



Emergence of New Technology



Disruptive challenges to utility operations and management may impact the ability of water utilities to meet their committed levels of service for their ever-changing service areas. As essential service providers, how can water utilities proactively plan for business continuity and adopt new processes and technologies?

CRITICAL FUTURE DISRUPTORS

For the purposes of this effort, a disruptor is defined as something that interrupts an event, activity, or process by causing a disturbance, problem, or opportunity. Disruptors can arise as barriers to normal operations or may present opportunities to do things differently/innovate.

The following items were chosen by a diverse group of water leaders and experts as the most significant future disruptors that water utilities must anticipate and plan for.



PROCESS TECHNOLOGY/ADVANCEMENT

Increased use of robotics and drones in water/wastewater treatment, self-diagnosing and healing systems, increased production of water and other resources by utilities, expansion of potable reuse opportunities, zero discharge/closed loop wastewater systems.



CLIMATE CHANGE/RISK

Concerns related to the potential loss of technology due to a natural or man-made emergency, increased water demand with population growth and in urban centers, increased expectations towards becoming a zero carbon water utility, drastic reductions in available water allocations through implementation of the CO River compact and other regulatory structures, and significant potential geographic shifts and crop changes in the agricultural sector.



REAL-TIME DATA

Real-time demand for information and response, enhanced QA/QC to ensure sensors and instruments are accurate and performing within acceptable limits, challenges associated with the incompatibility of existing software systems, challenges related to data overload (data rich but information poor), and expectations for full AMI implementation across the water sector.



DIGITAL WORKFORCE

An increasing need to recruit, train, and retain new workers to meet the needs of a demanding digital workplace, and increasing worker expectations that the water workplace will embrace emerging digital tools. The expectation that water systems will increasingly become equipped to automatically optimize for changing customer needs.



CUSTOMER SERVICE

High customer expectations on service standards, customer payments based on level of service provided, while also keeping rates affordable.



RESEARCH OPPORTUNITIES

Based on these critical future disruptors, experts prioritized the following targeted research areas:



OPTIMIZATION

Research to improve tools to better characterize human health risks; implementation of AI/ML for real-time risk management and automated decision making (i.e., a self-diagnosing and self-healing water system); rethinking energy use within the water sector, including improved approaches to pressure management; and strategies to implement molecular analytical methods.



BIOMIMICRY

Research to identify strategies for *in situ* remediation of PFAS by bioengineered microbes; increased adoption and implementation of natural systems thinking, including increasing use of closed-loop systems to minimize discharges into sensitive waterways; and implementation of hydrothermal processing of wastewater solids.



CUSTOMER FOCUS

Research is needed to identify strategies to build public trust and satisfaction with water services, including through implementation of a customer on-demand water system, mechanisms to provide real-time water usage information and data for customers, and co-creation of infrastructure design with community.