SWAN AMERICAS ALLIANCE-EPIC REPORT

How Utilities Organize for Digital Innovation

April 2023

Lead Authors:
Eric Bindler (Bluefield Research), **Reed Van Beveren** (EPIC), **Jennifer Suttles** (Gwinnett County), **Tim Medearis** (Innovyze/Autodesk), **Nishanth Senthilkumar** (HR Green/Houston Water), **Sandra DiMatteo** (Bentley), **Shirley Ben-Dak** (SWAN Forum).

Contents

SWAN AMERICAS ALLIANCE

Contributors:
Janelle Boelter (Las Vegas Valley Water District), **Matthew Santella** (City of Marlborough, MA), **Mike Beardslee** (Loudoun Water), **Flavio Eduardo Soares e Silva** (CORSAN), **Joukje Keuning** (Vitens), **Nima Najafi** (Metro Vancouver), **Alan Tucker** (Brown & Caldwell), **Adam Tank** (Transcend), **Kevin Shipp** (Transcend), **Jessica Mahr** (EPIC), **Joel Knight** (Optimatics), **Christobel Ferguson** (WRF), **Camilla Braithwaite** (Rezatec), **Ken Thompson** (Jacobs), **Aditya Ramamurthy** (Kennedy/Jenks), **David Rose** (Thales Water Advisors), **Nina Rossiter** (formerly Bluefield Research), **Mathilde Guglielmi** (formerly SWAN Forum), **Erika Scelfo** (formerly SWAN Forum).

With special thanks to over 30 global utility survey respondents and interviewees for sharing further insights.

Environmental Policy Innovation Center · AUTODESK · bluefield RESEARCH

Executive Summary

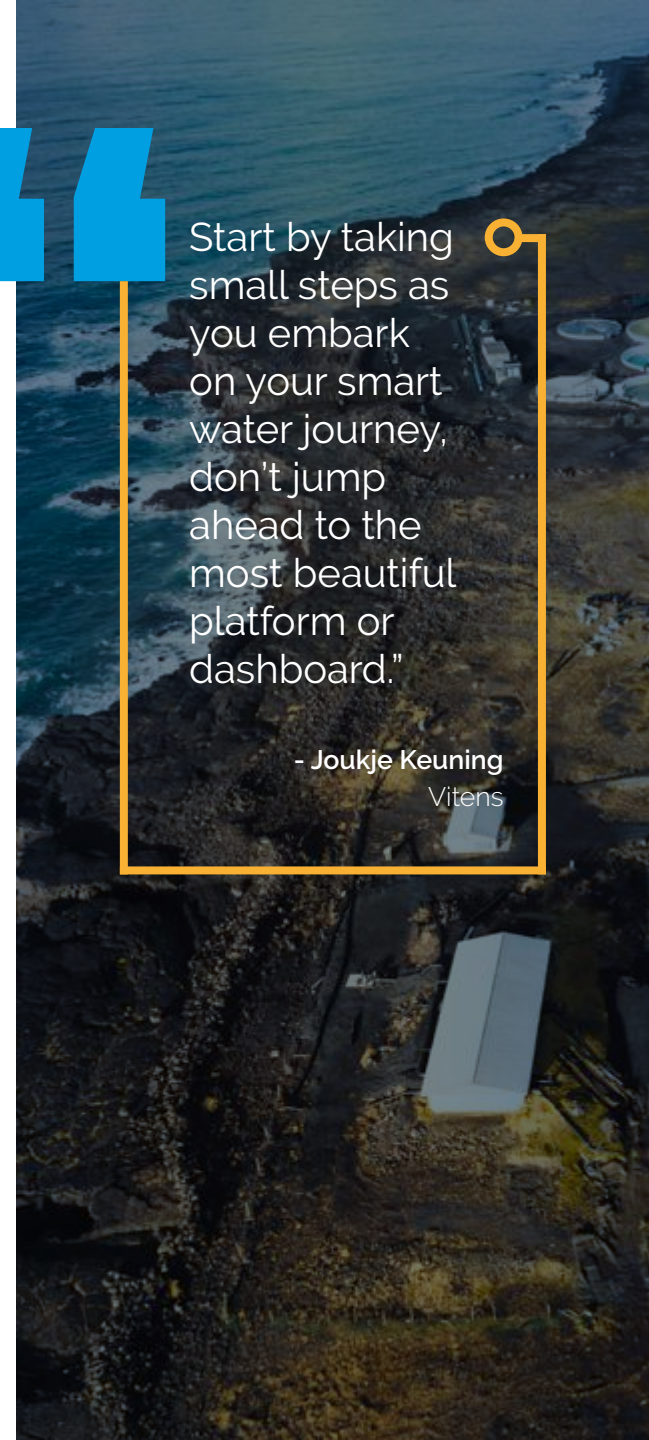
Rising population rates, federal and local regulatory demands, deteriorating infrastructure, environmental challenges, increased customer transparency expectations, limited or competing budgets, and poor operational and network performance are among some of the key phenomena sparking the adoption and acceleration of smart water technologies.

While data-driven technologies remain a critical part of the smart water movement across drinking water, wastewater, and stormwater utilities, the successful uptake of innovative tools remains largely dependent on people and organizations. This ranges from utility management and staff buy-in at the onset of a project, to the extent to which operators are comfortable with the implemented changes following technology roll-out.

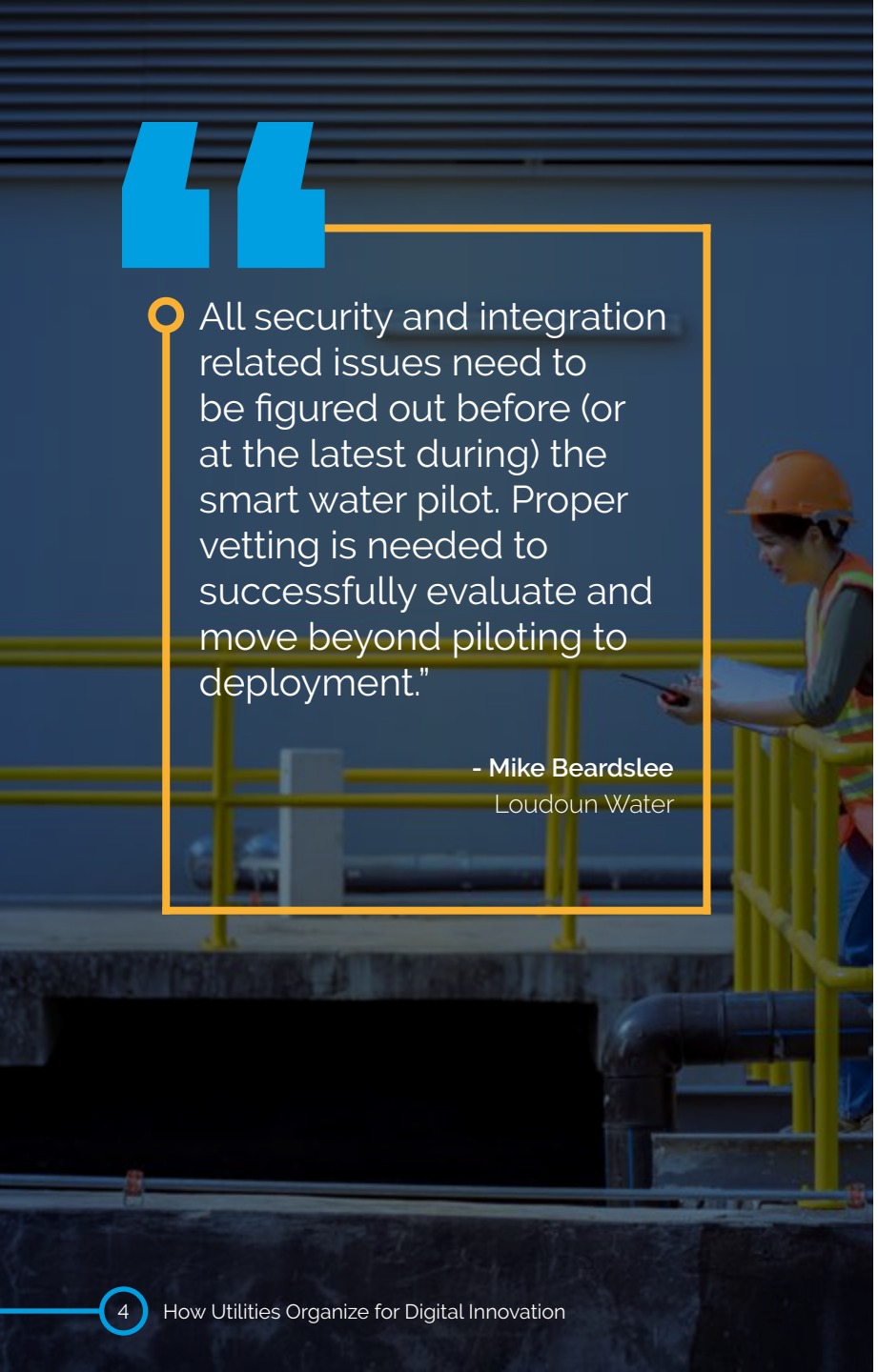
Therefore, the technology itself isn't the issue. In fact, the market landscape of smart water technologies has been growing steadily, consistently adding to the exciting ecosystem of both startups and mature companies alike. What's more intriguing and often complex is unpacking the human and organizational factors impacting technology adoption and implementation.

So how do utilities organize themselves to effectively embrace digital innovation? How do utilities address data sharing roadblocks both internally and externally? Is there an optimal organizational structure for utilities to consider when embarking on their smart water journeys? Are utilities fostering a positive environment to promote innovation within their teams to ensure continuity? What can we learn from other utilities on how their institutions position themselves for smart water success?

In this SWAN Americas Alliance report launched in partnership with The Environmental Policy Innovation Center (EPIC), we dive into some of the analysis behind these questions to help uncover utility best practices, advice for preventing unexpected outcomes, and practical insights that may shape future smart water implementation. This report follows the release of a 2022 SWAN Americas Alliance survey conducted with EPIC and Bluefield Research, covering responses from 38 utility workers from 34 diverse water, wastewater, and stormwater utilities across 10 countries (ranging in size from 4,000 to more than 4 million people served). In compiling this report, we conducted strategic in-depth interviews with select utility respondents to add further commentary on best practices and lessons learned from practical digital innovation examples.



> Start by taking small steps as you embark on your smart water journey, don't jump ahead to the most beautiful platform or dashboard."
>
> **- Joukje Keuning**
> Vitens



> All security and integration related issues need to be figured out before (or at the latest during) the smart water pilot. Proper vetting is needed to successfully evaluate and move beyond piloting to deployment."
>
> **- Mike Beardslee**
> Loudoun Water

We invite you to read on to learn about some of the highlights we uncovered during our research. This includes identifying key factors driving and inhibiting digital innovation, understanding how perceptions of innovativeness can differ from day-to-day reality within a utility organization, noting which key players and stakeholders set the innovation agenda, and highlighting specific structures and practices that utilities can put in place to foster an innovative data-driven culture.

Notable Report Highlights:

Innovation Drivers & Inhibitors (Chapter Two):

- The top three inhibitors included lack of time/bandwidth, organizational structure/bureaucracy, and unclear business case/ROI for digital technologies.
- For those utilities facing budget constraints, consider creative ways to fund digital innovation, such as making the business case by connecting project ROI and operational and labor-related savings.

Innovation Perceptions vs. Actions (Chapter Three):

- The relationship between technology adoption and innovation involves a feedback loop. An organizational commitment to innovate is likely to build momentum over time and have benefits for attracting technology talent and partnering with other organizations.

Innovation Influencers & Stakeholders (Chapter Four):

- While upper management, engineering, and IT often drive technology adoption, no one set of stakeholders should be single-handedly responsible for innovation, and all groups have a role to play in ensuring that innovation is successful at an organizational level.

Institutional Structures & Practices (Chapter Five):

- Although over 80% of survey participants stated that they have some form of institutionalized innovation, 'very innovative organizations' supplied more opportunities for active staff participation.

Chapter One:
Survey Background / Respondent Demographics

Utilities have traditionally been reluctant to embrace innovation for various reasons. They need to reliably and consistently provide essential services and protect public health, as well as be responsible stewards of ratepayer funds. Justifiably, utilities have typically been risk-averse organizations, and have subsequently been slow to adopt and realize the benefits of technological innovation.

Fig 1.1 Respondent Role

7 Frontline Staff
18 Middle Management
13 Upper Management/ Executive

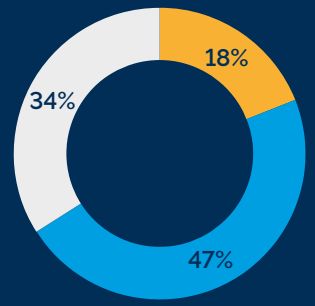


Fig 1.2 Utility Size

14 More than 1,000,000 people
18 Between 100,000 and 1,000,000 people
6 Less than 100,000 people

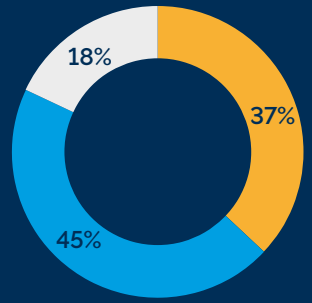


Fig 1.3 Utility Map

1. Anglian Water, East of England, United Kingdom
2. Bellevue Utilities, Bellevue, WA, USA
3. City of Grand Rapids, City of Grand Rapids, USA
4. City of Marlborough, Marlborough MA, USA
5. City of Princeton, Princeton, USA
6. City of Vaughan, Vaughan, Canada
7. Cobb County-Marietta Water Authority, Marietta, Georgia, USA
8. Coliban Water, Bendigo, Australia
9. Corsan, Porto Alegre, Brazil
10. Destin Water Users, Inc., Destin, USA
11. ESSBIO, Concepcion, Chile
12. Evansville Water & Sewer Utility, Evansville, IN, USA
13. Florida Power and Light Company, West Palm Beach, USA
14. Global Omnium, Valencia, Spain
15. Great Lakes Water Authority, Detroit, MI, USA
16. Halifax Water, Halifax, Canada
17. Loudoun Water, Loudoun County, Virginia, USA
18. Los Angeles Department of Water & Power, Los Angeles, USA
19. Louisville Water Company, Louisville, USA
20. Logan Water, Logan City, Australia
21. Mapleton City, Mapleton, USA
22. Metropolitan St. Louis Sewer District, St. Louis, USA
23. Metro Vancouver, Metro Vancouver Regional District, Canada
24. Northwest Suburban Municipal Joint Action Water Agency, Chicago Suburbs, USA
25. Oconomowoc WWTF, Oconomowoc, USA
26. Raritan Township MUA, Flemington, NJ, USA
27. San Antonio Water Company, Upland, USA
28. Santa Ana Watershed Project Authority, Riverside, USA
29. Seminole County Utilities, Sanford, USA
30. Southern Nevada Water Authority, Las Vegas/Henderson/North Las Vegas/ Boulder City, USA
31. Unitywater, Sunshine Coast, Australia
32. VCS Denmark, Odense and Nordfyn, Denmark
33. Vitens, Zwolle, Netherlands
34. Watercare, Auckland, New Zealand

Research into organizational innovation indicates that mature organizations are designed for delivery, not discovery. Innovation rarely comes from deep inside the establishment, where incumbents defend past decisions and don't give up power easily, and may feel bewildered by and fearful of uncertainty and change.

Fresh ideas come from those who think "outside the building." These are often visionaries who see the value of innovation and work around, underneath, and between the organizational antibodies that challenge new endeavors. They form autonomous groups within the organization, with different goals and metrics. They incentivize long-term viability and sustainable business models, in which the benefits of innovation outweigh the cost. They move from uncertainty to certainty at the least cost and the greatest speed, keeping the cost of exploration below the level of stakeholder and public scrutiny.

Most importantly, they are committed and patient, sustaining their efforts over long periods of time as the organization slowly adapts.

To answer the question of how water utilities can organize to promote digital innovation, the Smart Water Networks Forum (SWAN) Americas Alliance and the Environmental Policy Innovation Center (EPIC) partnered to conduct an in-depth survey in 2022. The survey included critical questions surrounding human and organizational factors impacting adoption and implementation of innovation.

The collaborative group surveyed 38 utility employees from 34 water, wastewater, and stormwater utilities across 10 countries, ranging in size from less than 4,000 to more than 4 million people served. The 38 respondents represented a diverse group of industry voices, with differing backgrounds, roles, and perspectives. The respondents included those new to the industry as well as those with more than 20 years of experience; those from a range of departments, including operations, IT, engineering, asset management, administration, and laboratory; those from both public and private utilities; and those who served in frontline staff, middle management, and upper management roles. The makeup of the survey provided a distribution of perspectives across several key industry cross-sections.

While SWAN made an effort to survey a diverse group of utilities, it is important to note that a majority of respondents were SWAN Members, who tend to seek out innovative solutions for service delivery, and who also tend to be larger utilities. Of the 34 utilities, only one utility served fewer than 5,000 people. For this reason, these survey results may not fully represent the utility population at large.

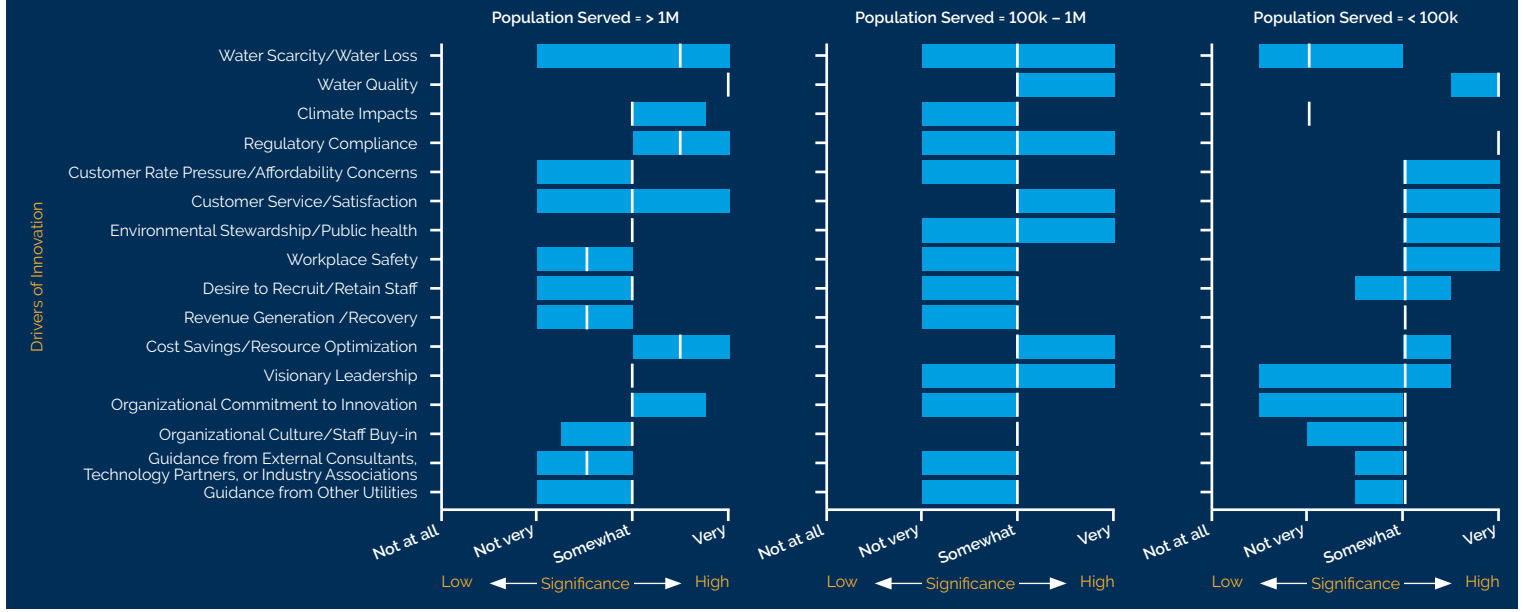
Chapter Two: Digital Innovation Drivers and Inhibitors

Digital transformation can be driven by many different factors, yet inhibitors can stop a project in its tracks, delaying progress, or prompting setbacks from which some initiatives never recover. Why are some utilities more successful than others in implementing digital advancements? To gain insights into the gap between the rapid pace of technological innovation and the rates of assimilating digital technologies into utility organizations, our survey examined the most significant drivers and inhibitors of innovation in the global water industry.

Drivers of Digital Innovation

According to our survey, the top drivers of digital innovation are tied to the core principles of maintaining essential service of safe and affordable drinking water, delivered efficiently and in compliance with regulations. Survey respondents identified water quality, regulatory compliance, and cost savings and resource optimization as the top three overall drivers, with customer service and satisfaction and environmental stewardship and public health also ranking high on utilities' priority list.

Figure 2.1 Drivers of Innovation by Utility Size



However, utilities of different sizes tended to emphasize different sets of innovation drivers. More significant drivers for larger utilities (i.e., those serving more than one million people) were climate impacts, organizational commitment to innovation, and water scarcity and water loss. For smaller utilities (i.e., those serving less than 100,000 people), customer rate pressure and affordability concerns, workplace safety, a desire to recruit and retain staff, and revenue generation and recovery figured more prominently in digital decision-making.

Note: In the figure above, we show the range of responses from the 25th to 75th percentile to illustrate broad differences in the significance of these drivers. The white line represents the median response.

Drivers based on Organization Size

Our analysis also found that certain drivers go hand-in-hand. For example, respondents often identified visionary leadership, organizational commitment to innovation, and organizational culture and staff buy-in as a powerful cluster of motivating factors that work together to move innovation forward within utility organizations.

> The most effective way to get buy-in for digital innovation projects is to tie them to cost savings. Recently, sustainability and system optimization have become additional key success factors in championing digital water initiatives within the organization."

- remarked a Senior Project Engineer at a North American water utility serving over 1M people

> We have a long history of innovation. Innovation projects used to be driven solely by cost savings but now it has shifted to focus on saving water and reducing water loss."
>
> **- Janelle Boelter**
> Director of Infrastructure Management
> Las Vegas Valley Water District

Inhibitors to Digital Innovation

Conversely, the top three inhibitors for digital innovation identified by our survey respondents were lack of time and bandwidth, organizational structure and bureaucracy, and an unclear business case or ROI for digital technologies. These three inhibitors are intricately intertwined, each affecting the others. When utility staff are consumed with putting out fires, they have no time or bandwidth for proactive projects, and digital innovation can suffer as a result. However, if staff and management don't have a clear understanding of the business case for digital adoption or lack a clear organizational framework for enabling innovation, they are unlikely to allocate the time and resources needed to explore innovative solutions, perpetuating the cycle.

As with drivers, innovation inhibitors varied based on utility size. The more significant inhibitors for larger utilities were siloed data and systems, as well as organizational structure and bureaucracy. Over time, assets and systems get more and more complex and siloed between departments, making sharing of information and insights difficult or time-consuming for very large organizations. Modernizing the utility's digital foundation towards open interoperability helps to break down those silos, improving data accessibility and connectivity and enabling collaboration between engineering and operations, a clear benefit of digital innovation.

In smaller utilities, the more significant inhibitors center around cybersecurity concerns and a lack of comfort and familiarity with digital technologies. Organizational structure presents less of a challenge for smaller utilities, which tend to be less bureaucratic than their larger peers. Thus, moving digital innovation projects along can be faster and easier in smaller organizations if the technology is well-understood, and the ROI is clearly demonstrated.

Figure 2.2 Inhibitors of Innovation by Utility Size

Note: In the figure above, we show the range of responses from the 25th to 75th percentile to illustrate broad differences in the significance of these drivers.

As was the case for drivers, some clusters of innovation inhibitors were apparent, particularly in three areas:

1. **High External Scrutiny:** Although regulation can sometimes be a driver of innovation, survey responses reflected that regulatory pressure, political pressure, or public scrutiny are often related. When all three are present, it can create a risk-adverse environment which may prevent a utility from trying out new innovations.
2. **Low Internal Buy-In:** Survey responses on management and staff buy-in, unclear ROI, and low comfort with digital technology often went hand in hand, underscoring the necessity of meeting multiple parts of the organizations where they are and taking the time to build the levels of comfort and understanding throughout an organization.
3. **Internal Process Challenges:** According to survey respondents, the significance of bureaucracy as an inhibitor mirrored the significance of policies related to IT and cybersecurity in many cases.

> People with a lot of experience know by heart what to do (so they might not see the value in some digital innovations). This can inhibit the success of a digital project. Yet new employees that are more comfortable with digital tools need to gain the right knowledge of the assets and systems from experienced people. Technology is bridging this gap."
>
> **- Joukie Keuning**
> Program Manager Infra 2025 (Vitens)

Are Certain Inhibitors Making It More Difficult to Take Action?

By looking at how responses change when certain inhibitors are viewed as significant or very significant, we can begin to understand how inhibitors map onto actions. For example, respondents for which "cybersecurity concerns" were significant, tended to rate collaborative actions that involve other departments or organizations as more difficult than other organizations. For technology evaluation actions, that is piloting and procuring technologies, inhibitors such as public scrutiny, lack of budget, and political/regulatory pressure seemed to be more significant. It is also worth noting that some inhibitors, such as lack of time/bandwidth, were so widespread among survey respondents that they likely affected all actions. The following table summarizes the potential inhibitors with the greatest differential effect on particular groups of actions:

GROUPS OF INNOVATION ACTIONS	PRIMARY INHIBITORS
Collaborative actions: • Share New Ideas with Management/Other Departments • Share Data with Another Department • Access Data from Another Department • Jointly Fund a Technology Project with Another Department • Share Data with an External Partner (e.g., University, Consultant, Tech Provider)	Organizational Structure/Bureaucracy Cybersecurity Concerns Lack of Management Buy-in Public Scrutiny Past Experiences with Failed Technology/Innovation Projects
Evaluation actions: • Pilot a New Technology • Procure a New Technology	Public Scrutiny Lack of Budget Regulatory/Political Pressure
Implementation actions: • Implement a New Technology	Lack of Staff Buy-in
Hiring actions: • Attract/Hire New Technology Talent • Create New Technology Positions	Lack of Management Buy-in Lack of Budget

Chapter Three: Innovation Perceptions and Actions

Innovation Perceptions

We asked survey respondents questions about how innovative and comfortable with digital technologies their organizations are overall. About half (55%) of respondents rated their organization as "somewhat innovative." Another third (32%) thought that their organizations were "very innovative" and the remaining 13% said "not very innovative."

Although comfort with digital technologies is linked to how innovative an organization is perceived to be, there were meaningful differences in how respondents answered these questions. For example, all five respondents who said that their organizations were "not very innovative" also said that they were "somewhat" or "very" comfortable with digital technologies. Conversely, seven respondents at organizations with a lower level of comfort with digital technologies saw themselves as "somewhat" or "very" innovative. This underscores that innovation is more about trying new ways of working regardless of what level of previous experience an organization has with digital technologies.

A variety of factors can inform perceptions of innovation and comfort with digital technology, such as where a person sits in the organization and how much industry experience they have. In general, more senior and more experienced survey respondents rated their organization's innovation capacity and comfort with digital technologies higher than newer or more junior staff did. Although organizational factors, such as utility size and structure, can also be at play, they were less clearly related to the perceptions of respondents in this survey.

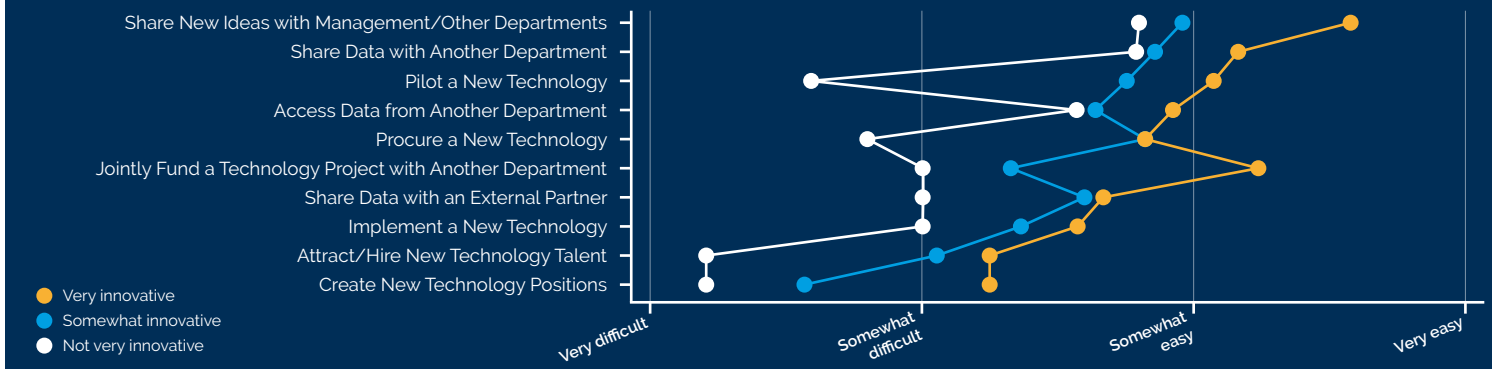
Figure 3.1 Innovation Perception and Comfort with Digital Technologies

Note: the table below shows the number of respondents by their responses to questions of how innovative and how comfortable with digital technologies they perceive their organizations to be.

How "innovative" or forward-thinking do you think your utility is as a whole?	Very	Somewhat	Not very	Not at all
Not very	1	4		
Somewhat	4	11	5	1
Very	3	8	1	

How comfortable do you think your utility's workforce is with digital technology?

Figure 3.2 Innovation Perception and Technology Adoption



Note: the figure above shows the tasks that are rated as easiest at the top and most difficult at the bottom, and gives the average rating grouped by how innovative the utility was perceived to be.

Relationship between Perception and Actions

Another way to understand what innovation means to an organization is to look at how perceptions of innovation translate into actions. The survey asked respondents about how easy or difficult certain actions were on the road to adopting new technologies, such as sharing ideas and hiring technology talent. A few patterns emerged when looking at how actions are related to perceptions of innovation. First, some actions, such as hiring and creating new positions, were consistently rated as more difficult. Second, when compared to others, more innovative organizations rated each action as less difficult on average, especially when it comes to procuring technologies and hiring technology talent.

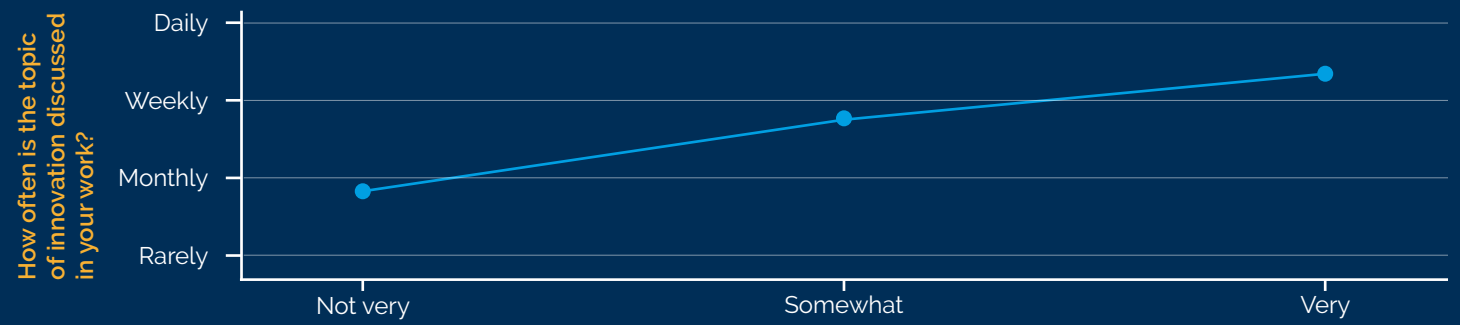
Innovation Perception and Technology Adoption

A similar pattern emerges for organizations that are very comfortable with digital technology versus those that are not as comfortable: the more comfortable the organization is, the easier these actions are on average. Furthermore, in a related question survey respondents were asked to rank the following phases of technology adoption from longest to shortest:

- Introduction / internal promotion of new idea
- Technology selection / procurement
- Rollout / implementation
- Staff adoption / wide-scale utilization

Very innovative organizations and those that were very comfortable with digital technology consistently rated the introduction and promotion step as the shortest, whereas the opposite was true for other groups.

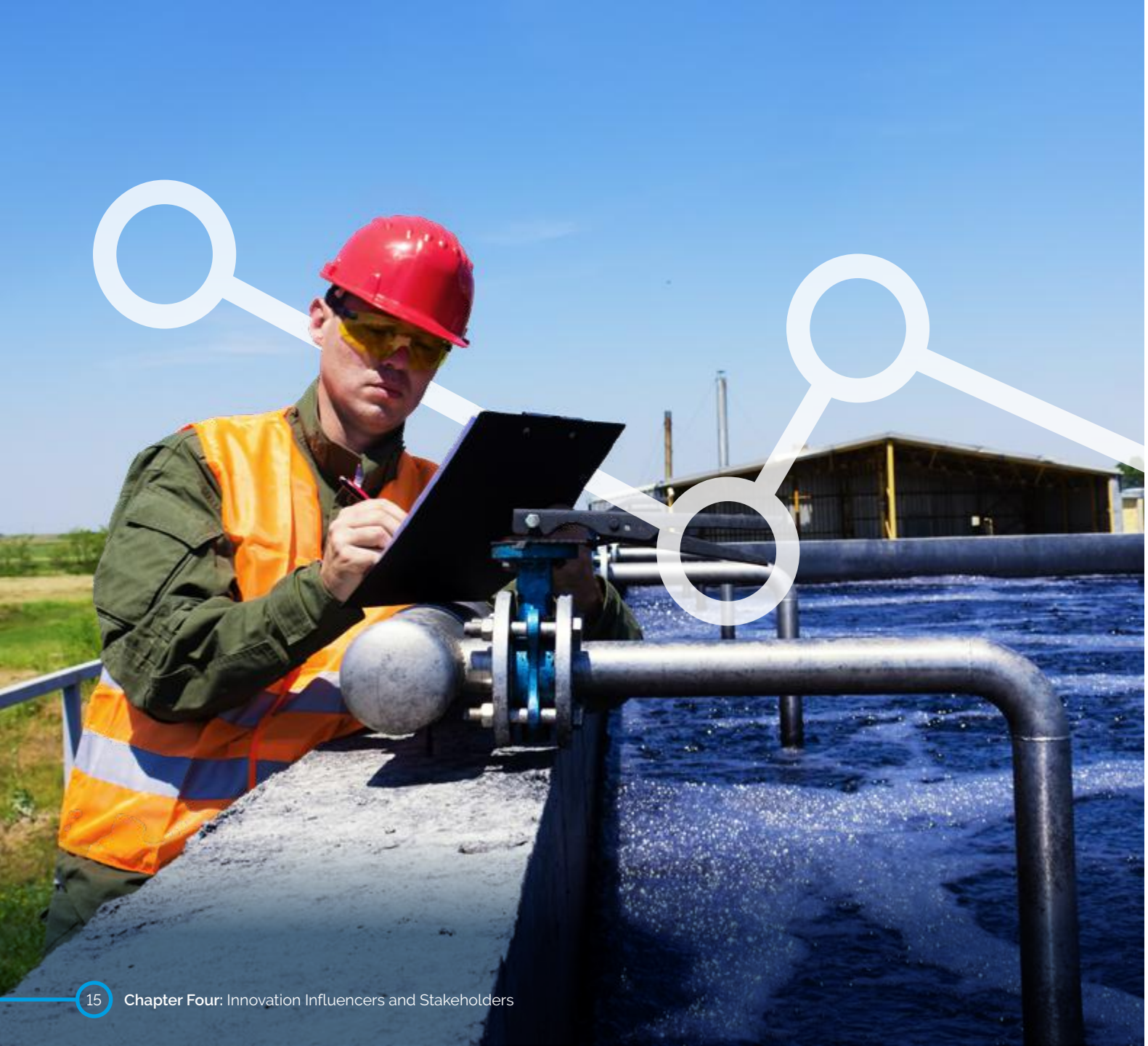
Figure 3.3 Innovation Perception and Discussion



What do these results suggest about the relationship between perceptions of innovation and actions? On the one hand, when it is easier to take certain steps, such as hiring technology talent and procuring technologies, that can lead to quicker technology adoption and innovation cycles. But the reverse may also be true: for example, organizations already perceived as more innovative could be more attractive to job seekers with sought-after technology skills or have an easier time finding partners. For example, Joukje Keuning from Vitens in the Netherlands said that digitization projects at their utility help keep staff engaged and reduce turnover, and the resulting tools can help with recruiting and supporting junior staff members and setting them up for success. Perhaps the relationship between technology adoption and innovation is best thought of as a feedback loop. An organizational commitment to innovate is likely to build momentum over time.

One place to start building momentum is by simply talking about innovation more often. Among those in our survey, the most innovative organizations discussed digital innovation daily to weekly on average in a variety of settings ranging from dedicated innovation-focused meetings to standard project reviews to regular presentations to leadership. This fits in with comments from Janelle Boelter of Las Vegas Valley Water District, a utility with a long history of innovation: "Putting innovation at the forefront of a utility's goals and finding ways to work across company lines is key."

> Putting innovation at the forefront of a utility's goals and finding ways to work across company lines is key."
>
> **- Janelle Boelter**
> Las Vegas Valley Water District



Chapter Four: Innovation Influencers and Stakeholders

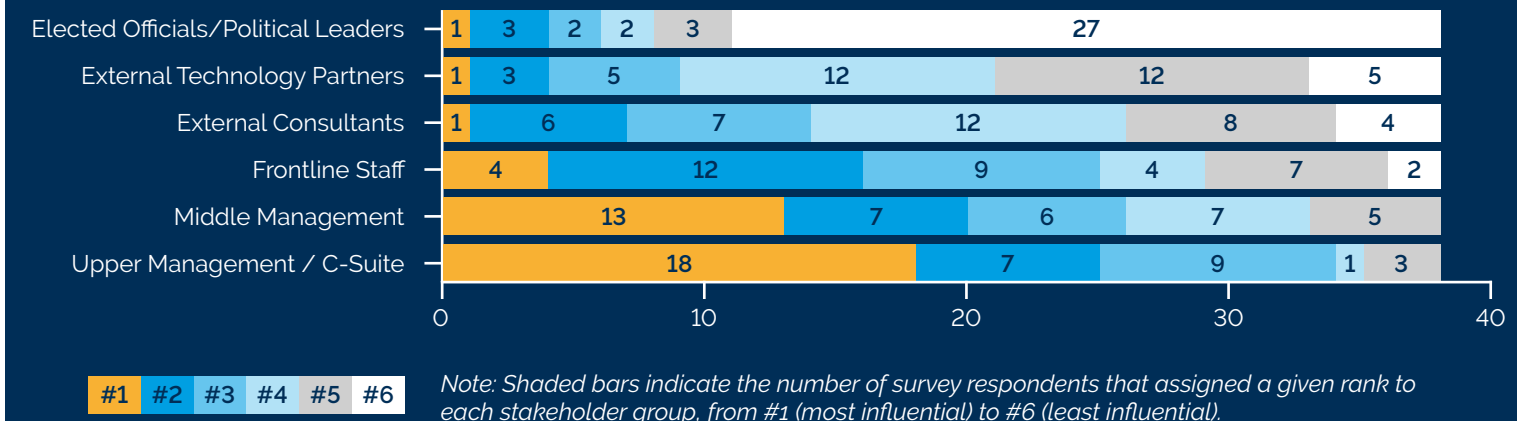
A good idea can come from anywhere, and anyone, in a utility organization. A director or superintendent, veteran plant operator, or even a summer intern can find innovative new ways to solve problems or do their jobs more effectively. That being said, institutional habits and structures typically make it so that certain types of individuals or groups play bigger roles than others in driving innovation at the organizational level.

In order to better understand these dynamics, our survey included questions about innovation influencers—the people and teams that utility respondents feel are most responsible for steering smart water innovation within their organizations. Innovation influencers can include both stakeholder groups (e.g., upper management, frontline staff, external consultants) and utility departments or functional areas (e.g., engineering, finance, IT).

Stakeholder Groups

When asked to identify innovation influencers among six key stakeholder groups, survey responses reflected the traditional hierarchical management structures within utility organizations. Upper management and C-suite personnel were ranked as the first or second most influential group by 66% of respondents, followed by middle management (53% of respondents) and then frontline staff (42% of respondents). External stakeholders, such as consultants, technology partners, and elected officials or political leaders, were generally considered to play a smaller role in driving utility innovation than internal staff, with each selected by only 10% to 20% of respondents as the first or second most influential stakeholder group.

Figure 4.1 Innovation Influence Rankings by Stakeholder Group



Note: Shaded bars indicate the number of survey respondents that assigned a given rank to each stakeholder group, from #1 (most influential) to #6 (least influential).

While this hierarchical pattern held true across the survey results as a whole, rankings varied for utilities and respondents of different types. For example, small and mid-sized utilities (i.e. those serving less than 100,000 people) with limited staff bandwidth and technical expertise tend to rely more heavily on external consultants and technology partners to propel their smart water innovation initiatives, with these external groups selected by nearly 30% of small and mid-sized utility respondents as the first or second most influential figures.

Responses also varied according to respondents' perceptions of how innovative their own utility organizations were, highlighting the roles that different types of influencers play for utilities at different stages of their smart water innovation journeys. For respondents that ranked their organizations as "very innovative," upper and middle management were identified as even more influential than in "somewhat innovative" or "not very innovative" utilities, signaling the importance of management buy-in and top-down leadership in setting the innovation agenda in the water sector. Meanwhile, 60% of respondents that considered their organizations to be "not very innovative" identified external consultants as the first or second most influential stakeholder group, suggesting that smart water innovation has more success and traction when it comes from within an organization rather than from outside of it.

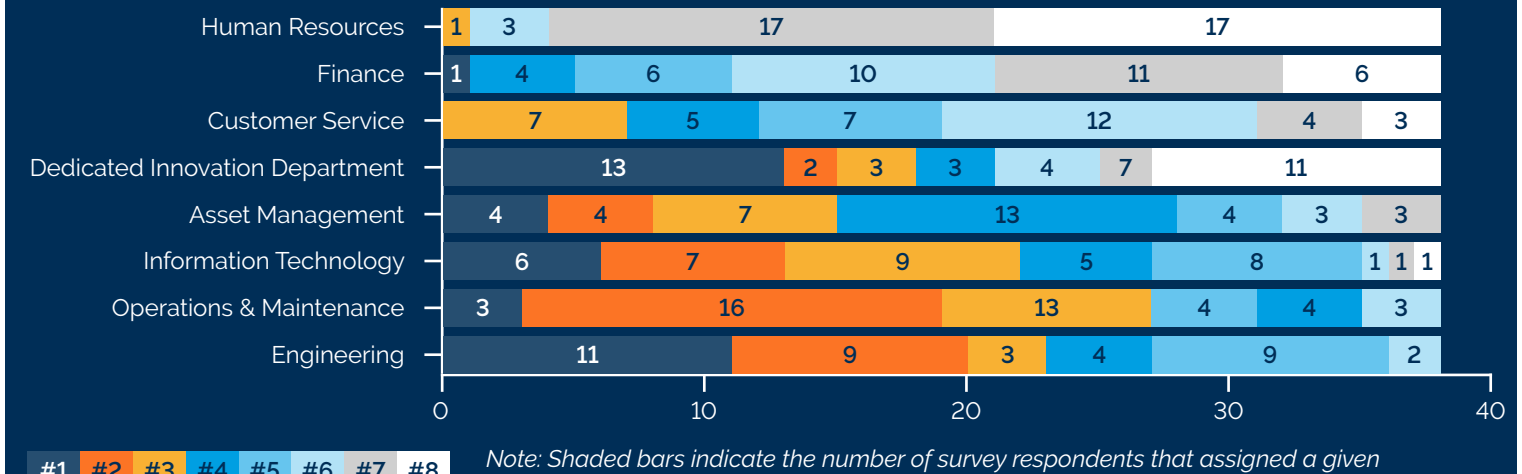
At the same time, no one set of stakeholders should be single-handedly responsible for innovation, and all groups have a role to play in ensuring that innovation is successful at an organizational level. According to Joukje Keuning, Program Manager Infra 2025 for Dutch utility Vitens, for instance, "senior leadership helps shape the vision, but all employees really have the most influential role and come up with various ideas, and we all share in the benefits when a good idea is realized."

Utility Departments

Evaluating innovation influencers at the department level is more complex, reflecting the differing organizational structures of different utilities. Fifty three percent of respondents ranked engineering as the first or second most influential department in driving innovation at their utility, followed by operations & maintenance with 50% of the vote. Information technology and asset management teams were also identified as important innovation influencers by a number of respondents, while administration and supporting departments such as customer service, finance, and human resources were seen by most as less active in propelling smart water innovation initiatives. Innovation departments were simultaneously seen as among the most influential and least influential units, given that many utilities have not carved out teams dedicated to organizational innovation.

Looking a layer deeper, survey respondents identified important regional differences in the departments that play the most significant roles in driving utility innovation. For instance, dedicated innovation departments were ranked among the top two innovation influencers by only 28% of utility respondents in the Americas, compared to 80% of European respondents and 75% of Asia-Pacific respondents, possibly because they are less common among respondents in the U.S., Canada, and Latin American.

Figure 4.2 Innovation Influence Rankings by Utility Department



Note: Shaded bars indicate the number of survey respondents that assigned a given rank to each utility department, from #1 (most influential) to #8 (least influential).

The role of different utility departments in driving innovation also varied significantly for more vs. less innovative utilities, as perceived by respondents. Only 17% of respondents from self-described "very innovative" utilities ranked IT among the top two innovation influencers at their organizations, compared to 38% of respondents from "somewhat innovative" utilities and 60% of respondents from "not very innovative" utilities, suggesting that within more innovative utilities, smart water innovation is driven primarily by business or operational needs, with IT playing a secondary or supporting role.

The role of IT departments in propelling—or impeding—smart water innovation was an important topic of conversation for our utility interviewees. According to Janelle Boelter from Southern Nevada Water Authority, "IT teams are naturally cautious because there are risks and ramifications for implementing new technologies, so while the technology's security is being vetted, that can be seen as bottlenecks to innovation, IT involvement is crucial to the process because they find a way to make things work and make things secure."

These were important lessons learned by some of the utility respondents. According to Joukje Keuning from Vitens: "When we first started working on a plan for a digital twin for our distribution network, we took it to IT, who said it was not possible. So we started the project over again with the IT team included from the outset, which helped the process because we made it their problem, and had them join in from the beginning to help solve it. This time around, the project is going very well."

Similarly, Matthew Santella, General Foreman for the U.S. City of Marlborough, Massachusetts' Water and Sewer Division, shared advice based on his own experiences implementing smart phones and tablets for his field staff. According to Santella, "everything has to go through the IT department, so you should try to get IT involved from the very beginning—give them time to acquire the technology you need, and keep them updated, since they have so many competing priorities to handle."

> Everything has to go through the IT department, so you should try to get IT involved from the very beginning—give them time to acquire the technology you need, and keep them updated, since they have so many competing priorities to handle."
>
> **- Matthew Santella**
> General Foreman for the U.S. City of Marlborough, Massachusetts' Water and Sewer Division

Chapter Five: Institutional Structures and Practices

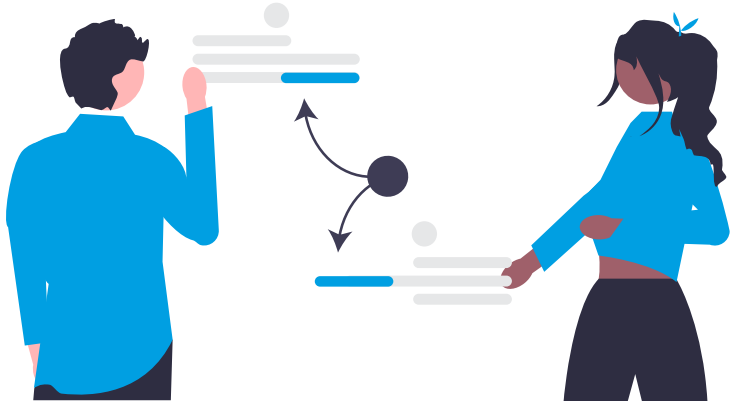
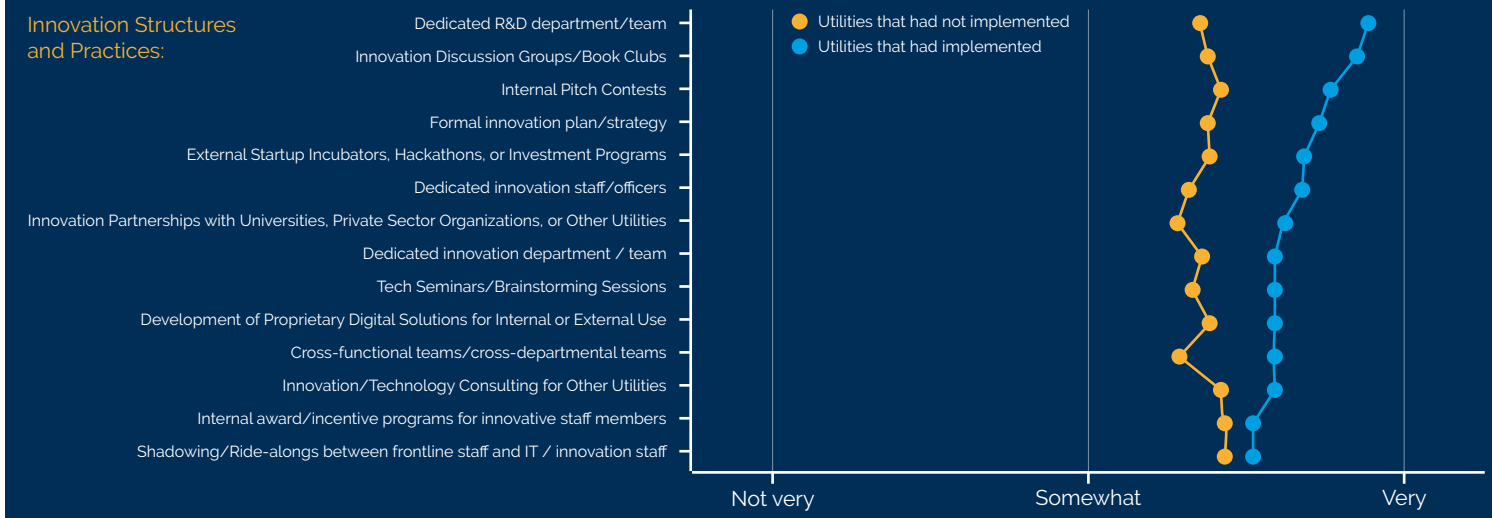


Figure 5.1 Innovation Perception vs. Structures



Internal factors, such as institutional structures and practices, influence utility innovation. We asked survey participants about some of the features that drive or hinder digital innovation within their organizations. Over 80% of survey participants stated that they have some form of institutionalized innovation—i.e., at least one formal innovation structure or practice in place, such as cross-functional teams, pitch contests, and hackathons. These features create dedicated space and time within the organization to allow staff to step back from their day-to-day responsibilities and think creatively about new ways of working and problem-solving, combatting the lack of bandwidth and organizational flexibility identified in Chapter 2 as the leading inhibitors of digital innovation.

Our survey results clearly showed that while institutionalized innovation structures and practices are not uncommon in the water utility sector, these features are far more widespread within more innovative utility organizations. Utilities whose staff ranked them as "very innovative" had an average of six different innovation structures and practices in place, compared to three for "somewhat innovative" organizations, and only one for "not very innovative" organizations.

Notes: Figure shows the average rating of utilities' innovativeness for those that have not implemented a practice (orange) and those that have implemented the practice (blue). It is clear that those who have implemented initiatives such as a dedicated research and development (R&D) department or team, or holding innovation discussion groups or book clubs, lean closer to being very innovative on the scale. Those that have not implemented these are closer to being somewhat innovative, and below.

Are some of these structures and practices more effective than others in cultivating a successful, deep-rooted culture of innovation within water utility organizations? The survey showed that the top features associated with a utility's perception of innovation were:

- Dedicated Research & Development Department/Team
- Innovation Discussion Groups/Book Clubs
- Internal Pitch Contests
- Formal Innovation Plan/Strategy

Our utility interviews shed more light on the impacts of various institutional structures and practices in driving innovation within their own organizations. For example, both dedicated innovation departments and cross-departmental collaboration were highlighted as key innovation enablers, particularly in terms of securing funding for digital technology projects. As Joukje Keuning from Vitens shared, "We may start with a project idea within the business development department, but if we don't have enough of a budget for this particular project, we look for financing plans through cooperation with another department—working across departments to get the project funded." Uniquely, a large North American water utility surveyed has a dedicated sustainability fund that can be tapped for innovative projects, which has played a key role in enabling new ideas and pilots at the utility.

Creating goals around innovation is another impactful institutional practice, with 21% of survey participants indicating that they have formal innovation plans or strategies in place. Mike Beardslee from Loudon Water shared that having a consistent, structured process for evaluating technology pilots is a best practice that his team has learned over time. Meanwhile, an interviewee from a large North American water utility expressed the necessity of relating technology to other organization-wide strategic goals and objectives, noting that "we have to take technical language and convert it to a language that addresses our organization's strategic goals in order to see it realized. We need to have strong justification."

Finally, workshops, discussion groups, and pitch contests can create space for staff across the organization to learn about innovation or share their own innovative ideas in a welcoming, risk-free environment. According to Flavio Eduardo Soares e Silva from CORSAN in Brazil, "The way to increase everyone's comfort level to innovation is to inform, through workshops on the culture of innovation and digital culture, or gamified education through corporate platforms." For example, one of CORSAN's directors organizes regular two-hour workshops where staff can get training on key innovation concepts and principles and share innovative technology projects that they are working on with their peers.

© CORSAN

Chapter Six:
Key Takeaways and Recommendations

Survey participants shared not only their goals and challenges, but also innovative paths forward into the digital frontier. While our survey results demonstrated that the vast majority of utility organizations discuss digital innovation on a regular basis, turning ideas into action remains a significant challenge for most, with a lack of clear ownership, responsibility, or processes and protocols for moving innovation forward.
So what are some of the most impactful steps that utilities can make to turn their ideas and discussions into improved realities?

1. **Organizational Alignment** - Many respondents and interviewees highlighted the need for frontline staff to feel empowered and accountable for digital innovation, but that consistent, top-down leadership is key to driving the agenda. The best way to increase comfort levels around digital innovation is to continually inform and empower all stakeholders within an organization. This includes allowing utility staff the time and freedom to fail when pursuing innovation! A key correlation found was that more innovative organizations often had advantages in hiring new talent; this could be due to the empowering effect of digital transformation. A robust commitment to digital innovation from the top all the way down to every other team member can improve multiple areas of an organization.

2. **Striking The Right IT Balance** - Digital innovation and good IT management are inherently linked. However, by linking them the right way, organizations can meet both their innovation objectives and their traditional IT goals. It's important to involve IT in the beginning of a new digital initiative to find a way to make it work and be secure, but after the initial screening the initiative should be driven by business or operational stakeholders.

3. **Creative Financing** - Lack of financial assets and staff capacity were key roadblocks for many respondents. However, some found creative ways to fund digital innovation. One respondent said their organization had a separate fund specifically set aside for digital innovation to allow them to experiment and try new ideas in a controlled environment. Other ideas may be to define the ROI ahead of time to drive hiring practices. For example, "If we can save X amount by digitally streamlining this part of our business, we can hire Y amount of staff to support this initiative."

4. **Expanded Data Capabilities** - Digital innovation is impacted by the organization's ability to collect, share and use data effectively. Without proper policies and requirements set, including how to share data internally across departments and externally across engineering firms, technology partners and other critical stakeholders, innovation alone cannot help organizations move forward with clarity and confidence. Strong practices to make data accessible, but protected, can empower staff to try new ways of working no matter what level of previous experience the organization has with technologies. Joukje Keuning (Vitens) summed this up quite fittingly, "Data quality is very important. Even with good data (and not much of it), you can improve processes and outputs."

From the survey and interview findings, there is no 'one-size-fits-all' solution when it comes to digital innovation within utilities. Clearly, utilities are highly interested in multiple avenues to improve their processes and workflows with digital innovation, yet the familiar hurdles with the alignment of people, processes, and technology often impede progress. Organizations representing multiple ecosystem partners, like SWAN, are necessary to communicate different digital innovation methods which are generating more or less success among organizations. The faster these methods can be shared and evaluated, the faster leaders can settle on what works best for their teams and pursue these solutions full-steam for improved financial, operational, and environmental outcomes.

Conclusion & Reflections

While it may seem challenging to make time for proactive digital innovations, it is not impossible. By aligning innovation with strategic goals and business priorities, organizations can set clear improvement targets and quantify ROI, ensuring that innovative initiatives get the attention and approval of senior leadership. Regular communication of progress as well as recognition and celebration of success can also help to turn a project into a fully sustainable program or process, turning innovation side projects into full-time priorities. Once a repeatable digital process is proven in one small area, it can be scaled quickly in other areas, leading to further acceptance and digital maturity across the organization.

Additionally, the rapidly changing technology landscape can also pose challenges for utilities to deploy technologies, particularly from startup vendors. Concerns regarding longevity, best available technology, as well as affordability of those products and services, may continue to impact adoption and scaling rates. This will likely be particularly felt by utilities investing significant resources on staff training and procurement-related efforts.

Finally, carving out institutional time and space for innovation can help ensure that all staff and stakeholders feel included in the innovation process. These activities help to gain buy-in, ensure commitment, and manage change in the organization, and can ultimately make or break a project.

Interactive Data Dashboard (click image to view)