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Toward the digital water age: Survey and case studies of Australian water utility smart-metering programs

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ABSTRACT

The role of 'smart metering' in demand management, customer service, labor optimization, and operational efficiency is becoming increasingly recognized by Australasian water utilities. The objectives of this paper are to provide a summary of the 2013 and 2014 surveys and in-depth interviews that were aimed at gauging the penetration of smart metering (SM) and intelligent water network (IWN) projects in Australian and New Zealand water utilities and to identify outputs and challenges faced subsequent to their implementation.

The key insights are summarized as follows:

- Smart meters and intelligent water networks are gaining momentum in Australasia, with at least 250,000 smart meters currently installed or planned for installation and 66% of the surveyed water businesses reporting projects underway or starting in the next 12 months.
- Key business drivers were easier to quantify and justify on water system economics rather than customer engagement and satisfaction. There appears to be a business case for deployment of smart metering technology, particularly for utilities seeking to avoid costs by lowering operating costs, reducing wholesale bulk water purchases, and/or deferring augmentation of infrastructure.
- Some utilities had well-advanced trials or operational rollouts, together with a similarly advanced understanding of the wider benefits of SM and IWN, while others were constrained by a lack of overall understanding and awareness of developing a business case, technology options, applications of data and the wider benefits of smart metering.
- Each water utility should know and understand its business drivers and goals. The value of smart metering and the specific business case drivers are highly contextual to location (e.g., opportunities for cost avoidance). The social benefits of customer satisfaction, community acceptance, and improved customer engagement and trust were major 'social' drivers.
- There is evidence that utilities are gaining an increased awareness of how digital metering and applying analytics of various data sets in near real-time, can benefit utility efficiency and customer service excellence. Aligned with data analytics was a clear focus towards the customer satisfaction (e.g. introducing web portals, leak alerts, two-way communications and customer consultation).
- In the last 12 months there has been a doubling in the number of utilities that are pursuing intelligent water networks – the integration of intelligent devices including water meters, pressure sensors, meter data, into all relevant business processes and systems and using this information to guide strategy and investment.
- As many respondents commented, there is an important need for an agreed upon and standardized set of definitions relating to smart-metering technology.

1. Background

There is a paradigm shift emerging in the ways water utilities view their customer relationships and interact with their water networks (Beal et al., 2014; Stewart et al., 2013). Equally evolving, is

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the level of service that some customers expect from their water and energy utility, as well as the how and when water is used and how this usage is reflected in bills (Beal and Flynn, 2013). A variety of smart meter and communication networks are being installed in Australia with the clear purpose of addressing these needs, along with potential Capital Expenditure and Operating Expenditure savings that automated monitoring of water supply and demand can bring. A range of solutions are currently being pursued in Australia, and elsewhere, to manage and integrate meter data with existing core utility systems, and most importantly, how to extract value from the data, for both the utility and the customer (Beal et al., 2014; Stewart et al., 2010).

Collaboration and information sharing is not evident among Australian water businesses. Utilities are repeating previously held trials and investing in a variety of communication systems that have a range of network compatibilities and compliances with national standards. For example, communication systems can be either or one or two-way, they may or may not support open communication standards, and they may or may not comply with the Water Services Association of Australia (WSAA) smart-metering specification manual (WSAA, 2010). Additionally, there appears to be little involvement or leveraging of non-water communications providers, such as electricity networks or the national broadband network (NBN), currently being rolled out. This fragmented and often ill-informed approach to adopting technologies for meeting the paradigm shift in the utility-customer interface, raises several critical questions. First, how well does this patchy rollout of smart meters reflect the substantial investment required? Second, how well understood by utilities already proceeding with a smart-meter rollout is the risk of technology redundancy, methods of risk mitigation, and data-integration strategies?

To answer these questions and address a plethora of design, technology, management, and implementation issues, a WSAA Roadmap (Fig. 1) and Cost-Benefit Analysis model for smart metering and intelligent water networks were developed by the WSAA Metering Program Group in 2012. Building on these initiatives, the first WSAA Smart Metering and Intelligent Water Networks Seminar and Workshop, informed by a report on the state of smart water metering in Australia, was held in August 2013 to share information regarding the implementation and management of SM/IWN projects. A follow up survey and workshop in 2014 sought to build on the results of the 2013 survey. This paper presents a summary of the methods, results, and recommendations from the two surveys (including in-depth interviews), which were conducted by the Smart Water Research Centre (Beal and Flynn, 2013, 2014). The purpose of the research was to assist the WSAA with the aim of gaining a deeper understanding of the state of smart metering in Australian water utilities.

The specific objectives of the research were to:

- Gauge the penetration of SM and IWN projects across Australian water businesses;
- Describe the 'who, how and why' of SM/IWN in Australian water businesses;
- Identify the key challenges typically faced in conducting SM/IWN projects;
- Undertake a Business Case Review of SM/IWN projects by the water utilities; and
- Collate and analyze information in a way that builds upon, rather than reinvents, the existing Roadmap and Cost-Benefit Analysis Framework developed by the WSAA smart-metering group in 2012.

2. Methods

2.1. On-line survey

Data were first gathered through an online survey tool specifically designed for the purpose of this study with guidance from the WSAA Smart Metering Program Group. Survey participants were recruited from registrants of the 2013 WSAA workshop. A link to the survey was automatically sent to each participant once they had officially registered for the workshop. This link accompanied an information letter that requested water business managers to take part in a 20-min online survey. The scope and purpose of the research was outlined, and a sample copy of a completed survey was provided to assist respondents in understanding of the nature

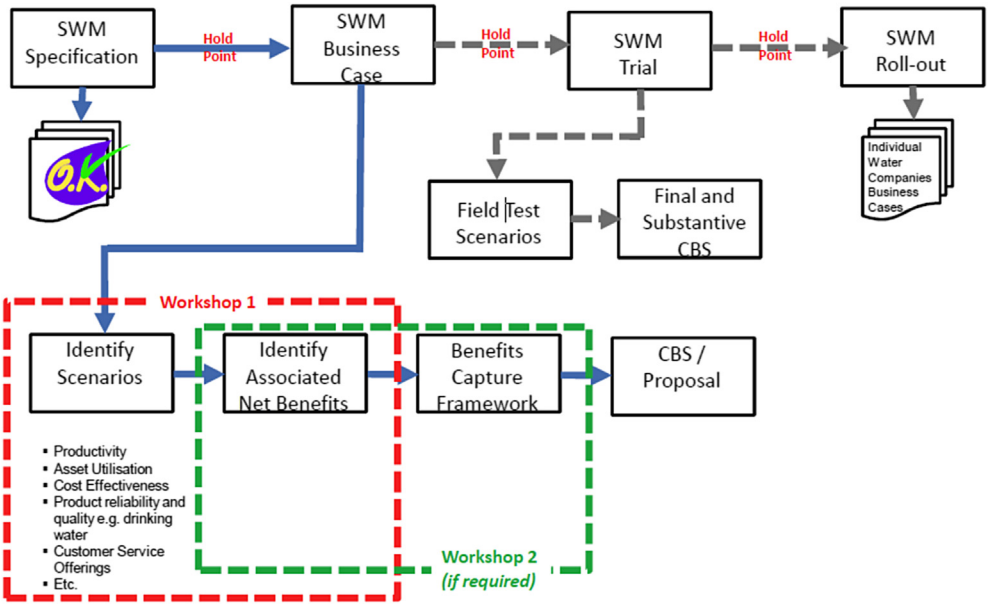

Fig. 1. WSAA metering program group roadmap (2012).