MAXIMISING DIGITAL INFORMATION FOR A SMART WATER CUSTOMER AND COMMUNITY FUTURE

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ABSTRACT

Now almost five years on since embarking on a customer-focused digital water utility research project with MidCoast Water, a wealth of experience has been accumulated regarding the key elements to harnessing digital information to engage customers in a digital customer strategy. The research project is specifically revisited with its review of the international literature to develop a practical tool box to assist water utilities in planning, implementing and evaluating a detailed digital customer information feedback strategy. The interactive tool box is introduced in this paper and aims to maximise digital information for a smart customer and community future.

HIGHLIGHTS

- We build on insights from two feedback trials and the international literature to develop a tool box for digital customer information provision
- The tool box provides comprehensive and up to date knowledge on available approaches
- The tools are applicable for digital customer information planning at all stages.

INTRODUCTION

Over the past few years, smart water metering has been gaining traction, carrying various important benefits in terms of detailed water-use data collection, systems monitoring and improved control. Gradually following suit, an increasing number of customers around the world are also slowly being granted opportunities to access various forms of customised water-use information feedback.

The Institute for Sustainable Futures (ISF) at the University of Technology Sydney (UTS) has been collaborating with MidCoast Water, NSW since 2012 at the forefront of develoment on an Australian Research Council Linkage Project to explore the role for smart water metering in a digital urban water future.

Focusing on the customer-side of the smart water metering opportunity, the research project particularly explored the role for the provision of more detailed information to householders on their water consumption and its various impacts.

This paper provides a brief background to the wider research project and reports on the digital tool box sub-project which was created to provide tools and insights for digital customer information planning strategies at all stages of development.

METHODOLOGY

Stage one

Stage one of the research project (2012-2014) involved the implementation and evaluation of two household feedback field trials using paper-based end-use reports (Figure 1) and digital water consumption information provided in near real-time via a custom-built online portal (Figure 2).

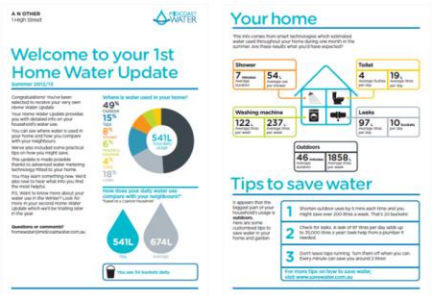

Figure 1: 'Home Water Update end-use feedback (Liu et al. 2015; Liu et al. 2016a)

Figure 2: 'My Home Our Water' online water-use feedback portal (Liu et al. 2017)

The application of both quantitative and qualitative methods of analysis (including householder surveys and interviews) led the research to provide valuable

insights into the opportunties and challenges for the active involvement of water utility customers in the new information afforded by the digital age.

Stage two

Stage two of the project (2014-2015) involved the development of a framework for detailed water-use feedback program implementation (Liu et al. 2016b). The framework identifies, for the digital water manager, the key questions and considerations in designing and implementing digital water-use feedback strategies for customers via smart water metering, and draws on lessons from existing projects internationally.

Stage three

Noting the need for bringing together and disseminating available knowledge, the logical next step in stage three (2016-2017) was to develop a practical tool box which combines insights from the implementation framework, the practical experiences gathered in our research project, and from an international review of approaches to digital information for customers around the world (see Figure 3).

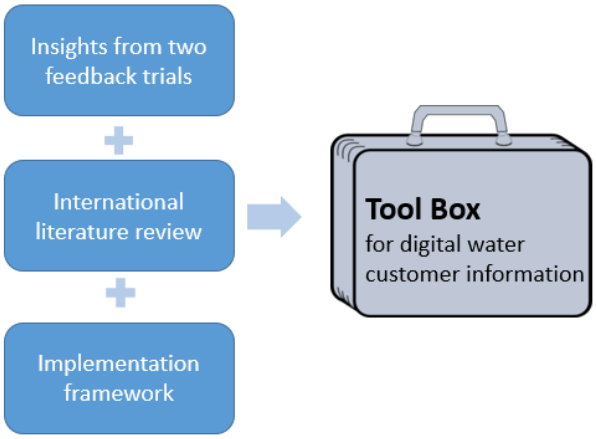

Figure 3: Tool box development

The process of developing the tool box used the elements in program design identified via the implementation framework (Liu et al. 2016b) and extracted details from existing studies to provide examples of alternative approaches, the results and best practice cases. In this manner, the tool box is designed to provide available knowledge to the digital water utility planner at each stage of project implementation.

Development of the tool box is currently underway and its launch is expected in late 2017. Thereafter, the tool box is expected to be developed continually as new studies and projects are implemented and new insights and best practice cases emerge in order to create a dynamic knowledge portal.

RESULTS / OUTCOMES

The stage one implementation and evaluation of the two feedback trials demonstrated water-savings effects through the provision of detailed water-use feedback to householders. Concrete changes in water-using behaviours and evidence of new investments in more water-efficient household water-using appliances, as well as improvements in awareness of water use, demonstrated the benefits of detailed feedback provision.

The stage two analysis of the results of studying 15 detailed water-use feedback projects implemented accoss Australia, the US and Europe between 2007-2015 showed the variety and focus of existing work in the field, as well as the need for improved knowledge generation and sharing of approaches and results (Liu et al. 2016b). The framework for detailed water-use feedback implementation (Liu et al. 2016b) offered an overarching guide to digital customer information provision for both water industry practitioners and researchers.

The tool box for digital water customer information under development in stage three of the research brings together available knowledge based on research into detailed customer water-use information, combining alternative options, detailed methods and impacts in a readily accessible format for water utilities and researchers.

The tools include practical implementation decisions (e.g. feedback content design, alternative customer communication mediums e.g. online portals); business case development methodologies that cover the questions of costs and benefits and the role of consumption information provision within the wider smart metering business case; smart water meter data analytics; and evaluative approaches (e.g. statistical methods, monitoring, and measures of success).

The tool box also provides a separate collection of case studies primarily from the water industry, but also from the energy sector and other sectors demonstrating digital leadership in customer communications.

Figure 4 provides a screen capture of the tool box and depicts the ‘practical’ level elements. Each of the elements is a ‘clickable’ button which leads to corresponding information on further site pages and sections. For example, by clicking on the ‘Why?’ button, the user is directed to further information that includes a summary of the reasons for implementing a detailed water-use feedback program, advice, as well further weblinks to a variety of available examples, resources and literature (Figure 5).

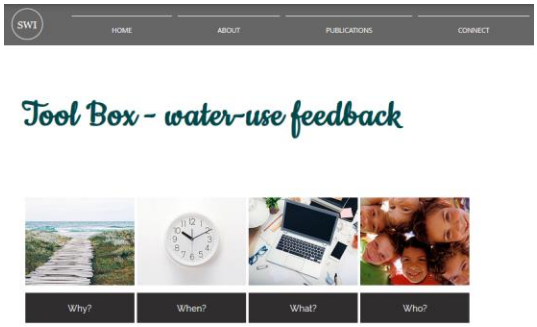

Figure 4: Tool box – practical level elements

In this manner, the user e.g. water manager or researcher, is provided with current information on existing knowledge and approaches.

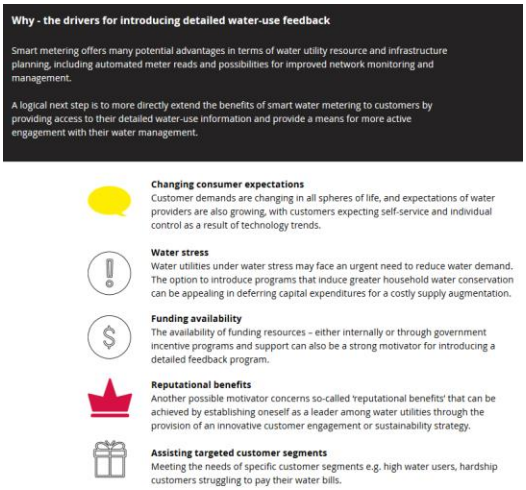

Figure 5: Tool box – 'Why' and the drivers for detailed water use feedback provision

The area of detailed water-use feedback program provision is in many regards still in its infancy. There are still important limitations in terms of what has been trialled or implemented in the field and/or research studies. In some cases, the information available on one particular aspect of detailed water-use feedback provision is very limited, and a best practice approach has yet to be clearly identified (e.g. business case development). In other areas, the sophistication of alternative approaches is more fully developed, so an understanding of the most advanced possibilities is more apparent. This is reflected in the resources available in the tool box which also therefore signals areas in need of further research and development.

DISCUSSION AND RESULT ANALYSIS

On the one hand, the tool box for digital water customer information brings together available knowledge on detailed customer water-use information. On the other hand, the tool box highlights a number of important gaps in the water industry's knowledge on approaches to the provision of detailed feedback to customers. The research therefore leads to the identification of further directions for advancing research and progress to maximise the usage of detailed water-use information enabled via smart water metering.

Research gaps

Smart water metering technology is now readily available and roll-outs are progressing, giving rise to a vastly increased availability of digital data where implemented. At the same time, the capabilities of digital communication technologies and data analytics have been advancing, meaning the technology is available to radically innovate in terms of strategies for customer engagement with their water-use information.

New and existing implementations of smart metering also carry the potential for further research and innovation that takes fuller advantage of the opportunities for communications and engagement afforded by the digital age. Here, particularly more research and improved understanding is needed to understand how to improve customer engagement and to achieve scalable impacts.

Opportunities for greater customisation and user-centred design

Our research in Liu et al. (2015) particularly highlighted the wide heterogeneity that exists among customers in terms of preferences between and responses to different forms of water consumption feedback; while the review of current progress with detailed feedback internationally (Liu et al. 2016b) signalled the availability of as yet untapped prospects for far greater levels of customisation in approaches to communications about water consumption and ways to save.

Despite narratives about customer engagement, current approaches to detailed water-use feedback provision are largely 'top-down' in nature, in which designers and researchers have determined specific approaches with little consideration of householders' interests or preferences, as exemplified in 'one-size-fits-all approaches' e.g. a single communication medium for all customers. However, 'one-size-fits-all approaches' will be unable to achieve the fuller benefits that can be attained.

The opportunity therefore exists for greater flexibility in the provision of detailed water-use feedback. This is particularly the case since the availability of detailed data collection that smart water metering entails and the availability of advanced information and communication technologies present opportunities for far greater customisation than is currently utilised.

Particularly the heterogeneity that exists among customers in terms of interests, preferences, and responses to feedback lends support to possibilities

for more ‘user-driven’ or ‘bottom-up’ approaches, rather than the current ‘top-down’ strategies.

A variety of key stakeholders – including utility decision makers, policy makers, technology developers, and customers – all need to brought together to help create a dynamic socio-technical system that integrates data, devices, people and processes. Specific opportunities towards this vision for a smart digital customer and community future are delineated below.

Further work

ISF is now exploring opportunities for further research that capitalises on available experience with digital water customer information in order to develop and then experiment with new and innovative means of engaging customers in their water use. One idea we are particularly keen on exploring is the novel ‘living lab’ approach, which involves rapid co-creation and trialling of new user-drive solutions through iterations of design cycles together with different sets of stakeholders.

CONCLUSION

Smart water metering and digital customer information present new opportunities for customer engagement. The variety of approaches to using digital information and especially in its provision to customers offers opportunities to learn from and build upon existing experience internationally. The tool box for digital water customer information developed in this research brings together this available experience in a format which provides practical tools to guide water utilities at each stage of implementation. This also serves a platform for knowledge sharing which can guide future research directions in order to maximise digital information for a smart water customer and community future.

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