

Water utilities are evaluating and adopting mobile and wireless technology to help them more efficiently manage information flow between field and office. **BY CHRIS STERN AND BRENT IADAROLA**

GOING MOBILE FIELD FORCE COMPUTING IMPROVES PRODUCTIVITY

LITTLE FORMAL RESEARCH has been done on the effectiveness of field computing applications and wireless technologies to help utilities operate more efficiently to better serve customers. To help fill this information void, the AWWA Research Foundation—along with a locations-based services company, a market research firm, and several US water utilities—developed the *Field Computing Applications and Wireless Technologies for Water Utilities* report.

Developed under AWWARF's Tailored Collaboration research program, the report analyzes current use by water utilities of field computing applications and mobile technologies. The report takes a closer look at the technologies and work practices

in place at several US utilities and provides an overview of current and emerging field computing and wireless technologies on the market.

The report reveals that the utilities market sector is more interested in adopting field automation and mobile computing tools than other sectors. Even so, many utilities have been slow to implement technology for use by field workers—typically the largest portion of the workforce—despite being aware of the benefits.

What is the future for mobile workers and wireless technologies? Inevitably the industry will see widespread adoption of field computing solutions over the next few years, and wireless technology use will have a deep and lasting effect on the industry.

Field force computing is a considerable growth area in the water industry that offers significant efficiency gains and improvements in customer service, but many utilities have yet to realize the full benefits of the technology.



Workforce Management

SURVEY FINDINGS

Researchers completed a comprehensive literature review, surveyed US and Canadian AWWARF-member water utilities, compiled case studies from five water utilities, and reviewed vast amounts of secondary research about current and emerging technologies for the utility sector. In the fall of 2006, 55 utilities were surveyed, all of which provide drinking water and more than half of which provide wastewater treatment services. The report focused on three key components of mobile technology: benefits, challenges, and technology.

Benefits. Utilities already using mobile technologies are reaping big benefits, such as reduced employee overtime and data entry time, decreased mileage and time traveling between field and office, and an increased number of jobs completed.

Of those surveyed whose field workers already use wireless technologies, more than 90 percent reported their technology solution is meeting or exceeding their

expectations for increasing response time and overall improvement in field-worker productivity. The main reasons cited for deploying the technologies include

- Cost savings and efficiency in field activities
- Improved customer service
- Better data quality, transparency, and control
- Enhanced overall visibility into field activities
- Reduced response time for unplanned activities
- Regulatory compliance and reporting
- Knowledge capture for succession planning

Challenges. Of the 55 survey responses received, fewer than half have deployed wireless technologies. This is in part because of several specific challenges:

- Utilities often perceive the reluctance of staff, particularly field workers, to use the new technology as the single greatest challenge to implementing mobile

technology. The survey revealed that of the 23 utilities already using wireless technology for field workers and operations staff, 40 percent said less than 25 percent of their field workers actually use the technology.

- Although utilities already using mobile workforce technologies are reaping impressive financial benefits, many utilities haven't formally evaluated the technology's value for their businesses.
- Wireless technology evolves every day. As a result, more companies are entering the market, and existing solutions are continually upgraded. Such advances can result in solution gaps or easily outdated equipment.
- By their nature, wireless technologies are less secure than wired solutions. As utilities add functionality and extend the use of wireless devices—as well as access to databases, intranets, and other confidential information—to more employees, data security becomes

CASE STUDY

HONOLULU BOARD OF WATER SUPPLY IMPROVES WORKER PRODUCTIVITY

With more than 225,000 accounts spread over 600 mi² on three islands, the Honolulu Board of Water Supply operates one of the largest US water distribution systems. With a workforce of 300 mobile workers who spend 50–75 percent of their time in the field, HBWS constantly looks for ways to improve worker productivity and customer service. The utility's aging infrastructure was requiring workers to spend a lot of time checking false leaks, and a nearby military facility required additional homeland security reporting. To achieve maximum efficiency, HBWS wanted to provide field workers with on-site access to the organization's back-end systems and simultaneously provide managers with more timely information from the field.

First, the utility used mobile technology to extend its current applications and geographic information system (GIS) software to workers in the field. HBWS also implemented a mobile computerized maintenance management system (CMMS), supervisory control and data acquisition (SCADA) system, and job management systems to cut costs and improve productivity and customer service. Next, GIS capabilities were integrated with the CMMS software, which was used to more effectively monitor and manage the work of field crews.

By giving field workers easy access to back-office information, the system ensured that projects were completed on time. It also

provided more efficient workflow management by generating automatic lists of activities, reminders, alerts, escalation procedures, and more. The mobile technology is also helping HBWS improve operational efficiency, increasing productivity and profitability, and allowing workers to spend more time serving customers and less time completing paperwork.

Perhaps more impressive is the time savings. Now, mobile workers receive work orders electronically throughout the day on a mobile device. As work is completed, data are entered into the mobile device, and managers are alerted immediately when work is completed. Electronic transmission of fieldwork data has eliminated the need for HBWS workers to make several trips to the office each day. The technology also allows field crews to plan their daily routes from home, further reducing travel time to and from the office.

Implementation of mobile technology is also providing a significant return on investment. Field workers have reduced response times, optimized work scheduling, traveled less, and improved reporting. An added bonus is that the technology was easy for field workers to learn and use. After just four hr of GIS software training, field workers incorporated the software into daily workflows.

Although a full-scale mobile workforce computing solution can be overwhelming and may be met with field-worker resistance, the technology can address many utility challenges.

a growing concern. Processes must be put in place to ensure that data shared over the network are secure and that managers approve who can and can't access sensitive data.

Technology. One of the biggest implementation obstacles utilities face is the overwhelming number of available products and the lack of a definitive network standard. The sheer number of operating systems, browsers, software solutions, and hardware devices make large-scale technology implementations challenging and time-consuming. Although it's likely that mobile devices and technologies will converge to similar features, it remains unlikely that they'll adopt a single standard.

The research revealed, however, that available technology has evolved to a point where widespread integration isn't only feasible but likely. With hardware, software, and application improvements, the components necessary for an effective real-time computing system are now in place.

MOBILE RESOURCE MANAGEMENT

The AWWARF report also examines mobile resource management (MRM), an emerging category of business solutions that enhances efficiency, asset management, and customer service. MRM solutions are designed to manage mobile workers and automate mobile assets and workflows. The process can be broken down into three categories:

- Mobile asset management, most commonly used to monitor vehicles and other physical assets, can help track the location, efficiency, and maintenance schedules of mobile resources.
- Field force management, used to monitor a mobile workforce, helps to better manage people and may provide business and intelligence reporting, supply work order information, and track shift times and breaks.
- Field service automation, which relies on mobile and wireless technologies to achieve workforce efficiency and data

integrity, can help automate scheduling and dispatching, streamline supply chain management, and provide customized applications.

Similar to investments that utilities made in enterprise asset management and customer information system products, MRM platforms allow utilities to deploy a single field automation that combines several technologies, including Internet services with Global Positioning System technology, mobile geographic information systems, dispatch software, wireless capabilities, and fleet management tools for greater visibility into field activities. Using an MRM to quickly and easily share information between the field and the office also reduces operating costs and improves customer service.

REAL-WORLD APPLICATION

In addition to providing general insight into MRM use by water utilities, researchers took a close look at five early adopters

CASE STUDY

PHOENIX WATER SERVICES DEPARTMENT STREAMLINES DATA ACCESS

The City of Phoenix Water Services Department relies on nearly 1,300 mobile workers and five water treatment plants to provide water and wastewater services to residents and businesses in one of the fastest-growing parts of the United States.

As one of the earliest adopters of field computing technologies, CPWSD first introduced a mobile geographic information system (GIS) pilot program in 1998. Learning from that experience, CPWSD deployed a comprehensive mobile GIS and mobile workforce management system in 2002.

Because many of CPWSD's field workers were spending all their time in the field, the utility managers sought a way to extend utility applications and back-end solutions to service technicians. The goal of CPWSD was to increase efficiency and improve customer service by streamlining the flow of information between the field and office and giving field workers easier access to critical data.

To ensure that workers would accept and use the new technology, CPWSD engaged employees from the beginning. Staff members were informed about the objectives and the status throughout the project and, more important, were asked to help define the program's direction.

To do their jobs, CPWSD field workers accessed information from the GIS, computerized maintenance management system (CMMS), customer information system, and customer relationship management system, as well as from locating services, human resources, and inventory and document management systems—all from the field, with one simple interface. Other benefits included:

- Improved customer service
- Increased employee morale
- Improved internal communications
- More accurate data
- Improved asset management
- Better communication with the customer services division

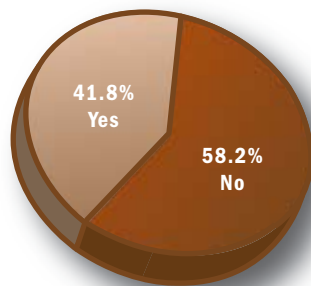
CPWSD personnel learned that a field computing solution was necessary, that it could be implemented with existing equipment, and that field staff were open to the new technology when they were involved in the process. In addition, the longevity of the program gives CPWSD access to valuable historical data. Using data collected over several years, managers can provide detailed reports to city managers, allowing for more effective planning.

CPWSD's field workers and managers agree that implementation of the enterprise mobile computing solution has been successful.

Wireless Technologies Use

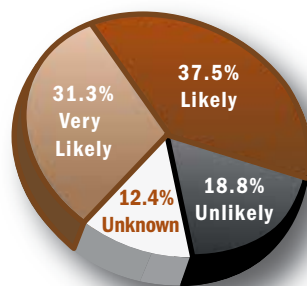
Inevitably the water industry will see widespread adoption of field computing solutions during the next few years.

Percentage of Utilities Deploying Wireless Technologies



Study based on 55 survey responses.

Likelihood of Deploying Wireless Technologies in the Next 1 or 2 Yr



Study based on 32 utilities that have not deployed wireless technologies.

who are using field computing applications in their daily workflows. The studies were conducted at the Honolulu Board of Water Supply, Tallahassee (Fla.) Water Utility, City of Phoenix Water Services Department, East Bay Municipal Utility District (Oakland, Calif.), and San Francisco Public Utilities Commission. Although each utility faced challenges—from lengthy deployments to lack of internal support—each utility studied showed a significant gain in worker productivity and improved customer service. (See Honolulu Board of Water Supply Improves Worker Productivity, page 18, and Phoenix Water Services Department Streamlines Data Access, page 19.)

Although a full-scale mobile workforce computing solution can be overwhelming and may be met with field-worker resistance, the technology can address many utility challenges. Faced with aging workforces, growing populations, and more stringent drinking water regulations, utilities are under intense pressure to operate more efficiently. The *Field Computing Applications and Wireless Technologies for Water Utilities* report recommends the following for utilities considering such an implementation:

- Start with a detailed needs analysis to identify priorities, challenges, and users' needs.
- Undergo a series of phased implementations, rather than a single rollout with full functionality.
- Consider open-platform solutions.
- Update, educate, and engage employees continually on the implementation's objectives and results.

THE FUTURE IS NOW

The future of water utility operations includes widespread use of mobile technology; for many the future is now. More than 68 percent of survey respondents indicated that they plan to deploy wireless technologies within the next two years.

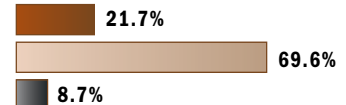
Running efficient, customer-focused utilities will be paramount as the industry continues to overcome challenges associated with industrial growth and a shrinking workforce. Those at the forefront of technology will be the most competitive. 💧

Acknowledgment: *The comments and views detailed herein may not necessarily reflect the views of the AWWA Research Foundation, its officers, directors, affiliates, cofunding organizations, or agents.*

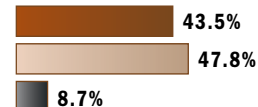
Impact of Wireless Deployment for Field Service Employees*

Utilities already using mobile technologies are reaping big benefits.

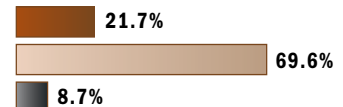
Improved customer service



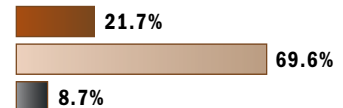
Better response time



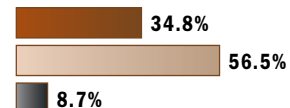
Increased average number of job orders facilitated per day



Reduction in "nonproductive" time of field service technicians



Overall improvement in field service technicians productivity



- Exceeded expectations
- Met expectations
- Below expectations

Study based on 23 utilities that deployed wireless technologies for field service technicians.

*Percentages do not add up to 100 percent because more than one type of expectation was expressed.