for its drinking water systems. This ensures the policies and procedures are in place to effectively manage the drinking water operations, continuously test and check and make improvements to all aspects of water treatment and distribution, from source to tap.

Background and context

Peel's QMS was developed based on the Drinking Water Quality Management Standard (DWQMS), a management system established to ensure that municipal residential drinking water systems in Ontario are managed to the highest quality possible. This Standard was developed by the Ministry of the Environment and Climate Change (MOECC) as a hybrid of the ISO 9001:2000 Quality Management Standard and the principles of Hazard Analysis and Critical Control Points (HACCP).

The Government of Ontario has committed to fulfill the recommendations from the Walkerton Inquiry Report that address the need to create standards for operations and compliance with regulations, for the delivery of safe and clean drinking water to customers. One of the recommendations speaks to the development and implementation of a drinking water quality management system. This system is intended to further improve the operation and management of drinking water systems and to maintain delivery of safe and clean drinking water.

Furthermore, Ontario has implemented a new regulation under the Safe Drinking Water Act, 2002 that requires owners of municipal drinking water systems to obtain a licence to operate their systems and to incorporate the concept of quality management into their operations. The intent is to ensure a culture of commitment to quality, diligence and dedication to consumers in providing safe and clean drinking water.

Justyna
Burkiewicz
Supervisor,
Water Quality
and
Compliance,
Region of Peel

To achieve this goal the MOECC developed the Municipal Drinking Water Licensing Program. A Municipal Drinking Water Licence is an approval to operate the drinking system. It is issued by the MOECC and comprises the following five components:

- Drinking Water Works Permit: A permit to establish or alter a drinking water system.
- Permit to Take Water: A permit to take 50,000 L or more of source water per day.
- Operational Plan: A plan prepared in accordance with the Drinking Water Quality Management Standard (DWQMS) developed by the MOECC.
- Accredited Operating Authority: A comprehensive audit and periodic review of the Operational Plan by an independent certified accreditation body appointed by the province.
- Financial Plan: A long-term strategic plan developed to ensure the financial sustainability of the drinking water system. Peel's Financial Plan was prepared in accordance with the requirements of Ontario Regulation 453/07.

Process

The new Drinking Water Quality Standard (DWQMS) consists of 21 Elements that cover operational, maintenance and administrative functions of a drinking water system. It focuses on continual improvement and is aimed at reducing any associated hazards in the management and delivery of drinking water.

Element 1 - Quality Management System (QMS): Maintain the QMS in accordance with the requirements of the DWQMS and the policies and procedures documented in the Operational Plan.

Element 2 - Quality Management System Policy: Maintain a QMS that is consistent with the Policy. The policy includes three main commitments: maintenance and continual improvement of the QMS, compliance with applicable legislation and regulations, and to provide safe drinking water to the consumer.

Element 3 - Commitment and Endorsement: Evidence of Owner and Top Management commitment and endorsement (signed Operational Plan).

Element 4 - Quality Management System Representative: Maintenance of the QMS by the QMS Representative, who is appointed by Top Management. An Alternate QMS Representative is also selected, and performs the role when the QMS Representative is unable to do so.

Element 5 - Document and Records Control: Conform to the procedure for QMS document and records control.

Element 6 - Drinking-Water System: Ensure the description of the drinking water systems is kept current.

Element 7 - Risk Assessment: Perform a risk assessment for the drinking water systems consistent with the documented process.

Element 8 - Risk Assessment Outcomes: Document procedures on how the risks identified in Element 7 are managed (monitoring; responding; recording and reporting).

Element 9 - Organizational Structure, Roles, Responsibilities and Authorities: Keep current the description of the organizational structure including respective roles, responsibilities and authorities and communicate this information to Operating Authority personnel and the Owner.

Element 10 – Competencies: Maintain competencies for personnel directly affecting drinking water quality and maintain records of these activities.

Element 11 - Personnel Coverage: Document a procedure that describes adequacy of personnel coverage to ensure delivery of safe and high quality water.

Element 12 – Communications: Describe how the relevant aspects of the QMS are communicated between Top Management and the Owner; Operating Authority personnel; suppliers; and the public.

Element 13 - Essential Supplies and Services: Identify all supplies and services deemed essential for the delivery of safe drinking water and document a procedure on how these supplies and services are managed.

Element 14 - Review and Provision of Infrastructure: Document procedure for the annual review of the drinking water system infrastructure.

Element 15 - Infrastructure Maintenance, Rehabilitation and Renewal: Document a summary of the infrastructure maintenance, rehabilitation and renewal programs.

Element 16 - Sampling, Testing and Monitoring: Document a procedure for the sampling, testing and monitoring of process and finished drinking water quality.

Element 17 - Measurement and Recording Equipment Calibration and Maintenance: Document a procedure for the calibration and maintenance of measurement and recording equipment.

Element 18 - Emergency Management: Document a procedure to maintain a state of emergency preparedness that includes emergency procedures and an up-to-date emergency contact list.

Element 19 - Internal Audits: Document a procedure for internal audits that provides a self-evaluation of the QMS and verifies conformity of the QMS with the requirements of the DWQMS.

Element 20 - Management Review: Document a procedure for Management Review of the QMS.

Element 21 - Continual Improvement: Strive to continually improve the effectiveness of the QMS through the use of corrective actions.

Outcomes/achievements

The Region of Peel has demonstrated the ability to consistently produce and deliver drinking water that meets legislative requirements and ensure consumer protection through an effective implementation of a Quality Management System (QMS). Subsequent to the audit process completion, Peel was awarded Full Scope Drinking Water Quality Management Standard Accreditation on August 26, 2011.

Full Scope Accreditation Certificates:

- South Peel Drinking Water System
- Palgrave-Caledon East Drinking Water System
- Caledon Village-Alton Drinking Water System
- Inglewood Drinking Water System
- Cheltenham Drinking Water System

The Region of Peel has met all the requirements of the Municipal Drinking Water Licensing Program. Our drinking water systems hold Drinking Water Works Permits and Licences, and the operating authorities have been accredited. Also, Peel's Financial Plan has been approved by Regional Council and submitted to the Ministry of Municipal Affairs and Housing. Peel staff developed and implemented the Water Operational Plan enhancing policies and procedures to effectively manage the drinking water operations, continuously test and check and make improvements to all aspects of water treatment and distribution, from source to tap.



- Management; difficulty achieving employee buy-in
- Province wide (new) program with lots of unknowns
- Program development and implementation: a steep learning curve offered an increased sense of ownership but placed strain on limited project team resources.
- Diversity of existing documentation formats, storage locations, integrity and validity of procedures, policies, practices and plans.

- Standardized approach with documented procedures
- Improved customer service and increased customer confidence
- Continual improvement culture
- Roles and responsibilities clearly defined with heightened accountability
- Better prepared/organized for annual inspections
- Consistency in performance
- Preventative rather than strictly reactive strategies
- Maintain state of emergency preparedness

- Ensuring user-friendly technology and staff buy-in
- Change management and communication
- Establishing efficient process for updates to and maintenance of QMS documentation
- More effective method to deliver staff competency training in standard operating procedures

- Staff time: Portions of 230 FTEs
- Costs: The following is a list of the initiatives and associated cost required to implement the QMS:
- Time to implement: development of the program started in 2007 and was completed in 2011

Session 5

DC Water and Sewer Authority: Innovation program

Los Angeles Sanitation: Resource recovery management

Rancho California Water District: MyWaterTracker

DC Water and Sewer Authority

Innovation program

Sudhir Murthy, Innovations Chief
Tera Fong, Strategic Business Analyst

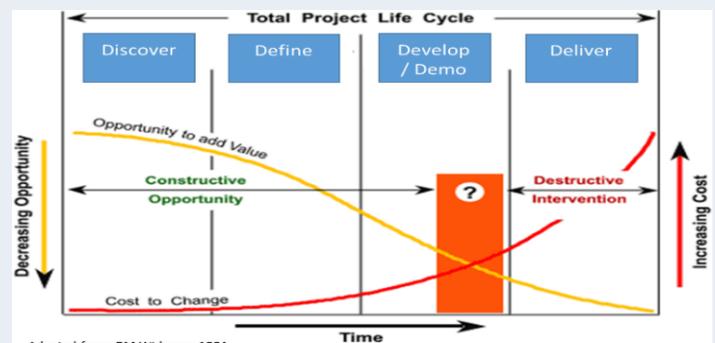
Description of Leading Practice

Objective

Using an innovation program to develop, implement and commercialize fresh approaches that include systems, processes and technologies that benefit employees and ratepayers.

Why Innovate?

We often consider innovations as a risk. However, the absence of innovation and accepting a status quo approach and its associated obsolescence can be a greater risk and cost for the utility and the customers it serves. Our robust innovation program seeks to manage uncertainty and/or risk associated with the implementation of fresh approaches for a utility. Fully developed, we can use it to develop and commercialize new products and associated services.



Innovation requires continual evaluation of processes and technologies to ensure fresh approaches can be adopted before they become cost-prohibitive.

DC Water's innovation program has two key purposes:

- To create a **balanced innovation portfolio** and actively manage projects based on market opportunities and priorities.
- To build a **culture of innovation**, recognizing employees as our greatest asset and enabling each to engage and participate in the culture.

The what of innovation

Innovation occurs at a system, process or technology level; and our balanced program considers innovations with various gestational timelines. Considering innovation lifecycles is necessary for evaluating procurement approaches, desired payback periods and managing associated risk. Utility processes such as financing, procurement and engineering should be flexible to accommodate each lifespan.

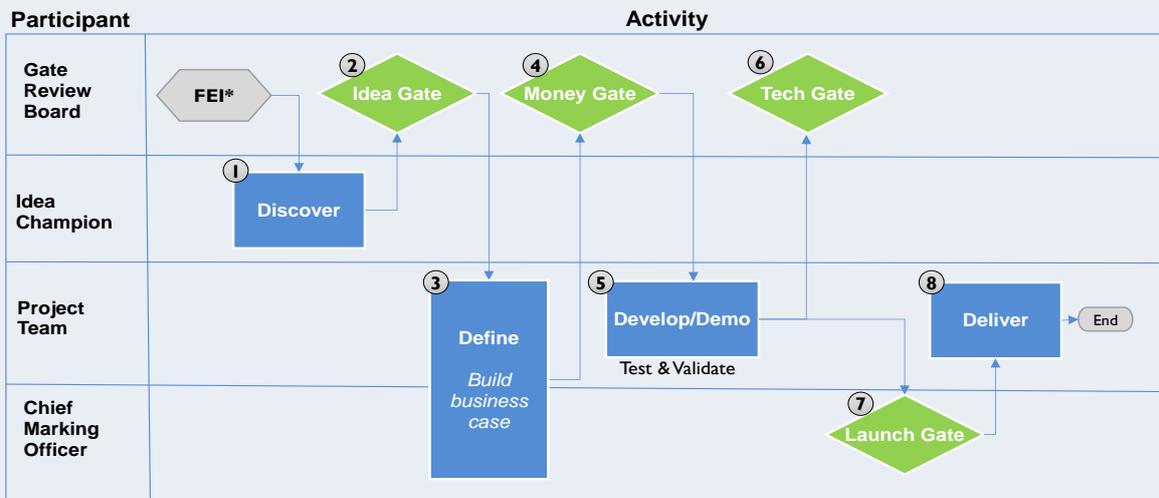
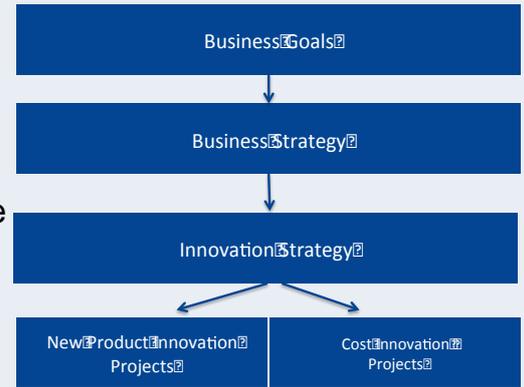
Hares (lifecycle of 5 years)	Horses (lifecycle of 20 years)	Elephants (lifecycle of >50 years)
Devices (sensors, tablets, industrial PCs, edge devices)	Mechanical Technology (mixers, aerators, scrapers, meters)	Centralized Infrastructure (systems and processes within water reclamation plants, drinking water plants, pump stations, buried infrastructure)
Analytics (controls, algorithms, machine learning)	Hydraulic/Selection Technology (pumps, screens, filters, cyclones, diffusers)	Distributed Systems (asset management, watershed management, cloud systems)

Sudhir Murthy
Innovations Chief,
Tera Fong
Strategic Business
Analyst

The How of Innovation

Identifying Projects: Innovation projects are developed through a routine assessment of DC Water’s business goals and strategies.

Evaluating Progress: Innovation is phased to routinely evaluate the progress of projects against their stated objectives. Under a phased approach, a project will progress through phases with critical decision points designed to evaluate whether the project should proceed.



Building the Team

DC Water employs a matrixed organizational structure to maximize engagement and advance innovation culture throughout the organization.

Effective management of the innovation portfolio involves leveraging differing skillsets as the project advances. DC Water balances internal expertise and open innovation practices. Local, regional, national and international collaboration is a goal of DC Water’s Blue Horizons strategic plan, and open innovation leverages this to globally accelerate development and commercialization of innovation.

	Regulators	Universities	Consultants	Other Utilities	Manufacturing
Metrics and Performance	X				
Discover		X			
Define			X	X	
Develop and Demonstrate			X	X	
Deliver					X

As open innovation proceeds, successive partnership documents such as Non-Disclosure Agreements, Memoranda of Understanding, Joint Development Agreements, and Joint Commercialization Agreements define roles and responsibilities at each stage.

Developing Intellectual Property (IP): Filing provisional and non-provisional patents serve as the bookends of the Discover process of innovation. Employees and open innovation development partners are incentivized through royalty sharing agreements, or joint licensing for improvements to technology, systems, or processes.

Commercializing Products and Services: Products include water-related resources, treatment assets, and intellectual property. Services include the delivery of short-term or sustained expertise associated with leveraging the products. Wherever possible, products and services are bundled to maximize efficiency for the customer and revenue potential for DC Water

Cambi: In October 2015, DC Water unveiled its \$470 million waste-to-energy project that produces electricity from the wastewater treatment process, providing clean, renewable energy to power. The CAMBI thermal hydrolysis process also produces an exceptional, cleaner biosolids product that will be sold as a compost-like material for urban gardens and green infrastructure projects.

Outcomes/achievements

Demon: DC Water is also implementing side-stream de-ammonification (DEMON) to achieve nitrogen reductions using significantly less chemicals and energy. The DEMON process treats the high-strength filtrate from anaerobic digestion and reduces the need for methanol, one of the most expensive chemicals for wastewater treatment, thus generating savings. This process will be put in service January 2017.

Technology Services: DC Water has also begun commercializing products and services from its intellectual property. DC Water offers an unparalleled combination of technology developer and end user, and seeks to share expertise to help fellow utilities promote energy neutrality, promote reuse and minimize costs.

Each core technology is packaged and paired to meet individual customer needs. Coupled with the technology, DC Water and its partners offer services for plant design, commissioning and start-up, and operations and maintenance. While early in commercialization, DC Water is pursuing projects around the globe and learning and adopting local approaches.

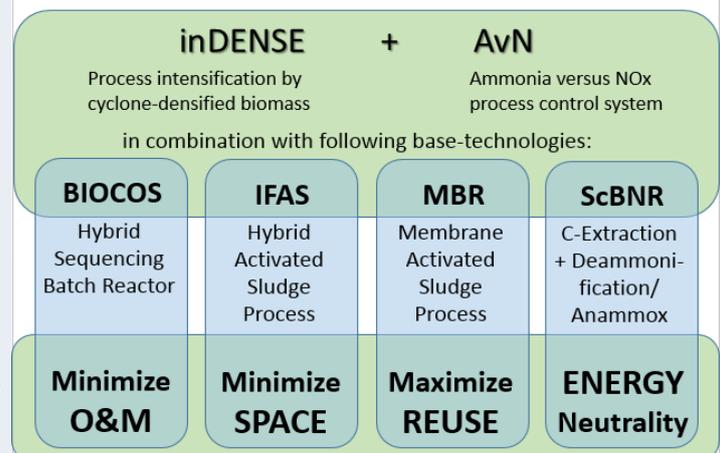


dc WaterEnergy Technology Suite

water is life® *Doing More in Less With Less*

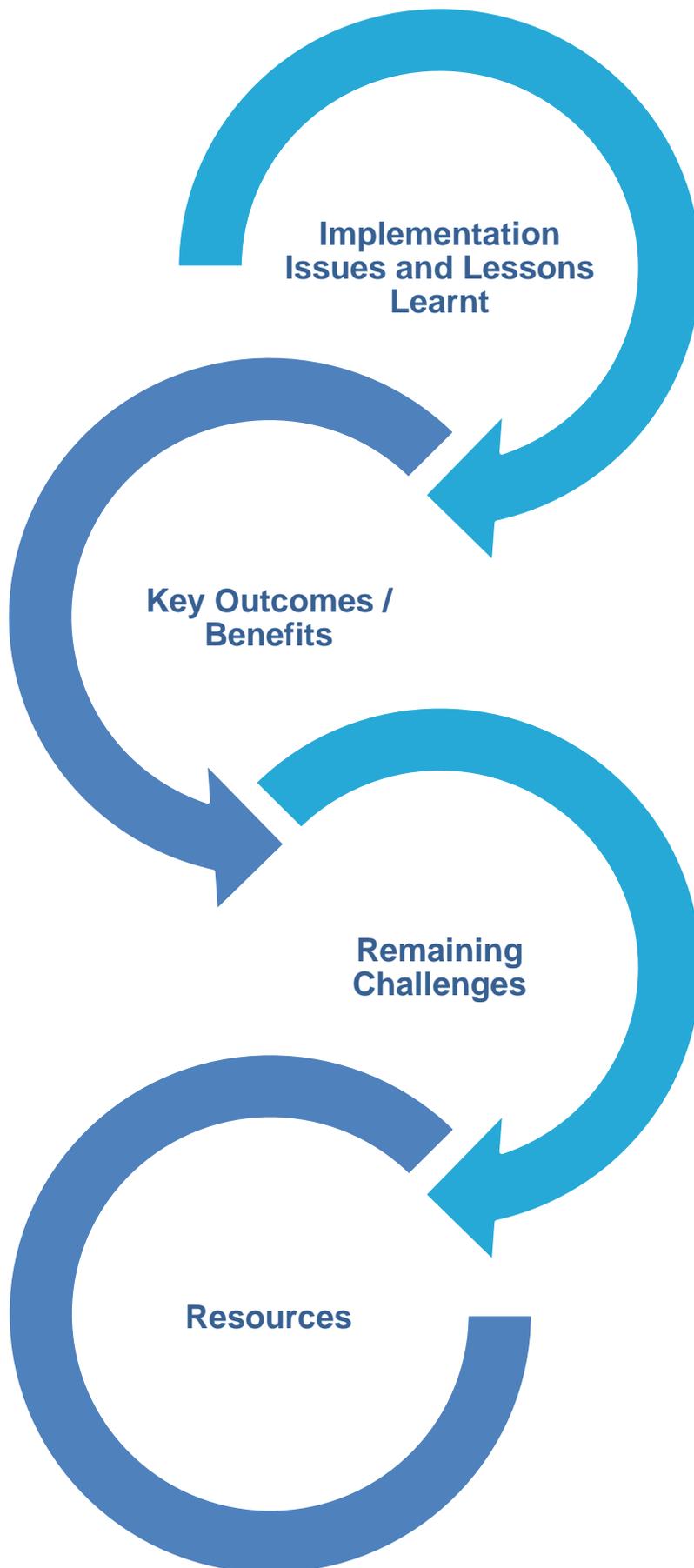
Technologies poised to transform wastewater treatment by:

- **Removing** nutrient pollution to stringent compliance standards,
- **Reducing** chemical and energy requirements and O&M needs,
- **Generating** energy-positive wastewater treatments, and
- **Achieving** all within in a small footprint



A portion of proceeds from the sales of WaterEnergy funds further non-profit research. Technologies principally developed by:





- Alignment with board and leadership
 - Manage expectations and develop a quick wins strategy.
 - Buy-in is a continuous process
 - Fairness is paramount to developing and maintaining relationship.
 - Engage, motivate and incentivize partners where and when possible.
 - Develop a mind-frame of a start-up.
- Innovative strategy is part of capital program execution.
 - Manage uncertainty, risk and costs for large capital programs.
 - Develop viable commercial approaches for products and services.
 - Drive organizational culture change.
- Accelerate program demonstrations and implementations.
 - Further develop viable commercial models.
- Staff time; creation of innovation organization.
 - Partners for innovations.
 - Costs.
 - Time to implement.

Los Angeles Sanitation

Resource recovery management

Diane Gilbert Jones
Environmental Engineer Associate IV

Description of Leading Practice

Objective

To implement sustainable methods for managing energy, biosolids, and recycled water resources to ensure assets are available and used efficiently.

Background and context

The use of valuable resources produced from wastewater treatment provides a benefit not only to the rate payers but the environment. The energy and recycled water production and biosolids use have for decades been part of the Los Angeles Sanitation (LASAN) practices of recovering valuable resources produced from the treatment of wastewater. For over 25 years, the City of Los Angeles (City) practice of beneficially using biosolids (about 258,000 tons) has generated positive environmental benefits and saved the rate payers money. The move away from ocean disposal of biosolids began in the mid-1980's as a federal consent decree mandated compliance with the Clean Water Act to reduce pollutants in wastewater effluent and seeking alternatives for disposal or reuse. Using treatment and solids technology, the City quickly embarked on what is considered standard industry practices today by installing high performing anaerobic digesters to remove a significant portion of the solids content from the effluent. This process has greatly aided in our ability to reuse the biosolids, often in farm based land application practices, that consists of meeting national standards to ensure quality control. Similarly, the Terminal Island Renewable Energy (TIRE) project uses an innovative technology to degrade biosolids into methane, carbon dioxide and non-volatile solids. This allows LASAN to harness the methane to produce a safe renewable energy as well as provide a reservoir to sequester carbon dioxide. The energy conservation program that LASAN has implemented also helps reduce the City's electrical consumption, increase efficiency, and reduce the carbon foot print.

On the recycled water side, LASAN has been a bold leader in going beyond the requirement to treat water to its NPDES limits necessary to safely discharge effluent to the LA River or the Santa Monica Bay. Approximately 97 million gallons of water are repurposed for beneficial reuse projects and customers throughout the City. The water is reused in parks, schools, cemeteries, golf courses, power plants and injected into the ground to protect aquifers from sea water intrusion. Additional pilot projects are being conducted to identify the most economical and efficient way to produce advanced treated water that would meet the strict California requirements for indirect potable use with a potential outlook to direct potable use options.

Diane Gilbert
Jones,
Environmental
Engineer
Associate IV,
Los Angeles
Sanitation

Resource Recovery Management Key Objectives:

- To make use of resources that would be lost or wasted
- To implement resource recovery management programs that are environmentally friendly and beneficial
- Reduce pollution in the Santa Monica Bay and provide cleaner beaches and safer areas for wildlife and recreation
- Reduce the cost of purchasing raw energy and investing in sources that are more sustainable
- Reduce our carbon footprint by utilizing the nutrients in biosolids to grow non-human food chain crops
- Reduce the need for additional potable water at land application sites given that biosolids contain 70% water
- Demonstrate leadership to others that a diversified beneficial reuse program reduces operational costs and significantly enhances the environment
- Reduce the City's dependence on purchasing imported water through increasing our reuse locally
- Enhance our City's resiliency should a disaster preclude us from accessing our traditional water supplies
- Combat concerns about growth and development through open discussions on higher efficient technology and equipment that supports a high quality of life while reducing per capita usage
- Focus on low impact development as an effective strategy to combat ongoing drought with a requirement to capture, treat, and reuse the first 85th percentile of stormwater for all private developers

Process

Development and implementation of Management Plans form the basis of most resource recovery management systems . LASAN has developed management plans for individual assets, including facility specific plans.

As part of the development and implementation of management plans, a systemic approach is utilized that includes goal setting, management review, a continuous improvement process, and corrective action audits and reporting of program performance. Each step of the system has specific procedures in place to ensure it is functioning effectively, as well as a corrective action process to address any deficiencies or nonconformances.

Strategic management goals are set for each of the assets recovered and are tracked through LASAN's strategic planning process. Several management plans have been developed and implemented that include strategies and goals to ensure that the resources are sustainable and environmentally sound. The City developed a biosolids Environmental Management System(EMS) for its Biosolids Management Program (BMP). The City's EMS follows the system approach established by the National Biosolids Partnership BMP. The EMS plan is reviewed and updated to ensure options are available for beneficially using the biosolids and treatment processes are adequate to handle the population growth and regulatory changes.

Through the use third party audits, LASAN is able to maintain management plans that are transparent. The verification of performance measures provides indicators to LASAN , rate payers, and general public on how well the utility is performing and meeting the strategic program or management goals. The periodic verification through audits are made available to the public. This audit process allows the public to see how LASAN is performing and also provides valuable information on the effectiveness of management plans. Management review of the audit results and reporting is used to implement changes for continuous improvements and confirm if the asset is meeting its intended outcomes. The review of the management plans are essential to maintaining a sustainable valuable resource.

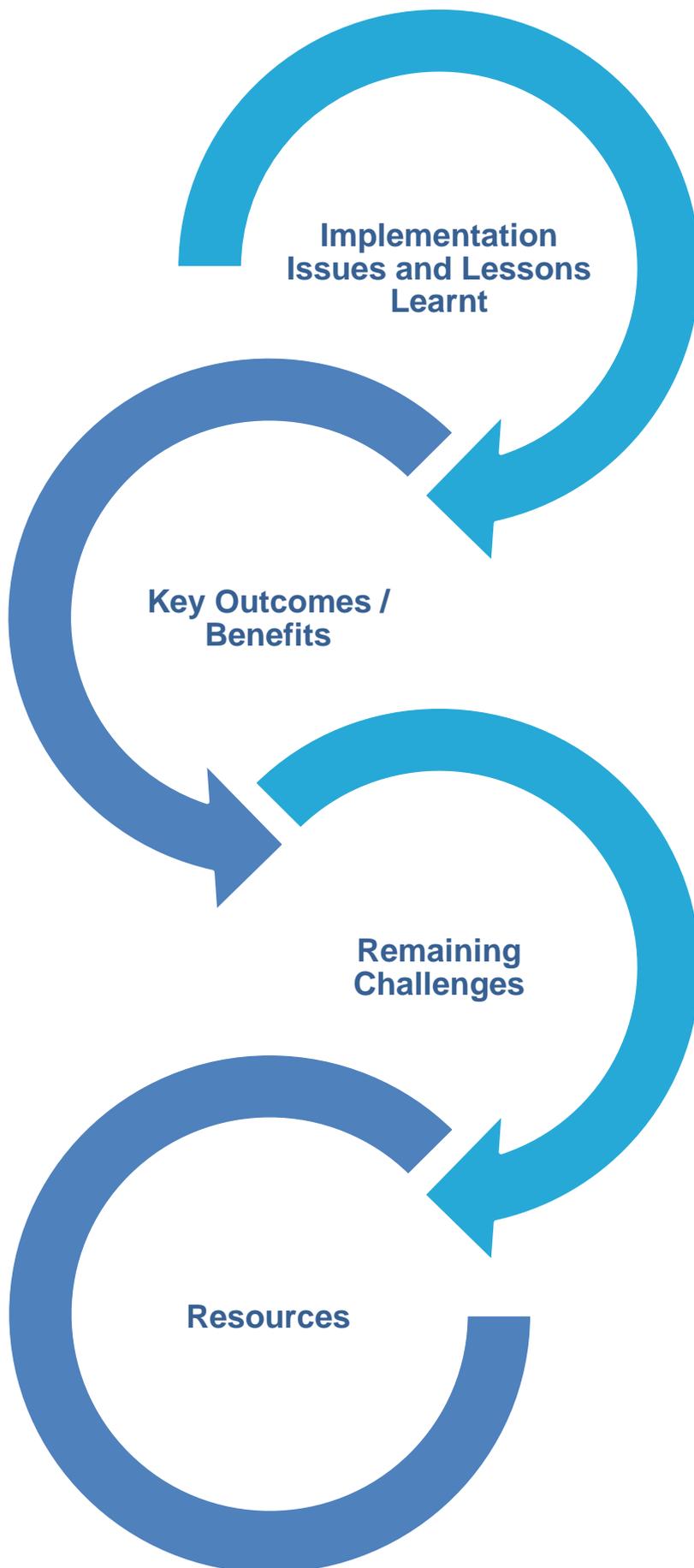
To ensure that the management plans are meeting the intended program outcomes LASAN uses a system approach to identify performance measures or indicators. These indicators are tracked and monitored. Some of the key indicators are listed below along with the results/outcomes achieved.

Performance Indicator	Result/Outcome
Maintain 100 % beneficial use	All material produced beneficially used through land application, composting, and deep well injection
Maintain Class A biosolids production	Consistent production of Class A biosolids since 2003
Meet and exceed regulatory compliance	No regulatory noncompliances since 2010
Reduce air emissions	Decreased amount of daily trucks from 30 to 24 resulting in reduction in transportation related air emissions
Maintain certified biosolids management program	No major nonconformances from audits since 2008
Reduce nuisance and odor complaints at land application site	No odor complaints from land application operations since 2003
Reduce carbon foot print	New demonstration project that is sequestering carbon dioxide and less material being land applied reducing greenhouse gases
Increase public acceptance	Number of people reached increased to over 19,000 since Environmental Learning Center opened 2013
Increase recycled water usage	Amount of recycled water used increased since 2014 from 84 million gallons to 97 million gallons
Increase in water customers and uses	Recycled water customers and uses for the water increased since 2014
Improve operations through use of best management practices	Increased volatile solids reduction beyond regulatory limit of 38% to 60%. Increased solids content from 25% to 30%.

This approach is used for energy conservation and recycled water without the external audit element. To continuously improve our recycle waste asset, LASAN tests water at our plants to ensure it meets tertiary standards for non-potable reuse customers (purple pipe). We have maintained consistent treatment at our wastewater plants that have been recognized and honored nationally, which allows us to maintain our customer relationships (lead by Department of Water & Power) through reuse at parks (Griffith Park since in 1980s), cemeteries, and the LA River to support recreation and wildlife habitats. The results of the testing and services utilizing the recycled water are published so that our customers and general public can be informed about the program.

Outcomes/achievements

- Maintained nationally certified Biosolids Management Program for over 10 years
- Maintained twenty-five year 100 % beneficial use program
- Largest Class A biosolids production facility
- Sustained land application program at City-owned farm
- Produced Class A exceptional quality biosolids since 2003
- Recycled and beneficially used 97 million gallons of recycled water
- Produced and used over 100,000 tons of non-food crops for livestock consumption
- Complied with all applicable local, state, and federal requirements and regulations
- Maintained sustainable management practices and operations
- Continued use of multiple management options (composting, land application, deep well injection)
- More transparency in operations performance and meeting goals and objectives
- Effective process for implementing program continuous improvements
- Improved communication and outreach program that provides opportunity for public and interested party input and feedback



- Training staff on new process and benefits
- Implementation of new audit process
- Incorporating the corrective action process into operations program
- Using the system to identify improvements to management plans
- Developing standards and procedures and providing periodic review for improvements

- Improved performance through program reviews
- Improve communication and outreach programs.
- Consistent operations and use of best management practices.
- Maintenance of viable land application operations.
- Cost-effective programs.
- Environmentally sound and beneficial programs.

- Regulatory changes resulting in loss of beneficial use options
- Public acceptance
- Legislative mandates
- Shifting technologies
- Identifying customers to meet our supply
- Cost of treating water to a higher standard at HWRP or deciding to convey it to DCT for advanced treatment (ie Groundwater Recharge).

- Staff time to conduct audits
- One time and on-going staff costs.
- Human resources/new skills
- Technological resources to assist with development of alternate management options.
- Conferences/workshops.
- Association participation.

Rancho California Water District

MyWaterTracker

Jason Martin
Director of Administration

Description of Leading Practice

Objective

The objective of MyWaterTracker is to provide Rancho California Water District (District/RCWD) customers with a tool to track water use and water budgets in real-time.

Background and context

Over the past several years, California has faced unprecedented drought conditions. In April, 2015, the California Governor imposed restrictions including a requirement for water agencies to achieve an overall use reduction of 25%. The Governor ordered the California Department of Water Resources (CDWR) to develop a plan to meet the target. The CDWR created a plan that set a reduction target based on the per capita use of each individual water agency. The final reduction target for RCWD was 36%.

To meet these water use reduction requirements, the District's Board of Directors voted to move into Stage 4a of the RCWD Water Shortage Contingency Plan (WSCP). Stage 4a reduced customer's outdoor tier 2 water budgets by 30% and inefficient tier 3 budgets were eliminated. Additionally, the District implemented Drought Surcharges that assessed higher charges to customers that exceeded their tier 2 outdoor water budgets. The District and their customers had never faced such significant reductions. The District wanted to provide customers with the information needed to understand their reduced water budget, monitor usage, and ultimately reduce their water use.

Jason Martin,
Director of
Administration,
Rancho
California Water
District

Know where you stand

Your Water Budget Has Changed!
Are you still within yours?

RANCHO CALIFORNIA WATER DISTRICT

Process

Leveraging the customer usage data RCWD collects using its Automatic Meter Infrastructure, combined with real-time weather data and landscape measurement information, RCWD developed MyWaterTracker (MWT). Databases were developed to collect and store the MWT data and a web portal was built to present the water budget information that emulated the same data that appears on a customer's bill, only at daily intervals (vs. monthly intervals on the bill). Analytics were added to the MWT portal to track the number of customers using the system. This data is then linked back to the customer's historical usage information to determine if the use of MWT is helping reduce the customer's overall water use.

Outcomes/achievements

The result of giving customers access to MWT was an overall water use reduction of 31% in the first year of its use. Since its launch on July 1, 2015, MWT has been viewed over 400,000 times. MWT provides customers with an almost real-time view of their water use and water budgets. Customers can drill into any day to view hourly usage information and can also sign up for text or e-mail alerts when the system identifies potential leaks or when the customer's use is getting close to exceeding their budget. In addition to overall water savings and a high level of customer adoption, the District was recognized for MWT at the 2016 White House Water Summit as an "Innovative Tool and Resource" and received the 2016 Public Communications Achievement Award from the American Water Works Association for MWT as part of the District's drought outreach efforts.





- 90 day development cycle for MWT was very short.
- Any time a customer-facing tool is developed, it's difficult to anticipate all the questions they may have about the tool – staff spent a lot of time on the phone with customers explaining MWT.

- A 31% decrease in customer water use over the first 12 months.
- More informed and educated customers regarding water use and water budgets.
- Use of key customer self service options like leak and budget alerts.

- Adding additional functionality and features.
- Daily system review to make sure that all data from multiple sources loads correctly.
- District water budget changes forcing MWT development.

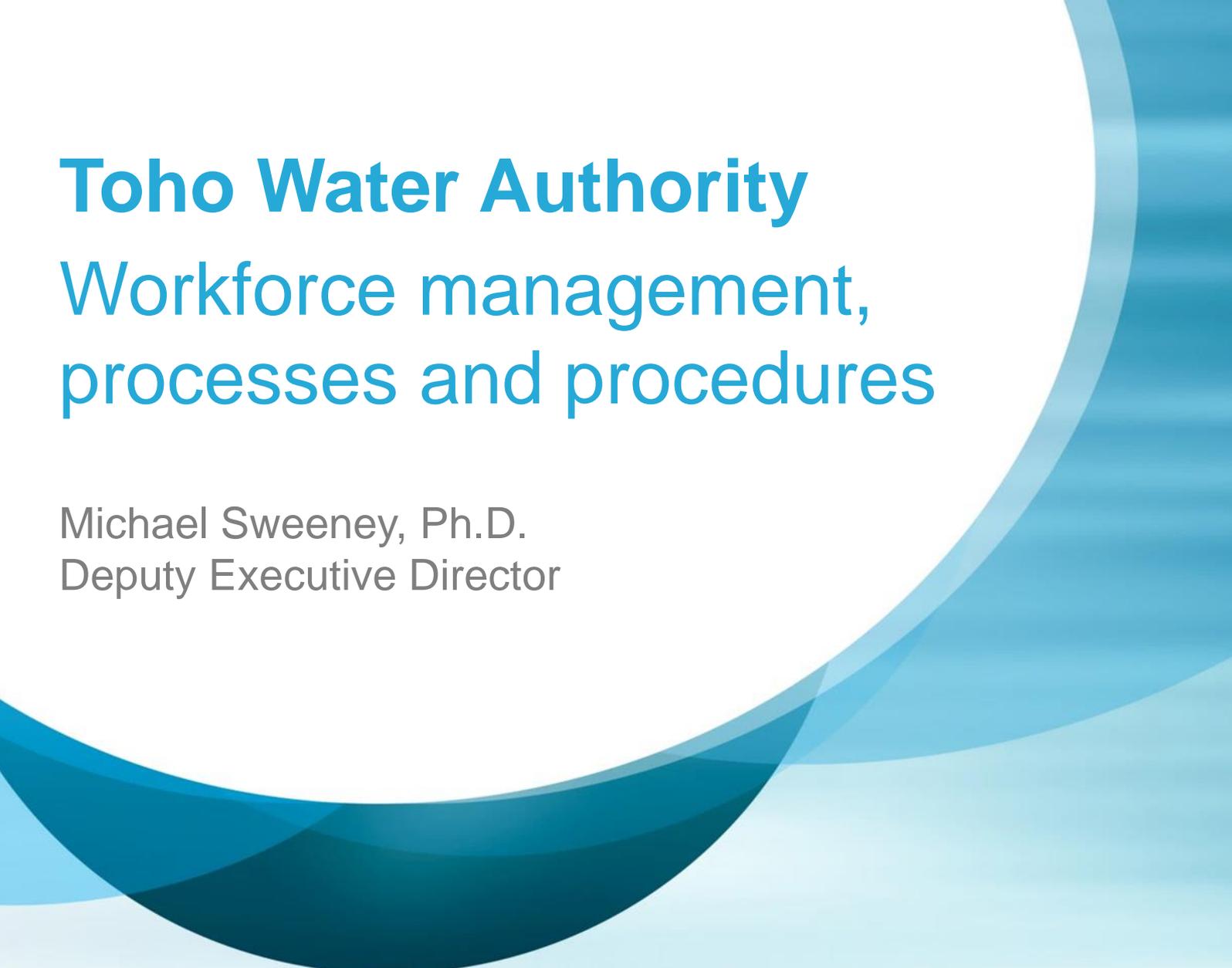
- \$32,500 for tool development
- 3rd party vendor input

Session 6

Toho Water Authority: Workforce management, processes and procedures

Metropolitan Council Environmental Services: Employee engagement

Portland Water Bureau: Collaboration conduit

A large, stylized blue circular graphic is positioned in the upper right quadrant of the page. It consists of several overlapping, semi-transparent blue arcs that create a sense of depth and movement. The colors range from a light sky blue to a darker, more saturated teal. The graphic partially overlaps the white background and the main title area.

Toho Water Authority

Workforce management, processes and procedures

Michael Sweeney, Ph.D.
Deputy Executive Director

Description of Leading Practice

Objective

This leading practice area addressed staff skills, training & performance management. At Toho Water the purpose of the policies (and implementing processes and procedures) is to provide a set of principals for establishing and maintaining harmonious and productive relationships in the conduct of Toho business.

Background and context

In 1985 the City of Kissimmee Water and Sewer Department had two offices in City Hall for four administrative employees. Total staff was between 40 and 45 with Field Services staff operating out of the City Central Services but had no place to house equipment or employees.

Since that time,

- Toho Water Authority was created as a regional water provider
- Integrated staffs from multiple acquired utilities
- More than doubled the area and customers served
- Insourced business functions including Human Resources, Purchasing Warehousing, Customer Call Center, Customer Billing and Information Technology and
- Grown to a staff of approximately 300 employees.

Toho's brief history has been rich with challenges met, opportunities seized and growth realized. The accomplishments have been made possible only through the shared efforts of the entire Toho Team. Executive Staff's goal is to allow the organization to continue to evolve without losing its core values.

Workforce Management Processes and Procedures were developed to:

1. Provide consistency and predictability in the day to day management of staff.
2. Invest in the capability of the workforce in training that delivers traditional and innovative training programs.
3. Allow staff to share in the savings associated with innovative recommendations.



Process

Operate Organization (Manage Staff) – The Employee Policies and Procedures Manual provides the basis for a common understanding and consistent implementation of policies and procedures concerning employees. Included in this manual, as it has been enhanced with new and innovative practices, is information on the following areas:

- Recruitment and Appointment,
- Employee Performance and Conduct
- Safety
- Position Classification Plan
- Pay for Performance
 - Authorized pay increases consist of two components, cost of living and merit. Minimum performance levels must be achieved in the performance review in order for an employee to be awarded the merit component of this increase.
 - Gainsharing program dates back to when Toho was still part of the City of Kissimmee. It allows employees to share in the savings achieved through their efforts to improve organizational efficiency and productivity while meeting performance goals. Bonuses are paid to employees funded out of savings achieved in Toho's operating budget. The program promotes total employee involvement in optimizing organizational efficiency and productivity by establishing a direct relationship to organizational achievement and employee reward.
 - Skill based pay has been implemented in most of the Operations areas of the Authority. This program defines clear expectations of the skills required to support career progression and provides the structure necessary for facilitating training and demonstrating skill mastery. Skill profiles are aligned with business goal objectives.
- Discipline / Grievance Procedure / Open Door Policy

The Policy and Procedures Manual is a living document that is highlighted at communications meetings to address questions and review revisions

Cultivate Skills (Training) – Continued development of the workforce is integral to Toho's Workforce Initiative documented in the Strategic Plan. The amount of training provided to staff is reported as an organizational key performance indicator and individually on many of the staff's performance evaluation. Toho has a Training Coordinator position responsible for identifying training needs and delivering needed training from internal and external sources.

Areas of focus include:

- Training required to obtain or maintain professional certifications and licenses
- Training necessary to support key organizational initiatives (i.e. Emergency Preparedness, Safety, First Aid)

Cultivate Skills (Training) – cont.

- Training to improve staff proficiency with productivity tools (software, hardware and methods)
- Leadership skills training
 - Employee surveys are needed to provide “management” with Leadership Skills Training. Focus areas included: Labor Law & Employee Relations, Communications, Conflict Resolution, Business Ethics and Fraud in Government, Evaluating Performance and Policies/Procedures.
- Awareness of the Organization as a “whole” lead to the implementation of the TWA Institute. Curriculum included the following subject areas:
 - **Finance/Budgeting**
 - **Safety**
 - **Payroll**
 - **Procurement**
 - **Human Resources**

Additionally, Toho has successfully implemented a skills based pay program that provides staff with a guided path to advance in skills and in their position.

Advance Organization (Innovation) – The next great idea does not need to solely rely on consultant engagements; it can come from the knowledge, experience and innovation of staff. In 2013, Toho has implemented an Innovation Rewards Program to provide a structured method for submitting ideas, evaluating recommendations, assessing impact to the organization and allowing staff to “share” in the realized savings.

- Recommendations may be submitted by an individual or a team
- Recommendations may vary from process changes to one that requires major investments in equipment and outside services to implement or evaluate the effectiveness.
- Submitted recommendations receive an initial screening to evaluate clarity, merit and feasibility. If accepted then the Review Committee will determine how costs and savings will be monitored.
- Rewards will be determined based on the verifiable savings after one year.

Outcomes/achievements

- Provides a documented, readily available collection of the workforce management processes and procedures in place at Toho Water Authority.
- Allows for the continued improvement of processes through questions and discussions at regularly scheduled meetings via the results of periodic employee surveys.
- Generates improved knowledge of expectations and communication of how well expectations have been met
- Centralizes the training needs identification and delivery efforts for the organization.
- Results in the focused delivery of training programs (i.e. TWA Leadership & Development Program)
- Implements a framework by which staff can share in the productivity gains (Gainsharing Rewards Program) or the savings realized through innovation.

Workforce management, processes and procedures



- Documentation of policies and procedures must be clear and readily accessible.
- Communication of existing, new and planned changes to policies is necessary for successful implementation, refinement and acceptance/compliance.
- Consistent application is necessary to provide the perception of fairness.
- Staff feedback mechanisms are necessary to identify areas requiring improvement.
- Training is a shared responsibility.
- Improves knowledge of expectations and communication of how well expectations have been met.
- Centralizes the training needs identification and delivery efforts for the organization.
- Results in the focused delivery of training programs (i.e. TWA Leadership & Development Program).
- Implements a framework by which staff can share in the productivity gains (Gainsharing Rewards Program) or the savings realized through innovation.
- Provide a tiered merit pay structure that rewards high performance determined via KPIs.
- Improve understanding of training payback to the organization
- Increased participation in the Innovation Rewards Program.
- Human Resources staff has lead responsibility for Employee Policies and Procedures Manual.
- Consultant services to facilitate periodic surveys (satisfaction, alignment, etc.).
- Ongoing effort from the Executive Team to understand and address gaps as well as administer Innovation Rewards Program.
- Employee Policies & Procedures Manual was initially implemented in 2010. It is referenced and updated frequently.

Metropolitan Council Environmental Services Employee engagement

Leisa Thompson
General Manager

Description of Leading Practice

Objective

Leading organizational change with processes and tools designed for greater employee engagement and collaboration and a resulting strategic direction that is more widely understood, aligned, and owned by the workforce. Continue to use these processes and tools to foster communications and connections between our “silos of excellence” as an essential component of organizational improvement and achieving a culture of engagement.

Background and context

Utility uses an employee engagement model to support its continuing strategic visioning process to break down communication barriers and “Build a Platform for Change.” Tools used for the change:

The Grove Models: Strategic Planning, Transformation, and Accordion Design

MCES Strategic Vision Steps: Drexler/Sibbet Team Performance Model incorporated into MCES Team System; The Four Disciplines of Execution(4DX) by McChesney, Covey, HulingHeartland, Inc. Convening for Collaboration Process

In 2012 MCES responded to the call for change triggered by the Utility of the Future trends and emerging local water resource challenges with a strategic visioning initiative. The work involved a series of facilitated high participation meetings taking place over several months and involving more than 80 staff from across the organization and external water stakeholders. The use of visuals supported the involvement and decision-making process and enabled the unusually high number of participants to co-create a “shared mission, vision and values” and MCES’ strategic direction for the next 10 or more years.

Key to transforming the culture for high levels of engagement are processes and meetings designed with the intent of supporting the participation of all attendees in the decision-making. This worked with the visioning process and it continues today with a team process used for chartering cross functional teams to work on the highest priority strategic goals. Essential components of the team process are effective sponsorship of the team, manager support of the team members, clear articulation of scope of work and outcomes, and measuring success. Other related examples of this are the Asset Management (Facility) Teams, Workforce Planning Teams and the MCES Team System.

The key purposes:

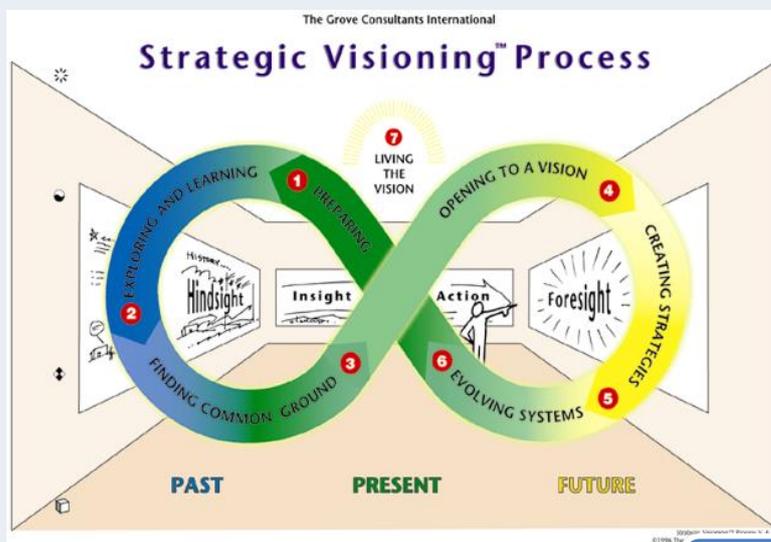
- Widespread staff engagement and co-creation of Mission, Vision, Values & goals
- Develop and use Level of Service (LoS) documents.
- Understand and manage risk better.
- Sustainable systems in place for continuous performance improvement.
- Shared Focus on a few important goals at a time.
- Working better together- up, down and across the organization.

Leisa
Thompson,
General
Manager,
MCES

Process

Developing a Strategic Visioning Process was the simple part, but making it a reality was not so simple.

Using several models that compliment each other, MCES is able to increasingly align strategic efforts and move them to implementation. MCES' overall process is a combination of the Groves Strategic Visioning Model and the Transformation Model. Together this provides guidance and allows for fluidity within each step where data and information are gathered and used by teams from across the organization. In addition to the Groves Model, change leaders in the organization received training in Convening for Collaboration (Heartland, Inc.) which equipped them with understanding of meeting design for collaboration and resulted in a noticed improvement in the quality of participation and interaction in MCES' conversations and interactions with each other and their customers.



The Strategic Visioning Cascade was developed once MCES completed their Strategic Vision to articulate to staff what steps occurred in the process, indicate the next step to implementation and assist in communicating those steps.

Outcomes/achievements

Underlying the process models is engagement at all levels with a collaborative and intentional approach. A process was developed to create standardization in forming teams, how they are to function, be resourced and managed. Sponsorship roles and responsibilities ensure teams are supported and goals are achieved. Engagement across the organization has increased alignment with strategic goals. Improvement efforts are focused toward achieving strategic strategies and goals. Communications from bottom up and across the organization are increasing and becoming more relevant.





- Communication is a work in progress
- Process improvements are needed that will increase data and information used in setting targets.
- Culture change is tough.
- Engagement is a top priority.
- Not saying “yes” to everything and focusing on what’s most important.
- Using a Plan, Do, Check, Act process
- Demonstrating the value
- Use metrics to bring goal focus and show progress
- Ensuring all the voices are heard
- Allowing some discomfort it helps support change
- Communicate up and down for improved understanding.
- Identifying and using good data to drive efforts and understanding.
- Implementation of plans
- Staying focused on the one or two big things while continuing to do the operational things
- Coaching Time-replacing ingrained behavior with new ones can be difficult even if it’s desired
- Training on new behaviors & techniques
- Design teams for leadership and strategic meetings
- Staff time– 1 position was dedicated to Strategic Planning Project Management; and a minimum of 20,000 staff hours contributed over three years
- Time to implement- Strategic Visioning took 3 years, Implementation started in 2015 and is expected to run 5 years.

Portland Water Bureau

Collaboration conduit

Devin Sanders
Applications Analyst

Description of Leading Practice

Objective

The initial vision for the Collaboration Conduit wiki space was to provide a centralized place for essential Portland Water Bureau (PWB) information and a forum for PWB teams to communicate and collaborate. Since the rollout, the vision has been revised to use the Collaboration Conduit as a space to display information about the bureau's assets and as an option for teams to communicate and collaborate.

Background and context

PWB has a work force of more than 500 employees that operate under seven different programs that are split into dozens of subprograms. Staff are widely dispersed—PWB has at least five locations where people report for work. Field staff in Maintenance and Construction and Operations maintain or repair water-system assets at hundreds of different sites spread out over miles. In addition, the years 2009–2016 have been a period of flux for water system assets. Projects that fulfill regulatory requirements, reduce risks, and ensure reliable and efficient operations have resulted in the replacement or elimination of many assets, including some of the biggest and oldest system elements such as finished drinking water reservoirs. These rapid system changes have required real-time information-sharing among many staff groups.

The project was created as part of a pilot effort to improve the ability of PWB teams to gather accurate, real-time information about water system sites and assets. When the project was launched in 2012, access to robust information was limited for field staff. Information about facilities (such as tanks, pump stations, and large valves and meters) was captured in a PDF document for each site. The currency of the site PDFs had to be maintained, users had to know where to look for the correct version of a document, and all of the information was paper based.

As recently as 2012, PWB had a work order system that, while computerized, created a static paper copy of the work order for field staff. Once the Collaboration Conduit was launched, planners were able to easily assemble the work order as well as background information, such as maps, pictures of the facilities, asset capacities, warnings, and other operating notes. In 2014, PWB implemented a mobile work order system for some field staff. With the mobile system, users

in the field can access the rich information available on the Collaboration Conduit through links. In 2016, use of the mobile work order system is being expanded so that more field staff can take advantage of the flexible mobile application and the Collaboration Conduit from job sites.

Devin
Sanders,
Applications
Analyst,
Portland
Water Bureau

Process

The Collaboration Conduit project started when PWB staff and managers identified a need to have a centralized source for reliable asset information. PWB managers and a consultant from the Bureau of Technology Services evaluated several wiki-type tools that would provide both text and graphics and a forum for collaboration and peer-to-peer communication. PWB selected Atlassian Confluence, Team Collaboration Software. The Atlassian tool had the best mix of capabilities to create, display, and manage text as well as image-based content such as photographs, maps, and diagrams, and videos.

Understanding of the information needs of the Maintenance and Construction and Operations groups aided in design a wiki space that is fairly flat in architecture, but offers deep information at the asset level. The home page for the site has two tabs: Spaces and People. The Spaces tab includes subpages for 15 groups or tasks as well as a tutorial for getting started adding content (Figure 1). The Asset Space includes detailed asset and site information, basic maintenance requirements, and links to standard operating procedures (Figures 2 and 3). The model for authors, editors, and content owners follows the model established by Wikipedia. Each contributor must curate and attend their own content.

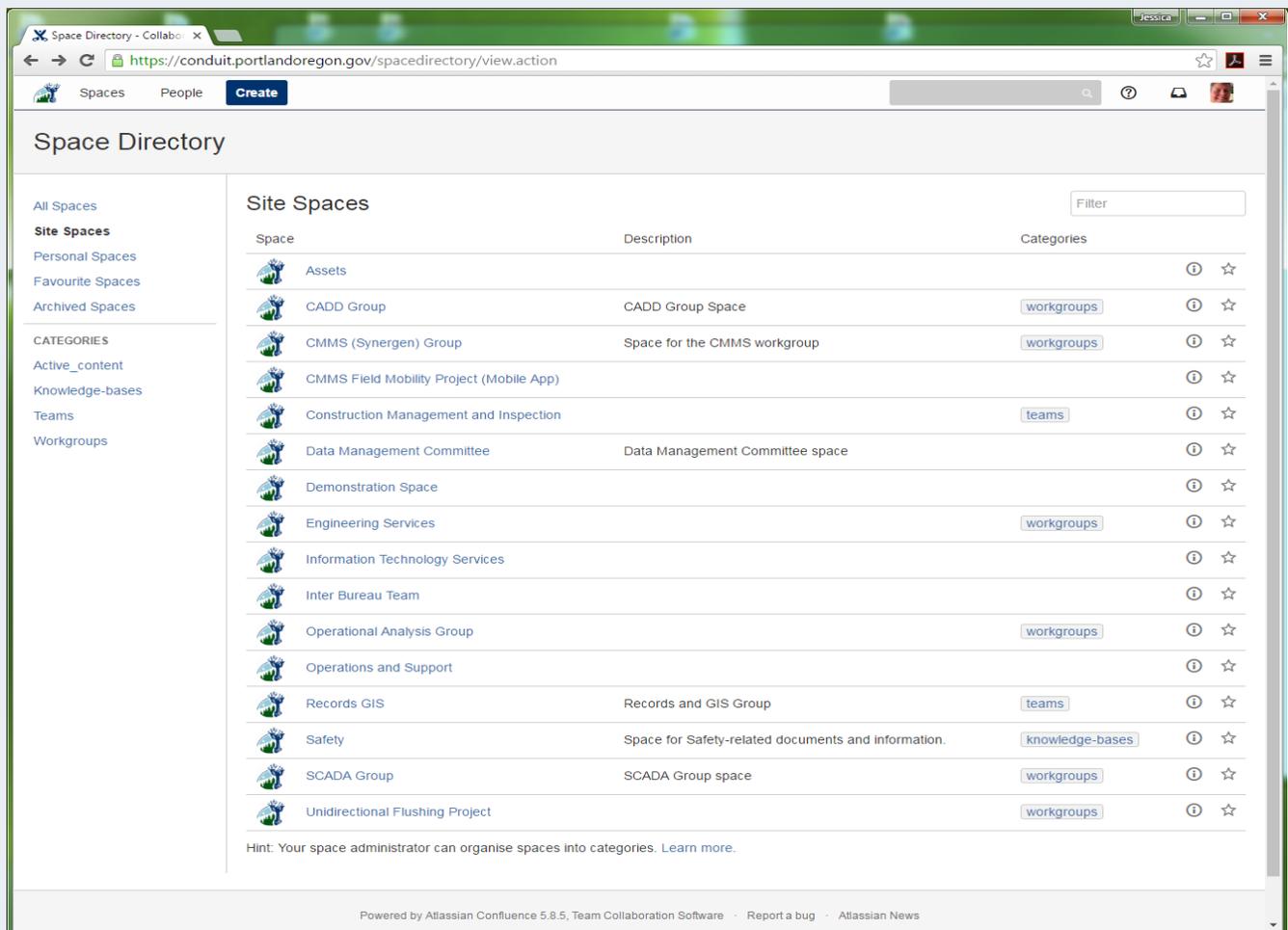


Figure 1. PWB's Collaboration Conduit Space Directory

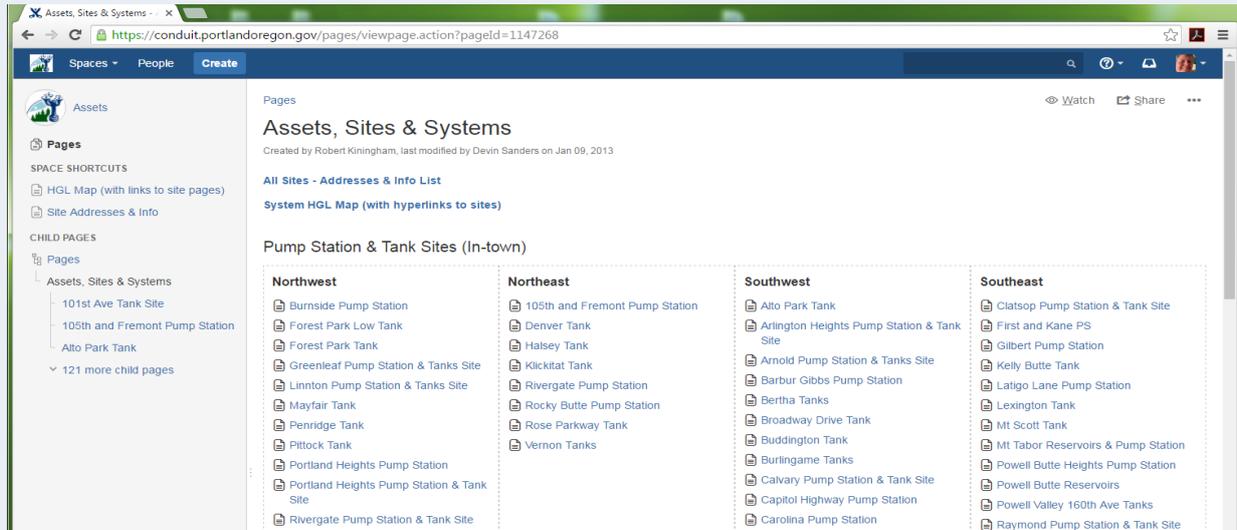


Figure 2. Assets, Sites, and Systems Directory

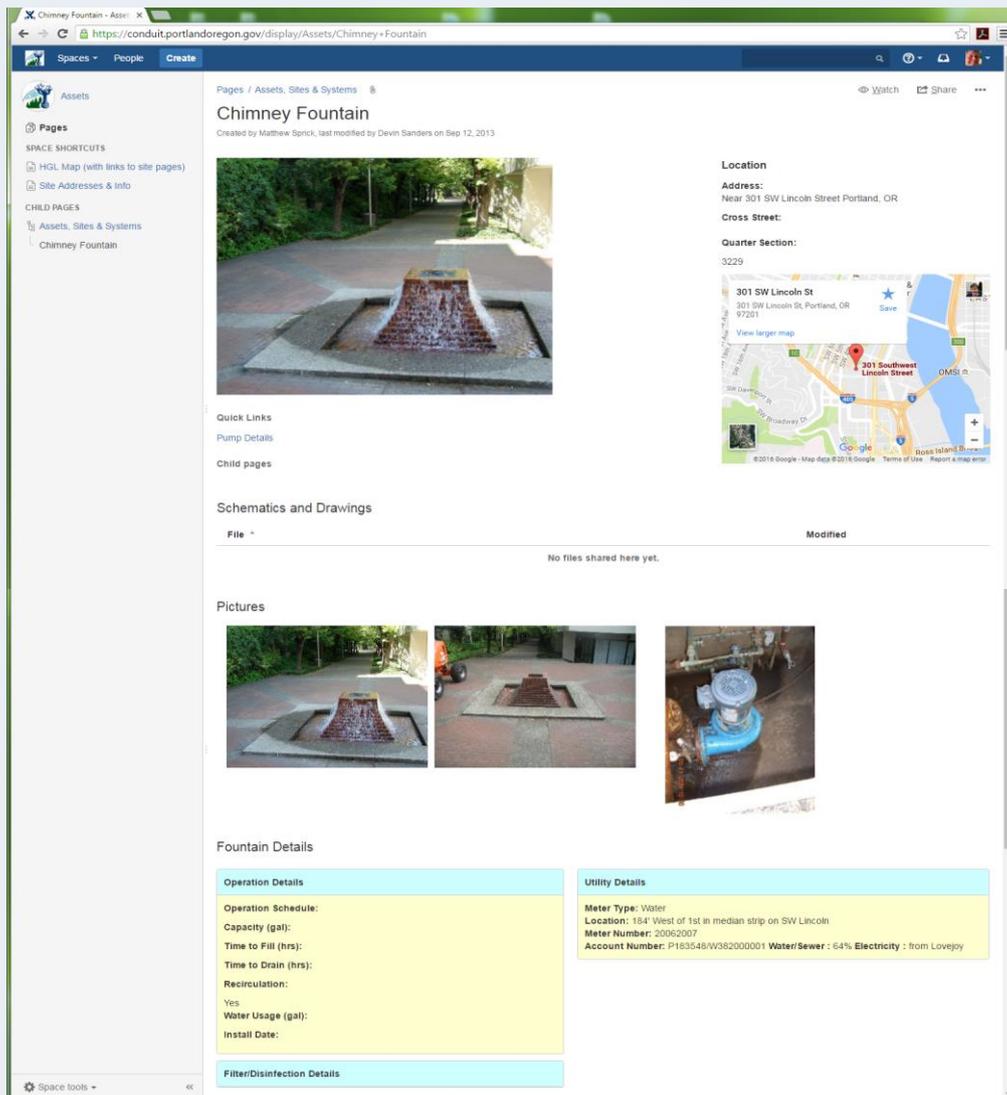


Figure 3. Sample Page of Asset Information

Asset information that is loaded into the wiki is created through a cut/paste and data-entry process. Asset information is linked directly from the information in CMMS and would be updated constantly; however, the information download process is complex and not straightforward. Programming automatic updates of asset information from CMMS to the Collaboration Conduit is on the To Do list after some other goals have been reached.

Users of the Collaboration Conduit report that they log onto the site daily, weekly, or monthly. Users that are part of collaborative groups often search the site for new information from members before tackling a technical problem. Staff teams report that they do the following types of activities on the site:

- **Operations and Maintenance and Construction Planners/Schedulers**—Assemble libraries of information for field work orders and document processes (Figure 4).

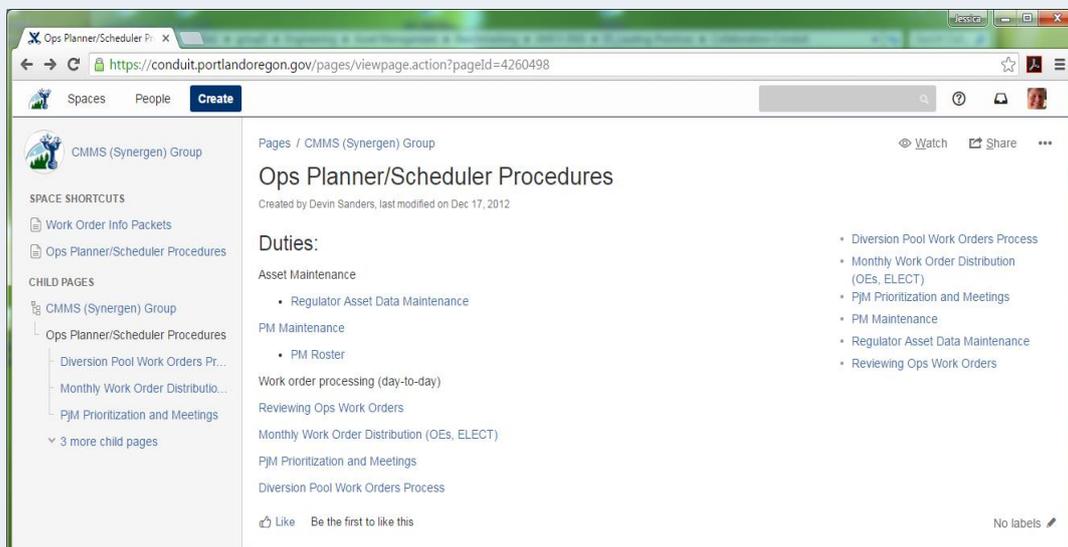


Figure 4. Process Documentation for Planners/Schedulers

- **Hydraulic Modeling Group** —Share how-to information and best-practice tips for use of the new InfoWater modeling software and exchange documentation with field staff (Figures 5 and 6).

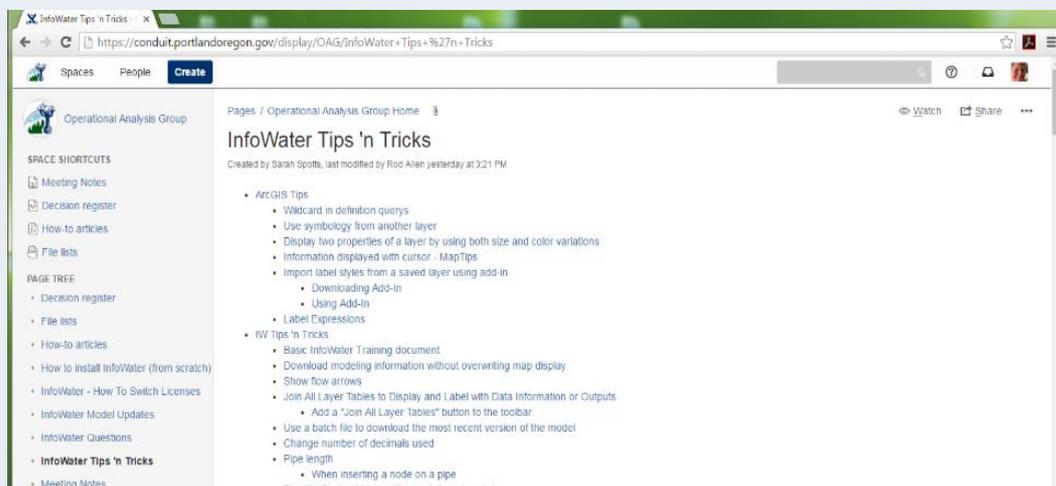
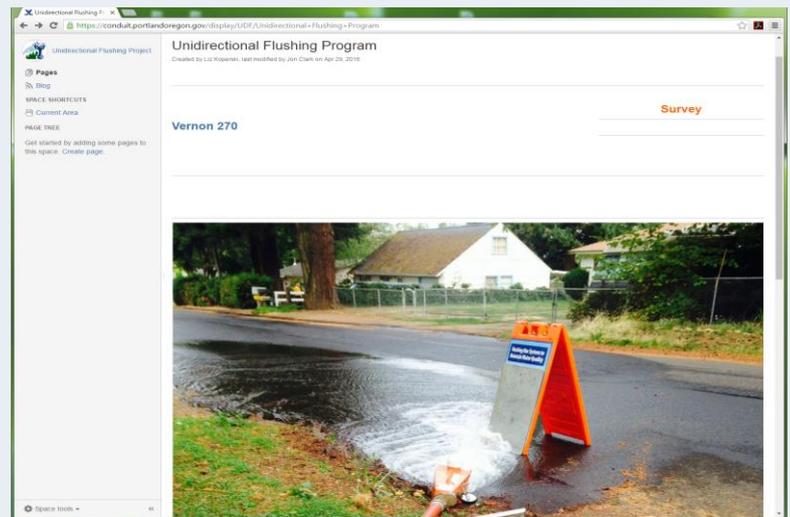


Figure 5. Hydraulic Modeling Staff Document Best Practices

Figure 6. Field Staff and Hydraulic Modeling GIS Staff Exchange Real-Time Photos



- **Mobile Workforce Project** —Document code, administration processes, and technical notes for various systems.
- **GIS Group** —Create and refer to trainings, notes, and standardized information; share current information about mapped assets, including photographs of appurtenances that are mapped but not part of the larger asset. GIS Specialists also create and update maps for field staff upon request and post them in the Collaboration Conduit.
- **Communications Group** —Confirm locations and basic information about assets.
- **CIP Planning Group** —Find basic asset information and images for presentations.
- **Engineering Group** —Suggested the Collaboration Conduit as a site for the group's primary process manual, the Efficient, Effective Engineering Manual, or E3, and standards and processes for records retention.

Since the initial wave of adoptions, users and usage has grown. More PWB staff have requested access to the Collaboration Conduit. PWB increased its number of licenses from 100 to 250 in 2015. Additional expansion is planned in 2016-17 fiscal year.

A widespread embrace of the Collaboration Conduit in its full capacity is still in the future. A few organizational, procedural, and technical barriers have limited the adoption of the tool:

- **Organizational culture** —The Collaboration Conduit also includes capabilities similar to those found in other social media apps—customizable personal profiles, the ability to follow other users, and collaborative tools such as shared drafts, status updates, and task assignments. The social media aspects of the tool, which might lead to collaboration, have not been a part of PWB's organizational culture and are therefore largely unused.
- **Lack of strategic direction and policies on data and data systems at the City of Portland** —The Collaboration Conduit was designed as a central repository for asset information; however the City rolled out an upgrade to
- a decade-old content management and archiving system in 2014, which caused confusion for users and potential users seeking current information. Some of the asset data in the Collaboration Conduit have been copied and pasted from the information in CMMS, but the process is not automated (and is not simple to automate), rendering the Collaboration Conduit information a step behind the current information available from CMMS.

- **Lack of internal marketing** —The power of a centralized information-sharing site is attracting a sustainable number of people to seek and share information. Although limited marketing has created some active user groups, the largest potential user groups—the bulk of the Engineering, Operations, and Maintenance and Construction staffs—have yet to learn much about the tool and its potential for information exchange.
- **Security** —PWB is evaluating the information that should be stored and available on the Collaboration Conduit. Current efforts to mitigate risks to sensitive data include integrating the Collaboration Conduit login process with the City’s user authentication system and other measures for user and system security.

Outcomes/achievements

The returns on investment in the Collaboration Conduit for those who use it have been great. The access to information and ability to collaborate have created a flexible and powerful sharing environment for work groups. The amount of time to assemble a work packet and the durability of the packets has improved greatly with both the mobile application and the ability to provide linked information.

Autonomous information-gathering and the ability to access reliable information has greatly reduced the amount of time Operations Planners need to prepare work orders.

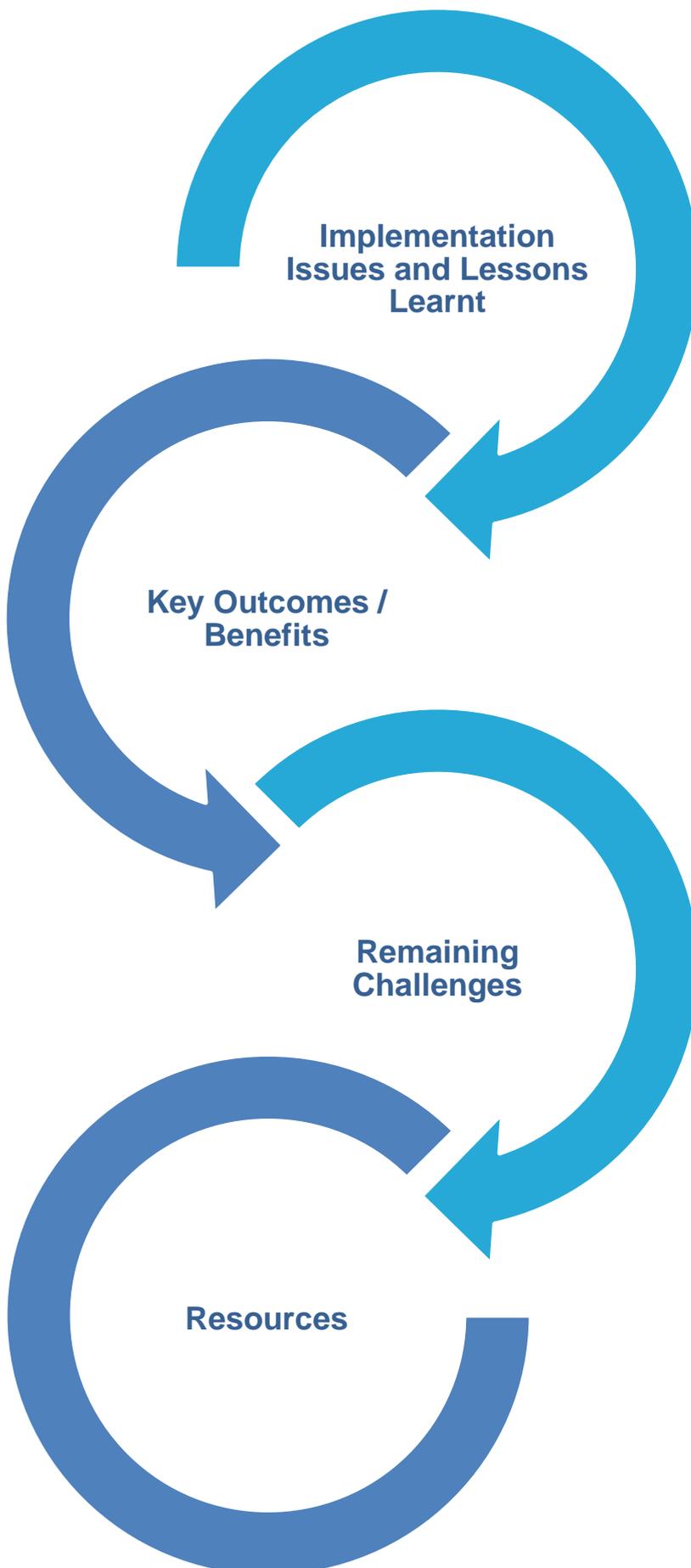
Staff in the field have used the Collaboration Conduit to access maps, photos, and other information that, previously, required a drive back to the office to retrieve. This saves labor and fuel resources. Crews can call for updated information and GIS/modeling staff can update within minutes.

For the groups using the Collaboration Conduit, members report the following advantages:

- Quick access to training information in the form of text, photos, and any updates.
- Current documentation of technical processes.
- Feedback from peers on the quality of information.
- Tips on best practices.
- A ready archive of technical documentation, such as an SQL query or XML codes for tasks.
- Learning or confirming the description of an asset and its location.

The biggest wave of adoption and the greatest efficiency gains are still ahead for the Collaboration Conduit. As the City of Portland’s and PWB’s data policies mature, there is an opportunity to promote the use of the Collaboration Conduit as a best practice, based on the experiences of the groups that have already adopted this flexible collaboration tool.

Collaboration conduit



- The scope and vision for the Collaboration Conduit had to be adjusted downward once teams started using the tool.
- Security protocols for logging in did not initially match protocols for the City of Portland.
- Asset data input is not automated; depends on user input.
- Organizational culture does not foster peer-to-peer communication, which means PWB has not used the full capability of the tool.
- Several technical teams have adopted the Collaboration Conduit for rapid communications.
- Teams have uploaded best practices and documented processes in the tool.
- New users find new ways to use the tool.
- The searchable format encourages use.
- Information from the Collaboration Conduit can be accessed through links in work orders.
- The Collaboration Conduit fosters moving away from a paper-based system for some work processes.
- Marketing to more groups at PWB.
- Developing standards for use.
- Ensuring that the information remains current.
- Evaluating whether to expand the use of the Collaboration Conduit for other teams.
- Developing algorithms to update information electronically.
- Determining whether to connect to other data systems.
- Staff time to set up: three weeks
- Staff time to administer and maintain: 2-3 hours a week
- \$13,500 annually for hosting and licensing

Session 7

DC Water and Sewer Authority: Linking strategic planning to process improvement

Albuquerque Bernalillo County Water Utility Authority:
Customer Engagement

Yarra Valley Water: Determination of acceptable levels of service to customers

DC Water and Sewer Authority

Linking strategic planning to process
improvement

Sarah Neiderer
Strategic Planning Officer

Description of Leading Practice

BACKGROUND AND CONTEXT:

Comprehensive and sophisticated approach to strategic planning and linkages with metrics and reporting to stakeholders

OBJECTIVE

To achieve becoming a world-class utility through strategy and performance.

BACKGROUND AND CONTEXT

The DC Water Blue Horizon 2020 Strategic Plan, adopted by the Board of Directors in March 2013, serves as a blueprint for achieving a vision to be a world-class water utility. By laying out a course of action, Blue Horizon represents a disciplined process for making fundamental decisions and shaping DC Water’s future. To achieve the goals in the plan, the enterprise is embracing a culture premised on strategy and performance.

DC Water is paving the way to realizing its vision through the development of performance management at the enterprise, business unit and individual levels. By implementing a performance management program based on the goals outlined in Blue Horizon 2020, DC Water will set priorities and appropriately allocate resources to sustain and improve services. Ultimately, strategy will drive enterprise performance, be used to assess and improve business unit processes and inform individual performance goals.

To effectively implement performance management, DC Water is developing cascading strategies, goals and metrics beginning at the enterprise level. This level involves engaging the DC Water Board of Directors and Executive Team who are responsible for focusing on enterprise strategies. Together, these two groups developed a strategy map to communicate four key enterprise strategy perspectives based on the goals outlined in Blue Horizon 2020 – workforce, finance, operations and customer.

The Strategy Map will serve as the foundation for the development of strategic outcome metrics aligned with the four key strategy perspectives. These metrics represents a holistic view of how DC Water is performing at an enterprise level as directed by the Board of Directions and Blue Horizon 2020.

The enterprise strategic outcome metrics inform cascading metrics aligning with business processes and performance metrics at the business unit level. The business maturity project launched in 2016 known as “Achieving World-Class” aims to evaluate business unit processes and establish performance metrics aligned with the strategic priorities of the enterprise.



PROCESS

The Achieving World-Class project utilizes a maturity model framework for evaluating business performance, establishing business unit strategies, and aligning individual and team goals with business unit maturity standards. By assessing the maturity of its business processes, DC Water is defining the “current state” of its business units and assessing gaps to ultimately achieving a “future state” of world-class. The Achieving World-Class project will ensure individual performance is driving business unit maturity, and ultimately advancing enterprise performance.

The project employs a facilitated methodology within each department to:

1. Define key business processes and sub-processes.
2. Assign roles and responsibilities for each process and sub-process.
3. Define the “current state” of maturity for each process and sub-process.
4. Develop a maturity model that defines strategies for advancing business processes
5. Develop and implement performance metrics for each business process.

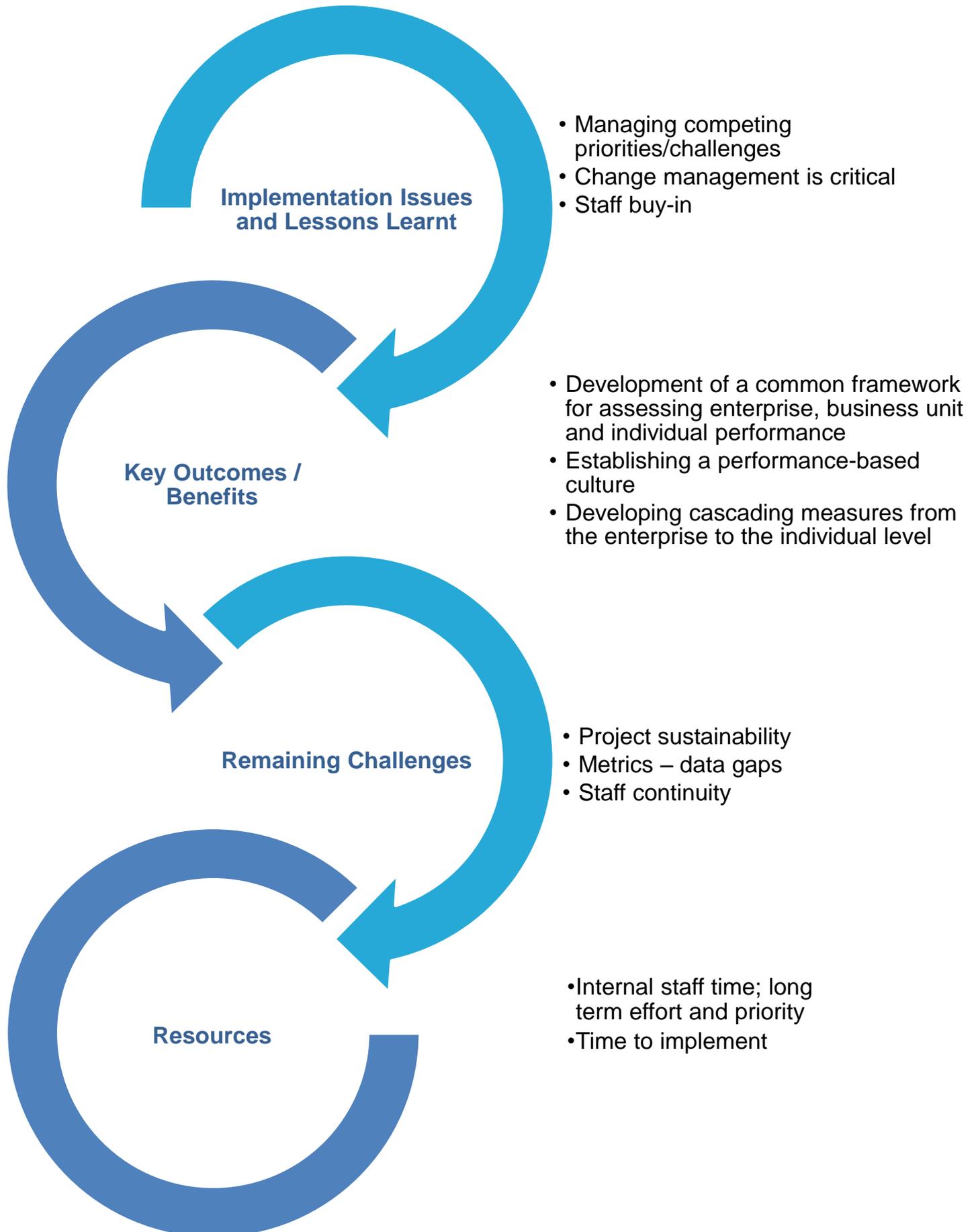
The project assigns strategies and metrics to business processes and enhances how DC Water establishes individual performance. Individual performance management based on business unit maturity is the next cascading step in achieving the strategic goals of the enterprise. Monitoring business unit maturity creates an opportunity for DC Water to measure and evaluate the impact of individual performance. Moving forward, staff performance goals will be based on business unit strategies and individuals will be rated according to their role in advancing business unit maturity.

DC Water’s unique approach to integrating business unit maturity and performance management creates the opportunity to measure the impact of cascading strategies and goals. If a business unit fails to demonstrate progress over time, business unit strategies and individual performance goals are evaluated and realigned. This approach is integral to continuing to meet the strategic priorities of the enterprise. The Achieving World-Class project will position DC Water to begin monitoring the impacts of individual and business unit performance on overall enterprise outcomes.

OUTCOMES/ACHEVEMENTS

Integrating strategy and performance at all levels of the enterprise ensures the goals and strategies outlined in Blue Horizon 2020 are achieved. Strategy guides what we do, how we do it, what we measure, and how we define success. The Achieving World-Class project is the bedrock to a results-oriented work culture DC Water believes will serve as the foundation for achieving world-class status. Following the completion of the Project, all DC Water departments will utilize a common framework for monitoring, reporting and evaluating business performance. This framework will also inform how we set performance goals, coach and direct employees, assess high potential employees, and implement workforce and succession planning.

In the Spring of 2016, DC Water launched the Achieving World-Class project within two business units, Human Capital Management (HCM) and Information Technology (IT). Each department utilized the maturity model framework for assessing “current state” and identifying strategies for achieving a world-class “future state.” Strategies and metrics were assigned to each process and subprocess, creating a roadmap to achieving higher levels of maturity over time.



Albuquerque Bernalillo County Water Utility Authority

Customer interactions

Frank Roth
Senior Policy Manager

Description of Leading Practice

Objective

The purpose of the Customer Conversations effort is to engage Water Authority customers through topic forums on a quarterly basis to maintain an ongoing conversation with its customers on important issues facing the utility.

Background and context

The Water Authority has historically had a good relationship with its customers and has taken care to educate them on critical issues. Water conservation, for example, has been the subject of numerous public forums and media campaigns over the last twenty years emphasizing preservation of a dwindling regional aquifer. Customers have responded by reducing per capita usage from 252 gallons in the mid-1990s to just 127 GPCD today. Another example is the education effort surrounding the transition from sole reliance on groundwater to conjunctive management of multiple water resources including surface water from the San Juan-Chama project. Several years of town hall and neighborhood meetings paved the way for rate increases (and street closures) necessary for construction of the \$450 million surface water system. More recently, the Water Authority updated its 10-Year Water Conservation Plan using input from a series of eight community meetings to guide the utility in implementing new conservation programs to ensure sustainability of the water supply.

These outreach programs, while successful, were limited in scope and focused on specific programs. There was not a consistent, ongoing discussion with customers regarding the broad scope of the utility's policies and mission. Recognizing the need to more fully engage our customers, the Water Authority's governing board in 2013 directed the utility to develop a customer involvement program as part of an ongoing effort to engage its customers and generate public input regarding the utility's plans, policies, and programs.

The new customer involvement program was dubbed "Customer Conversations" and consisted of quarterly topic forums. The interactive sessions are intended to educate and inform while also soliciting ideas and opinions. The Water Authority has completed three years of this new program. The program has covered topics of long-term water supply, adaptive management planning, potable reuse, infrastructure renewal, conservation and rates.

Frank Roth
Senior Policy
Manager
ABC Water
Authority



Roundtable Discussions with facilitators and recorders at each table.

Process

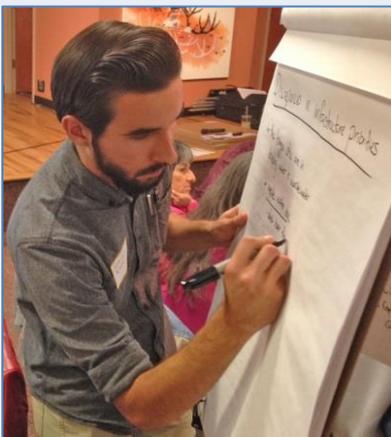
Water Authority staff established a steering committee to oversee the development and implementation of the four scheduled meetings each year. Staff utilized the 2011 guidance document “Assessing Customer Preferences and Willingness to Pay” from the Water Research Foundation on how to plan and conduct focus groups. The Water Authority was a participating utility in this research and was used as a case study. The Water Authority hired a facilitator to assist in the planning, organizing, and facilitating of the four Customer Conversations meetings.

To recruit customers to these meetings, bill inserts were used to notify customers and encourage them to pre-register online or by phone for one of the four meetings. Each participant received a \$20 credit on their water/sewer bill for attending the meeting. A confirmation letter was sent to pre-registered customers a week before the meeting to confirm their registration and as a reminder to attend the event.

The utility’s Customer Advisory Committee (CAC) hosted each meeting and members of the CAC attended these meetings to observe the process and listen to customer comments. The CAC’s attendance is consistent with its mandate to assist and facilitate public review and discussion on Water Authority policies, plans and programs.

Annually, about 200 customers attend the Customer Conversation meetings with an average attendance of 50 per meeting. Participants are assigned tables to ensure a balanced male-to-female ratio. Typically, there are two-thirds female to one-third male. Each table has a group facilitator and a recorder. The facilitator sits at the table to assist with the program, discussion and exercises. The recorders stand near the table with an easel pad to record comments or questions from the participants.

The goal of these meetings is to obtain input from customers but also includes an educational component. Staff provides short presentations but spends most of the time allowing the customers to discuss the issues in a round-table format with facilitators and recorders at each table. The discussions are guided by staff-developed activities to draw customers into the discussion and to allow for full participation. The activities, developed with input from professional educators, are the most innovative component of these meetings. The activities allow the participants to think through the decisions and discuss the results with fellow participants.



Roundtable discussions lead by facilitators and comments captured by recorders

Outcomes/achievements

1) Water Supply Priorities. Many of the discussions have centered around Albuquerque's long-term water supply. In one activity, customers discussed and provided input on nine water supply priorities. Each priority was assigned a point value based on the relative amount of water it would need, the amount of effort to secure that water and the cost to obtain and supply that water. Participants were asked to place their 10 tokens in the 9 cups in the middle of the table. Participants were required to place a minimum number of tokens to make a commitment to a specific use. A point system was applied to this activity to place the priorities on a relative scale and give customers a way to compare choices. Overall, the activity helped customers understand the value of water when considering long-term water supply priorities.



Consolidation of each table's Water Supply Priorities and reporting out from all tables

2) Infrastructure Renewal. A common question many water customers ask is "Why are my rates going up again when I am conserving?" It's a question that the Water Authority wanted to answer for its ratepayers, because it goes to the heart of what has been called the "Conservation Conundrum."

Like many utilities, the Water Authority faces significant financial challenges from rising infrastructure costs with a shrinking revenue base because of lower water demand due to conservation. Albuquerque's water use has declined over the last two decades, during which per capita consumption has dropped to a level equal to that of 1984. With conservation, Albuquerque has been able to handle a population increase of 46% while decreasing its per capita consumption by 49% since the mid-1990s.

The goal in this activity was to explore customer's perceptions of utility infrastructure needs and priorities. Staff began the sessions by educating customers on the Water Authority's Asset Management and Capital Improvement Plans, infrastructure challenges, and key risk criteria for prioritization decisions.

A primary objective was to explore differences between customer concerns and Water Authority priorities. For example, customers tended to be more concerned about drinking water infrastructure, when in fact the highest priorities for the Water Authority center around rehabilitation of aging wastewater treatment facilities. After gaining an understanding of the "perception gaps," participants provided input on how to take information on utility needs and priorities to the general public. The majority of comments focused on standard outreach efforts including bill inserts, public service announcements, and newspaper inserts. The Water Authority used this information in developing stakeholder communication to better educate its customers on the need to continue infrastructure rehabilitation improvements.

Overall, customers realized the need for rate increases to sustain levels of service and meet infrastructure renewal needs. Most support a balanced approach between water conservation and attaining revenue sufficiency and rate stability. Moreover, many have supported taking care of the infrastructure renewal needs now rather than burdening the next generation with significant rate increases.



Roundtable discussion on comparison of Customer to Water Authority Priorities

Customer input led to the development of the theme line for our campaign. The visual elements juxtapose images of new equipment against pictures of decay. The message: System failures and higher costs are the price we'll pay if we wait until later to address our infrastructure needs.



3) Climate Change Planning. Meetings held in 2016 provided our customers the opportunity to provide feedback on a number of topics related to the new water supply plan. The meetings included a presentation on the update and status of the development of the plan, followed by two exercises examining several alternatives in an effort to afford our customers the opportunity to experience what it was like trying to fill the supply gaps.

Customers were provided three different supply scenarios (historical, central tendency climate change, and hot-dry climate change along with a water conservation alternative). Given the gaps presented to them, they worked together to select alternatives based on a variety of criteria including the amount of water they would provide, the frequency of the water supply and environmental and financial impacts. The selected alternatives provided an opportunity to obtain productive feedback about customer choices. For example, the customers really liked the idea of capturing and using storm water as a future alternative water supply. Customers also explored their willingness to pay for watershed restoration (thinning the forests so wildfires are not so devastating) in order to preserve the forests and their ability to store our water supply when it falls as snow in the winter.

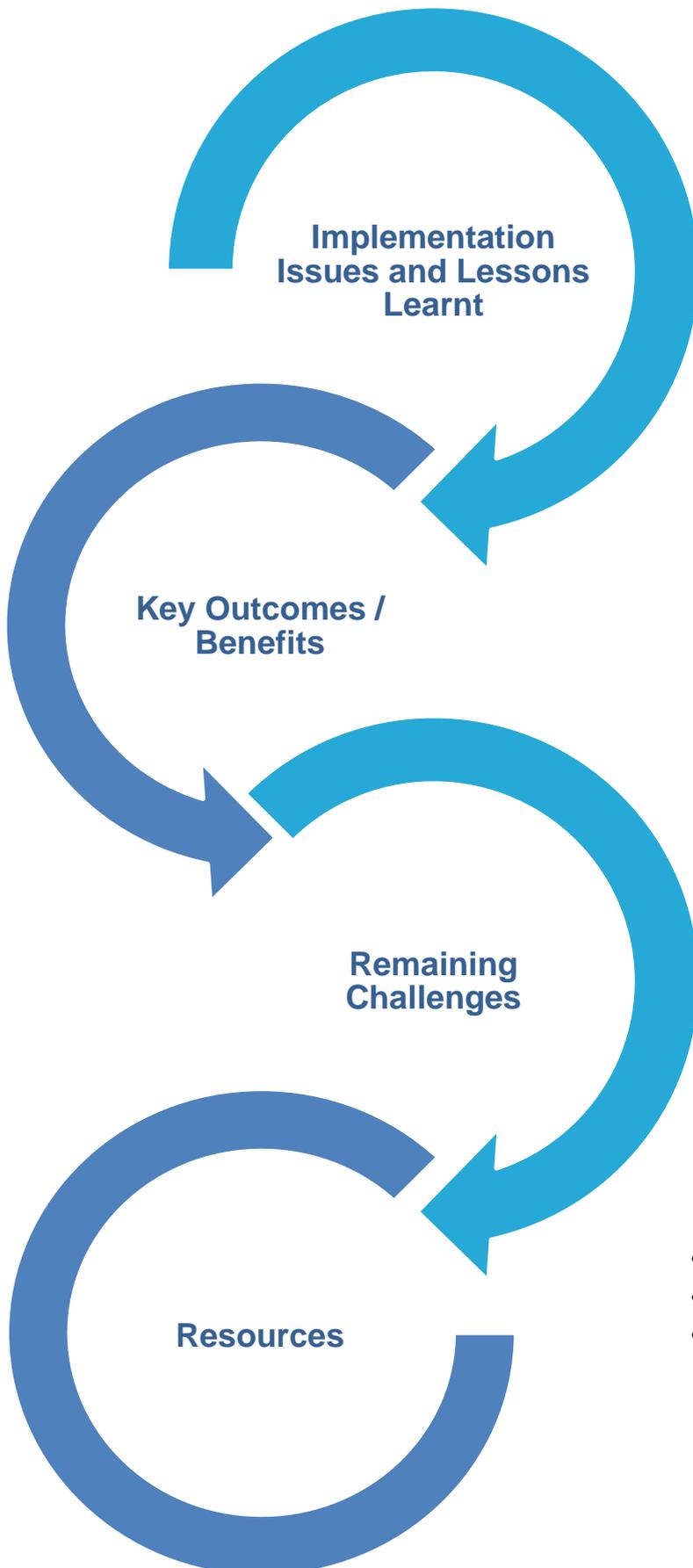


Customer discussion of water supply alternatives under low, medium and high climate change scenarios.



The Water Authority, like nearly every utility in the U.S., is dealing with increasing infrastructure needs and regulatory mandates, increasing operating costs, and declining revenues. Through the Customer Conversations, the utility has been able to educate its customers on these challenges and obtain input on what they think is the best direction for the utility in achieving its objectives. It is critical for utilities to communicate with its customers about the value of water and wastewater services while maintaining the community's objectives and service levels. With better communication, customers will have a better understanding of their rate charges and the community's objectives.

The Water Authority implemented the Customer Conversations program as an ongoing effort to engage its customers and obtain input regarding the utility's plans, policies, and programs. By continuing this program, the utility is able to better fulfill its achievement in the Effective Utility Management attribute of Stakeholder Understanding and Support. Moreover, by reviewing these proposals with its customers allows for better buy-in from the utility's governing board when considering budgets, rate adjustments, capital improvement programs, and risk management decisions.



- Hire recorders to record information on easels so participants can see comments recorded.
- Post final report on website and alert participants of the report availability.
- Create online registration and provide follow-up confirmation.
- Cover only one to two topics.
- Allow plenty of time for discussion.
- Frequent engagement with customers on a quarterly process.
- Provides two-way conversation and education component.
- Engagement program that obtains input from “rank and file” customers.
- Customers enjoy meetings: feel time well spent, would participate again, meeting structure allowed for feedback.
- Better involvement from customers in 30s – young families difficult to reach because of time constraints.
- Engage governing board in meetings.
- Staff time.
- Lead facilitator contract.
- Activity materials.

Session 8

Portland Water Bureau: Managing the risk of asset failure

Los Angeles Bureau of Sanitation :CIP development

City of Vancouver, Washington: Using business case evaluations

A large, stylized blue circular graphic is positioned in the upper right quadrant of the page. It consists of several overlapping, semi-transparent blue arcs that create a sense of depth and movement. The colors range from a light sky blue to a deep, dark teal. The graphic partially overlaps the white background and the main title area.

Portland Water Bureau

Managing the risk of asset failure

Mia Sabanovic
Engineer

Description of Leading Practice

Objective

The objective of the practice was first to standardize an approach to look at all Portland Water Bureau (PWB) assets in a consistent fashion, in terms of the risks of asset failure. Then, the focus shifted to understanding and identifying the most significant risks and how to address them, and then to track PWB performance in mitigating those risks over time. The objective was to develop tools and analysis procedures that enable higher level of transparency in assessing risk likelihood of failure and consequence by utilizing asset condition and failure history information.

Background and context

One of the lessons learned as part of our original Water Services Association of Australia (WSAA) benchmarking efforts (in 2006-2008) was the use of risk management methods among Australian utilities. Risk management practices were shared with PWB's Asset Management Steering Committee (AMSC), a group of executive-level decision-makers. The AMSC agreed to develop and implement risk management practices at PWB. A broad-based group developed the approach, which included forming consensus on levels of consequence across many categories. At PWB, the process was called the CLEM (C for consequence of failure, L for likelihood of failure, EM for evaluation methodology). Eventually, "CLEM" became a verb at the bureau, as in "have you CLEMmed that asset or that process?" In other words, does that asset have a high risk of failure? A service level goal of addressing high risks was established. A variety of methods were identified to evaluate assets for their risks of failure. One of those methods was the development of the Likelihood Assessment Process (LAP) tool. The LAP tool helps establish and quantify risk for water mains crossing large arterials and highways.

Risk identification of the high-consequence pipes has been the focus of the Asset Management Branch (AMB). These pipes included uncased water pipe crossings of freeways and railroad lines, large triple bottom line consequence of failure pipe crossings. The AMB estimates that large pipe failures under major highways could cause social impacts of more than \$10 million if highway traffic is delayed for a prolonged period of time. These financial estimates of the triple-bottom-line consequences of failure were determined using cost standards put forth by the National Highway Traffic Safety Administration.

In 2015, PWB staff updated the statistical analysis for the Weibull failure curves for various pipe cohorts, based on actual pipe failure data collected in the field. Asset Management staff also determined that a segment of pipe could be subjected to external environmental factors that might increase its probability of failure above that predicted by a Weibull curve. In order to facilitate estimating failure curves on pipes with additional environmental factors or prior history of failures, the Asset Management Branch developed the LAP tool. The Excel-based LAP tool includes fields to enter environmental factors and leak or break history specific to the pipe being evaluated. With the information entered by the user and standardized pre-determined factors, the LAP tool generates an adjusted failure curve for the pipe segment being evaluated. The LAP tool has created consistency and documented processes in assessing water main likelihood of failure for PWB staff.

Process

Risk and Service Level: A service level goal for managing risk was first established in 2009. This risk management goal is one of six for PWB that are highlighted in the City's performance dashboard. PWB's performance in managing risk is reported regularly to the AMSC, along with additional details on current efforts to address the risks. The service level goal is to address high (and extreme) risks.

Risk ranking methodology: The level of risk is based on a matrix of likelihood of failure and consequence of failure ratings, developed by the broad-based group from within the utility (Figures 1 and 2).

Risk Methodology

Risk ranking using a matrix; not a point score

Likelihood	Consequences					E = extreme H = high M = medium L = low VL = very low
	1 Very low	2 Low	3 Moderate	4 High	5 Very high	
Very low (1)	VL	VL	L	M	M	
Low (2)	VL	VL	M	M	H	
Moderate (3)	L	L	H	H	E	
High (4)	L	M	H	E	E	
Very high (5)	L	M	H	E	E	

Figure 1. Risk Matrix

Likelihood and Consequence

Moderate Likelihood (3) = 20-50 years
High Likelihood (4) = 5-20 years
<u>Moderate Consequences (3)</u>
\$5-10 million cost
250-1000 services out of water 24-72 hrs
Major injury
<u>High Consequences (4)</u>
\$10-20 million cost
250-1000 services out of water for more than 72 hours
Permanent disability

Figure 2. Selected Likelihood and Consequence Values, Including Safety Consequences

Mia Sabanovic,
Engineer

Refining the Likelihood of Failure: The PWB utilizes the LAP tool to assess the likelihood of failure for pipes, for all other assets where PWB uses failure history, or asset factory useful life curves. For pipes, the LAP tool will adjust the expected useful life of a pipe based on environmental factors. Second, it will calculate a distribution of the modes of failure based on the pipe material, age, and size. Third, it will provide a risk analysis, and, fourth, it estimates a benefit-cost ratio analysis for pipe replacement and rehabilitation. The risk analysis is divided into the different types of failures, from catastrophic failures such as a horizontal break to low-consequence failure such as a pinhole leak. In the LAP process, the first three factors—cover and location, environment, and hydraulics—change the Weibull curve. For a pipe in poor condition or with a history of leaks, the result is to move the failure estimate further up (right) on the failure of remaining population curve (i.e., a pipe in poor condition is assumed to exhibit failure rates of a pipe of older age but with the same failure distribution curve as the rest of the pipes in the same cohort). Figure 3 shows the LAP data-entry screen.

8	2. Material (if galvanized select "steel")	Steel
10	3. Size (if > 48-inch select 48)	16
12	4. Length of Pipe (feet)	200
14	5. Expected useful life (before LAP adjustment)	180
Part I: Adjustments to the Weibull Mean Time to Failure		
COVER AND LOCATION		
1. Enter information about depth of cover and pipe location by selecting from the drop-down box.		
21	1. Depth of cover and location of pipe	- High traffic loading or bus route, more than 5ft or in casing -10%
ENVIRONMENTAL ADJUSTMENT (if cathodic protection is present, no environmental adjustment, skip to "Hydraulic Changes" below)		
2. Enter information about depth of cover and pipe location by selecting from the drop-down boxes. Note Tables 2a, Trench Estimating, and 2b. Soil Corrosivity Scale.		
27	2. Environment adjustment (See tables at right.)	2a. Pipe Trench Type (see Table 2a.) - Laying Conditions types: 4 & 5 0%
29		2b. Soil Corrosivity Scale (see Table 2b.) - If Addition of assigned points using Table 1-2 is less than 10 0%
31		2c. Slope Stability - Pipe is NOT located in a landslide zone 0%
HYDRAULICS		
3. Enter information about pressure from the drop-down box.		
37	3. Pressure	- Maximum pressure is less than 100 psi 0%
PIPE EXPECTED USEFUL LIFE (LAP ADJUSTED)		
41	Total Sum of Reductions Before Condition Assessment	-10%
42	LAP-Adjusted Mean Time to Failure of Pipe Cohort (years)	165 <i>Rounds to 5-yr period</i>
43	LAP-Adjusted Time Remaining Until Mean Time to Failure (years)	107
Part II: Adjustments for Pipe Breaks/Leak and Condition (increasing pipe age along the probability density function)		

Figure 3. Part of the LAP data entry screen. LAP is an Excel-based tool that enables the user to adjust the estimated mean time to failure by applying environmental reduction factors for cover, location, laying condition, landslide, pressure, and pipe failure history.

Refining the Consequence of Failure: While health and safety and supply outages are stand-alone categories in the consequence of failure table, some impact valuations have been assigned to other types of consequences through the community financial impact category. For example, the value of traffic disruptions has been quantified.

Identifying Risks: Many different efforts have been made to identify risks. The most systematic way in which potential risks of asset failure have been identified is through the development of Asset Management Plans (AMPs). An internally developed guidance document led AMP Leads through the process of ranking the assets for risk. These risks were evaluated and recommendations for risk mitigation were made, often as part of the AMP itself.

Justifying Risk Mitigation: Business cases consider total life cycle costs and the triple bottom line factors of social, environmental, and economic impacts. So, while there is a consequence of failure table used in the risk matrix, impact valuations that quantify health and safety impacts and supply outages, among others, are used to complete the business case. In some cases, following the business case analysis and recommendations, risks have not been mitigated, and the bureau has accepted a high risk. In other cases, some lower risks were mitigated because a strong business case could be made.

Outcomes/achievements

PWB has recorded and assessed over 900 risk entries. Over the past 10 years, 135 cases have been elevated to high risk status at some point in time. Of the 135 risks, 57 have been addressed and 47 will be addressed in the coming years. PWB will continue to monitor and manage 31 high risks. One asset determined to be a risk failed before action was taken. The consequences of that failure – a release to a stream – were less severe than anticipated.

PWB hit a major milestone with the incorporation of risk assessments into engineering planning studies. All planning studies now require that the risks of asset failure be evaluated, to rate the risk, and then to evaluate risk mitigation options through business case evaluations.

Considering risk and the consequences of failure have changed the focus of some organizational efforts. The consequence of failure of uncased pipes crossing under (and over) major highways and railroad tracks far exceeds the consequences of supply outages in almost all situations. As a result, pipe condition assessment work and valve exercising is now focused on uncased pipes and assets that cross major transportation routes. The returns on investment have been great. Visual inspection of one pipe on a bridge crossing identified an imminent failure (Figure 4). Another high-risk crossing did fail prior to the establishment of risk management. The consequence of that failure exceeded a million dollars (Figure 5).

High Consequence Pipe Failure – Pipe on bridge (failure avoided)



Potential traffic disruption cost, in the \$ millions

Potential to cause fatal accident

Figure 4. A High-Consequence of Failure Avoided by Early Action

High Consequence Pipe Failure Uncased under-crossing (Highway 99E)



Utility cost, repair \$50,000

Utility cost, pavement \$450,000

Social cost, traffic disruption = \$1,000,000

Figure 5. A High-Consequence Failure Not Avoided



Our risks: It's not just pipes and pumps

Figure 6. Some Unexpected High-Risk Assets

Not all of the identified high risks were “on our radar screen.” The process of ranking risks highlighted some unexpected assets: decorative fountains are used for interactive purposes during hot weather, the fall hazard associated with these fountains make it a high risk (although it is hard to prevent use in this way and they are art, it is risk that can’t be mitigated, Figure 6); the bill printing device had no back-up and, without the capability to print bills, the consequences are high (higher in the past when electronic bill payment was less of an option). An alternative method for bill printing has been identified, so the risk has been addressed. In any case, PWB has developed a new culture regarding risk—that the risks of asset failure are not just pipes and pumps and that social and environmental risks must also be translated into dollars and cents and considered.



- Agreeing on the consequence category alignment,
- Consistent valuations for health and safety.
- Some risks came from unexpected sources, such as the bill printer issue mentioned in the Outcomes section.
- Risk assessments are used in business cases, planning studies, and as part of the capital planning process.
- Systematic risk assessments are documented in more than 20 AMPS.
- The AMPs define risk at both the asset and PWB level.
- PWB has assessed more than 900 risks and found 135 high risks and is addressing or monitoring the high risks
- Several of the high risks addressed had the potential for consequences representing millions of dollars
- The AMB exemplified the importance of data integration and using asset management practices as a tool
- Continuing to find all potential risks.
- Keeping the momentum going on risk mitigation.
- Developing a better database for tracking progress.
- Refining the consequences of failure categories..
- Staff time: Part-time assignment for one staff person.
- Time to implement; Great progress was made in the first year. Seven years into the program, PWB continues to improve it.

Los Angeles Bureau of Sanitation

CIP development

Dale Burgoyne
Senior Environmental Engineer

Description of Leading Practice

Objective

Operate a Capital Improvement Program (CIP) review and approval process to ensure robust asset management of Los Angeles' wastewater program

Background and context

LA City Sanitation (LASAN) manages a comprehensive capital improvement program with annual expenditures of over \$350 million. With \$4.8 billion in wastewater assets that ensure the safe and effective conveyance of 350 million gallons of wastewater per day from more than 550,000 customers, including multifamily dwellings approximately 100,000 businesses and 29 adjacent contract agencies, LASAN and the 4 million people it serves demands that the system be kept in good working order and accountable to the ratepayers. Besides the 6,700 miles of sewers, LASAN operates 44 pumping plants and 4 water reclamation plants to treat and purify wastewater to meet or exceed all of the regulatory criteria contained in the National Pollution Discharge Effluent System (NPDES) permits as well as local limits. Effluent from the plants is routinely recycled and reused for beneficial purposes with the excess being discharged through the Los Angeles River and the Santa Monica Bay.

The CIP program must adhere to all fiduciary standards and is annually subject to external financial audits as well as rigorous reviews by the City Controller.

Dale Burgoyne,
Senior
Environmental
Engineer, Los
Angeles
Sanitation

Process

The key elements of the CIP are:

- The Program Review Committee (PRC). The PRC, created in 1997, consists of the LASAN Chief Operating Officer, Chief Financial Officer and Assistant Directors, and the Bureau of Engineering Wastewater Deputy. This oversight committee manages the CIP, including approving new projects, the issuance of work order numbers to begin planning, the establishment of the project budgets to begin design, and bid and award. The PRC also reviews projects, including costs and technical decisions and reviews programs within the CIP, such as emergency sewer repairs, on-call contracting for smaller projects, and equipment replacements.
- Risk-based project prioritization. Though the City has had a prioritization system for years, it has recently implemented a new system taking into account a triple bottom line evaluation of capital projects. The new evaluation criteria include the following: physical condition, performance/process condition, regulatory/environmental, O&M and service level/reliability, safety, public benefit/perception, community/growth, financial, efficiency/energy, and process effectiveness/institutional knowledge. This system quantifies the likelihood and consequences of the failure of the existing infrastructure to be replaced by capital projects.

Project managers are required to submit business case analyses for projects proposed for approval, including calculations of prioritization scores for the proposed projects based on the above criteria, as well as documentation supporting their calculated scores. The proposed scores are evaluated and modified, as necessary, by a committee of engineers in LASAN and Engineering. The nearly three hundred capital projects in the CIP are rank-ordered by their scores. LASAN financial managers determine a “cutline” of the projected capital funds that are available for construction in future years. Starting in fiscal year 2017-18, the cutline is at \$300 million. Those projects falling below the cutline in a given year are deferred to years in which they fall above the cutline. As new projects are added to the list, it is possible that lower-ranked projects will repeatedly be deferred and will never be constructed.

The conditions of sewers throughout the City are determined by CCTV and replacements are recommended in concept reports. Sewer replacement projects are developed from the recommendations of the concept reports, prioritization scores are determined and the projects are submitted for approval by the PRC.

- Program master schedules from pre-design, design, bid/award, construction, and post-construction. LASAN maintains a project database including funding information, schedules, project descriptions, documents related to the projects and record of approvals. BOE has another database showing the status of its projects. The two bureaus meet once or twice a year to reconcile the schedules and projected project costs.

- Annual ten-year CIP expenditure plan for long term financial planning. As projects are approved by the PRC and LASAN Director, they are added to the CIP. In the annual budget process, projects in the next fiscal year are included in the City's budget and adopted by the City Council. Because projects in the CIP are continually updated, the CIP is more complete in the first years and sketchier in later years.
- Wastewater fixed asset accounting system. This system tracks assets from in-service dates to salvage. Once per year, projects that are identified as completed in LASAN's project database are evaluated as to whether their costs can be capitalized and for their appropriate depreciation lifetimes. The project information is added to the fixed asset accounting system, which the Office of Accounting uses to determine the fixed asset value and depreciation for the wastewater fund financial statements.

Outcomes/achievements

- Having a well-developed project approval process is a positive for the credit rating agencies in determining their bond ratings. The ratings are currently AA+ for the three agencies that LASAN uses. Though the Board of Public Works must approve the awarding of construction contracts, the PRC process allows the overall development of the CIP to be determined within LASAN.
- PRC review of programs, as well as individual projects, provides management oversight on technical and cost issues and increases accountability in the project development process.
- With limited available capital funds, the prioritization process assures that the funds are applied to the projects with the greatest return on investment, leading to a more efficient use of LASAN's resources. The prioritization criteria are applied to all projects, whether treatment or collection, avoiding turf battles in obtaining capital funds.
- The CIP development process, including planning, PRC oversight and prioritization, as well as greater funds available for sewer replacements and cleaning, has reduced sewage spills by 85 percent over fourteen years and resulted in the City's successful completion of a ten-year Collection System Settlement Agreement. More funds are now being directed to replacements of assets in the treatment plants.
- The CIP is an integral part of financial forecasting for the wastewater program. This allows LASAN to plan for future debt issuances and rate adjustments, as well as provides essential information for preparing bond official statements.
- Having a well-developed CIP is also positive for the credit ratings. It allows LASAN to issue bonds without identifying specific projects in the official statements, unlike for the solid resources program. Not identifying specific projects gives us greater flexibility in determining to fund projects from cash versus bond funds.

Remaining challenges

- Projects are identified by the facility managers and developed by Engineering before approval by the PRC and director and being added to the prioritization list. The treatment plants have a maintenance management system, but could do more tracking of individual assets, including identifying asset ages, replacements and conditions. This would provide better information on asset values for Accounting's fixed asset list and financial statements. It would also provide the plant managers with better information on assets that need replacement.
- The City is in the process of replacing its maintenance management system and plans to become more refined in its ability to use predictive modelling for determining the optimum timing of asset replacements. The City also plans to eventually apply the lessons used from the collection system in the treatment program optimization.
- The fixed asset accounting system could be improved with better identification of retired assets. There are two issues that the City still needs to address: Lack of identification of removed equipment in the existing treatment maintenance management system and the past aggregation of sewers in the fixed asset system. The locations of new sewers were not previously identified but, instead, were recorded as totals for each size in each year. The first issue should be remedied by the new maintenance management system, while the latter will be remedied in the very long-term as the old aggregated sewers become fully depreciated while new sewers with locations are added to the fixed asset system. Note that we use an 80-year accounting lifetime for sewers.

CIP development



- The Project Review Committee reviews projects and provides management oversight.
 - Projects are ranked based on prioritization scores.
 - Project databases provide information needed to manage the CIP.
 - The 10-year CIP provides allows long-term financial planning.
 - The fixed asset system provides accounting information for the financial statements
-
- The project approval process provides accountability and enhances bond ratings – AA+
 - The project prioritization process provides efficient use of limited capital funds.
 - The CIP process has helped to increase collection system reliability.
 - The CIP supports financial forecasting and provides information for debt issuances.
-
- The reclamation plants could improve asset tracking, including ages, replacements and condition.
 - The fixed asset system could improve with better reporting of asset replacements.
-
- The current treatment maintenance management system project will address asset tracking and replacement reporting issues.

City of Vancouver, Washington

Using business case evaluations

Elaine Huber, P.E.
Asset Management Engineer

Description of Leading Practice

Objective

Using Business Case Evaluation (BCE) & Multiple Objective Decision Analysis (MODA) to support strategic decisions for Vancouver's SCADA/Asset Management (AM)/ Maintenance Management Systems (MMS).

Background and context

The City of Vancouver's two Wastewater Treatment Facilities (WRF) were built/rehabbed in the mid 1990's. The original SCADA equipment has been used continuously since that time, with major components now obsolete or unmaintainable. Vancouver needs to plan for significant investment in this equipment to maintain plant reliability. We wanted a systematic approach to assess the current capabilities and clarify the business objectives relative to SCADA/AM/MMS improvements. Vancouver, along with their contract operators, used the Business Case Evaluation Process, which included a Multiple Objective Decision Analysis to clarify business objectives, identify alternatives and potential upgrades, and set a clear strategy relative to these investment decisions.

The BCE/MODA is an objective process that serves several key purposes:

- Ensures appropriate and agreed upon problem statement;
- Clarifies business objectives;
- Assesses current capabilities, and gaps;
- Evaluates emerging trends to guide development of alternatives; and
- Uses MODA process to set relative value scores for each alternative, and support selection of the preferred alternative

Vancouver had previously approached its asset investment decisions primarily using a bottom-up approach. The BCE/MODA provided a strategic top down approach that is transparent and defensible. The project recommendations will guide multiple project decisions that consistently support clear business objectives, over several years.

Two key reasons for the change / improvement relate to:

1. Previous process did not support a long range plan for systematic and coordinated upgrades, and;
1. Introduction of the BCE/MODA process – a generic process that can be applied throughout Vancouver's Public Works programs, for enhanced programming and strategic decision making.

The BCE/MODA has provided Vancouver with a clear set of business objectives for SCADA/AM/MMS upgrades, and alternatives to support ongoing identification of critical WRF funded projects. It has also provided Vancouver with a robust process for strategic decision making that can be applied throughout the organization.

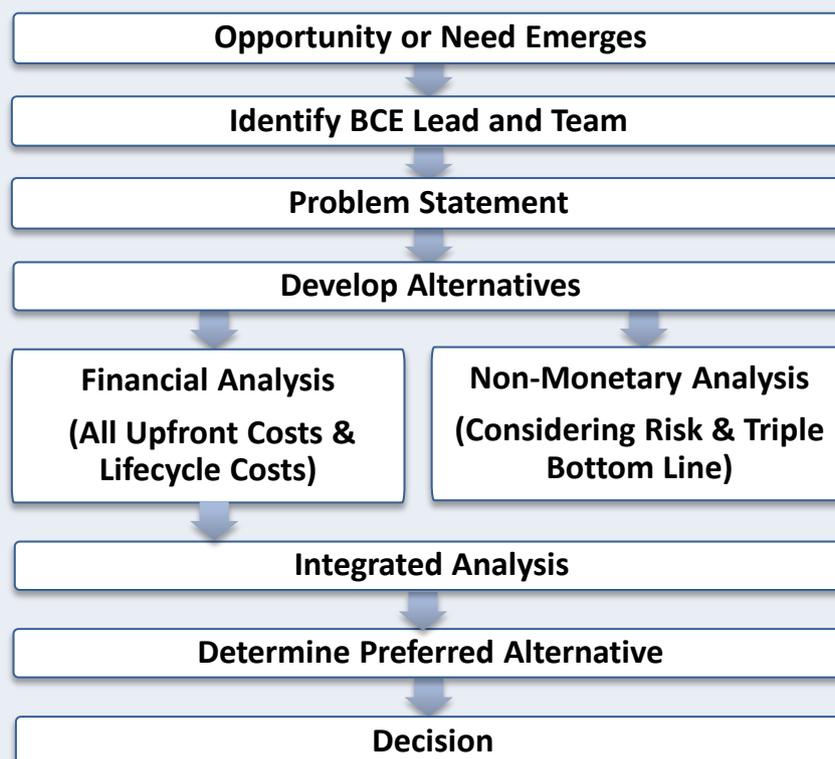
Elaine Huber,
P.E., Asset
Management
Engineer, City
of Vancouver

Process

The City of Vancouver needed a way to clearly identify problems and strategic business objectives for diverse groups of SCADA equipment assets. This Business Case Evaluation process was selected to support asset investment decisions that clearly support Vancouver's strategic business objectives. This also included a Multiple Objective Decision Analysis (Non-Monetary Analysis,) to evaluate non-monetary project benefits and Triple Bottom Line costs .

This process was a good fit to systematically address strategic planning for WRF SCADA reliability concerns and to support our ongoing WRF Levels of Service . This process supported asset decision making by clearly identifying problems and business objectives for a diverse group of SCADA process equipment before starting on project solutions. These asset investments are critical to safe and reliable operation of the WRF facilities. This process also gave us an objective and transparent approach to identify and evaluate strategic alternatives.

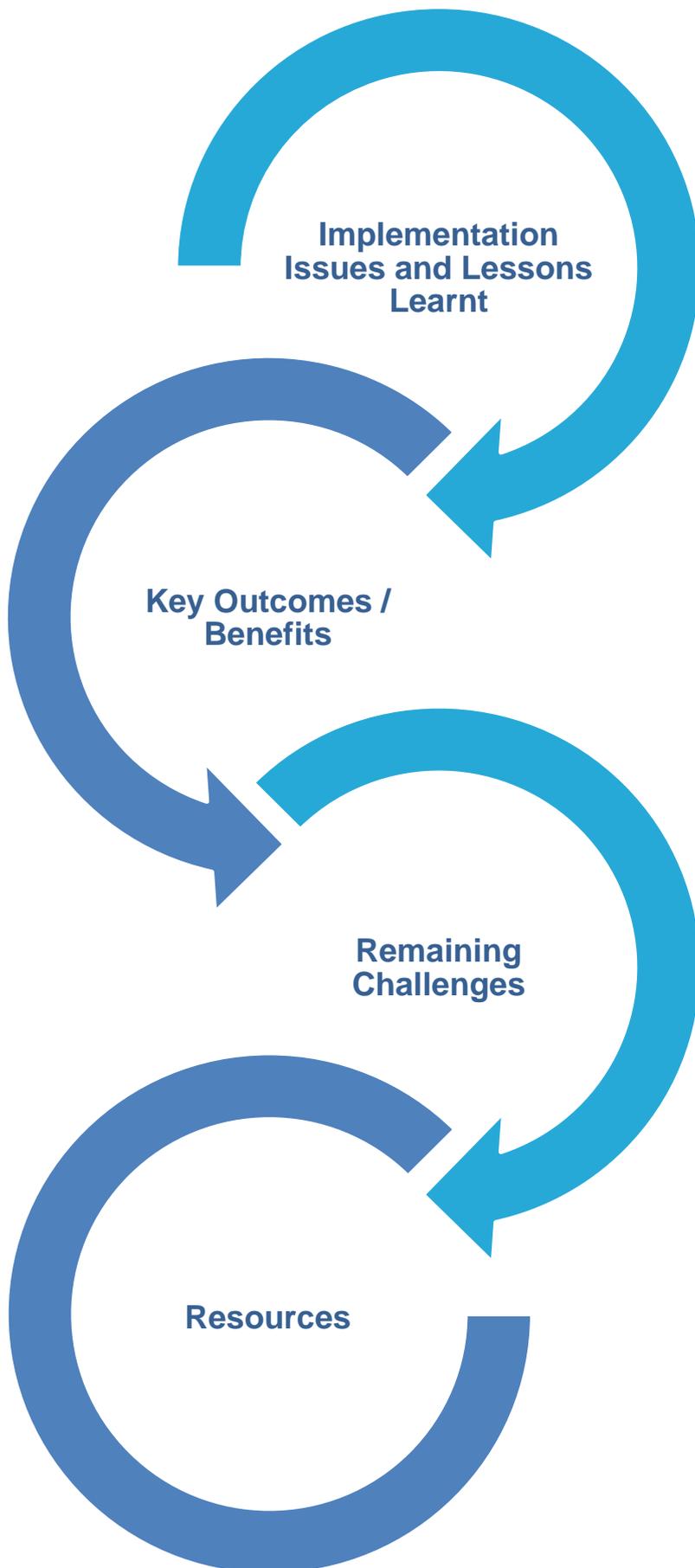
Fundamental Components of BCE/MODA:



Outcomes/achievements

- Improved understanding about business objectives for the WRF facilities, & identification of gaps and strategic alternatives;
- Transparent framework to formally evaluate and communicate life cycle costs and non-monetary benefits that align to business objectives; and
- Robust process that provides a check on strategic objectives, management regime and renewal planning.

Using business case evaluations



- BCE/MODA provides a robust assessment of strategic alternatives that also provides a level of validation.
- Strategic decision making provides transparency and tools to communicate benefits and costs to decision makers.
- BCE/MODA objectively accounts for emerging trends while identifying gaps and non-monetary benefits of targeted system improvements.

- Improved understanding about current capabilities and gaps, business objectives, and strategic alternatives. *Non monetary benefits are more easily identified and accounted for in decision making.
- Both BCE and MODA provide a check on risk, management regime and renewal planning.
- Strategic alternatives allow for program consistency during phased implementation
- Facilitated utility decision after considering range of alternatives, risks, costs and benefits.

- BCE/MODA supported strategic decision making but program financing and budgets are ongoing obstacles to full implementation .
- Use of BCE/MODA to provide a more consistent approach to operating regime.
- Identify ongoing agency resources as required for consistent implementation.

- Staff time
- Consultant costs

Not presented at conference

Montgomery County Environmental Services: Rehabilitation and replacement program for buried assets

Region of York: Regulatory engagement

Albuquerque Bernalillo County Water Utility Authority: Long term water management

Montgomery County Environmental Services

Rehabilitation and replacement program for buried assets

Nicole Diak
Assistant Director



Description of Leading Practice

Objective

The key objective of the buried infrastructure Rehabilitation and Replacement (R&R) program development was a 20-year cost projection of necessary improvements for the water distribution and wastewater collection systems' buried assets to maintain or achieve desired LOS while reducing risk to an acceptable level. The development of a risk methodology was a primary factor in the determination and prioritization of capital and maintenance projects for the R&R program.

Background And context

Montgomery County Environmental Services (MCES) has implemented a number of Asset Management (AM) principles and practices to better serve its customers and was poised to develop a more comprehensive AM program and associated tools. As part of MCES' 2013 Strategic Plan, MCES desired to develop a prioritized infrastructure Rehabilitation and Replacement (R&R) program to improve their capital and maintenance planning process. MCES focused the initial R&R program on buried infrastructure, water distribution system mains and wastewater collection system lines. AM principles, processes, and tools to develop the initial buried infrastructure R&R program.

The identification of the high-consequence buried assets and the determination of high-likelihood buried assets is the focus of the R&R program. Risk mitigation tactics have been implemented in Montgomery County's capital, operational and maintenance planning to reduce the risk of these high consequence and likelihood buried assets. One of the primary recommendations of the R&R program was to have a high focus on condition assessment of high-consequence infrastructure that has had no assessments.

The comprehensive AM approach taken by MCES' buried infrastructure R&R program included enhancement of organizational culture, historical workflows, specific infrastructure needs, software requirements, and business goals. MCES identified a number of discrete activities that are needed to improve their current practices. At the same time, the development of the buried infrastructure R&R program recognized the relative size of MCES and its local operating environment to assure that the proposed activities and projects were both relevant and scaled to the MCES' specific needs.

Nicole Diak,
Assistant
Director,
MCES



Rehabilitation and replacement program for buried assets

Process

Risk ranking methodology: The level of risk is based on the classic risk equation of Risk = Consequence of Failure X Likelihood of Failure. A risk matrix of consequence of failure and likelihood of failure were developed by the MCES staff (Figures 1 and 2).

Consequence by Level of Service Category: WASTEWATER					
LOS Category	Wt.	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Financial Viability and Impact	30%	Corrective action costs could be absorbed in O&M budget. A low percentage of unplanned \$ versus planned \$ improvements.	Corrective action costs could be absorbed in O&M budget or may require budget transfers from other accounts. May have to postpone other projects. A low to moderate percentage of unplanned \$ versus planned \$ improvements.	Corrective action costs could not be absorbed in O&M budget or would not be covered by acceptable budget transfers from other accounts. Would require Board/Council approval. A moderate to high percentage of unplanned \$ versus planned \$ improvements.	Corrective action costs would require Board/Council approval and probably new borrowing or cause rates to increase. A major percentage of unplanned \$ versus planned \$ improvements.
Customer Satisfaction	30%	No to minimal loss of service or impact on other services. Only local and temporary traffic interruption. No sewer structure or basement backups.	Minimal to some loss of service or impact on other services for several hours. Generally local and temporary traffic interruption. No sewer structure or basement backups.	Some loss of service or impact on other services several hours but less than a day. Generally local but possibly major traffic interruption for days or weeks. May experience structure or basement backups.	Will cause loss of service or impact on other services for several hours or more than a day. Generally local but major extended traffic interruption for weeks or months. Most certain to cause structure or basement backups.
Compliance/Health	20%	No state permit violations. No potential adverse health effects. Any overflows can be contained without reaching U.S. waters.	Technical violation. Possible notice of violation but enforcement action is unlikely. No to minor potential health effects. Any SSO < 1,000 gals.	Probable enforcement action but fines unlikely. Any SSO ≥ 1,000 gals and < 30,000 gals.	Enforcement action with fines likely. Likely to cause "boil water" notice. Any SSO > 30,000 gals.
Public Service and Image	20%	Would not trigger complaints or media coverage. Isolated incident for area; e.g. first in 10 years. Affects less than 50 customers and no major customers.	Might trigger wide spread complaints or media coverage. Isolated incident for area; e.g. one or two in 5 years. Affects 50 to 250 customers or one or two major customers.	Likely to trigger wide spread complaints or media coverage. Fairly regular incident for area; e.g. one or two in 3 years. Affects 250 to 1,000 customers or several major customers.	Most certain to trigger wide spread complaints or media coverage. Regular incident for area; e.g. about one per year. Affects > 1,000 customers or multiple major customers.

Figure 1. Consequence of Failure Risk Matrix

Likelihood by Category: Wastewater Gravity						
Category	Wt.	Negligible = 1	Unlikely = 2	Possible = 4	Likely = 7	Very Likely = 10
Physical Factors	40%	Very good (Condition Grade 1). New or nearly new. Ten or less years old. Ferrous pipe that has internal and external corrosion protection or is corrosive resistant material. Rubber gasketed compression joints. Segment lengths > 10 feet.	Good (Condition Grade 2). Minor defects. Ten to twenty five years old. Ferrous pipe has internal and external corrosion protection or is corrosive resistant material. Rubber gasketed compression joints. Segment lengths > 10 feet.	Fair (Condition Grade 3). Twenty five to fifty years old. Few moderate severity defects or lots of minor severity defects. Ferrous pipe may not have internal or external corrosion protection. Pipe segment lengths less than 10 feet.	Poor (Condition Grade 4). Fifty to seventy five years old. Several moderate severity defects. Ferrous or cementitious pipe material. Corrosion protection deteriorated. Pipe segment lengths less than 10 feet. Other than rubber gasketed joints or welded joints.	Very poor (Condition Grade 5). Greater than seventy five years old. One or more major severity defects. Ferrous, cementitious, or brick pipe material. Corrosion protection deteriorated. Pipe segment lengths less than 10 feet. Other than rubber gasketed or welded joints.
Operational Factors	30%	Sufficient capacity to meet peak wet weather flow requirements. No leaks or breaks in past five years. Have maintenance SOPs and structured training. Good work order system. Perform scheduled inspections and expeditious, prioritized subsequent maintenance and rehab. Maps updated. No to very few odor complaints.	Sufficient capacity to meet peak wet weather flow requirements. Avg less than one leak or break per 1000 feet in past five years. Have maintenance SOPs and structured training. Good work order system. Perform scheduled inspections and reasonably quick but prioritized subsequent maintenance and rehab. Maps updated. No to very few odor complaints.	Just enough capacity to meet peak wet weather flow requirements. Avg less than one leak or break per 1000 feet in past five years. May or may not have maintenance SOPs and informal, more on-job-training. May or may not have functional work order system. Perform mostly scheduled inspections, others to resolve questions. Subsequent maintenance and rehab performed but no formal prioritization. Maps infrequently updated. A few odor complaints.	At or slight exceed capacity to meet peak wet weather flow requirements. Leaks or breaks in past five years avg about 1 or slightly more per 1000 feet. No or outdated maintenance SOPs and training. Perform reactive inspections and subsequent maintenance. Map accuracy is poor and not updated. Periodic to regular odor complaints.	Insufficient capacity to meet peak wet weather flow requirements. Leaks or breaks in past five years > 1 per 1000 feet. No maintenance SOPs and training. Perform reactive inspections and subsequent maintenance. Map accuracy is poor and not updated. Frequent odor complaints.
Environmental Factors	20%	Does not traverse or not exposed to landfills, peat bogs, road de-icing, salt water or cinders. Granular or clay backfill. Normal low moisture and below water table, medium pH soil, and high resistivity soils.	Does not traverse or not exposed to landfills, peat bogs, road de-icing, salt water or cinders. Granular or clay backfill. Normal low moisture and below water table, medium pH soil, and high resistivity soils.	May traverse or be exposed to landfills, peat bogs, road de-icing, salt water or cinders. Sand/silt backfill. Seasonal moisture or at water table, medium pH soil, and medium to low resistivity soils.	May traverse or be exposed to landfills, peat bogs, road de-icing, salt water or cinders. Mostly organic and moist backfill. Normally below water table, medium pH soil, and medium to low resistivity soils.	Traverses or exposed to landfills, peat bogs, road de-icing, salt water or cinders. Organic backfill. Normal high moisture, low pH soil, and low resistivity soils.
Mechanical Factors	10%	No vibration from surface activity. Accessible by walking and vehicle/equipment. Cover depth of generally between 4 and 12 feet. Line locating service required. Rarely third party damage.	No or minor vibration from surface activity. Accessible by walking and vehicle/equipment. Cover depth generally between 0 and 12 feet. Line locating service required. Rarely third party damage.	Some vibration from surface activity. Accessible by walking and vehicle/equipment but some obstacles or traffic congestion. Can have trench depths of up to 20 feet. Line locating service required. Rarely third party damage.	Subject to vibration from surface activity. Mostly accessible by walking only and only very limited to vehicle/equipment. Can have trench depths of up to 30 feet. Line locating service not required or loosely enforced. Some third party damage.	Subject to frequent or substantial surface vibration. Not accessible by walking or vehicle/equipment without significant effort. Can have trench depths greater than 30 foot depth. No line location required. Some third party damage.

Figure 2. Likelihood of Failure Risk Matrix

Service Level Development: As part of the R&R program, MCES developed an approach for setting service levels (SL) to define the desired performance outcomes that are of high priority to customers and/or to the environment or are required by regulators. Additionally, these desired performance outcomes were largely within the control of MCES and had performance level data that could be accurately and consistently collected and audited.



Rehabilitation and replacement program for buried assets

Risk Prioritization: Selection and prioritization of high-risk assets was initially determined by graphical methods. The asset risk for each system was graphed to determine the optimum risk reduction point, the so-called “knee-of-the-curve” or the point of diminishing return. The high-risk assets above the line were further analyzed for inclusion in a capital or maintenance program. In addition to the risks, planning level cost estimates were developed for the rehabilitation and/or replacement of these buried assets.

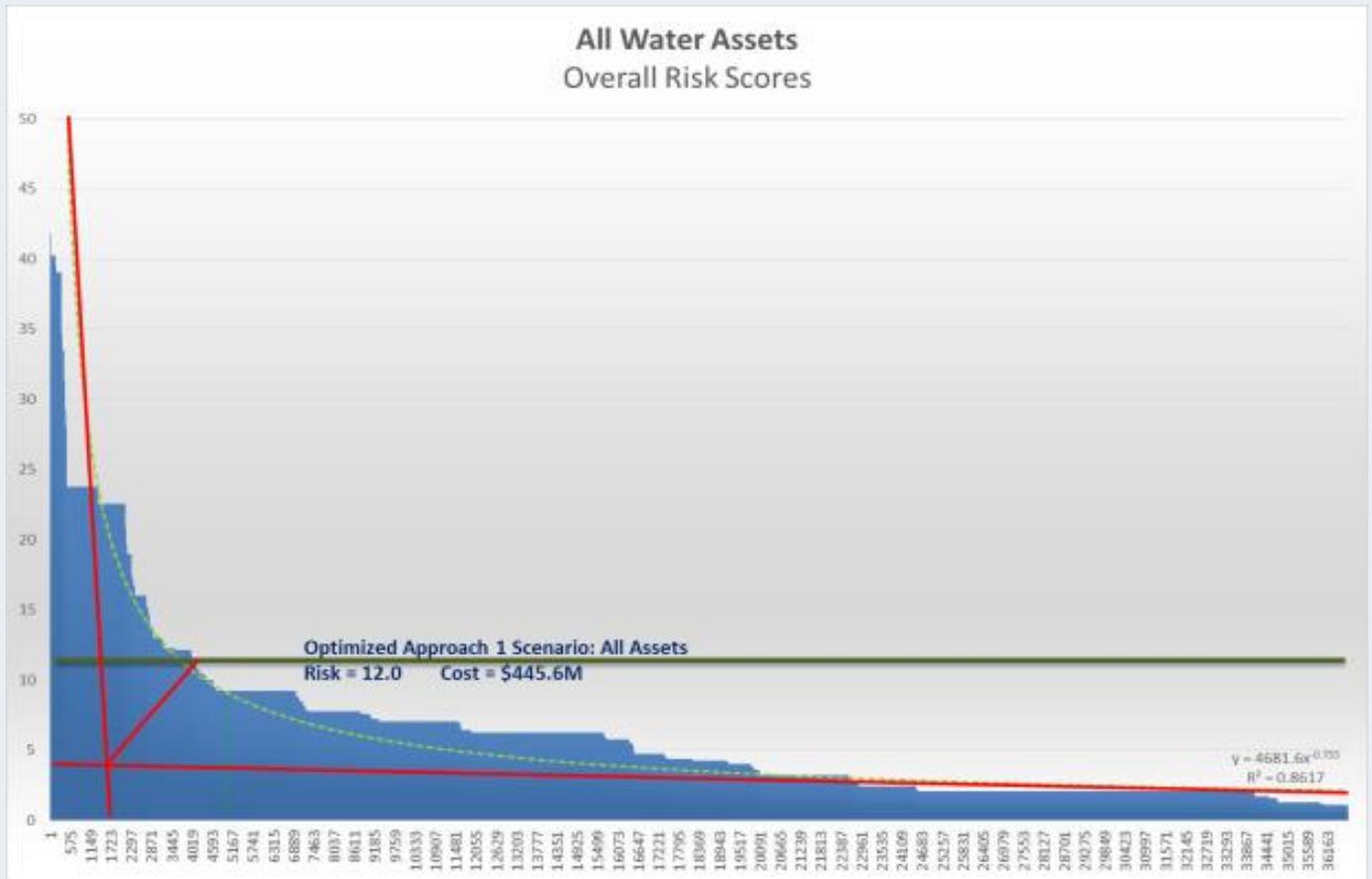


Figure 3. MCEs’ Risk tool is an Excel-based tool that helps to determine and prioritize assets based on risk.

CIP Prioritization: For the development of the annual R&R program CIP, an Excel-based CIP Prioritization Tool was developed to identify and prioritize projects based upon criteria developed by MCEs. The prioritization criteria were used to calculate the total benefit score a project receives, including how each criteria contributes to this total benefit score. In addition, cost criteria were also used to determine the cumulative cost of the R&R program, as well as the Benefit-Cost ratio.



Rehabilitation and replacement program for buried assets

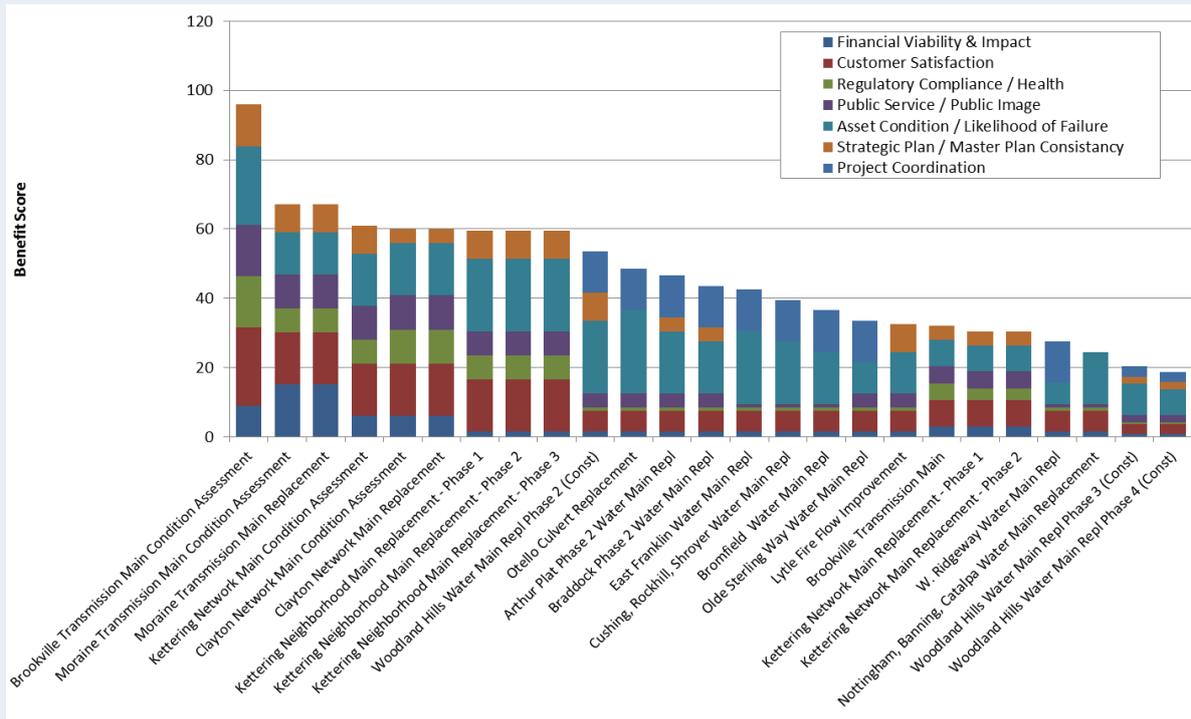


Figure 4. MCES' CIP Prioritization tool showing total benefit of potential projects

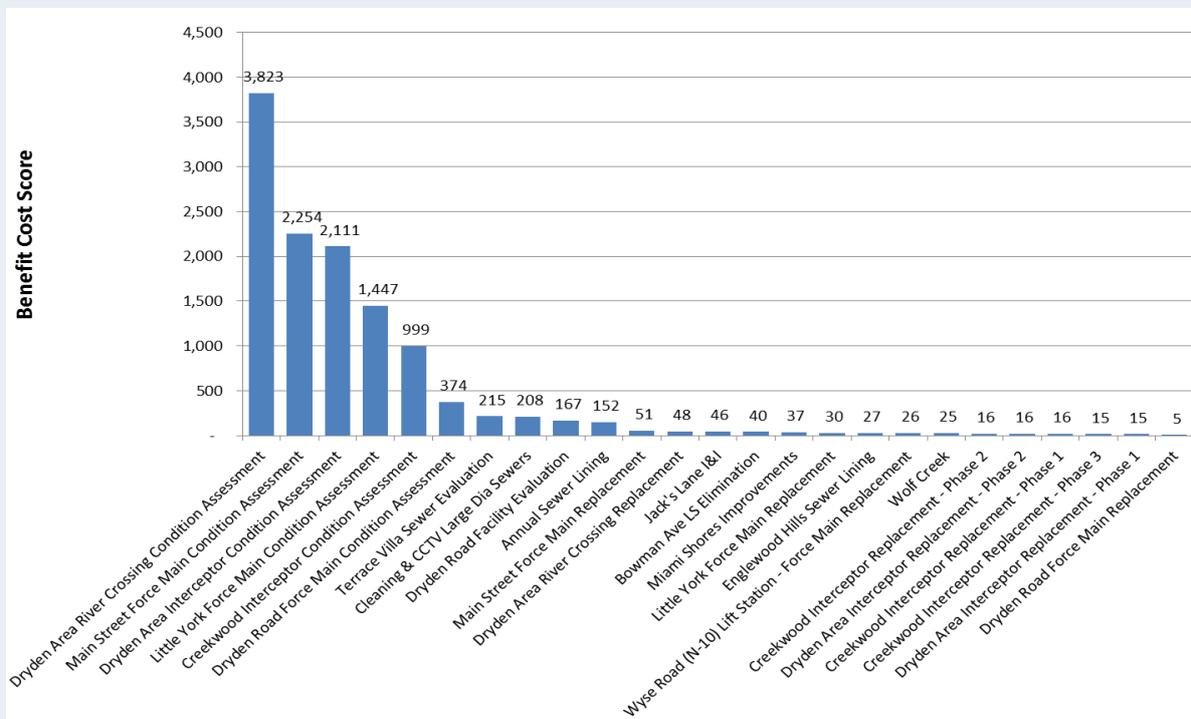


Figure 5. MCES' CIP Prioritization tool showing benefit cost scores of potential projects



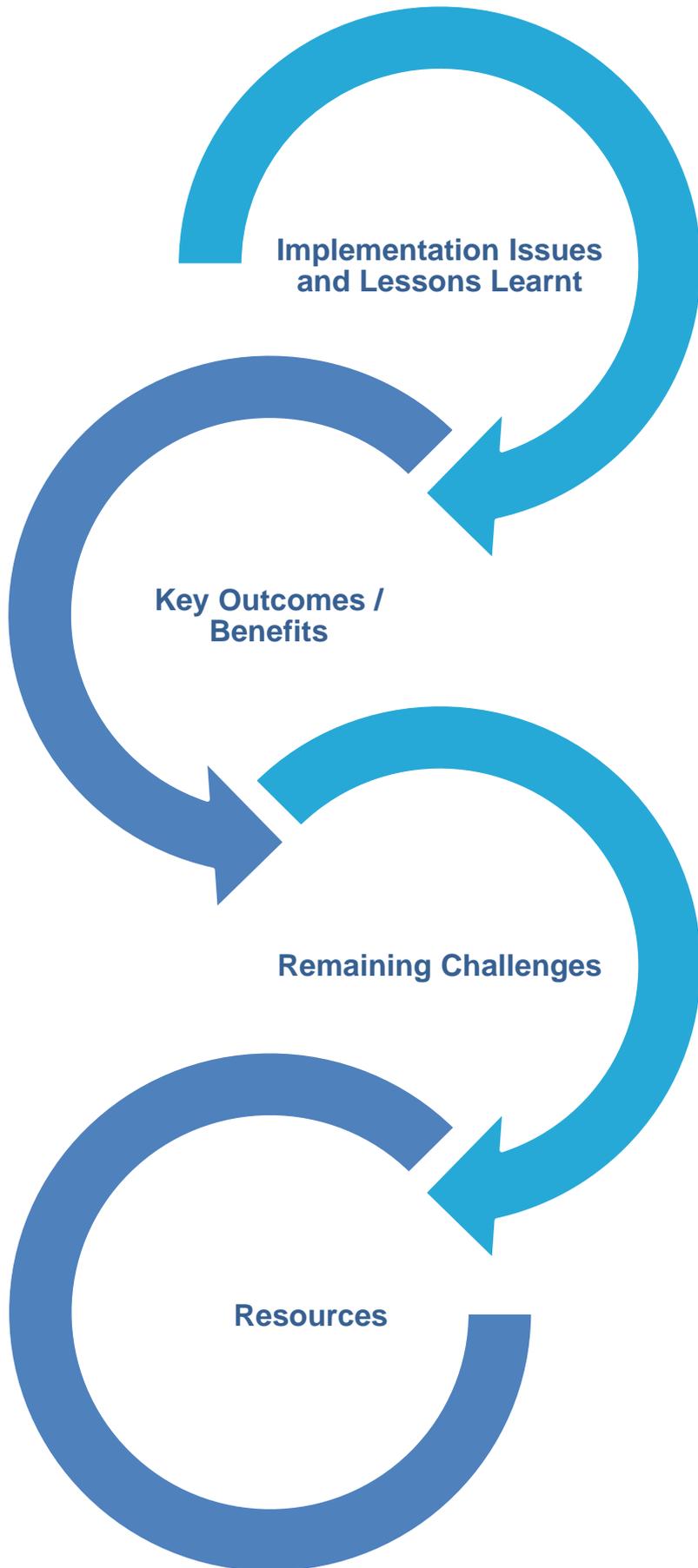
Outcomes/achievements

MCES has been able to further develop and solidify their AM program through the development of the R&R program for buried assets. The R&R program has been able to establish a baseline risk score for all assets. In addition, processes were standardized and tools were created to determine and prioritize risk, which is a critical piece of the annual CIP prioritization process and the development of the R&R program. The logic developed as part of this R&R program will continue to be applied to the water distribution and wastewater collection systems annually as more information and condition assessment inspections are conducted. This process will continue to refine the prioritization of pipeline R&R, as well as creating updated planning estimates for the highest needed projects in the R&R program.

The R&R Program also gives MCES a 20-year outlook for their R&R needs. The results of this work has provided a defensible capital program that has been used to present to executive county leadership and the board of commissioners. In addition, the R&R program has created a dependable and repeatable process for analyzing the R&R needs for MCES on an annual basis.



Rehabilitation and replacement program for buried assets



- Development of the risk matrices and scores takes time.
- Need to have reliable data in order to have confidence in the analysis.
- Need to have reliable data and engaged staff to track service levels and performance metrics.

- A defensible 20-year outlook for R&R needs.
- A repeatable process for determining the annual capital program.
- Documenting the institutional knowledge of the staff.

- Enhancing our CMMS/GIS to assist our staff with this effort.
- Keeping the momentum going on AM.
- Developing a better system for tracking performance.
- Refining the likelihood of failure scores with condition assessments.

- A new CCTV software to integrate with our CMMS.
- Enough staff to move this effort forward.
- Better tools in the field to collect quality data.

Region of York

Regulatory engagement

Jennifer Khemai
Manager, Strategic Policy and Regulatory
Compliance



Description of Leading Practice

Objective

Using ongoing utility engagement and management processes that provide an integrated approach for managing risk and regulatory compliance in the drinking water system.

Background and context

Starting in 2000, Environmental Services' began the process of ISO 14001 certification by voluntarily adopting an Environmental Management System for wastewater operations. This standard helps York Region minimize operational impacts on the environment, comply with applicable laws, regulations and other environmental requirements, while continually improving environmental management. In 2001, Environmental Services' water operations received ISO 9001 registration after the Council endorsed implementation of a quality management system. This standard assists York Region with meeting the needs of customers and other stakeholders, while continually monitoring and improving quality.

In response to the Walkerton water quality tragedy in 2000, the Province created the Drinking Water Quality Management Standard, which is a legal requirement under the Safe Drinking Water Act, 2002 and the Municipal Drinking Water Licensing Program. This tool helps ensure that consistent processes and procedures are in place to manage risks associated with production and delivery of high quality drinking water. An Integrated Management System helps York Region exercise due diligence by providing confidence that appropriate management controls over drinking water systems have been established.

Process

Intalex is the software package used by Environmental Service to manage documentation and tasks related to environment, quality, regulatory compliance, and ISO based requirements. Emergency and other procedures for operation of our water, wastewater and waste management facilities are stored in Intalex. This system provides reminders for regular review and update of procedures and also allows staff to document preventative and corrective actions undertaken by staff.

Auditing verifies effectiveness of the Integrated Management System by evaluating conformance with each management system standard

ISO 9001, 14001, and the Drinking Water Quality Management Standard emphasize the importance of audits as a tool for monitoring and verifying effective implementation of quality and environmental policies. An effective auditing program is a critical component of the Integrated Management System to monitor compliance with regulatory requirements and enhance system performance via continuous improvement.

Jennifer Khemai,
Manager,
Strategic Policy
and Regulatory
Compliance



York Region’s Integrated Management System uses three types of audits:

1. Internal audits conducted by staff to proactively confirm conformance with management system requirements
2. Compliance audits conducted by staff to evaluate operational activities against applicable regulatory requirements to ensure compliance with regulations
3. External audits completed by a third-party registration body to confirm registration/accreditation

Policy, Liaison and Regulatory Compliance

Advocacy is a process by which York Region aims to influence public policy and resource allocation decisions within political, economic and social systems and institutions through partnerships, promotion, active participation, relevant communications and demonstrating leadership and stewardship in our business. Regular regulatory reviews help to ensure proposed initiatives have regard for municipal environmental service delivery, as well as provide advanced notice of proposed regulatory changes that may impact our service delivery.

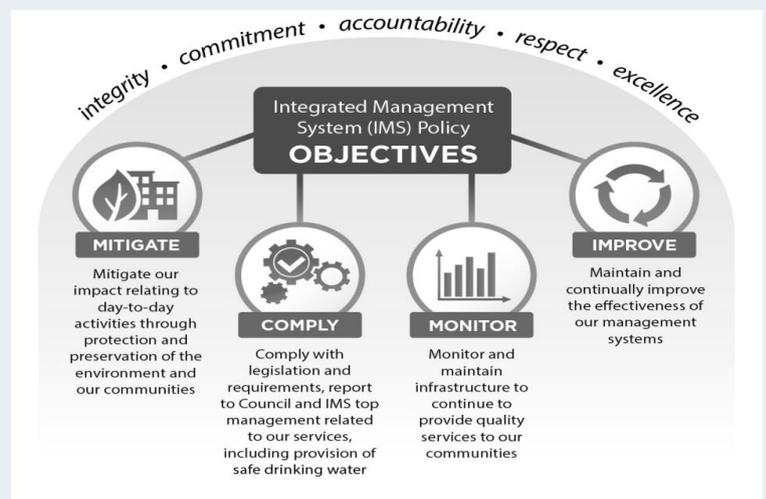
York Region Environmental Services takes a multi-faceted approach to advocacy to ensure it has a strong voice and can comply with changes to the regulations that govern our business.

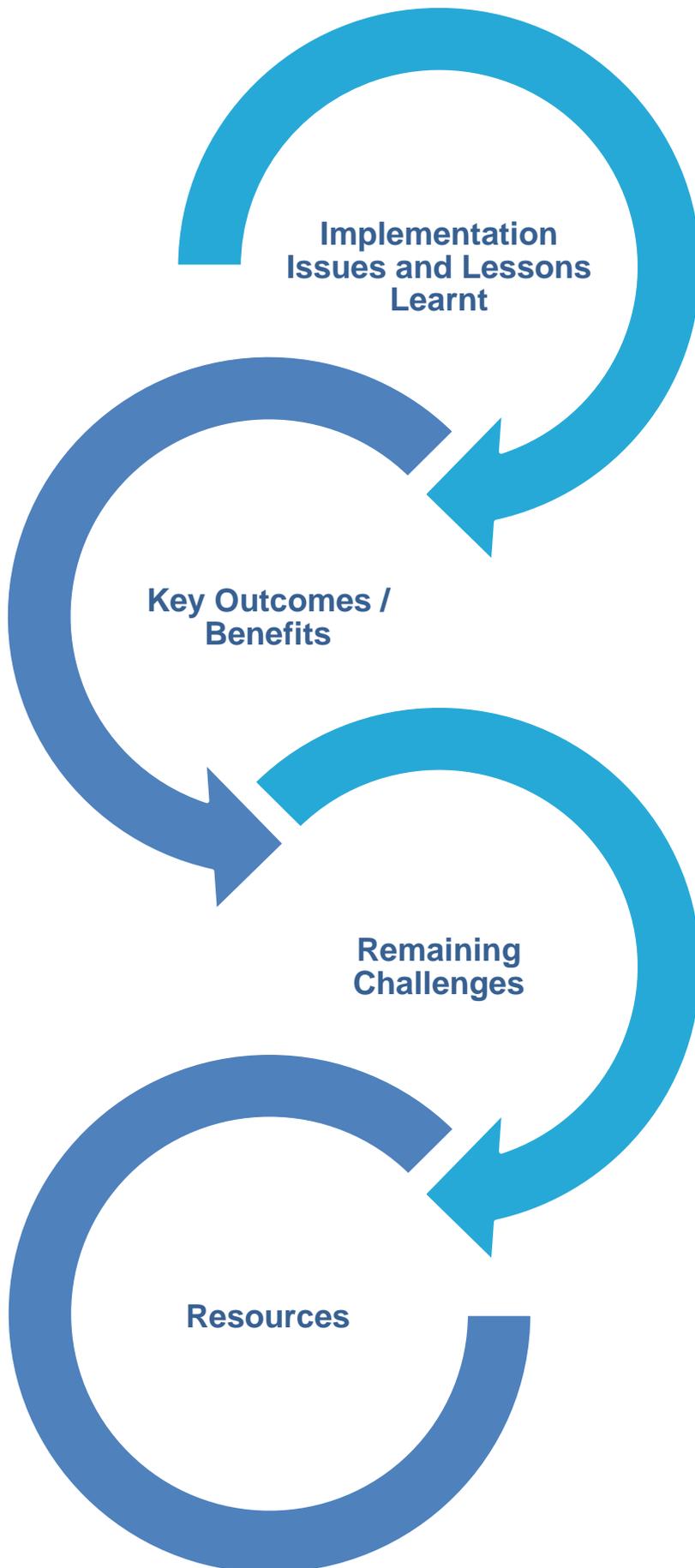
Environmental Services has face-to-face meetings with Ontario Ministry of the Environment and Climate Change (Provincial regulator) on a quarterly basis to discuss concerns and share information. York Region staff will also engage other levels of government, non- non-governmental agencies and academia in other ad-hoc meetings to further research, innovation and technology adoption goals. In addition, Environmental Services has a staff member with a focus on monitoring for potential advocacy opportunities and will coordinate responses on behalf of the Region with the support of an Inter-Departmental Advocacy Coordination Group, which includes subject matter experts and key stakeholders who can contribute to responses. This helps ensure that advocacy responses consider input from stakeholders across the corporation and facilitates development of a single Region-wide response to proposed regulatory changes.

Environmental Services is committed to demonstrating leadership through the Integrated Management System; the department’s commitments are summarized in an Integrated Management System Policy (shown below), which contains objectives and obligations for delivering an effective and integrated management system.

Outcomes/achievements

- Improves regulatory compliance
- Internationally recognized and accepted
- Reduces liability and risk
- Prevents pollution
- Increases operational efficiency
- Improves communication between work groups and levels in the organization
- Commitment to continuous improvement
- Creates awareness of the need for training and encourages operational problem solving
- Encourages self-assessment and maintains internal consistency





- Overall, the Region has proactively managed regulatory compliance and risks to its infrastructure through the Integrated Management System. An important implementation consideration is rooted in the procedures and policies that are used by all levels of the organization.

- Improves regulatory compliance.
- Internationally recognized and accepted.
- Reduces liability and risk.
- Increases operational efficiency.
- Improves communication between work groups and level
- Creates awareness of the need for training and encourages operational problem solving.
- Encourages self-assessment and maintains internal consistency.

- York has chosen to engage regulators and inform them of the financial and operational impacts of their decisions. It is our intent to work with the regulator and researchers to find mutually beneficial, cost effective solutions to the various challenges facing the industry as a phased approach to change.

- Staff time.
- Costs.
- Time to implement.

Albuquerque Bernalillo County Water Utility Authority

Long term water management

John Stomp, PE
Chief Operations Officer



Description of Leading Practice

Objective

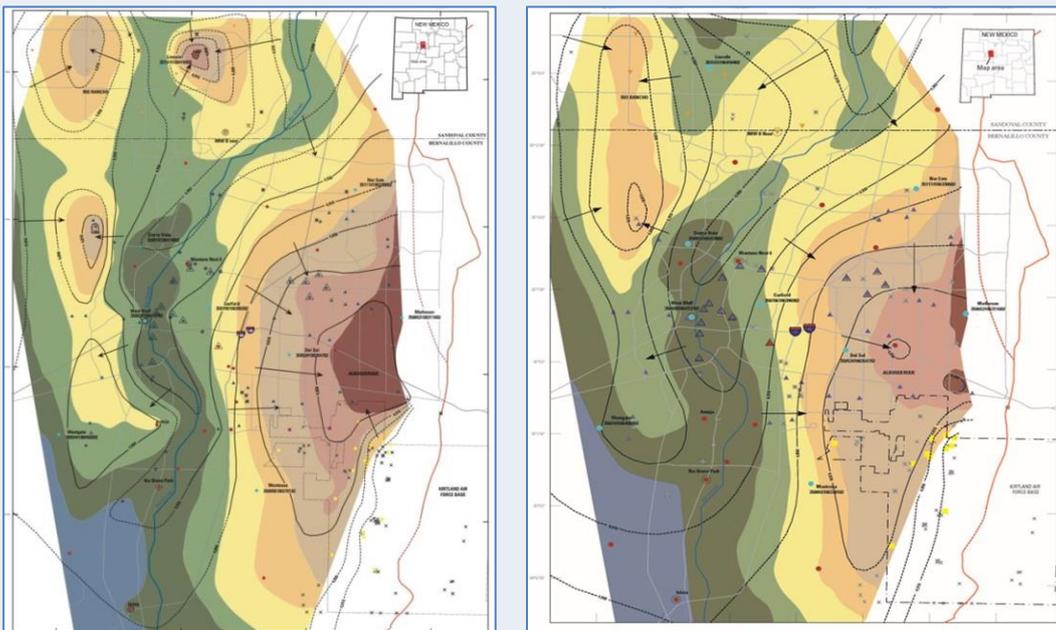
The Water Authority updated its Water Resources Management Strategy entitled, “Water 2120: Securing Our Water Future,” which outlines a plan to provide its ratepayers a resilient and sustainable water supply for the next century.

Background and context

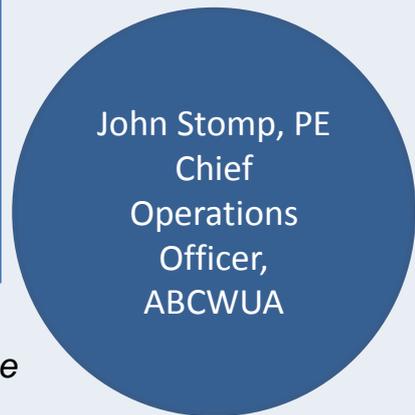
After years of decline, it’s making a comeback: Aquifer levels are on the rise throughout the Albuquerque metro area. And it’s all thanks to a Water Resources Management Strategy that made groundwater renewal a top priority for the local water and wastewater utility, the Albuquerque Bernalillo County Water Utility Authority, New Mexico.

“When you think about it, it’s a big accomplishment,” said Greg Gates, the environmental engineer who co-authored the U.S. Bureau of Reclamation’s Colorado River Supply and Demand Study. “In 20 years, the Water Authority has saved ten years’ worth of supply. They’ve been proactive, starting in the mid-‘90s, doing things that other communities are just starting to do today.”

Groundwater storage in the Water Authority’s service area has increased by about one million acre-feet as compared to the mid-1990s, according to expert analyses. Despite six consecutive years of drought, USGS monitoring wells show aquifer levels in places have risen by as much as 14.8 feet since 2008; rising levels are projected to continue for another decade or so.



Maps from 2008 and 2012 show the recovery of the aquifer beneath Albuquerque. Groundwater levels have risen by nearly 15 feet in some areas.



John Stomp, PE
Chief
Operations
Officer,
ABCWUA



Process

The aquifer's rebound is the result of a multifaceted Water Resources Management Strategy that made groundwater renewal, and long-term water supply sustainability, its primary goals. The four main pillars of the strategy are:

1) The San Juan Chama Drinking Water Project. At the end of 2015, the San Juan-Chama Drinking Water Project celebrated its seventh full year of operation. Prior to its inception, Albuquerque relied solely on the underground aquifer for its drinking water needs. Since 2008, the San Juan-Chama project has delivered more than 100 billion gallons of surface water for the community's use.

This water, purchased in perpetuity from the Federal government and imported from southern Colorado under terms laid out in the 1960s, has been imported into the Rio Grande Basin since the early 1970s. It wasn't until late in 2008 that the Drinking Water Project enabled Albuquerque residents to start drinking it – after years of environmental reviews, community meetings and rulings from the State Engineer. This was followed by construction of some \$450 million in infrastructure, including a state-of-the-art treatment plant and about 38 miles of underground pipeline.

“It was a tremendous amount of effort, but it has been worth it for the community,” said Trudy Jones, Albuquerque City Councilor and Chair of the Water Authority's governing board. “The Project works in combination with other elements of our Water Resources Management Strategy to reduce aquifer pumping, and the water it has produced since 2008 represents more than three years' worth of supply left in the aquifer.”



San Juan-Chama water is diverted from the Rio Grande at an adjustable-height dam near the Alameda Bridge in Albuquerque. The Water Authority holds rights to 48,200 acre feet of surface water from the San Juan-Chama project, use of which is partially responsible for rising aquifer levels in the Albuquerque area.

2) Conservation. As a condition of using San Juan-Chama water, Water Authority customers were required to achieve a per capita daily usage of 155 gallons by 2024 – a conservation requirement placed on no other municipality in the state of New Mexico. That goal has been surpassed years in advance, with daily per capita usage (gpcd) now at 127 gallons, including commercial and industrial use. To put these numbers into perspective, the Albuquerque area's daily per capita usage in mid-1990s was 252 gallons.

“Back then, we were considered one of the biggest water wasters in the West,” said John Stomp, the Water Authority's Chief Operating Officer and one of the architects of the Water Resources Management Strategy. “Our first response was to look to conservation, and the resulting program has been amazing, with the main thrust being incentives and education.”



The Water Authority's conservation rebate program provides incentives for the installation of water-smart appliances and xeric landscapes, like the one shown here. Conservation efforts have seen per capita water usage drop to 127 gpcd (gallons per capita per day).

3) Re-Use. Conservation is one way of using water more efficiently. Another way is to use water more than once by "polishing" wastewater and industrial effluent and using it to irrigate large turf areas such as parks and golf courses. Water Authority re-use projects are now operational in the city's Northeast Heights, where industrial effluent is being used on parks and golf courses; and in Southeast Albuquerque, where reclaimed wastewater from the Water Authority's sewage treatment plant is being delivered to irrigation customers. Another re-use facility, to be built in the next decade, is planned for the city's West Side.

This reservoir at the Puerto Del Sol Golf Course provides re-use water for irrigation in Southeast Albuquerque.





4) Aquifer Storage and Recovery. Using the aquifer for storage of water through a systematic aquifer storage and recovery (ASR) program is another way to ensure long-term water security for the Albuquerque area. ASR allows injection or infiltration of excess San Juan-Chama water into the aquifer where it can be stored, free from losses to evaporation, until it's needed.

The Water Authority dedicated New Mexico's first permitted ASR project in November of 2014 at the Bear Canyon Arroyo in Northeast Albuquerque and made its first withdrawal of stored ASR water in 2015. The Bear Canyon ASR project will allow potential recharge of some 3,000 acre-feet per year via infiltration through 500 feet of soil. Larger-scale direct-injection projects are in the works.



Imported San Juan-Chama water flows down the Bear Canyon Arroyo, from which it infiltrates into the underground aquifer for storage and later recovery.

Outcomes/achievements

The utility is updating the Water Resources Management Strategy to reflect current science regarding future water availability. The revised strategy, entitled WATER 2120, will take potential climate change impacts into account and will for the first time look at a 100-year time horizon for the greater Albuquerque area. WATER 2120 is building on the successes of the previous two strategies, by incorporating an adaptive management approach considering potential climate change impacts to the surface water supply, protecting the watershed by participating in established forest restoration projects, using fully the existing water resources currently available, increasing the use of non-potable reuse of wastewater supplies, and increasing the storage capacity of the aquifer with potentially construction of off-channel storage facilities.

Features of the new strategy will allow the Water Authority to move conservation above and beyond currently levels, while maintaining the quality of life we expect in our community. WATER 2120 calls for managing the aquifer more conservatively than has been done in the past by the establishment of a groundwater reserve and management level, and decreases the long-term impacts on the Rio Grande by implementing an environmental and Rio Grande Compact pools, and keeping the Water Authority from actively participating in any additional pre-1907 water rights transfers.

“Planning now for the future improves our ability to deal effectively with contingencies such as drought,” said Mark Sanchez, the Water Authority’s Executive Director. “And it vastly increases the likelihood that, in addition to providing water for ourselves, we’ll be able to provide for future generations.”



Water 2120 summary

- A bold plan unlike any other in the West
- A thoughtful, well-balanced approach that uses existing resources but seeks to acquire new supplies when needed
- A reproducible adaptive management approach that will guide our decisions for the next 100 years
- Unique in its long-term vision – 100 years is very brief in “water years”
- Designed to meet the projected demand
- Data driven and based on best available science
- Based on the same policies implemented in the 1997 and 2007 WRMS
- Includes: Rio Grande Compact pool, environmental pool, new off-channel storage





- Early stakeholder outreach needed.
- Implementation to start in 2017.
- A thoughtful, well-balanced approach that uses existing resources; seeks to acquire new supplies when needed.
- A reproducible adaptive management approach that will guide our decisions for the next 100 years.
- Designed to meet the projected demand.
- Data driven and based on best available science
- Based on the same policies implemented in 1997 and 2007.
- Continued stakeholder involvement in implementing the Strategy.
- Succession planning in implementing the Strategy.
- Staff time and internal competencies.
- Reorganization of Water Resources Division; hire new people.
- Phased implementation; ongoing evaluation.