Realising the water utility potential of mobile computing

Mobile computing and wireless technologies can transform the work of water utility field teams. **CHRIS STERN** and **BRENT IADAROLA** highlight the key advice that came from a US study of these technologies.

Today, water utilities around the world are faced with challenges that include an outdated infrastructure, rising energy costs, aging workforce, increasing levels of automation and data communications, and an operating environment impacted by a less stable global economy. Much like the energy industry's transition to a Smart Grid, the water industry has the opportunity to overcome many of these challenges and enhance service through the application of improved work processes and technologies, in the office and perhaps more importantly, in the field.

With new field technologies such as automated metering infrastructure (AMI) being rapidly deployed throughout the industry, utilities will ultimately require new business practices, field technologies, communications, and information management systems to operate these intelligent networks. At the same time, the skills and capabilities of the industry's workers will fundamentally shift toward a technology-enabled knowledge-based workforce.

Much has been written about the costs and benefits of using technology for customer, asset and workforce management, but until recently very little formal research had been done on the use of field and wireless technologies throughout the water utility industry.

To help utilities navigate the options available, the Utilities Field Solutions business group of technology company Trimble teamed up with business information company Frost & Sullivan and several US water utilities to develop the Awwa Research Foundation (AwwaRF)-sponsored Field Computing Applications and Wireless Technologies for Water Utilities report.

Background

The purpose of the study was to understand the current wireless and field computing applications and future needs across the water utility industry, and to provide case studies and tools for helping utilities effectively prioritize, plan and implement these programmes.

Over the course of 18 months, the research team conducted extensive primary and secondary research, including conducting online utility surveys and tracking market developments, technology innovations and industry trends, as well as developing detailed case studies on the current use of wireless technology by five US water utilities.

The report outlines key work practices performed by mobile utility workforces and field service professionals, as well as presenting recent developments in field computing applications, devices and network technologies. The report also addresses risks, challenges and lessons learned from water utilities that have successfully implemented wireless and mobile computing solutions.

Survey findings

Overall, the survey revealed a strong business case for adopting the use of wireless and mobile technologies for water utilities. If implemented properly, enterprise mobile computing systems can deliver a 30% annual improvement in service efficiency. Wireless and mobile technology can also improve security, as well as ease the burden of regulatory compliance and reporting, which is often a time- and labour-intensive requirement for utilities.

Direct cost savings were shown to be available through improved resource productivity, reduced fuel costs and corresponding greenhouse gas (GHG) emissions, and improved asset management.

Although many utilities acknowledge that mission critical mobile applications could be a valuable asset to their businesses, the research shows that complexity, confusion and uncertainty about the return on investment (ROI) are creating significant barriers to entry for most water utilities. In fact, survey results indicated that more than 58 percent of utilities aren't using wireless technologies at all.

Study highlights

The research conducted shows several highlights related to the adoption of field computing applications and mobile resource management (MRM) solutions by water utilities. Some of the highlights include:

MRM solutions are becoming increasingly important

In evaluating the industry and technology trends, the research identified MRM as the emerging category that encompasses technology solutions designed to help organizations efficiently manage their mobile resources and field work processes.

MRM incorporates a variety of technologies, including wireless communications, sensors, mobile

Figure 1: Percentage of utilities deploying wireless technologies. Source: Table 2.9, 'Field Computing Applications and Wireless Technologies for Water Utilities', Water Research Foundation.
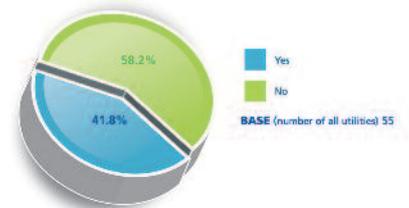
computing equipment, in-vehicle technology, field application software and automated workflows. MRM solutions also significantly leverage locating and spatial technologies such as Global Positioning Systems (GPS) and GIS to automate and streamline utility field operations. Together, these technologies make it easier to manage mobile assets and give decision-makers greater visibility into field activities.

Equipping mobile workers with wireless technology makes it easier for them to access necessary data, communicate with each other and the office, more efficiently complete work orders and documentation, and reduces the number of trips between the field and office. The research findings showed that these benefits can provide substantial improvements in efficiency and customer service.

Improved customer service is also a priority
Improved customer service – as well as improved customer perception – is another key driver for deploying field computing and wireless technologies for water and wastewater utilities. In fact, it ranks second only to higher fleet productivity / utilization when it

Figure 2: Importance of factors for deploying wireless technologies for field service employees. Source: Figure 2.1, 'Field Computing Applications and Wireless Technologies for Water Utilities', Water Research Foundation.
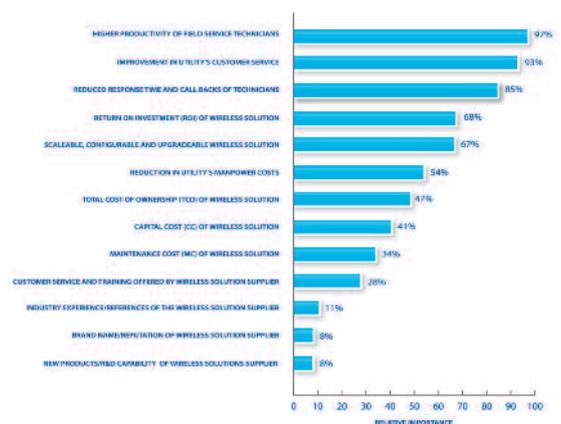
comes to the most important factors for choosing wireless technologies for field service employees among survey respondents.

More importantly, the investment is paying off for water and wastewater utilities adopting the use of wireless technologies to help improve customer service. The survey results show that more than 91% of survey respondents believe that their wireless deployment for field workers met or exceeded their expectations when it came to both improved customer service and improved response time.

Technology advancement is helping drive adoption

Hardware, software and application technologies have progressed to the point where pervasive mobile integration is now feasible. With middleware platforms set to leverage advancements in network technologies and a proliferation of connected, rugged devices, the ingredients for compelling, real-time field computing systems are now in place.

Technology is a valuable competitive advantage

Water utilities around the world are increasingly facing pressure to utilize mobile technology as a means of gaining a competitive advantage. As early adopters continue to demonstrate tangible ROI through the use or wireless and mobile technology solutions, those without such solutions are often at a disadvantage. The prospects for mobile technologies are poised for growth as more and more utilities realize the benefits integrating location and mobility capabilities into their core applications.

Utilities see myriad tangible, intangible benefits

Utilities list access to real-time, mission-critical data as the most important tangible benefit to mobility. Additional tangible benefits include:

• Better data quality, transparency and control;
• Enhanced overall visibility into field activities;
• More effective asset life-cycle management;
• Reduced response time for unplanned activities;
• Regulatory compliance and reporting;
• Time savings in meter management and other field tasks; and
• Time savings in the field and in more accurate time reporting.

Significant intangible benefits of field computing applications have also been identified. These include:

• More consistent business processes;
• Improved communication;
• Increased morale; and
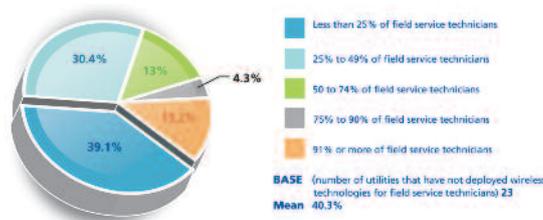
• Improved worker skills, knowledge and abilities.

Key challenges

Although there are significant benefits to the use of wireless and mobile technologies among water utilities, the industry as a whole has been slow to adopt these solutions. There are significant barriers to entry for water utilities exploring their technology options, and the research revealed several key challenges that must be overcome. These include:

Limited understanding slows adoption

The research findings revealed several reasons that water utilities have been slow to adopt the use of wireless technology, one of the most important being an overall lack of understanding about options available, the benefits and how to use the equipment.

In fact, the potential reluctance of staff to use a mobile computing system is often perceived as the single greatest risk to mobility deployment. Although many utilities have made substantial investments in IT systems over the past ten years, most have done very little to introduce technology to their mobile workers and field crews.

In many cases, managers are concerned about field workers' individual reaction to change or use of technology they are not familiar with. Their concerns are valid: nearly 70% of the utilities that have deployed wireless technologies report that fewer than half of their field service technicians actually use the technology.

Incompatible network standards create challenges

Another significant challenge to the adoption of mobility solutions for utilities in the United States is the lack of a definitive network standard. Furthermore, technologies such as AMI are introducing new communication protocols, such as Zigbee. The vast array of incompatible network standards, operating systems, browsers and devices make large-scale wireless
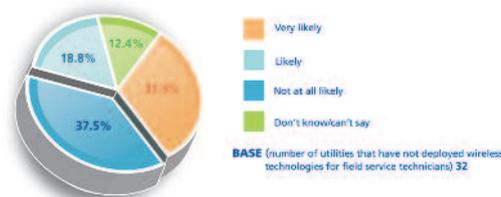
Figure 3: Percentage of field service employees using wireless solutions. Source: Table 2.12, 'Field Computing Applications and Wireless Technologies for Water Utilities', Water Research Foundation.

Figure 4: Likelihood of deploying wireless technologies in the next one or two years. Source: Table 2.14, 'Field Computing Applications and Wireless Technologies for Water Utilities', Water Research Foundation.

convergence too complex for many organizations. Slowly, technology providers are beginning to work together to eliminate the plethora of incompatible platforms and standards that currently exist. Overcoming this challenge will require the cooperation of all market participants.

Few are using mobile computing, fewer are quantifying their results

Industry surveys show that less than 15 percent of field service workers are using real-time mobile computing devices. Of those that are, many have no formal method in place for measuring the value of the technology. In fact, many early pilot implementations have focused exclusively on single work groups and specific service order dispatching functionality.

These results are compelling, but they don't represent the full functionality and ROI that can be achieved across an enterprise. Although most adopters become evangelists for mobile technology, the majority are not tracking, measuring or reporting the time and cost savings of it, particularly at the enterprise level.

The future

Although there are challenges to be overcome by water utilities and technology vendors globally, primary and secondary research indicates that the adoption of wireless and mobile technology will become increasingly important in the coming years. In fact, nearly 70% of survey respondents indicate that they are 'very likely' or 'likely' to deploy wireless technologies in the next one or two years.

One thing is certain: technology will play an important role in helping water utilities worldwide adapt to meet the challenges of tighter budgets, aging infrastructures and the need to increase efficiency while sustaining service. ●

More information
See www.waterresearchfoundation.org

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