

# Embracing change delivers SMART benefits

Over the past several years, the water industry has increasingly investigated new technologies to address performance gaps and improve efficiency. Across water network distribution systems, the use of self-monitoring, analysis, and reporting technology (SMART) is becoming more prevalent and developments in Operational Technology (OT) are providing solutions, which are starting to meet many of the challenges a 21st century utility company faces.

## Overview of SMART water technologies

The Smart Water Networks Forum (SWAN) defines SMART water network technology as the collection of data-driven components helping to operate the data-less physical layer of pipes, pumps, reservoirs, and valves. These technological solutions seek to improve the efficiency, longevity, and reliability of the network by better measuring, collecting, analyzing, and acting upon a wide range of network events. However, experience in other sectors has shown that the adoption of a SMART network needs to be fully considered if the benefits of such solutions are to be realized. Many of the challenges of adopting new solutions result not from the technology itself, but from how successfully the new technology is embedded within the organization.

As water and wastewater companies embrace new operational technologies, it may be time to take a step back and learn from other industries that have already followed the path of performance improvement through new data-driven solutions.

Perhaps the most closely linked technological developments in recent decades, which could provide insight into the successful adoption of operational technology across water networks, are from the information technology (IT) revolution. In fact, the integration of IT, operational technology (OT), and engineering technology (ET) including comprehensive network models, is a key emerging trend in the area of SMART water networks under

the concept of “digital twins,” which creates a digital replica of the physical system where data is seamlessly transmitted and tracked. But before the integration of these three technologies is fully embraced, lessons of past technology integration issues would be worthwhile to learn.

IT has undoubtedly influenced the way people work and live, yet concerns remain about its failure to deliver the expected benefits to both industry and to society in general. IT was once seen as a means of increasing productivity so we would have much more free time. But, we are not quite there yet. Whether the initial aspirational impact of IT was unrealistic, or it simply has yet to deliver such widespread changes, there is potentially a lot to be learned when looking to adopt OT or developing and using digital twins.

The apparent mismatch between IT investment and the observed increase in productivity has led to a number of high-profile research projects. Massachusetts Institute of Technology (MIT) Professor Erik Brynjolfsson – who led a US\$4.5-million study across 800 firms in the United States to show the correlation between IT investment and productivity – concluded in 2002 that “IT is significantly more productive when combined with organizational change,” as stated in his 2003 seminar on IT spending and productivity.

## Organizational change enables SMART solutions

The amount of organizational change required to support SMART solutions should be considered at the very outset of assessing a performance issue. In fact, one of the first questions to ask should be: “do we need a new technology or a solution to bridge the performance gap?” Whether the performance gap relates to water loss or improved customer service, the development of a strong case for investment should be driven by the range of potential benefits the solution can provide. For example, the replacement of one range of sensors for a new set with a better battery life

has only local and marginal benefits. Likewise, the degree of business change is also relatively small. However, compare that with SMART

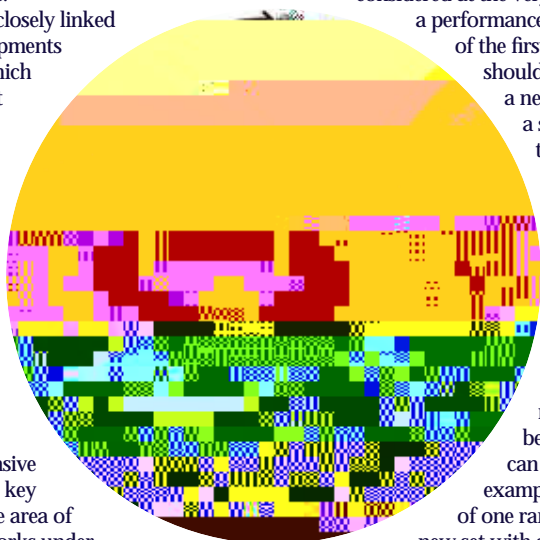
While there are a number of challenges with successfully embedding SMART water network solutions there are also vast benefits for having more data-driven technologies supporting network management.

The benefits associated with embedding SMART solutions across water networks include reduced leakage, improved resilience, and enhanced customer service (Figure 2). And, while understanding the potential level of business change required to enable the successful deployment of SMART solutions is important, the implementation can face potential pitfalls that can be avoided with the right information process.

**Achieving significant benefits means making new OT part of the fabric of the company.**

## Past failures signpost the way forward

Learning lessons from past business change initiatives can provide insight into the factors that can halt successful business transformation and the integration of new SMART solutions. In 2006 the authors Oakland and Tanner under-



took a piece of research that identified the potential reasons why business change initiatives failed or proved less successful than was originally anticipated. The aim of their project was to identify factors that were reported as being critical to managing change successfully across 32 public and private organizations. From their research, the seven key factors identified as impacting business change are:

- External events often drive successful change, above and beyond internal drivers. For the water industry this may be from a key event or incident that has put the organization under the spotlight from one of its regulatory organizations.
- Leadership sets clear direction and strategic intent. This can be in the form of a single vision for the organization or department, and should be aligned with the need for a new technological solution, such as improved customer focus, after having taken full account of the alternatives or the “do nothing” option. This should then provide the initial momentum require to overcome change inertia due to doubt surrounding the need to change.
- Change requires operational alignment. While top-level leadership is key, so too is the support of those that are required to implement change at an operational level. Oakland and Tanner’s research explains that changes that attempt to resolve real operational issues tend to be embedded more successfully than those that don’t have operational buy-in.
- A process approach is central. The number of processes affected by the integration of any new type of technology is often vast and far-reaching. Even at the initial concept phase of reviewing any new technology, the impact upon existing processes needs careful consideration,

## Change was found to be most successful when aligned to the existing culture of an organization.

as it is these processes that will set the blueprint for how the technological solution will support the day-to-day activities of the organization. Past failures have identified that these processes need to be fully understood, mapped, and impact-assessed in line with a new future operating model that enables the benefits of any new technology to be realized.

- Change management is best when it is clearly measurable. The pre- and post-performance of the issue being addressed by new technology needs to be fully understood and measured in order to ensure the performance trajectory heads in the desired direction. This is even more critical when multiple changes are being introduced. For example, if new advanced pressure management is introduced alongside the use of real-time noise correlators for leakage management, the impact each change has on the desired performance parameter needs careful assessment. This measurable and visible success will often create a momentum for further change, as the benefits become clear to all.

SMART Solutions Business Performance Outcome Impacted

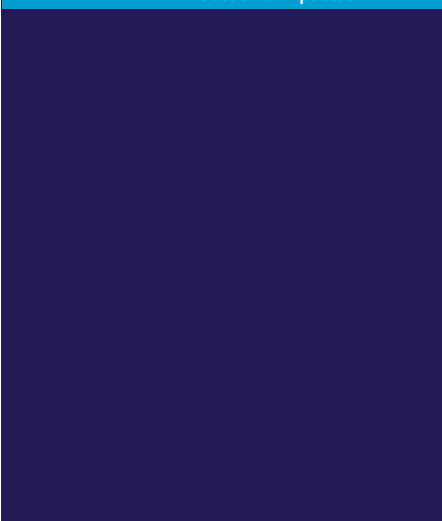


Figure 2. Potential business outcomes impacted by SMART solutions

- External support adds value. The Oakland and Tanner research identified that, as well as a momentum, careful attention to the report address will assign a baseline. Various factors can all revitalize performance by analyzing the key elements.

