Digital Water Metering

The time is now
Water businesses across Australia can prepare for deploying Digital Water Metering and Intelligent Water Networks by leveraging the experiences of the Victorian electricity distribution industry.

Australia’s water industry is on the path to major technological change. However, whilst cloud information technologies have offered an immediate capability uplift, the future of operational technology is yet to be fully embraced.

Digital Water Metering (DWM) and Intelligent Water Networks (IWN) have long been a topic of conversation. However, the business case for investment differs between organisations, with many still conceptualising the role that DWM will play in service provision, customer service, and operations management.

The challenges faced by the sector are complex. It has to balance an agenda of Smart Cities, Internet of Things (IoT) technologies, big data, analytics, cyber security, and other converging technologies and trends that will alter how organisations deliver water services to customers.

This disruption is creating a two-paced industry, with some advanced in DWM pilot rollouts, and others still working through the conceptual impact to their business.

With a market outlook of reduced revenue forecasts, government pressure for efficiency savings, and increased customer demands for service quality, water businesses would be unwise to deliberate on the value of DWM too long.

DWM provides the opportunity to realise significant return on investment, to be recognised as an industry leader, and to set the foundation for new and innovative customer and asset management strategies. Whilst metering and communication technologies have evolved in recent years, the real value for water businesses is understanding how to best position their business to absorb this change, how customer expectations are changing as a result, and learning from the experiences of their power and utility counterparts.

Here we discuss the drivers for change towards DWM, the technology on offer, lessons learned from the Victorian electricity distribution industry’s smart metering rollout, and provide insights into the journey that water businesses should undertake to prepare for rollout.
The drivers for change

1. Automated reads
DWM provides a perfect example of the adage ‘you can’t change what you can’t measure’. With automated interval meter reads, water businesses can better manage water consumption, assets and operations, and deliver new services and business models that support enhanced customer experience.

2. Improving infrastructure
Infrastructure planning, and deferring infrastructure replacement through peak demand management and extending the natural life of assets, are commonly cited as two principle drivers for investment. For example, there are clear benefits in being able to defer a multi-million dollar capital programs if you are able to extend the useful life of your assets.

3. Enhanced knowledge of network operations
DWM provides water businesses with enhanced knowledge of network operations, reducing non-revenue water, improving leak detection, and avoiding the costs of manual meter reading. Reducing water leakage has flow on benefits throughout the water supply chain, including costs of treating and moving waste water. Improved network operations will also reduce the cost of price rebates to customers associated with failure to meet agreed service level commitments for water supply and sewerage system charges.

4. Customer engagement
Digital meters provide customers with the tools to pro-actively manage their consumption patterns. Industry reports estimate that up to a 10% reduction in average household water consumption (equating to circa $60 per household/year) can be realised as a result of demand side management schemes which relieve peak demand management and reduce supply pressures. DWM will provide consumers and water businesses with near real-time information on consumption patterns. This creates an opportunity to implement dynamic pricing tariff models that reduce peak time demand, in turn reducing cost-to-serve, and providing consumers with a reduced charge for off-peak consumption. By providing a mechanism for consumers to proactively manage their water usage, water businesses should see a reduction in requests for information and customer complaints.

5. New business models
DWM sets the platform for a range of future business models and customer experience services, including data sharing across machine-to-machine networks (e.g. to collect data from environmental sensors to combat noise and pollution).

1. Australian Utility Week, 29 Nov 2017, Digital Metering Joint Program presentation by David Ryan (CWW) and Phil Johnson (SEW).
Technology on offer

A number of water businesses across Australia have undertaken DWM trials. In Victoria, South East Water, Yarra Valley Water and City West Water, having a combined fleet of 2 million water meters, have collaborated on trials as part of the Digital Metering Joint Program (DMJP).

In undertaking these trials the DMJP businesses have trialled Low Power Wide Area (LPWA) communication technologies, including LoRaWAN, NB-IoT, Sigfox and Taggle, and have since narrowed their selection to LoRaWAN and NB-IoT. Similarly, there are other water businesses that have selected Sigfox and Taggle as their preferred communication technology.

LPWA communications are designed to bring connectivity to large networks of devices, spread across a broad geographical area, whilst drawing very low power. This, in combination with new battery technologies has improved the viability of the digital metering business model, allowing battery powered digital meters to achieve up to a 15 year lifespan.

LoRaWAN networks have grown exponentially in the past 12 months. Australian providers such as NNNCo, Meshed and GeoWAN will expand and focus on water businesses as a key market. NNNCo is supporting in-field trials with Melbourne’s metropolitan water businesses, testing the coverage, data delivery, and battery life of digital water metering.

NB-IoT is operated by cellular telecommunication providers such as Telstra, Vodafone and Optus. Vodafone has been providing coverage for Victorian pilots since 2016. Telstra has announced that their NB-IoT coverage is going live across all major cities in Australia in 2018. South East Water is performing field trials with Vodafone and Huawei for IoT digital metering solutions.

The Sigfox network in Australia is operated exclusively by Thinxtra. Sigfox was one of the first LPWA technologies to become available and currently has the highest Australian coverage by population (reported to be 77% as of April 2018). Sigfox has benefited from significant external funding and investment.

Taggle operates its own LPWA network in Australia, with coverage exceeding 300,000 sq. km, deploying their networks as required to meet customer needs. Taggle report double digit numbers of water businesses using their network, including Barwon Water in Victoria and Mackay Regional Council in Queensland.

In addition to the terrestrial LPWA IoT networks, Myriota and Fleet who are new players in space, are providing IoT communications coverage from a network of low earth orbit satellites. These networks offer compelling alternatives for many parts of rural Australia.

In building out an end-to-end digital water metering implementation, the communications technology is one key consideration. Other technology considerations include; the choice of digital meter, and the level of sophistication required to meet the business requirements, whether to replace mechanical meters or to retrofit communications modules, what Meter Data Management systems IT infrastructure will be required, and whether the communications network will be shared by other IoT devices.

2. Australian Utility Week, 29 Nov 2017, Digital Metering Joint Program presentation by David Ryan (CWW) and Phil Johnson (SEW).
Lessons from electricity distribution

With few industry pilots yet to progress to fully scaled-up deployment, the rollout of smart metering across the Victorian electricity distribution industry provides a strong case study for water businesses.

Below we outline some of the key challenges faced, based on our personal experience of supporting Advanced Metering Infrastructure (AMI) deployments, and the regulatory impacts of this change.

1. The value of data

Data ownership and management are central topics for digital metering. Consideration is required around how water businesses will best collate, analyse and manage the vast datasets. Working through the digital metering data requirements of an organisation is a time consuming exercise, but if performed early in the program it will reduce rework post deployment, assist in determining the functional scope of the metering technology, and help plan the impact of change.

Business functions should be involved early to determine what data needs to be captured and its latency. Harnessing the insights from meter data readings to drive strategic and operational decision making (e.g. asset replacement strategies or customer education programs) will improve operational efficiency and support customer service.

Digital meter data sets are a strategic asset with significant value. Careful consideration is required to determine how to establish and manage a data management strategy.

2. Putting the customer at the centre of the digital transformation

Early customer engagement is paramount to ensuring a smooth adoption of DWM. A lack of engagement and knowledge regarding the impact and proposed benefits of DWM will lead to significant challenges in adoption and advocacy.

Whilst economic drivers such as deferred network capital investment and avoided network operating costs are key considerations, business cases must emphasise the ‘softer’ customer centric factors such as improved customer engagement and empowerment associated with better visibility to data and metering self-service.
With a number of communication networks available, consideration should be made regarding which to pursue. Network ownership is a key consideration for water businesses about to embark upon a digital water metering rollout. Water businesses must decide whether they wish to use a public or private network, and if the latter, what additional services they may wish to promote.

Network optimisation is critical to the success of the communication network. During roll-out there is often a need to improve coverage for certain areas, particularly for undulating landscapes with a poor line of sight. Add to this seasonality and vegetation, and water businesses must not underestimate the investment required in communications.

Network data sizing also needs to account for discrepancies in data transfer. Meter read re-tries on missing reads, imperfect messages, and potentially firmware updates all contribute to significantly higher network requirements.

Picking the appropriate communications network will not follow a ‘one size fits all’ approach. Careful consideration will be required to determine the current and future services it must enable, the spatial reach to support customers (especially for regional and rural businesses), the exact sizing requirements, and any carrier network charges.

Few electricity businesses considered the implications of operating a metering business when commencing planning for digital meters and integrated electricity networks.

Water businesses must consider what impact a metering business will have on the size and structure of the organisation, and how this is best managed.

Most businesses operate a two-phased approach to a metering business operating model. In the first instance the metering business function must focus on optimising the network and managing the increased customer service demands. Once these elements are embedded, the water business must determine what adjacent water metering services will be rolled out, and what the implementation roadmap will look like.

Setting the strategic agenda for DWM now, and preparing the business well in advance through the development of a target operating model, will ensure that the water business is positioned to realise the return on investment outlined in its business case.
The digital age of water management is inevitable, but apprehension exists regarding how water businesses will manage this transition. There is limited knowledge available around the capabilities and development roadmaps of proposed technology solutions, and there have been well documented issues in the technical compatibility of metering, communication and meter data management systems. When determining the best DWM approach, water businesses must establish the appropriate business model and IT environment to adopt and integrate DWM technology.

In light of this challenge KPMG has developed a Water Business Digital Metering Readiness framework, which provides a structured approach for determining how water businesses can adapt their businesses to meet the demands of digital metering.
Whist all components of the framework will need to be addressed in order to establish a well functioning digital water metering business model, below we outline three design layers that require immediate attention.

1. **Business strategy**

   We recommend that water businesses undertake an assessment of their existing business strategy and service model to determine how best to accommodate DWM.

   Serious consideration needs to be made into what metering services will be provided by the water business, and how a specific business function will be established to support this work.

   This will involve the development of a target operating model for the metering business, including what services it will perform, how it will integrate into existing business functions, and staffing requirements.

2. **Technology environment**

   Technology integration plays a vital role in realising return on investment from DWM. Water businesses have historically underinvested in IT. Many are reliant on bespoke systems connected by point-to-point integrations. A robust IT environment is critical to ensure seamless integration of metering data to support functions such as billing, asset management and customer service.

   Modernising these systems is not simple. Careful planning and architecting is required to ensure that each water business invests funds in the best-fit solution.

   However, the advent of cloud technology does provide the opportunity for water businesses to improve the maturity of the IT systems, and operate enterprise standard solutions, quicker and at a competitive price point.

3. **Customer engagement**

   Customer engagement is another key consideration for water businesses about to embark upon a digital metering rollout. Customers can be unaware of the value proposition of digital metering. The absence of comprehensive and targeted communications can lead to mistrust and issues around engagement.

   If the value proposition is not persuasive, this will bear out in friction through the deployment and operations stage, and customers will be unlikely to be convinced of its merits and the services it provides.

**Time is of the essence**

The current IT environment is the burning platform for water businesses. Digital water metering readiness is a critical stage gate to deploying the technology and water businesses need to ensure that they have implemented business and IT initiatives well in advance of this deadline.

Whilst the benefits of DWM are plain for all to see, the biggest obstacle is transforming the broader business, to ensure that it can embrace this digital transformation. The first step is to assess the business strategy and determine how best to integrate digital metering. A formal business case will help to determine the strategic, commercial and operational cases for investment. And with the success of the DVM programs relying on IT compatibility, water businesses must commence IT planning and architecting as a matter of priority.
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