Is your utility already taking on new responsibilities? Struggling to fill critical positions? Recognizing the impacts of recent retirements? Looking for ways for your workforce to get more engaged with your technology systems?

Meeting the Challenge: Preparing for a Changing Workforce

by Sharon Peters

North American utilities find themselves in the middle of a major workforce transition. Some of today's biggest concerns were identified as issues more than ten years ago, when changing demographics, impending retirements, and potential knowledge losses were seen as a perfect storm threatening water and wastewater service delivery. The Great Recession delayed and softened some of the predicted effects, but change is accelerating now that the economy has recovered.

Baby boomers are retiring. Succeeding generations are considerably smaller and want different types of career opportunities. The U.S. is close to full employment and competition for dedicated employees with strong technical and customer service skills is fierce. Some types of positions and certain markets are particularly constrained. New generations of leaders and workers are bringing different expectations and values to the workplace.

New technologies are changing how traditional utility work is done. Five years ago, it was still common to see utility workers resisting computers. Smartphones and tablets have changed those attitudes. Everyone wants to be able to interact with their phones at work the way they do at home. They want to be fully mobile and access reference information and perform data entry anywhere.
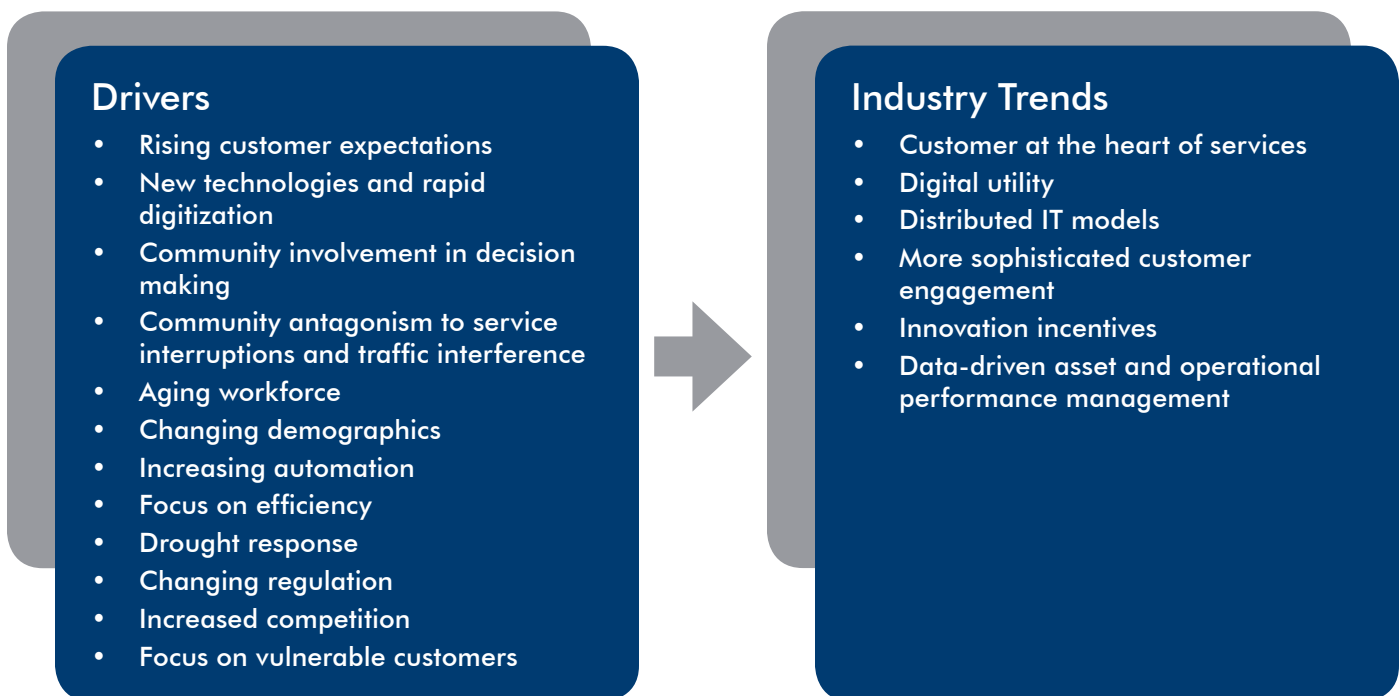
Drivers
- Rising customer expectations
- New technologies and rapid digitization
- Community involvement in decision making
- Community antagonism to service interruptions and traffic interference
- Aging workforce
- Changing demographics
- Increasing automation
- Focus on efficiency
- Drought response
- Changing regulation
- Increased competition
- Focus on vulnerable customers

Industry Trends
- Customer at the heart of services
- Digital utility
- Distributed IT models
- More sophisticated customer engagement
- Innovation incentives
- Data-driven asset and operational performance management

Figure 1: Drivers of change and industry trends (WSAA and WE&RF 2017)

Emerging Technologies Disrupting Other Industries and Expected to Impact Water and Wastewater Utilities

Emerging Technology	What is it?	What does it mean for water and wastewater?
Messaging/chat-bots	A computer program that conducts a conversation via auditory or textual methods.	Employed by other types of utilities and cities for customer service and information acquisition, it may become a customer expectation for water.
Autonomous vehicles	Vehicles relying solely on automation.	Lower cost and improve performance of supply chain; provide access to parts of utility systems not readily accessible now at lower cost.
Augmented/virtual reality	A technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view/computer generated scenario that simulates a realistic experience.	Simulation of flow in plants and pipe networks; enhance customer engagement through virtual tours; complete 3D engineering design reviews; safety and operator training simulations.
Blockchain	A continuously growing list of records, called blocks, linked and secured using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data.	Peer to peer supply networks; billing and payment transactions; trusted sharing of operational and customer behavior data among utilities.
Quantum computing	A computing technique using quantum mechanical phenomena, including superposition of states. Has the potential to solve certain problems much more quickly than binary digital electronic computers based on transistors.	Asset degradation modeling; distribution system optimization; supply chain optimization; customer behavior modeling; machine learning.
Artificial intelligence	A system of devices that perceive their environments and take actions that maximize the chances of successfully achieving goals. Aspects include: reasoning, knowledge representation, planning learning, natural language processes, perception, and the ability to move and manipulate objects.	Predictive analytics to save operational costs and reduce risks through real-time optimization of assets. Better planned and executed capital projects; real-time water loss minimization; personalized customer portals.
Internet of things (IoT)	The network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data.	Smart meters and other equipment capable of exchanging much more information at lower costs. These can be used by a utility or by its customers to obtain enhanced information about water usage, electricity usage, operating environment factors, and equipment health.
3D printing	Processes in which material is joined or solidified under computer control to create a three-dimensional object. Also called additive manufacturing.	Produce water system assets and equipment at much lower cost than conventional methods; may increase the life of assets through use of alternative materials; can detect and repair corrosion in pipes.
Platform economies	Economic and social activity facilitated by technology frameworks. Big data, new algorithms, and cloud computing will change the nature of work and the structure of the economy.	Water and energy efficiency; disruption of traditional utility business models; changing work schedules.
True global connectivity	Personal mobile technology can connect every human being to knowledge, markets, services and communities.	Role-based dashboards, analytics and decision support available for multiple roles for both utilities and customers anywhere.

Figure 2: These emerging technologies have already begun disrupting other industries and are expected to have significant consequences for water and wastewater utilities in the coming years.
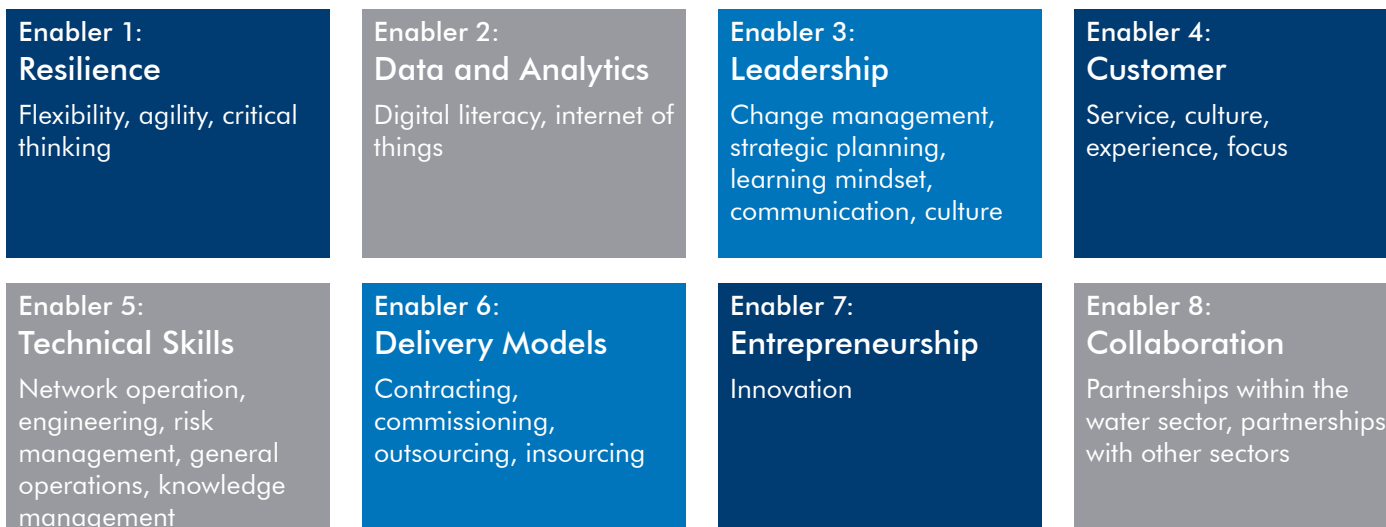
Enabler 1: Resilience	Enabler 2: Data and Analytics	Enabler 3: Leadership	Enabler 4: Customer
Flexibility, agility, critical thinking	Digital literacy, internet of things	Change management, strategic planning, learning mindset, communication, culture	Service, culture, experience, focus
Enabler 5: Technical Skills	Enabler 6: Delivery Models	Enabler 7: Entrepreneurship	Enabler 8: Collaboration
Network operation, engineering, risk management, general operations, knowledge management	Contracting, commissioning, outsourcing, insourcing	Innovation	Partnerships within the water sector, partnerships with other sectors

Figure 3: Key water utility enablers (WSAA and WE&RF 2017)

Organization structures and job roles are evolving to help the water industry adapt and new skills are needed. New roles help address new business models, new data capabilities, innovation drivers, and more interactive customer service models. Utilities are forced to consider non-traditional alternative scenarios to meet their workforce needs, including temporarily filling positions with consultants or other change agents, contracting work, combining or dividing traditional roles, and entering into shared service partnerships with other utilities.

In response to water and wastewater utility interest in the workforce transition, the Water Services Association of Australia (WSAA) and the Water Environment and Research Foundation (WE&RF) completed the "Workforce Skills of the Future" project in 2017. The central question this project investigated is how current drivers of change and industry trends (Figure 1) are affecting today's workforce and shaping the knowledge, skills, and experiences that will be needed in the workforce of the future.

As part of the project, U.S. WE&RF members were surveyed to highlight key workforce trends. Almost 70% of the utilities surveyed reported that they are extremely or very confident that they can deliver on their current business objectives with the skills and capabilities of their current workforce. Forecast more than ten years into the future, however, and that confidence level drops to 31%. Potential future gaps were identified in critical thinking, leadership and communication skills, and digital literacy and technical skills. U.S. survey respondents also identified workforce retention, emerging technologies, and increased automation as the top transformational changes most likely to affect their workforces in the next ten years.

A list of emerging technologies that are currently disrupting other industries and expected to affect water and wastewater utilities as well is provided in the table in Figure 2 (facing page), along with descriptions of potential effects.

To help water utilities adapt in a rapidly evolving work environment, the WSAA and WE&RF recommend pursuing eight key enablers (Figure 3) at the individual utility, regional, and national levels.

One thing that hasn't changed in the past decade is that planning and preparation are keys to success. Several utilities are preparing new, future-focused workforce plans or updating previous plans to focus on more flexible organizational design, user-friendly knowledge transfer, and accelerated training and career development. Other utilities are engaging with peers through regional partnerships and national conferences.

More information on the WSAA and WE&RF project can be found by selecting "Intelligent Water Systems" from the Research Areas menu on the WE&RF website at www.werf.org, or by visiting www.wsaa.asn.au/news/workforce-skills-future.