ARCADIS Design & Consultancy for natural and built assets

Digitally enabled innovation

The power lies with people

Foreword

Innovative cultures are born when everyone can engage. But for utilities, staff engagement remains far and away the greatest challenge in leading creative and agile organizations. A recent global survey Arcadis conducted with The Water Research Foundation (WRF) found that only 20 percent of employees believe their utility provides opportunities to engage in innovative thinking. Respondents note that their utilities fail to encourage collaboration, recognize innovation and consider innovation in building the workforce. As a result, most utility staff feel unable to bring new ideas to their leadership, leaving potential efficiency and value gains buried within the organization. Globally, utility leaders are searching for better ways to build a more vibrant and engaged workforce.

Digital transformation and end-to-end digital integration of business models can streamline business processes, break organizational silos, improve decision-making and deliver greater value and customer experience. But utilities might not be leveraging these opportunities to create an innovative culture.

We are curious how accelerating digital transformation within the sector might change this narrative moving forward.

To gain the sector's perspective, Arcadis launched a survey in October 2018 at World Water-Tech North America. More than 90 organizations representing utilities, consultants, entrepreneurs, technology providers, government and academic institutions completed the survey. Ninety-one percent of respondents have integrated or are in the process of integrating digital into their business strategies. Employees, as the end users, were identified as the most critical stakeholder for successful digital transformation efforts. Over 80 percent of respondents believe digital could promote innovation through improved collaboration, communication, knowledge management and exploration – but are we equipping and building a workforce that can use these capabilities?

Digitalization cannot be achieved without competent and engaged employees driving the process.

When asked to rank workforce impacts of digital transformation, 38 percent of utilities listed skill development among the top three most important influences, but recruitment and retention were listed last. While some utilities see the potential for empowering their current workforce, most are missing a critical element to innovative cultures – attracting and retaining the right people. Leveraging the potential of digitally enabled innovation hinges on building and empowering a fit-for-future workforce.

As a part of our research, we had conversations with utilities that are embracing the potential of digital transformation to foster innovation. Their innovation stories, featured at the end of the report, explore how digital innovation can attract a digitally savvy, innovative workforce; address present and future needs; empower staff by expanding access to and accuracy of data; and make utilities innovation leaders in the water sector.

Our hope is that utilities and water-related businesses use this research to realize the potential of digitally enabled transformation, especially as it relates to developing powerful cultures of innovation capable of creating a sustainable water future.

Thank you to the survey participants and innovation storytellers. Sharing your perspectives and experiences with your peers and the industry at-large strengthens the connectivity of the utility innovation community.

Jason Carter

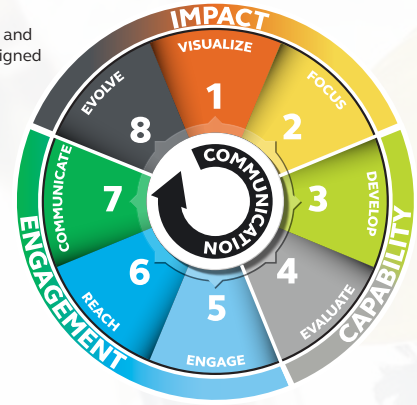
Water Strategy & Innovation Lead

Utilities crave the power of innovation, but not all of them have been able to harness it. Despite heavy investments to improve operational efficiency, reliability and quality, many utility leaders believe the industry's go-to solutions fail to leverage innovation or deliver sustainable outcomes. Only 40 percent of utility executives say they've seen measurable change through innovation. What's missing?

Results-oriented. Tangible and intangible improvement aligned with leadership and organizational philosophy.

ENGAGE -
Motivate, enable and reward stakeholders

People-oriented. Ideators, mentors, adopters leading initiation and application of innovation.



Ecosystem-oriented. Environment encouraging growth and maturation of ideas.

Figure 1: WRF Utility Innovation Framework

Based on a WRF survey of key innovation disciplines, only 20 percent of water utility employees believe they have the opportunity to engage in innovative thinking. Of the eight disciplines identified as the foundation of an innovative culture, staff engagement was the lowest scoring proficiency. Staff don't feel encouraged to innovate or recognized when they do. Further, they believe recruiting activities failed to consider innovation when bringing in new team members.[1]

Digital transformation is accelerating in the water sector. Many utilities see it as the key to innovation. It can be a powerful catalyst, but transformation efforts must extend beyond implementation of technology and address the human element. The real power lies in connecting workers and encouraging them to explore new insights and possibilities. With all eyes on exciting digital tools (e.g., augmented reality and machine learning), utilities might be overlooking an opportunity to build a culture of innovation that improves their sustainability.

[1] Fostering Innovation Within Water Utilities. (April 2018). Accessed December 17, 2018 at http://www.waterrf.org/PublicReportLibrary/4642.pdf

Creating digitally enabled innovation

Incorporate digital into the business strategy. Arcadis recently surveyed over 90 utilities and water sector organizations regarding innovation and digital transformation, and 91 percent of water utilities have incorporated or are incorporating digital into their current business plan.

To balance increasing investments needed for infrastructure while achieving affordability across all customer categories, the water sector sees digital as the pathway toward improving asset management, information management and customer service. They recognize that advanced data collection, visualization and analysis enable better decision-making and cost optimization.

Overall, utilities are leveraging digital to increase the efficiency, quality and reliability of services provided to their customers. Perhaps surprisingly, nearly a third of all utilities surveyed saw opportunities to use digital as a way to expand their service offerings.

Near-term opportunities also exist in treatment and delivery systems (i.e., operational technology). These systems are expanding to collect more data from a broader array of sources throughout treatment plants and pipe networks. Utilities see future opportunities to further develop information technology platforms that can integrate their array of data sources for improved analysis and decision-making.

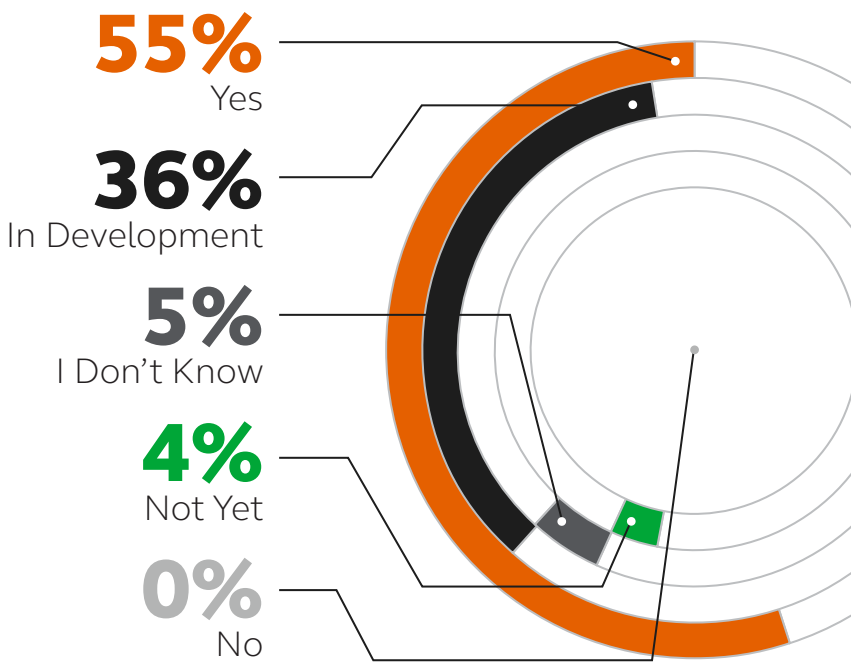


Figure 2: Water utilities incorporating digital in their business plans

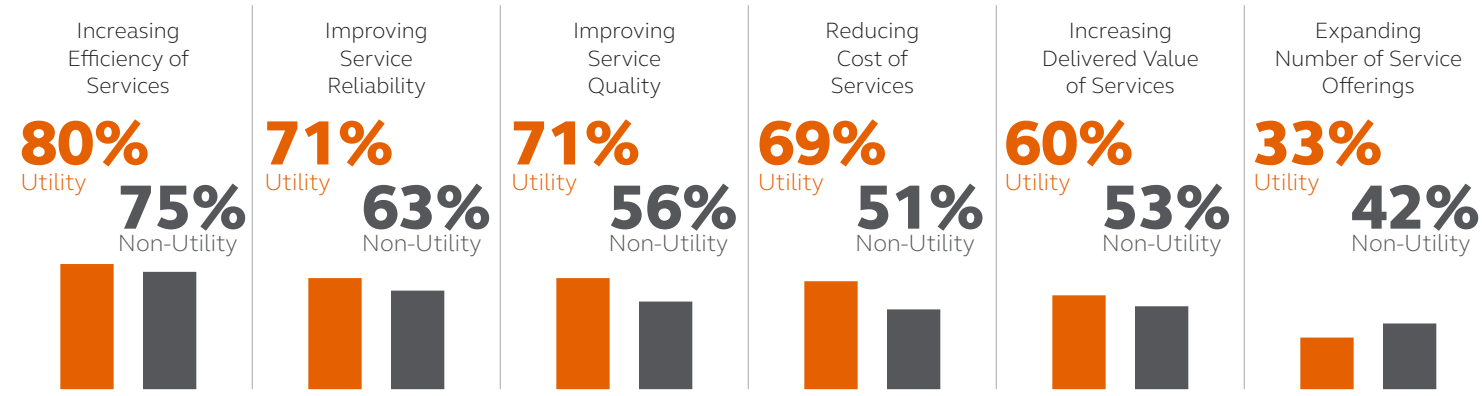


Figure 3: How is digital impacting water utility services?

Harness digital's transformation potential. Buzzwords like machine learning and Big Data conjure visions of optimized efficiency, seamless data sharing and increased customer satisfaction. But these represent digital's potential, not guaranteed benefits from incorporating new technologies. To get there, utilities must recognize that people are the nexus between digital transformation and innovation.

True digital transformation allows organizations to push beyond existing models to reimagine how to approach challenges and who to partner with to solve them. By pushing these limits, digital transformation can foster the culture needed to innovate.

Neglecting the workforce puts transformation efforts at risk. Our survey results suggest that there is a disconnect when it comes to workforce and digital initiatives. Seventy-six percent of utilities identified employees as the most critical stakeholder for successfully implementing digital solutions, and nearly every survey respondent stressed that any transformation effort will fall flat without employee buy-in.

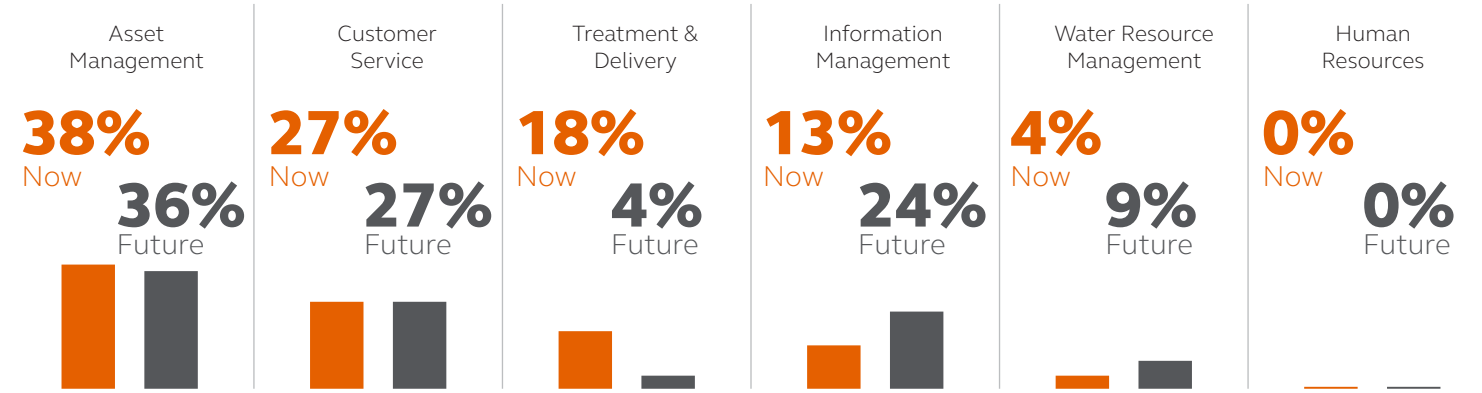


Figure 4: Digital's greatest improvement opportunities

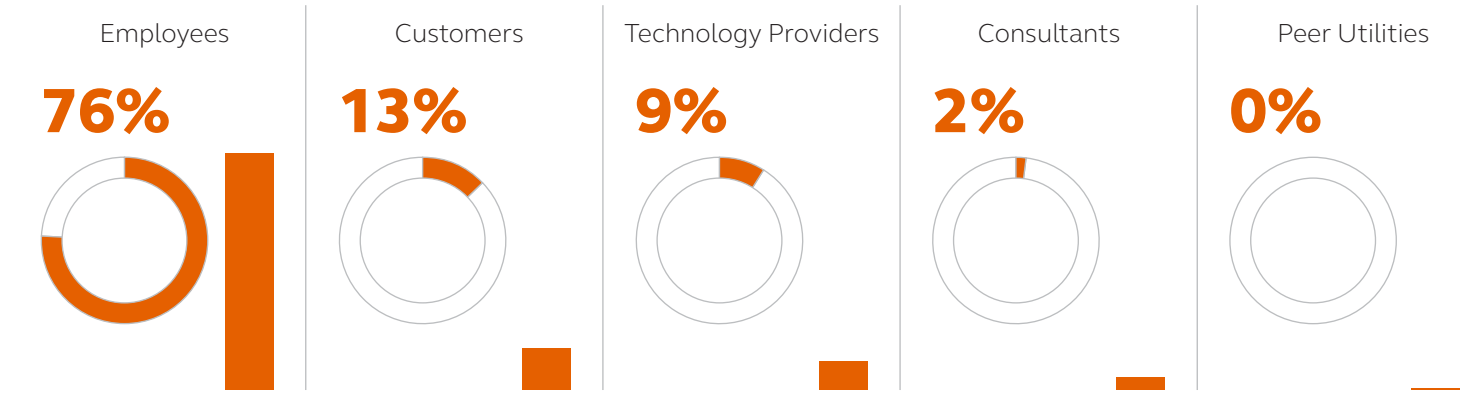


Figure 5: Critical stakeholders for successful digital transformation

Drive transformation through workforce development. Seventy-six percent of utilities say that digital transformation results in workforce development. However, neither workforce development nor recruitment are seen as drivers for change or innovation. Utilities seem to consider workforce evolution as a byproduct of digital transformation rather than an essential success factor.

Other survey results highlight a similar disconnect. Skills development, recruitment and retention rank lowest among benefits of digital enhancements. Human resources (HR) rank last among opportunities for digital transformation now and in the future.

Follow-up interviews with HR directors across the industry revealed the consensus that workforce development should be an intentional outcome of any transformation effort. The one innovation element many utilities are missing out on, according to the interviewees, is effectively targeting creative thinkers who can engage with digital upgrades.

Highlight your change management needs

Non-utility respondents also rank employees as the most critical stakeholders for success, but at a much lower rate than utilities (42 percent vs. 76 percent). If technology implementers are underestimating utilities' change management needs, the adoption process they use to implement their tools might not stick. The non-utility response is more consistent with current utility procurement requirements, which gives greater priority to factors other than employee engagement.

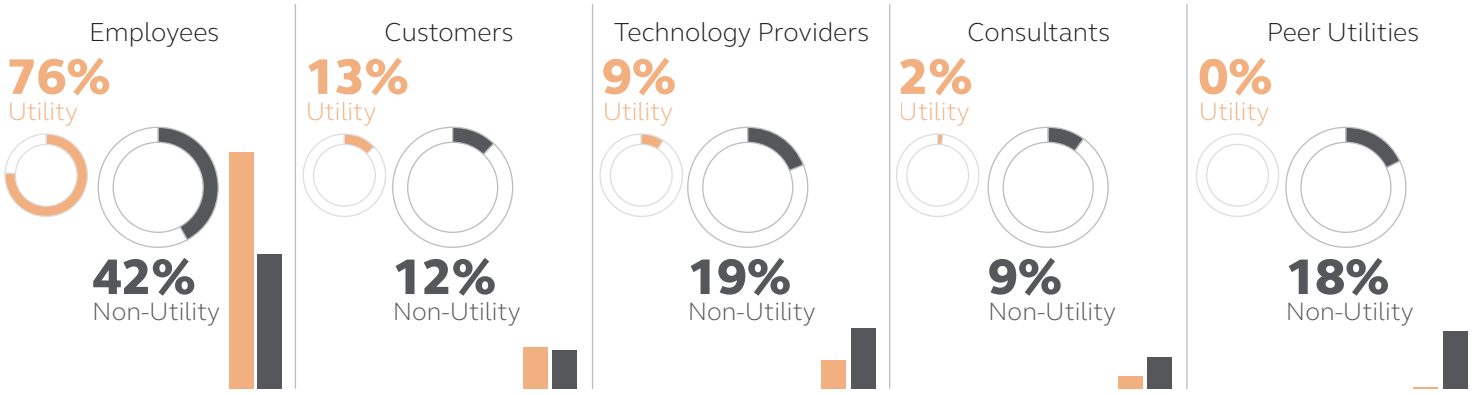


Figure 6: Critical stakeholders for successful digital transformation, utilities and non-utilities

Focusing on the customer experience

As important as it is to focus on the workforce, innovation efforts must incorporate the customer as well. Twenty-seven percent of respondents point to customer expectation as utilities' greatest future innovation opportunity. True evolution combines cutting-edge technologies with new ways of working to address business objectives while keeping customer experience at the core. The use of techniques such as design thinking helps illustrate this approach.

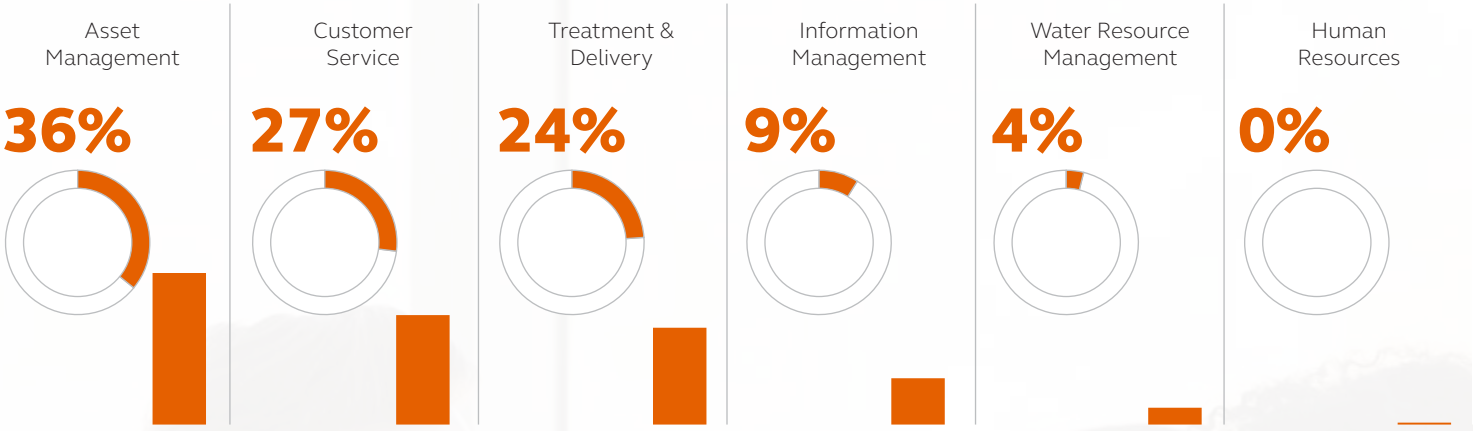


Figure 7: Water utilities' greatest digitally enabled innovation opportunity

Advanced systems support operational needs such as proactive maintenance plans and leak detection, but they can be used to forge stronger bonds with customers, too. Connecting customers to real-time data gives them insight into how they use their water, making them more active participants in water efficiency efforts.

Ultimately, utilities will have to rise to meet the expectations of their digitally-sophisticated customer base. They want the same on-demand access to information, transparency and autonomy they experience with other industries.

Design thinking

Design thinking provides a formidable customer-centric problem-solving framework that challenges teams to consider nontraditional perspectives to effectively leverage younger workers' strengths. It can be especially useful in challenging organizational assumptions and inspiring new ways of thinking.

Cultivating the future workforce

Initiating substantial change can be a challenge. Fortunately, the trends currently influencing the water sector offer an unprecedented opportunity to innovate—particularly regarding culture. Utilities should use these as catalysts for transformation and fully exploit the benefits of a digital transformation:

Replacing the retiring workforce. The retiring workforce is a top 10 concern among water utilities. Some utilities are faced with vacancy rates as high as 50 percent, compounding worries about talent attraction and retention.[2]

Turnover can be a great source of change. Many organizations are responding with a replace-in-kind strategy, but industry leaders are using it as an opportunity to revise core functions, organizational models and workforce development efforts.

"In government, it's hard to avoid hearing, 'We've always done it this way.' But here, new ideas are encouraged and, in many cases, required."

– Gina Hillary
Human Resources Director,
Moulton Niguel Water District

Read their innovation story on page 15.

Prioritizing the right mindset among new recruits is pivotal. Seeking out creative "out-of-the-box" thinkers will accelerate the change in culture. The rising workforce, like the iGen (people born between 1995 and 2012), for example, lives in a technology-rich environment where digital is woven into their everyday lives. They are comfortable with technological evolution and constantly improving solutions.

The water sector is generally overlooked by the rising workforce. Further, the water utility workforce represents less than 18 percent of the overall water sector workforce.[3] Those who do come to utilities see it as an opportunity to give back to their communities. While recruitment and retention rank last among the benefits of digital, the new workforce doesn't want to be stifled by antiquated systems or work environments. Offering candidates the chance to expand their professional skillsets while contributing to the utility's mission will differentiate your organization from the private sector.

[2] American Water Works Association State of The Water Industry Report 2018. Accessed November 30, 2018 at https://www.awwa.org/Portals/0/files/resources/water%20utility%20management/sotwi/2018_SOTWI_Report_Final_v3.pdf

[3] Renewing the Water Workforce: Improving Water Infrastructure and Creating a Pipeline to Opportunity. (June 2018). Accessed December 17, 2018 at http://www.waterrf.org/PublicReportLibrary/4751.pdf

Enhancing capabilities with advanced technology. Twenty-seven percent of utilities see operational efficiency as the primary driver for innovation in the water sector. Artificial intelligence, the Internet of Things, and augmented reality platforms can create more efficient systems, but a plug and play approach could leave a lot of unrealized value on the table.

Realizing the tools' full potential goes back to empowering innovative mindsets. Encouraging your workforce to push their limits and try new approaches presents a path toward true innovation.

"It's not all about bits and bytes and tech, there's also a large cultural component to it. People feel great about being able to innovate and explore."

--Jesper Kjelds
Chief Information Officer, Aarhus Vand

Read their innovation story on page 19.

Leveraging new ways of working. Inspections are increasingly done by drones, automation is reducing staffing needs, and smart diagnostics are optimizing operations and maintenance practices. A digitally enabled organization staffed with teams capable of maximizing its potential might reduce the number of vacancies utilities need to fill as time goes on.

Or, the vacancies might shift to a new area. Eighty-one percent of utilities believe that digital transformation can be a catalyst for innovation, and they ranked collaboration (33 percent), communication (29 percent) and knowledge transfer (22 percent) as digital's most effective workforce development influences. Positions that facilitate information sharing and data-driven decisions, such as data scientists, could become more sought-after in the future.

"It's not about replacing [staff] with automation, it's about enabling them to do their job better. Even if their specific task is replaced by a digital tool, they'll be retrained to work within the new system."

– Steve Price
Treatment Plant Engineering Manager, Denver Water

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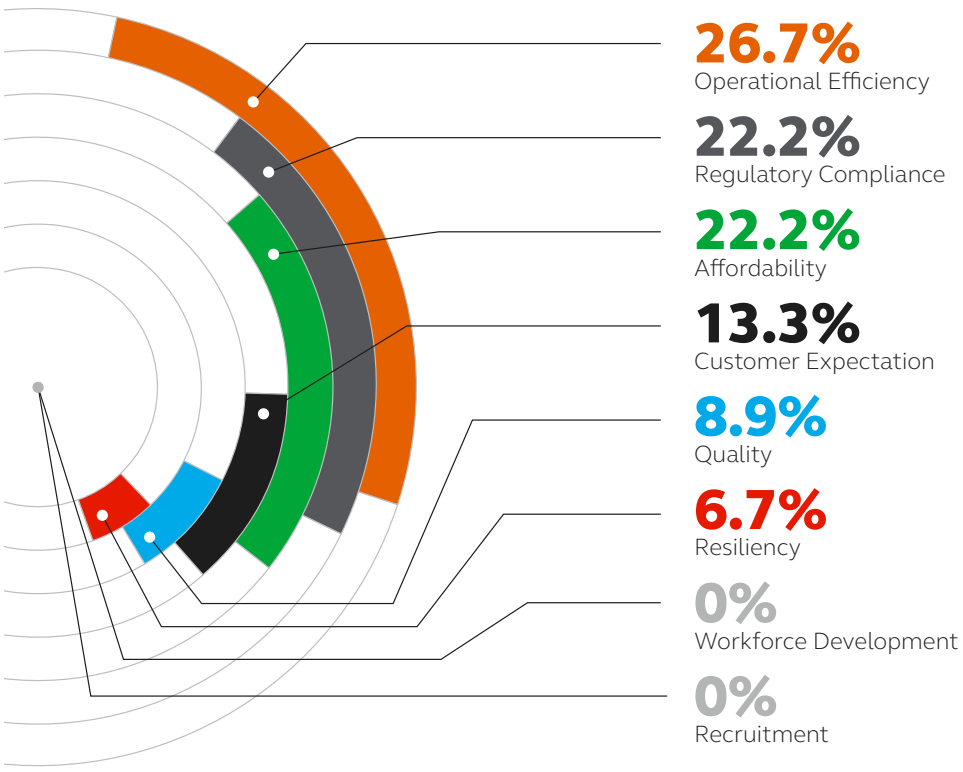

Figure 8: Water utilities' primary driver for innovation

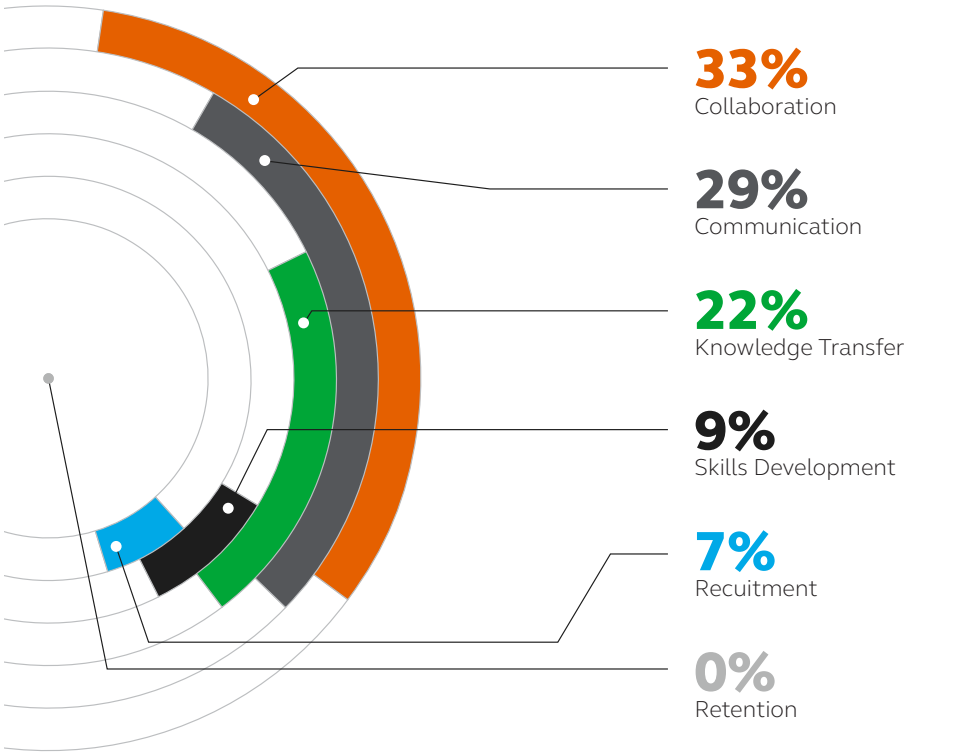

Figure 9: Digital's most effective workforce development influences

Driving innovation with organizational change

Innovation's power is fueled by workplace culture. Digital transformation can be an important catalyst, but technology will always evolve. A mindset that embraces change is stronger than any one tool. Encouraging constant change and exploration will keep your organization on the innovation forefront.

When building your innovation culture, consider the following:

- **Ensure business alignment and organizational support.** Implement a governance committee that makes executives and other leaders a driving force of innovation. This ensures top-down cultural change and alignment of innovation efforts and organizational objectives.
- **Do not create stand-alone digital or innovation plans.** Instead, develop strategic business plans that incorporate digitally enabled innovation as a core element of your strategy. This approach integrates innovation within your business, instead of creating a separate effort that could be disconnected from the functions of the utility.
- **Enable an innovative workforce as a key priority.** Realizing that the work you are doing today will not be the same work you will be doing tomorrow. Partner with talent that might not have been considered by utilities in the past, such as data scientists. And ensure your recruiting efforts focus on the mindset of the candidates, not just on a set of skills that will become obsolete.
- **Leverage digital tools to help you achieve your innovation goals.** Create digital platforms and workspaces angled to recruit and retain next-generation employees. Tear down data silos and use business intelligence tools that allow teams to collaborate with data.
- **Reconsider how you measure success.** New ways of working might render some metrics obsolete or offer new metrics that provide better insights into your performance. Utilities should consider a value management framework and start measuring components such as collaboration, communication, visualization, knowledge transfer, and exploration. When implementing critical tools such as a new computerized maintenance management system (CMMS) or an Advanced Metering Infrastructure system, think about how it connects employees and empowers them to develop imaginative solutions.

Innovation stories

Moulton Niguel Water District

ORANGE COUNTY, CALIFORNIA

Photo provided by
Moulton Niguel Water District
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Building the workforce of tomorrow

In 2012, Moulton Niguel Water District's (MNWD) Board of Directors recognized that a confluence of issues was creating low morale. As HR Director Gina Hillary puts it, "The Board had a directive to fix what was broken. They could see that there was a lot of disruption happening, and labor negotiations were contentious." To build a more collaborative, engaged workforce culture, incoming General Manager Joone Lopez met directly with every employee to identify and prioritize improvement areas.

Their resulting approach blended many of the strong foundations at MNWD with new ways of thinking and digital resources to spur progress. HR adopted a recruiting tool to target and track desirable talent, using it to fill more than 100 recruitments over a 3-year period. Utilizing a collaboration portal, their IT team developed an onboarding network using SharePoint containing resources, training modules and important information that made new employees feel welcome and empowered in their new role.

Director of Finance and Water Resources Drew Atwater said the enhanced recruitment established a resilient foundation to build upon. "We don't just want to fill the immediate need. We're looking long-term. We look for people who have experience using programs like Python, who look at the open source community, and who are nimble enough to have multiple skillsets."

Employee development was enhanced as well. The organization reconfigured how they assessed performance and took an open stance regarding advancement and cross-training. Hillary says the office mantra is, "Every day you come in, you're interviewing for the next job." And even as new digital solutions arise, they're committed to retaining staff rather than replacing them with technology.

Working across departments, each project is fueled by the best ideas, not a particular person or group. "In government, it's hard to avoid hearing, 'We've always done it this way,'" Hillary said. "But here, new ideas are encouraged and, in many cases, required."

By sourcing new ideas and emphasizing teamwork, seasoned veterans and younger staff work hand-in-hand in leveraging new tools to improve processes. This strong collaboration culture also supports a knowledge transfer program for when employees retire or move on to a new position.

Moulton Niguel's focus on people established a foundation for building an on-going digital transformation. This transformation includes recently completed projects (new emergency response plans and Advanced Metering Infrastructure), on-going initiatives (the extensive use of business intelligence tools to run a better business) and planned ones (CMMS upgrade and advanced asset management programs). This approach also ensured attraction and retention of desired talent.

> "Prospective employees come to water utilities because they believe in the mission and to give back to the community," Atwater said. "They come to Moulton Niguel because of our culture of innovation and how we carry out that mission."

As a result of these commitments, MNWD placed first among mid-size workplaces according to the Top Workplace of Orange County program in 2018, an impressive feat for a public utility. Moulton Niguel's flexible approach is building a resilient workforce that can evolve in step with new technology and changing customer needs.

Denver Water

DENVER, COLORADO

Rethinking data management infrastructure

Denver Water aims to leverage the strengths of Big Data using a cloud-based information sharing system. According to Steve Price, Denver Water's Treatment Plant Engineering Manager, they're making data more powerful. "Putting the data at everyone's fingertips creates transparency that allows for more flexibility and quicker responses."

There was a practical cost element involved as well. While upgrading their central campus, the IT department recognized numerous aging servers were costly to maintain and becoming obsolete. A move to the cloud meant no more concerns about server upkeep.

The cloud-based system gathered data from multiple sources in the distribution and treatment systems. This transparent view makes for more proactive decisions and agile reactions. Also, customers will eventually get real-time updates on their usage instead of relying on a database that's updated periodically.

On the workforce side, Price says teams recognize the value of the system upgrades. "It's not about replacing them with automation, it's about enabling them to do their job better. Even if their specific task is replaced by a digital tool, they'll be retrained to work within the new system, much like meter readers were when that process went digital."

In the future, he expects the organization to move to Advanced Metering Infrastructure that will allow teams to interact with the system remotely. Expanding capabilities will be a recruitment tool, too. "Competing for talented workers without the resources of a major tech company or large business thins the talent pool. The ability to operate tasks remotely means someone's expertise can have a wider reach, so we can recruit outside of our immediate area."

When asked to share any tips for utilities engaging in a similar initiative, Price stressed partnerships. "Utilities aren't on their own," he said. "We can learn from each other in a way that everyone benefits.

"Partner with someone who can give you the dos and don'ts of starting an information-sharing program. It's a long process, so start slow and build a basis of what you're doing before moving forward. Don't jump into a big investment, run a pilot program to measure whether your plan will help you or your customers."

Photo provided by
Aarhus Vand ©2018

Aarhus Vand

AARHUS, DENMARK

Embracing digital transformation and disruption

Digital innovation can elevate a water utility's role in its community, and Aarhus Vand is an excellent example. "We want to stay relevant and avoid a situation where someone else disrupts the industry," Chief Digital Information Officer Jesper Kjelds said. "If disruption is needed, we want to be leading a part of that transformation."

Already ahead of the curve, the utility is working with and plans to make extended use of artificial intelligence, machine learning and perhaps even blockchain into future projects. Still, the power of people is paramount.

"It's not all about bits and bytes and tech, there's also a large cultural component to it," Kjelds said. "People feel great about being able to innovate and explore. They are embracing the digital transformation because they too see that we can do things better and smarter. We believe that we, with our deep domain knowledge and experience, can exploit new IT technologies to greatly increase our productivity and develop solutions for the utility and our customers."

"Automation is a big asset for the utility business. We want to capture in real time what's going on in the field and at our facilities so we can optimize and improve the processes – from wellfield to tap, from rainfall to effluent," Kjelds noted. The utility leverages geographic information systems alongside field Internet of Things sensors to build data-informed plans and respond quickly to customer needs.

Customer experience is a major driver for success. "Customer service is an indicator for overall performance, so we track that to see how our transformation is working," Kjelds said. Digital monitoring allows for more proactive service responses, and giving customers access to usage data helps them determine the specific services they need. The utility even leverages social media to bridge connections with customers beyond monthly bills. All play a role in increasing overall customer satisfaction.

Environmental impact is a key measure of progress as well. Aarhus Vand's wastewater treatment plant at Marselisborg in Aarhus is 100 percent net energy positive. It uses that energy to power operations elsewhere, including returning electricity to the power grid and excess heat to the city's district heating system. The unique ability to reuse and recover materials from the waste stream, coupled with future projects to turn wastewater itself into an asset it can distill and make useable, makes Aarhus Vand stand out among water sector leaders.

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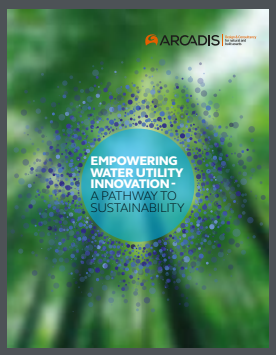

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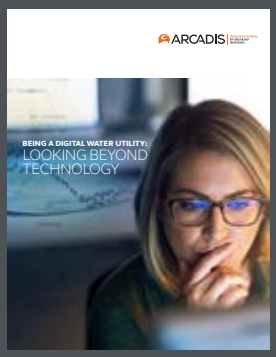

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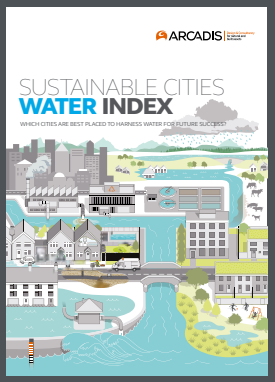

SUSTAINABLE CITIES WATER INDEX: HARNESSING WATER FOR LONG-TERM SUCCESS

Contacts

Jason Carter
Water Strategy & Innovation Lead

jason.carter@arcadis.com

Estaban Azagra
Water Business Advisory Lead

esteban.azagra@arcadis.com

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