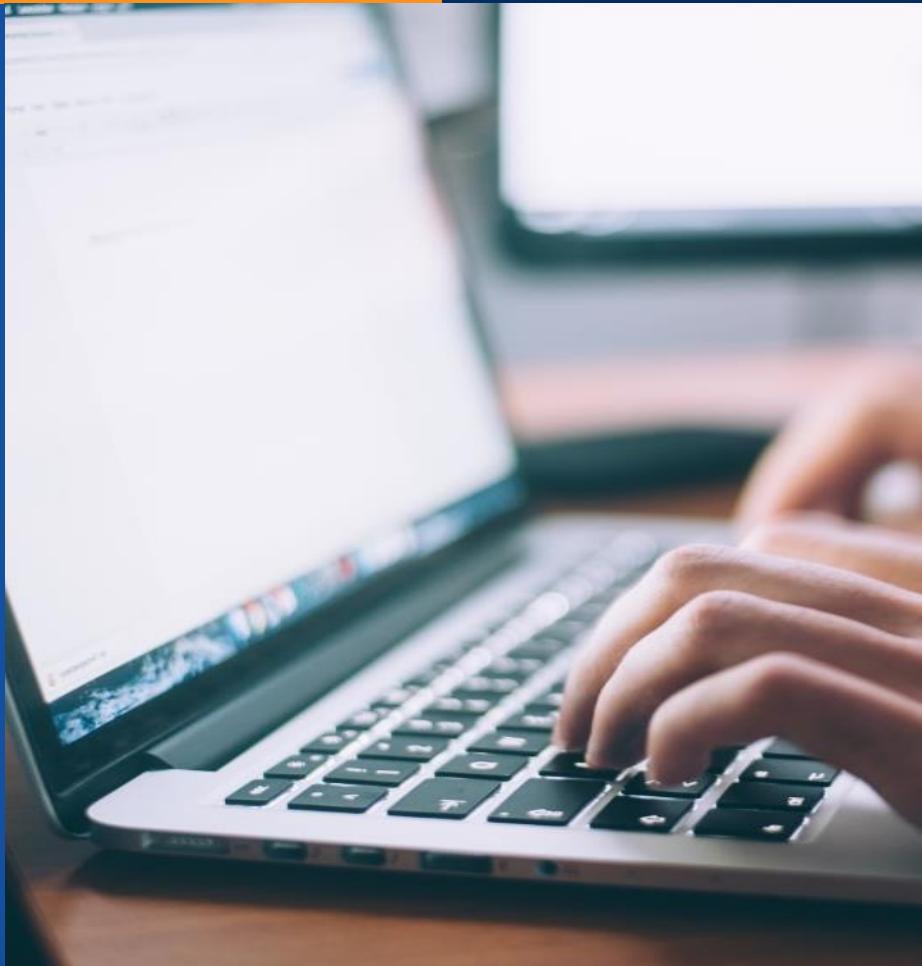




WORKFORCE SKILLS OF THE FUTURE





About WSAA

The Water Services Association of Australia (WSAA) is the peak body that supports the Australian urban water industry. Our members provide water and sewerage services to over 20 million customers in Australia and New Zealand and many of Australia's largest industrial and commercial enterprises.

WSAA facilitates collaboration, knowledge sharing, networking and cooperation within the urban water industry. The collegiate approach of its members has led to industry-wide advances to national water issues.

WSAA can demonstrate success in standardising industry performance monitoring and benchmarking, as well as many research outcomes of national significance. The Executive of the Association retains strong links with policy makers and legislative bodies and their influencers, to monitor emerging issues of importance. WSAA is regularly consulted and its advice sought by decision makers when developing strategic directions for the water industry.



Important notice

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The findings in this report are based on a survey and the reported results reflect the information provided by, and the perceptions of, the sample of respondents surveyed, as approved by the Water Services Association of Australia Ltd (**WSAA**), as at the date of the survey. Any projection to a wider group or to the future is subject to the level of bias in the method of sample selection and to changes in perceptions.

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Executive summary

KPMG has been commissioned by the Water Services Association of Australia (WSAA) and the Water Environment & Reuse Foundation (WE&RF) to help their members understand and prepare for the key future trends affecting the water sector and its workforces.

A number of key global drivers for change have been identified in this report to enable well-informed strategic planning for future opportunities, challenges and risks up to the year 2040, with an emphasis on customer-focused outcomes. Water service providers need to stay 'ahead of the curve' in light of shifting workforce trends and customer expectations. A holistic understanding of supply and demand drivers will enable water service providers to develop staff and build appropriate capacity to meet future requirements including identifying key talent.

A survey was conducted among water utilities in Australia, the United States and the United Kingdom to collect information on five key facets of the workforce: cost, capability, capacity, connectivity and compliance. Key insights and themes were explored further during a two-day industry workshop, which focused on the development of plausible future water scenarios. These scenarios were based on the potential impact and interaction between four key drivers for change of workforce skills in the water sector, being the customer, technology change, regulation and government, and climate change.

As an outcome of this process, eight key enablers have been identified to help water utilities be successful in a rapidly evolving environment:

Enabler 1: Resilience – Flexibility, agility, critical thinking	Enabler 2: Data and Analytics – Digital literacy, internet of things	Enabler 3: Leadership – Change management, strategic planning, learning mindset, communication, culture	Enabler 4: Customer – Service, culture, experience, focus
Enabler 5: Technical Skills – Network operation skills, engineering, general operations, risk management, knowledge management	Enabler 6: Delivery Models – Contracting, commissioning, outsourcing, insourcing	Enabler 7: Entrepreneurship – Innovation	Enabler 8: Collaboration – Partnerships within the water sector, partnerships with other sectors

After the industry workshops, a series of initiatives have been developed and, with the support of the WSAA Utility Excellence Committee, two foundation programs were identified as priority recommendations to position water utilities to address gaps and leverage existing opportunities to ensure a successful water sector into the future. These two industry foundation programs are an Employee Value Proposition and a Strategic Workforce Plan. Giving priority and focus to these two recommendations will provide the foundation for all subsequent activities. Undertaking these recommendations, and then considering the other initiatives raised in this paper, will ensure the water sector and its workforce is in the best position to adapt and thrive in an uncertain future.

1 Introduction

The water sector is transforming from engineering and asset centric to a more technology-enabled customer focus. The transformation is being driven by the emergence of new consumer and network technologies, and ever increasing customer demands, environmental concerns and economic globalisation. The water sector is also rapidly being impacted by the global megatrend of digitisation. Some of the key current drivers of change in the water sector specifically include:

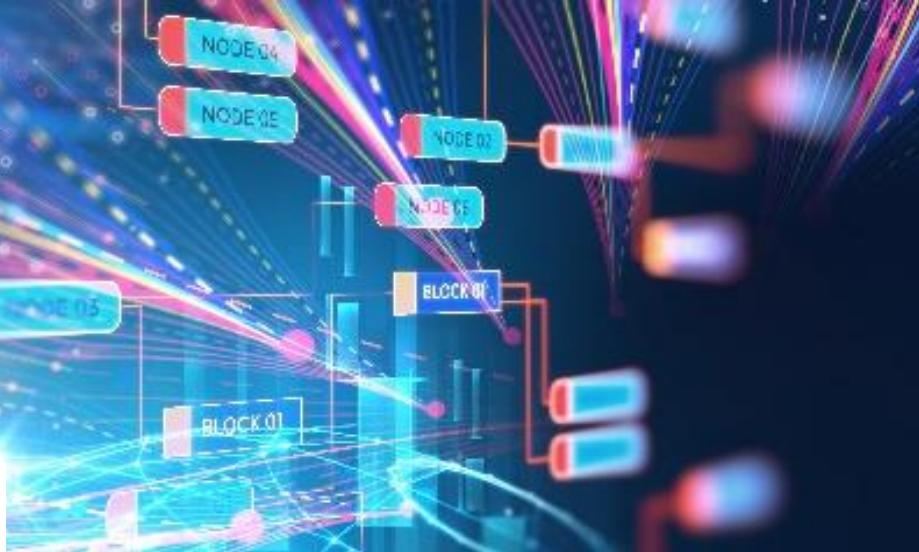
- Rising customer expectations regarding service management and willingness to pay;
- Development of new asset and customer technologies and rapid digitisation of services;
- Community expectations to be involved in decision making;
- Heightened community antagonism to service interruptions and traffic interference;
- Ageing workforce, longer working lives and multiple generations working together;
- Increasing automation of routine tasks;
- A significant focus on operational improvement and efficiency (i.e. cost reduction);
- Acute need for effective demand and asset management in drier climates;
- Changing regulation and increased competition into water services markets; and
- The United Nations Sustainable Development Goals coupled with heightened awareness of the need to better manage vulnerable customers.

At the same time, the water sector is planning and responding to this changing world through a range of key industry trends. These include:

- **Customer at the heart** – integrating customer insights into the traditional network business;
- **Digital utility** – defining a digital roadmap for the water sector including how to leverage the operational opportunities created from widespread connected devices and the Internet of Things;
- **IT architecture** – developing asset-light IT models for customer-focused, smart networks;
- **Strategy and regulation** – deploying more sophisticated customer engagement techniques and applying innovation incentives; and
- **Asset management** – increasing asset management maturity while increasing data capture to better understand, predict and manage network performance.

In this time of unprecedented change, it is difficult yet increasingly important to understand the potential impacts on the workforce and the skills required in the workforce of the future. If unaddressed, the water sector may be left with significant skill gaps. It may be unable to support clean and safe water and waste water services at affordable prices. It may not keep up with changing customer needs or may not take advantage of critical improvements for worker safety. Without a strategic approach to workforce planning, the water sector may find that its social licence and trust within the community is severely compromised.

The Water Services Association of Australia (WSAA) and the Water Environment & Reuse Foundation (WE&RF) – the peak industry bodies representing the water sector in Australia and the United States – commissioned KPMG to undertake a review of future skills for the water sector. The aim of the review was to build WSAA and WE&RF's



understanding of the key workforce trends driving change and the future skills requirements to enable success in the water sector over a long term horizon to the year 2040, with a key focus on the areas of customer trends and the future of work.

To achieve these outcomes, KPMG undertook the following activities:

- **Step one** involved consultation with the industry steering committee chaired by WSAA;
- **Step two** involved desktop research of published literature on the future of work, customer centricity and future utilities, compiled into a Document Register for ease of use;
- **Step three** involved the design of an industry workforce survey;
- **Step four** involved a two-day industry workshop and scenario planning exercise in both Melbourne Australia and Alexandria United States; and
- **Step five** involved developing a series of initiatives and recommendations based on the above work to address identified gaps and leverage existing opportunities to ensure a

successful water sector into the future.

This report summarises the findings from this work and provides a roadmap for future skills for the water sector. The report is structured as follows:

- **Section 2** sets out the current state for skills in the water sector based largely on an industry survey conducted with senior leadership teams of WSAA member associations during March 2017;
- **Section 3** provides a brief overview of the research undertaken for this review on future trends for the future of work;
- **Section 4** outlines the implications from the scenario planning undertaken in our Australian and US two-day industry workshops;
- **Section 5** draws out the key enablers and corresponding initiatives for the water sector to be successful in the future; and
- **Section 6** sets out priority recommendations for action.



2 Current state

As global megatrends cause unprecedented change in the water sector, it is vital to understand the current state, in order to identify current or potential gaps which will impact the sector's readiness for the future.

In 2017 the Australian water sector is already seeing the disruptive effects of the changing environment in which it operates. Changes in the Australian and global climate, urbanisation, standards of living, technology, population dynamics and customer expectations are currently impacting on the water sector.¹

Workforce skills of today

In April 2017, a short survey was distributed to WSAA membership in relation to 'Workforce Skills of the Future'.

Whilst the survey was primarily designed to collect insights regarding future impacts on the workforce, responses also generated insights into the current state of skills in the water sector.

Respondents were asked to consider their ability to deliver against their current, medium, and long term business objectives with the current skills and capabilities of their workforce. Figure 1 highlights 64% were very or extremely confident in their ability to meet their current business objectives with their workforce's current skills and capabilities, while this declines to 0% extremely and 18% very confident over the next two decades.

So what are the characteristics of the current water sector workforce? Why is there a gap between the current skills and capabilities of the workforce, and what is required to meet business objectives?

The 'Workforce Skills of the Future' survey collected insights in relation to the workforce according to five key facets, which are defined on the following page.



Figure 1 Confidence to deliver business objectives with current skills and capabilities, Australian 'Workforce Skills of the Future' Survey Results

¹ Melbourne Water, "2016 Operating Environment Scan", 2016

Key facets of the Workforce Skills of the Future Survey

Cost: factors that impact the efficiency and effectiveness of the workforce

The top **cost drivers** impacting on the water sector workforce include productivity, employment arrangements, compliance and recruitment.

Capacity: factors that impact on having sufficient resources in the right locations

The top **capacity drivers** impacting on the water sector workforce include the workforce mix, career pathways, geographic location and the organisational structure and operating models.

Capability: factors that impact on having a skilled, agile and diverse workforce

The top **capability drivers** impacting on the water sector workforce include leadership development, skills and capabilities, and performance management and development.

Connectivity: factors that impact on having motivated and innovative employees

The top **connectivity drivers** impacting on the water sector workforce include organisational culture, organisational leadership, and employee engagement.

Compliance: factors that impact on financial, legal, regulatory and reputational compliance

The top **compliance drivers** impacting on the water sector workforce include regulatory compliance, health and safety compliance, and environmental compliance.

Alignment of workforce planning to business needs has been highlighted by respondents as an area which is currently lacking, with 52% identifying their workforce planning maturity as developing, and 9% of respondents indicating they have only basic maturity.

Basic maturity:

The outputs of the workforce planning process have little to no impact on aligning the workforce to business needs. Where workforce development strategies are described, they do not include action plans or assign responsibility. Workforce planning is essentially an exercise to produce a document.

Developing maturity:

Formal workforce planning activities have been undertaken however in many cases the result has little to no impact on the workforce which exists currently or into the future. Most recruiting and L&D activities seek to address immediate need without consideration to long term implications or business needs.

Figure 2 Workforce Planning Maturity Definitions, KPMG

Overall, the survey identified that the key current or potential future gaps in skills and capabilities of workforces include leadership, digital literacy, critical thinking skills and customer centricity, refer Figure 3.

The water sector is already making progress to address the current or potential gaps in skills and capabilities, with the top initiatives including recruitment, up-skilling and professional development for current employees, and supplementing the existing workforce with external contractors. Where these activities are being undertaken with the support of external partners, this mostly involves universities, recruitment agencies and professional associations.

Current or potential future gaps in skills and capabilities

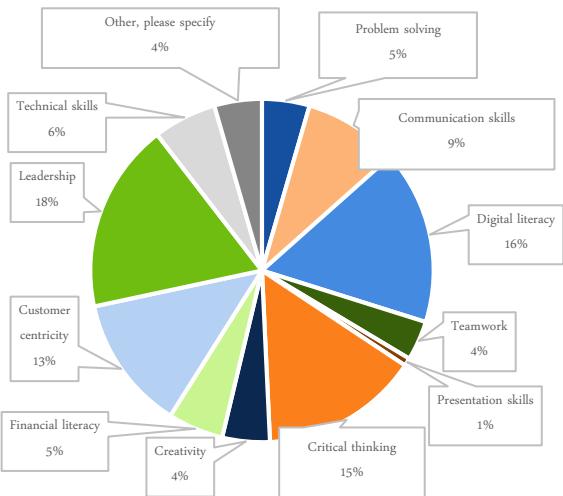


Figure 3 Current or potential future gaps in skills and capabilities, Australian 'Workforce Skills of the Future' Survey Results

There are some differences between the large and small organisations who submitted a response to the 'Workforce Skills of the Future' survey.

Geographic location and demographics have a greater impact on the availability of sufficient resources for small organisations. This is reflected in a number of areas, with smaller organisations engaging with external parties to fill their skills and capabilities gaps (i.e. 75% of small organisations compared to 54% of larger organisations). Similarly, while the top barrier to maximising workforce skills and capabilities is organisational culture and change management in large organisations, for small organisations it centred on workforce demographics and the availability or the right people.

A global comparison

During the course of this research, the survey was also distributed to water associations in the United States of America, Water, Environment and Reuse Foundation (WE&RF), and the United Kingdom, UK Water Industry Research (UKWIR). The results from this survey has therefore enabled a comparison of current state across the water sector in 3 different global locations.

As demonstrated in Table 1 in Appendix D, the top three drivers for each of the five workforce facets are largely consistent across all locations. While the

order in which the top three appear varies between locations, there are significant consistencies. However, one notable difference identified through the survey is the varying levels of confidence in relation to the respondents' confidence in delivering against their current, medium, and long term business objectives, with consideration given to their workforce's current skills and capabilities. For example, both the United States and the United Kingdom's confidence in meeting their business objectives remains relatively stable following an initial drop at the 1 – 5 year time horizon. When considering 'somewhat confident' to 'extremely confident' as confident, the United States confidence drops by only 8%, and the United Kingdom's confidence drops by 11%. In contrast, Australia's confidence drops by 18%, from 94% confident to 76% at the 11 – 20 year time horizon.

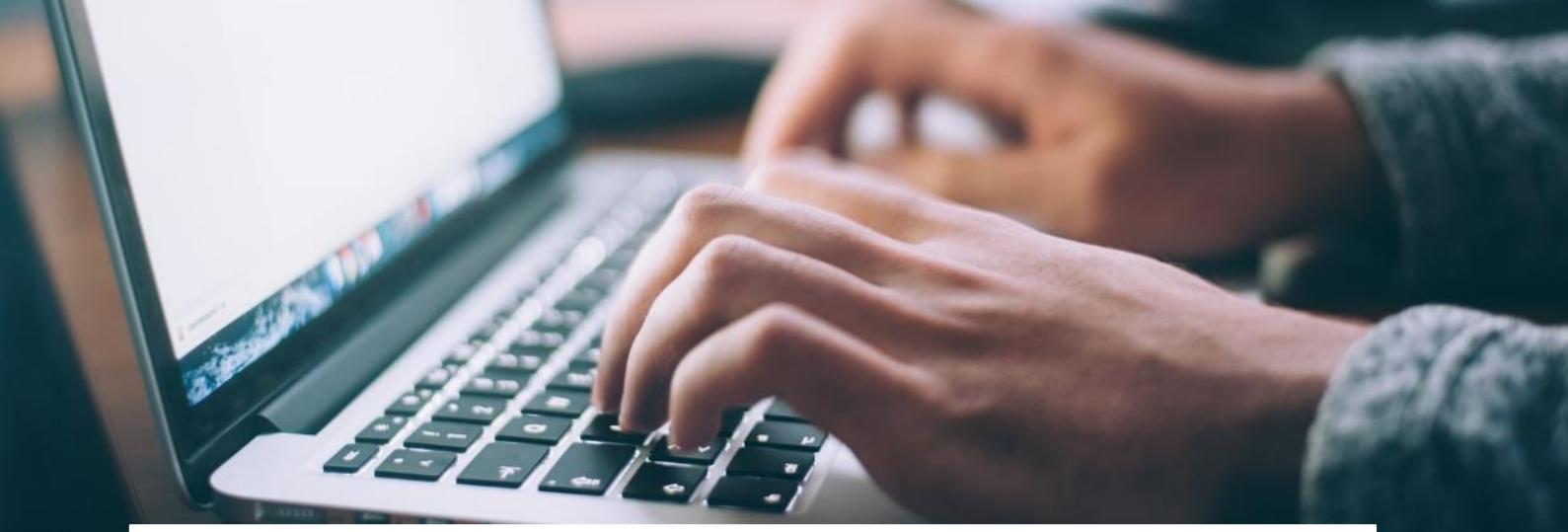
To fill the identified skills gaps, the UK water utilities are engaging externally with vocational training

providers, universities and local communities. In the United States, the primary external engagement is through professional associations.

In relation to the main barriers to maximizing the skills and capabilities of the workforce, organisational culture and change management were the top response for both Australia and the United States. However, this response did not appear in the top three for the United Kingdom, with inadequate data and technology identified at the top barrier.

Looking forward

So what will the water sector look like in the year 2040, and what are the key trends that will have an impact on the water sector, and shape what its workforce looks like in the future? These key trends for the future of work are explored in the next section.



3 Key trends for the future of work

Clean water and sanitation are precious. The water sector has its own specific challenges in terms of reuse, recovery and regulation, but the sector is also affected by the global megatrends disrupting industries across the world. By understanding trends and planning for the future, water utilities can create more engaging customer experiences, enhance the liveability of urban areas and provide greater development opportunities for their people.

This section considers the key trends affecting the water sector and highlights their relevance for the future of work. First, it considers the global megatrends and other trends affecting utilities. Next it considers the key customers trends and finally it considers the key “future work” trends. The section concludes by identifying the main drivers for the future of the water sector.

Utility megatrends

Demographics

Millennials will make up 50% of the workforce by the year 2020, and this will play a key role in shaping the workforce of the future in all sectors, including the water sector. The characteristics of millennials include decreasing loyalty towards employers; greater emphasis on potential for personal development and work/life balance than on financial reward; the expectation that companies will keep their diversity promises; increasing electronic communication; the expectation of rapid progression through a company; and an increasing focus on employer brand rather than the employer’s Corporate Social Responsibility.²

Another key change in demographics which has ramifications for the cultural and ethnic makeup of the workforce is the **ageing population**.³ The growth of the labour force is slowing as more people are exiting the workforce than entering. Generally, this gap is being filled by immigration, which increases the cultural and ethnic diversity of the workforce of the future. Additionally, as the population ages, people are beginning to work longer to fund their retirement, a phenomenon known as “the 100-year life”, and as more millennials enter the workforce, the diversity of the workforce will continue to grow. It also presents challenges for some organisations to manage the uncertainty around the end of employees’ working lives. For example, Line Managers need support in managing performance and improving productivity of older workers to build diverse inter-generational teams.

“People are going to have to work longer, and will need to adapt to more changes over their career”

2-Day Industry Workshop

² Insight from KPMG Challenge Panel, 2017.

³ Sydney Morning Herald, “Future of Sydney’s Jobs and Economy”, available at <<http://www.smh.com.au/interactive/2016/sydney2026/chapter7.html>>,

Overall, this trend will result in a positive impact on businesses, as **diverse workforces** make better decisions, increase the skills available in your workforce, improve innovation and deliver better outcomes for the community.⁵

The jobs that will **grow faster than the workforce average** during the 21st Century cluster into five distinct skill sets, and these skills sets represent typical jobs of the future - care givers (e.g. personal services, aged care workers); technocrats (e.g. electrical engineers, engineering managers); specialist professionals (e.g. clinical psychologists, school teachers); doers (e.g. electricians, carpenters); and creatives (e.g. outdoor adventure and fitness instructors).⁶

Rise of the individual

With advances in global education, health and technology, individuals are becoming more empowered, leading to the rise of the individual. By 2030, 60% of the world's population will be middle class; 75% of the global population will have access to a mobile phone and 50% will have access to the internet.⁷ One of the key consequences of this is rising expectations of individuals in the goods and services they procure or utilise.⁸ To succeed, businesses in the future will need to cater to middle class mass demands for revised and more personalised service delivery.⁹

Global economy megatrends

Public debt is expected to operate as a significant constraint on fiscal and policy options through to 2030 and beyond.¹⁰ **Increasing public debt** increases exposure to global markets. Potential tax increases from the government to raise funds would have an impact on the profitability of asset owners.¹¹

"Public debt means government are less able to fund infrastructure so big cities will continue to age. How will we build what the cities need? What does it mean if international investors have a say in what infrastructure is built?"

2-Day Industry Workshop

Physical environment megatrends

By the year 2050, the cost of extreme weather could reach 1% of world GDP per annum.¹² With a warming of 3 – 4%, up to 200 million people could become permanently displaced due to rising sea levels, flooding and droughts,¹³ which will also have an impact on asset owners, as some assets may become stranded and unusable.

Climate and resource stress will lead to less available water-energy-food-land resources. Public pressure will encourage asset owners to offer more resilient services at no extra cost. Greater resource efficiency will be required, to prevent higher input costs. This would include accelerated moves to carbon neutrality in order to reduce significant energy costs as well as meet greenhouse gas targets.¹⁴

Technology and 'Internet of Things' (IoT)

Dubbed the **Fourth Industrial Revolution**, new emerging technologies are rapidly disrupting businesses across all sectors. These technologies include messaging and chat bots, autonomous vehicles, augmented or virtual reality, blockchain, quantum computing, artificial intelligence, internet of things, 3D printing, platform economies, and true global connectivity.¹⁵

For the water sector, the **IoT** is particularly focused on Intelligent Water Metering (e.g. automatic meter reading, meter data management, sensor device management, networks and transmission); Intelligent Asset Management and Operations (e.g. SCADA, remote condition monitoring condition based maintenance automated water quality and control) and Data Acquisition and Insights (e.g.

⁵ Water Services Association of Australia, "Tapping the Power of Inclusion and Diversity in Urban Water", 2017

⁶ Insight from KPMG Challenge Panel, 2017

⁷ KPMG, "Future State 2030: The Global Megatrends Shaping Governments", MOWAT Centre, University of Toronto, 2014

⁸ KPMG, "Future State 2030: The Global Megatrends Shaping Governments", MOWAT Centre, University of Toronto, 2014

⁹ Insight from KPMG Challenge Panel, 2017

¹⁰ KPMG, "Future State 2030: The Global Megatrends Shaping Governments", MOWAT Centre, University of Toronto, 2014

¹¹ Insight from KPMG Challenge Panel, 2017

¹² UK Government, "Stern Review: The Economics of Climate Change", available at <http://www.wwf.se/source.php/1169157/Stern%20Report_Exec%20Summary.pdf> 2006.

¹³ Myers, N., "Environmental Refugees: an emergent security issue", paper presented at OSCE 13th Economic Forum, Prague, 23-27 May 2005, available at <<http://www.osce.org/eea/14851>>

¹⁴ Insight from KPMG Challenge Panel, 2017

¹⁵ Insight from KPMG Challenge Panel, 2017

availability of more data points, real time data, and predictive data). With these advances, the global water metering market is forecast to be \$6.6bn annual market by 2025.¹⁶

Key considerations for water utilities in an IoT world include devices (i.e. when and how to rollout smart network); connectivity (i.e. management of connections); data & analytics (i.e. creating insights from overwhelming volumes of data); interoperability; and ownership and control (i.e. control points and who owns the "network").¹⁷ **Skills sets synonymous with digitalisation and this new IoT world** are in high demand, and include data specialists (i.e. data scientists, architects, visualisation), cyber security specialists (i.e. to protect not only consumer information but also the network infrastructure), and software and application programmers (i.e. user experience and back end).¹⁸

"Many people in decision making roles seem to be scared of the new emerging technologies".

2-Day Industry Workshop

Another element of the Fourth Industrial Revolution which has **disruptive potential for water utilities is Blockchain**. The applications of Blockchain are being explored globally and a new ecosystem of start-ups are now emerging. Industry users of this technology are vast as it leverages decentralised peer-to-peer internet technology, where both computers and people share a distributed ledger to enable trading. When technology and regulation find an equilibrium in the water industry, the long-term potential of blockchain will be transformative.¹⁹

Utility specific trends

Key drivers within the water sector include ageing infrastructure and cost; water supply; quality and compliance; water reform and access rights; climate change and mitigation; customer insight and communications; new technologies (onsite water harvesting; grey water re-use; smart water pumps); and renewables.²⁰

With **increasing urban population growth**, in the future urban water utilities will need to be prepared to serve more people while simultaneously dealing with increasing scarcity and competition for resources. As a result of this there is a growing need to develop more efficient systems.²¹

Five disruptive trends impacting the utilities sector include customer trust and experience (i.e. empowered consumers drive links of customer experience and improved performance); challenger businesses (i.e. with lower barriers to entry, challengers are disrupting markets); asset-light business models (i.e. cloud technologies and the collaborative economy); big data and pricing (i.e. given more sophisticated data capabilities); and convergence (i.e. blurring of boundaries between previously distinct industries).²²

Recent regulatory advances in Victoria have placed significantly greater emphasis on consumers, by requiring businesses to work with customers to listen and act on their interests, preferences and priorities, and to reflect this in their pricing submissions. Businesses can recover higher levels of return if they can demonstrate they are delivering what their customers want and commit to ongoing engagement to demonstrate that they are delivering what they promised.²³

Regulatory advances in the UK imply new models relating to abstraction licence trading; upstream water entrants selling to incumbents / retailers; water trading between incumbents; markets in bio-resources; and operators taking direct ownership of assets and activities.²⁴

Business model trends

Alternative and innovative business models and activities available to the water sector include a demand aggregator providing demand reduction as a service to network companies; multi-utility retail consolidation; non-potable water; treated effluent as a source of water; flood resilience as a source of water; asset and licence area swaps; independent system operators and sewerage only companies.²⁵

¹⁶ Insight from KPMG Challenge Panel, 2017

¹⁷ Insight from KPMG Challenge Panel, 2017

¹⁸ Energy Skills Queensland & CSIRO, "Changing Industry, A Changing World", October 2016

¹⁹ Insight from KPMG Challenge Panel, 2017

²⁰ Arup & Australian Water Association, "Australian Water Outlook", 2016

²¹ Arup & Sydney Water, "The Future of Urban Water: Scenarios for

Urban Water Utilities in 2040", 2015

²² KPMG, "No Going Back: Five Disruptive Trends Reshaping the Utilities Sector", 2015

²³ KPMG, "Essential Services Commission: A Practical Application of the PREMO Framework", 2016

²⁴ Insight from KPMG Challenge Panel, 2017

²⁵ KPMG, "New Business Models in the Water Sector", 2016

Examples of alternative business models include the energy sector, which is acting to address long and short term interests of consumers. These ‘no regrets’ actions include encouraging **direct participation by customers**. Customers will be exposed to a range of choices, incentives, and disincentives. Increased availability of data will enable customers of the future to balance their energy consumption with the real time supply of energy and with new storage technologies. New information infrastructure will support additional services not currently available today.²⁶ The energy sector is currently transforming to retain relevance in a “distributed energy future.”

Customer trends

Customer expectations

Individuals in society are more informed, involved and connected than ever before, and this is having a notable impact on **customer expectations**. There is an increasing desire to track information about themselves in order to have greater control over their health, exercise, finances and travel. Customers want instant access to real-time information and data. To meet this expectation, electricity companies have started to give customers access to their energy and gas usage data. The water industry could consider similar offers to encourage customers to reduce their daily water usage.²⁷

Customer centricity

With the rapid disruption in the services and retail sectors, **successful utility providers will be those that focus their investments in delivering customer experience excellence**. Customers of the future will expect greater service, more flexible and digital access, as well as more control and choice. The utilities will need to be able to define and align their customer propositions and brand, and engage all their employees to deliver customer excellence.²⁸

In order to stay ahead of consumer shifts and technological advances, leading consumer

²⁶ Energy Networks Australia & CSIRO, “Electricity Network Transformation Roadmap: Key Concepts Report”, 2016
²⁷ Melbourne Water, “2016 Operating Environment Scan”, 2016
²⁸ KPMG, “The Race for the Customer: Winning the Race in the Dynamic Energy Services Marketplace” 2016
²⁹ KPMG, “Seeking Customer Centricity: The Omni Business Model”,

manufacturers and retailers are transforming themselves into fully integrated omni businesses, where the products and services they provide are identical, regardless of the medium through which the customer accesses them (i.e. bricks and mortar / call centre / online). This new breed of consumer centric enterprises is built on six pillars of **operational excellence**, which include seamless cross-channel commerce; hyper customer-centricity; digital-first mindset; an agile and demand-driven supply chain; pervasive use of advanced analytics; and a culture of trust and integrity.²⁹

“There is a change in regulation, the low touch utility is moving on. You need to come in and interact with customers now. Utilities are setting up challenge panels which allow customers to have direct input into what the organisations are doing”.

Kenan Hibberd, Unitywater, Chair of WSAA People and Culture Network

Customer experience

Given the move to consumer centric enterprises, there is an emerging opportunity to **use technology** to drive altogether new customer and employee experiences, and in turn produce bottom line business results. Customer-facing workforces can become much more perceptive regarding the emotions of their customers and this has the potential to radically improve their interactions with them.³⁰

In some industries, progress to improve the customer experience has been inconsistent and undermined by systemic failings on business basics. Those that do succeed, master the **six pillars of customer experience excellence** at each touch-point of the customer journey, unlocking profound financial and reputation benefits. These pillars include integrity, resolution, expectations, time and effort, personalisation, and empathy, as defined in Figure 4 over the page.³¹

Within the utilities sector, the pillar of **Empathy has become critical to engineering human warmth into customer interactions**.

³⁰ 2016
³⁰ KPMG, “The Changing Nature of Work: The Relevant Workforce”, 2017
³¹ KPMG Nunwood, “A New Era of Experience Branding: Customer Experience Excellence Centre 2015 UK Analysis”, 2015

Successfully demonstrating Empathy will play a key role in customer satisfaction in a digital future. Recent research into utilities in the US has shown that achieving this can, in part, be linked to high staff engagement and enthusiasm for their roles.³²

	Integrity Being trustworthy and engendering trust.
	Resolution Turning a poor experience into a great one.
	Expectations Managing, meeting and exceeding customer expectations.
	Time and Effort Minimising customer effort and creating frictionless processes.
	Personalisation Using individual attention to drive an emotional connection.
	Empathy Achieving an understanding of the customer's circumstances to drive deep rapport.

Figure 4 '6 pillars of customer experience excellence', KPMG Nunwood

Future of work trends

Digital labour

Advanced technologies are becoming increasingly **integral to operations** in the water sector and others. The technology shockwave is amplified by evolving customer, producer and supplier behaviours and expectations, as well as **our expectations as digital humans**.³³

"Despite doom and gloom scenarios for massive unemployment, cognitive technologies can spur new jobs and enhance human skills and expertise".

Rise of the humans, KPMG³⁴

These emerging technologies threaten to make **current skills obsolete** and pose a threat to our workforce capabilities. This has the potential to completely shift the profile and skill requirements of

the workforce.³⁵ However, as a result of the introduction of emerging and cognitive technologies, new jobs and skills will also be created.³⁶

Growing adoption of digital technologies will also have major implications for HR operating models, as the workforce of the future will be a **hybrid of humans and digital 'colleagues'**.³⁷

"The challenge for leaders is to integrate and make the most of both kinds of labour".

Rise of the humans, KPMG³⁸

With the rise of digital labour, one area likely to see significant **employment growth** is STEM – science, technology, engineering and mathematics skills and knowledge. STEM jobs still need a human element, with these roles involve both technology and creativity to solve problems, for example, coding and programming, nanoscience, biomedical engineering and robotics.³⁹ Supply of STEM skills to meet future demand requires coordination between government, educators and employers.

Automation

The rise of **automation technology will affect process operations, labour markets and economies** all around the world. It is predicted that about 60 percent of all occupations could see at least a third of their constituent activities automated and replaced by smart robots by 2025, as automation rapidly becomes more intelligent and affordable with widespread application. Both non-skilled repetitive labour and knowledge work is being primed for displacement.⁴⁰ However, the **potential for automation differs dramatically across sectors and activities**.⁴¹ Figure 5 over the page highlights how automated tasks can result in more time to focus on complex and strategic tasks, and the critical skills required.

Specifically, in the water sector this would mean:

- Increasingly self-managed networks;
- Automated customer interactions creating time for moments that matter;

³² KPMG Nunwood, "Engineering a human touch into a digital future", 2017

³³ Insight from KPMG Challenge Panel, 2017

³⁴ KPMG, "Rise of the Humans: The Integration of Digital and Human Labour", 2016

³⁵ Committee for Economic Development of Australia, "VET: Securing Skills for Growth", 2016

³⁶ KPMG, "Rise of the Humans: The Integration of Digital and Human Labour", 2016

³⁷ KPMG, "HR Operating Models: The Next Generation", 2016

³⁸ KPMG, "Rise of the Humans: The Integration of Digital and Human Labour", 2016

³⁹ Viva Electricity Australia, "Occupational Outlook: Jobs of the Future", 2016

⁴⁰ KPMG, "Employees: An endangered species? - The Rise of Robotics, Artificial Intelligence, and the Changing Workforce Landscape", 2016

⁴¹ McKinsey & Company, "Where Machines Could Replace Humans - and Where They Can't (Yet)", 2016

	Automated tasks	More time to focus on	Critical skill
Architects 	<ul style="list-style-type: none"> — Reporting, data analysis and initial interpretation — Trend and issue correlation and analysis — External insights scanning 	<ul style="list-style-type: none"> — Strategic planning and decision making — Influencing leadership on workforce matters — Financial impact analysis of HR initiatives — External networking 	<ul style="list-style-type: none"> — Strategic thinking — Strategic horizon planning — Predictive analytics and data judgement — Evidence based influencing — Systems thinking — Change leadership
Workforce consultants 	<ul style="list-style-type: none"> — Reporting, data analysis and initial interpretation — Trend and issue correlation and analysis — External insights scanning 	<ul style="list-style-type: none"> — Strategic workforce issues (e.g. Talent management, organizational effectiveness, engagement) — Managing change — Consulting with business leaders on workforce issues 	<ul style="list-style-type: none"> — Commercial acumen — Predictive analytics and data judgement — Evidence based influencing — Systems thinking — Change leadership — Relationship management
Workforce solutions 	<ul style="list-style-type: none"> — Reporting, data analysis and initial interpretation — Trend and issue correlation and analysis — External insights scanning 	<ul style="list-style-type: none"> — Solution design and delivery — External trend identification and application — Innovation 	<ul style="list-style-type: none"> — Business insight — Project management — Stakeholder management — Innovation — Predictive analytics and data judgement — Technology savvy — Change leadership — Collaboration
Workforce central 	<ul style="list-style-type: none"> — Mass mail generation — Transaction processing — Database creations, edits, retrievals — Archiving and tracking — Customer support and query response (level 1) — Master Data Management — Routine follow-ups — Data entry and replication (e.g. forms) — Import/export of data between systems — Document screening 	<ul style="list-style-type: none"> — Complex case resolution — Proactive issue identification — Offering segmented services and communication channels to meet customer requirements 	<ul style="list-style-type: none"> — Advanced data analytics and reporting — Technology savvy — Customer service — Delivery focus — Operational excellence — Continuous improvement

Figure 5 Potential impacts of automated tasks, KPMG

- Greater visibility and management between field force and customers; and
- More tool time due to greater insights and automation of procedural matters.

Leadership

Leadership skills of the future will need to be adaptive and flexible, in order to successfully lead an increasing culturally diverse and **complex workforce**. Their employees will be connected online, have vastly differently skills, and could be operating at different capacities from any corner of the world.⁴² Additionally, as university graduates enter the workforce, and the population starts to retire later in life, there will potentially up to five generations working together in the one workplace. In an **environment with multiple generations**, leadership will need to adopt new and flexible approaches to motivating and engaging workforce will be required.⁴³

Skills requirements

The **core skills of the future** are changing, and businesses need to develop new ways to identify and recruit for these skills. This will need to involve:

- A. Identifying the relevant academic and technical qualities;
- B. Identifying network/digital skill sets; and
- C. Developing an overarching culture and HR culture that builds a more adaptable workforce.⁴⁴

As the future of work is about **more than technical skills**, the workplace of the future will become fluid and mobile. People will time-shift and the workplace will be more flexible. The types of work will also be different and the development of soft skills will be vital.⁴⁵ These **soft skills** will help to develop a resilient workforce, and reduce brittleness and resistance to change. They **need to be built at all**

⁴² Insight from KPMG Challenge Panel, 2017

⁴³ Insight from KPMG Challenge Panel, 2017

⁴⁴ Insight from KPMG Challenge Panel, 2017

⁴⁵ KPMG, "Fluid and Mobile: the Future of Work", video available at <<http://newsroom.kpmg.com.au/fluid-and-mobile-the-future-of-work/>>, 2015

staff levels within the business, as even university graduates will have a level of brittleness as they enter the workforce for the first time. Key future soft skills will be **flexibility, adaptability, agility**.⁴⁶

“These things aren’t emerging, they’re here. We need to build change resilience within our people. We need a culture that embraces what’s coming”.

Michael Robinson, Melbourne Water

There is a growing demand from employers for young workers to have **enterprise skills**. These are transferable skills that allow young people to be enterprising so they can navigate complex careers across a range of industries and professions. They include problem solving, financial literacy, digital literacy, teamwork, and communication and are different from technical skills which are specific to tasks, roles and industries.⁴⁷

Considering the workforce of the future will be a hybrid of humans and digital ‘colleagues’, **skilled HR professionals will need to take on more strategic roles** by becoming the architects of this new hybrid workforce. Simple tasks will likely be automated, and as a result shared services centres will be called upon to offer higher value services. Learning and development teams will need to plan to reskill the workforce as demands on human labour change and new roles emerge.⁴⁸

Talent management

Talent will be the key to keeping a business relevant. In order to fully optimise the workforce and combat disruption, businesses must put their people first, and focus on how to attract, retain and reward employees. Four key strategies include creating a customer journey for employees; embracing technology to increase connection; building capability to support agility and individual needs; and rethinking traditional reviews and reward systems.⁴⁹ There will also need to be **strong links between the functions within the business** which are responsible for mobility, talent development, succession planning and global resourcing. Those in charge of talent management will need to develop a strategy focused on retaining the employees the business has invested in.⁵⁰

⁴⁶ Insight from KPMG Challenge Panel, 2017

⁴⁷ Foundations for Young Australians, “The New Basics: Big Data Reveals the Skills Young People Need for the New Work Order”, 2016

⁴⁸ KPMG, “HR Operating Models: The Next Generation”, 2016

⁴⁹ KPMG, “The Changing Nature of Work: The Relevant Workforce”, 2017

Reward and recognition for human endeavour is evolving, and in the workplace of the future, it is likely that **personal validation will become even more important than income**. Leading demographer Bernard Salt predicts there will be a cultural shift in the workplace of the future, where employees are more focused on recognition via validation.⁵¹ Leadership should be encouraged to **provide immediate feedback to reinforce desired behaviours**.⁵² As businesses transform their workforces to be relevant in an increasingly agile and digital future, continuing with more traditional methods of goal setting, performance management and reward and recognition is unlikely to retain the best talent. Failing to move with the times could place strategy and productivity at risk.⁵³

Change management

In the future, it is highly likely that businesses will need to manage major and multiple change programs at any one time. This requires a **holistic organisational vision to manage change, balanced with a front-line perspective**. A well sequenced change program needs to be considered within the context of key activities and external influences, and also needs to be backed by analytics that show where the biggest impacts will be felt, particularly from the bottom up.⁵⁴

Clear communication is essential to help mitigate a post-change productivity dip, which can be common when people don't understand how to operate in a new way.⁵⁵

US specific trends

Many of the trends which have been identified in the Australian water sector also have relevance for the water sector in the United States.

A key insight gained from the US two-day industry workshop was that while the roll out of smart meters and the availability of real-time customer data is relatively advanced and puts the customer at the centre, the terminology of ‘customer centric’ is not yet widely used. Customer-centric, smart networks are becoming the norm, however the articulated

⁵⁰ Insight from KPMG Challenge Panel, 2017

⁵¹ Insight from KPMG Challenge Panel, 2017

⁵² KPMG, “Rethinking Reward for Employees of the Future”, 2016

⁵³ KPMG, “Rethinking Reward for Employees of the Future”, 2016

⁵⁴ Insight from KPMG Challenge Panel, 2017

⁵⁵ Insight from KPMG Challenge Panel, 2017

focus at the core of the US water sector is still engineering and asset management.

At the time of the two-day industry workshop in the US, the US economy was booming and the result in the water sector has been an increasing challenge in accessing labour. The sector has recognised the need for a workforce with a broader set of skills, beyond traditional engineering skills. In pursuit of a workforce with “Engineering +” skills, the water sector is now increasingly finding itself in cross-sector competition for talent.

There is a focus on the need to develop marketing skills to improve and promote the sector brand, and attract talent to the water sector. The development of an Employee Value Proposition would further the position of the US water sector as the sector of choice.

It has been identified that there is a need to further embed the recent amalgamation of regional water businesses and focus on unifying the consolidated workforce.

Additional trends which are impacting on the US water sector in particular include the increasingly prevalent use of technology and data to make better decisions, leading to the monetisation of data as strategic resource.

Prioritised industry drivers for future work

Based on the above megatrends, key drivers for the future of work have been ranked by likelihood of occurrence and potential impact on the water sector. This ranking process was undertaken by the participants of the two-day industry workshop in Melbourne, and then confirmed in the US workshop. These driving forces, and their potential impact on the water sector, are explored in the next section.

Driving force	Likelihood (H / M / L)	Impact (H / M / L)
Technology (Including internet of things and data)	High	High
<i>Technological advances will be unavoidable, and utilities will need to decide whether they embrace these new capabilities internally or whether they source these new skills externally.</i>		
Customer centricity	High	Medium
<i>The water sector is already moving towards a more customer centric focus. However, the key will be whether utilities can be flexible and adapt the customer's continually evolving expectations.</i>		
Climate change and resource stress	Medium	Medium
<i>The combination of unreliable climate and consistent population growth will lead to recourse stress. Infrastructure will need the resilience to store resources in times of draught and protect against potential breaches in times of flood.</i>		
Government regulation	Medium	Medium
<i>New regulation can change a sector's priorities. Utilities will need to develop relatively agile business strategies to enable quick course corrections if/when there are rapid changes in regulation.</i>		



4 Future of work scenarios

The drivers of change for skills and work are accelerating. A range of publications and consultations have for many years pointed to the future being very different to the past. While it is not possible to predict the future, consideration of alternative plausible futures can support identification of the key enablers of success for the future of work.

There is still significant uncertainty on the extent of the impact that the aforementioned drivers will have on water and wastewater workforces, and the speed of the impacts. There are many different possible assumptions associated with customer and community expectations, ageing workforce, rise of millennials, changing regulation, population growth and climate change. Many of these uncertainties are amplified by the digitisation of work and the rapid advancement of the fourth industrial revolution.

As a result of the uncertainty surrounding all the drivers and the possible effects, it is understandable that there is not a common view shared by all stakeholders on the core skills required and how the industry should respond.

For example, in relation to population growth and climate change, there are a range of actions water companies could take now to address future challenges to the supply and demand balance for water, and given changes in technologies these may require different skills. They could identify and reduce leakage further by deploying smart meters, sensor networks and IoT platforms to increase interconnection within and between networks. They could develop additional marketing skills to more actively promote demand management and metering for households. The regulatory framework could also be adjusted to support such measures to the extent that they do not occur by market-led

actions. The skills required for each of these responses are different and would extend the capabilities contained within the traditional, asset-centric utility. It is likely that a combination of these skills would be required.

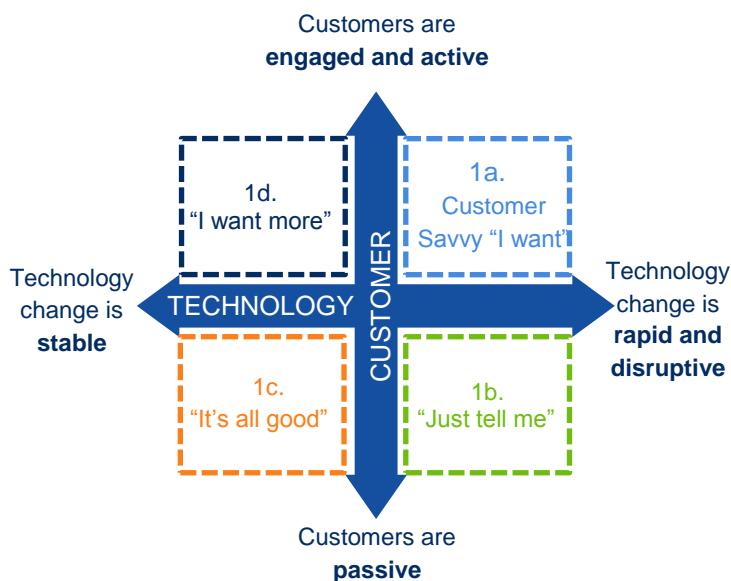
Looking well beyond this example challenge of population growth and climate change, the future shape of the industry will be dependent on a number of complex and inter-related factors, both within the industry and the wider socio-economic and political landscape.

It is therefore helpful to consider a stylised set of scenarios that cover the range of outcomes that may exist. The aim is to focus on how the industry may evolve in relation to the drivers for change, and what would be the defining characteristics of a successful water sector across the range of scenarios.

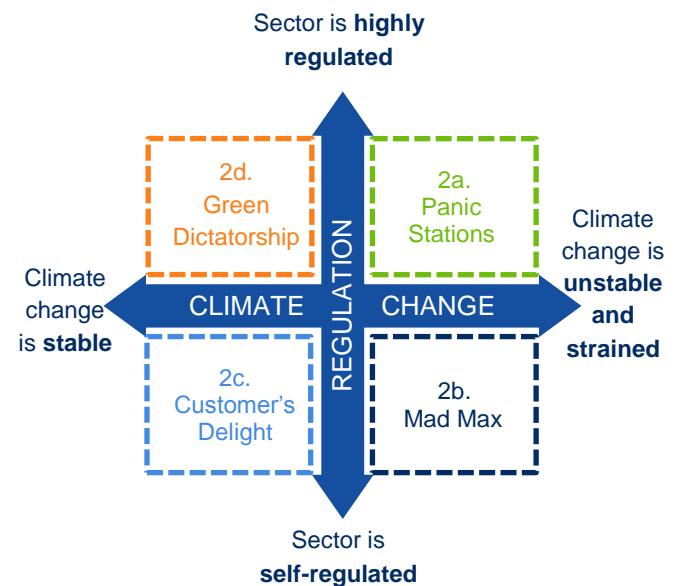
To this end we have deliberately chosen contrasting scenarios. To develop our scenarios we considered the following key driving forces identified in Section 3 above: customer, technology, regulation and climate change.

These variables gives us a matrix with eight potential directions the water sector could develop.

Scenario 1



Scenario 2



The above scenarios are 'snapshots' of what the water sector in 2040 may look like. They are not meant to be accurate predictions, rather they are meant to show a wide range of potential options. We recognise that the water sector system is unlikely to develop according to one particular scenario; rather a mixture of potential scenarios is likely to emerge.

Scenario 1, which explored the interaction between the key driving forces of Customer and Technology, was selected during both the Australian and US 2-day Industry Workshops. Therefore, Scenario 1, as described on the following pages, is a combination of what was developed during both 2-day Industry Workshops. Given the number of participants at the Australian 2-day Industry Workshop, a second scenario planning exercise was run concurrently, which explored the interaction between the key driving forces of Regulation and Climate Change.

Scenario 1a: Customer Savvy "I want"

In this world, water utility customers are engaged and active, and technology change is rapid and disruptive.

Water businesses and their current operating models become irrelevant (i.e. stranded assets, high debt levels, need to write off debt, underinvestment). This results in costs spiralling upwards. In response, there is political intervention and loss of control by water businesses.

In this combative environment industry brand suffers, as there is a high level of customer complaints and low trust. This leads to frustration and more and more customers move to off-grid arrangements. In addition to this, there is a rise in water theft through new technologies. Increases in off-grid numbers and water theft results in a significant loss of revenue base. These new technologies from the private sector and customers and new market entrants will cause large-scale disruption in the water sector.

In this scenario it is difficult for utilities to attract new talent, with current staff numbers high and inefficient, and high staff turnover. There is a need for a large complaints function, potentially outsourced to a call centre. Other roles will also be outsourced to companies with more advanced technology capabilities.

Key skills include crisis management, negotiation skills, resilience, customer service, community education, managing expectations, and more hands-on operations.

Scenario 1b: "Just tell me"

In this scenario, customers are now passive, while technology change remains rapid and disruptive.

There is a push to embrace emerging technologies, but not at the same level as other industries (e.g. telecommunications). There is no lobbying for innovation in technology in water industry.

There is complacency around understanding water security.

Customers want fast, transactional interactions with no bells and whistles. Utilities must meet customer expectations in relation to core services. Customers have a “do it for me” attitude, and are only interested in getting just the information they ask for, not anything else that is potentially irrelevant that they will need to sift through.

Key skills and capabilities for success in this world include emotional and social intelligence, critical thinking and problem solving, tech savvy, and skills from other industries. Change management programs will need to explain their purpose effectively to staff and potential benefits to customers.

Scenario 1c: “It’s all good”

In the scenario “It’s all good”, utility customers are passive and technology change is stable.

The risk appetite is low, and utilities are late adopters of new technology. Any technological improvement is incremental, and on an as-needs basis. Return on investment is expected and results in price rises. The old and new technologies are integrated, creating a patchwork network.

Utilities are at the mercy of the environment, rather than proactive and would be unprepared for a significant change or disruption to the sector. Likewise they are under the government radar, and wait to be ‘pushed’.

Customers are disengaged and passive. Customers have an expectation that service levels will be improved over time or at least maintained, however, as they do not communicate this, the utility does not know if customers are happy or unhappy with service.

The voice of the customer is relayed through the regulator only, and therefore utility decisions are not specifically informed by the customer. Services are segmented rather than personalised to the customer. The utility does not know if they are meeting customer demands and expectations, and the gap between utility and customer is growing larger.

Utilities would need to retain current skills and workforce mix, supplemented by steady growth and continuous improvement. The continuous

improvement should include a mix of the traditional approach plus new technology and skills.

Scenario 1d: “I want more”

In this world, customers are engaged and active, and the rate of technology change is stable.

New technology is used to develop unbreakable / self-managed assets, and water treatment plants are run by Artificial Intelligence. Future prediction enabled technology allows customers to pre-order water.

Utilities have increased their social responsibility activities, with carbon balancing and bioremediation. Customers would trade their waste water, given advances in waste to energy technologies.

There is a consistent and reliable supply of water and customers have a variety of sources to choose from. Therefore, utility customers’ expectations include quality and the availability of “consumption options”. A result of this is that many business decisions are customer driven.

Customers want to be able to choose their own service, enabled by apps, including the ability to pay when they want, and interact with data. Customers want 24/7 access to information and for this information to be individualised.

Key skills in this scenario include those relating to app development and management, which will need to either be developed in-house or outsourced. In general, employees’ technology capabilities will require continuous improvement in the environment of stable technological advances to avoid complacency and falling behind.

Customer service will have to be focused and personalised, with fast response rates (i.e. through “chat now” options in the app) to meet customer expectations.

There is an increased need for data and analytics capabilities as there is an increasing amount of data available, provided by the future prediction enabled technology and the customer app.

Scenario 2a: Panic Stations

In this scenario, the water sector is highly regulated and climate change is unstable, causing a strained environment.

There is increasing climate change denial. As the climate is becoming more strained, there are increasing instances of water theft. Rising sea levels lead to displaced assets and people. Public debt increases and there is a rise in the number of mega-projects. There is better data on water availability, and the Government starts to influence population growth in areas of water.

Reduced choice for the customer means they develop a greater level of adaptation. The government provides incentives for customers to go off-grid.

Key skills for success in this environment are disaster management, negotiation and communication with customers, engineering and innovation with a focus on security, project and risk management skills, and a workforce that is resilient, flexible and highly mobile.

Scenario 2b: Mad Max

In the “Mad Max” world, the water sector is self-regulated and climate change is unstable, causing a strained environment.

All water management is taken away from the government and there is a pure market economy. Water is potentially owned by foreign investors.

The population of Australia finds itself on the move as many of the population move to areas of water, while the agriculture sector becomes strained and many farming families start to move to cities, with farms increasingly bought by foreign investors.

Water prices spiral as disruption increases and the population starts to move off-grid, aiming for self-sufficiency with desalination plants in their backyard. This results in greater disparity between the rich and poor.

These changes will drive innovation, and Australia will move to the forefront of innovation, with opportunities for international partnerships to share the new technologies.

The lack of regulation leads to some undesirable environmental outcomes, with unpredictable floods and draught reducing certainty about demand and supply.

Customers are demanding more choice, and start moving off-grid in increasing numbers as new houses and developments with new technology

make it easier to opt out. There is a rise in Water Cooperatives, to connect and increase access to water.

Utilities are left with a small customer base who can't afford to go off-grid. Prices increase dramatically for these remaining customers as the utilities still have the same level of infrastructure. Industrial and manufacturing customers also look at options to become self-sufficient.

Key skills in this scenario include strong leadership, with advanced skills in emergency management. Other key skills the utilities will include risk management and environmental management, an entrepreneurial mindset with investment in R&D to develop new products, market analysis skills, and a focus on security.

Scenario 2c: Customer's Delight

In this world, the water sector is self-regulated and climate change is stable.

The utility business model is changing to privatisation and commercialisation as the market becomes more and more competitive. There is an increased push to embrace new emerging technologies and increase R&D investment into developing new products for diversification.

Customers have a variety of choice in products and services, and have more control over what these options include. Utilities need to focus on customer segmentation and transparency of information in order to maintain trust and loyalty of customers.

There will be a lean, agile workforce, where streamlining and partnerships create efficiency.

Key skills include commercial acumen, business development and marketing skills, and specialised project management skills. Soft skills and relationship management will be critical to improve customer engagement and build a culture of customer centricity.

Innovation will be through technology, and the workforce will require digital literacy skills to use data for predictive customer analytics.

Scenario 2d: Green Dictatorship

In this final scenario, the water sector is highly regulated and climate change is stable.

Barriers to entry are high and there are a steady

leaders in the industry. Utilities are less commercial and costs have been driven down.

There is tight regulation around resource efficiency, and utilities also strive for productivity efficiency internally.

Third parties become the driver for innovation as there is a decrease in internal R&D and low risk appetite. There is little entrepreneurship, as the focus is on just maintaining the existing infrastructure. Customers remain on the network.

Utilities are using technology to create efficiencies and communications rather than innovate. With

improved forecasting capabilities and rigid pricing, it is easier to manage customer expectations. The utility and its customers are a community, and there is an increase in collaboration. Low risk taking behaviour results in a lack of entrepreneurship, with innovation and skills being outsourced to contractors or other businesses.

Steady as you go leadership has a focus on monitoring, reporting and measurement. Community involvement is more collaborative and there is no urgency.



5 Key enablers for success

To be successful in an uncertain future, water utilities will need to constantly strive to understand, influence and react to the transformational forces impacting the water sector, and have a clear but agile business strategy to enable quick course corrections as new information becomes available. “Key enablers” will be crucial to achieving this.

So far this paper has considered the key drivers of change in the future, and explored eight different scenarios which describe what the future water sector could plausibly look like. There is now no doubt that the water sector of the future will look very different from the sector of today. Water utilities will need to be more efficient with their resources, and provide the customer with more choice. Diversification through new products, services and distribution methods will emerge as a key opportunity to stay relevant. Utilities will face increasing, and potentially necessary, risks as they strive to adopt more advanced technologies to meet and exceed the expectations of the digital world. To thrive in this environment, a utility will need to constantly strive to understand, influence and react to the transformational forces impacting the water sector, and have a clear but agile business strategy to enable quick course corrections as new information becomes available. The following key enablers will help water utilities be successful in an uncertain future.

During the 2-Day Industry Workshop, held in Melbourne in April 2017, participants from the water sector identified their top skills and capabilities that would be needed in the future, shown in Figure 6.

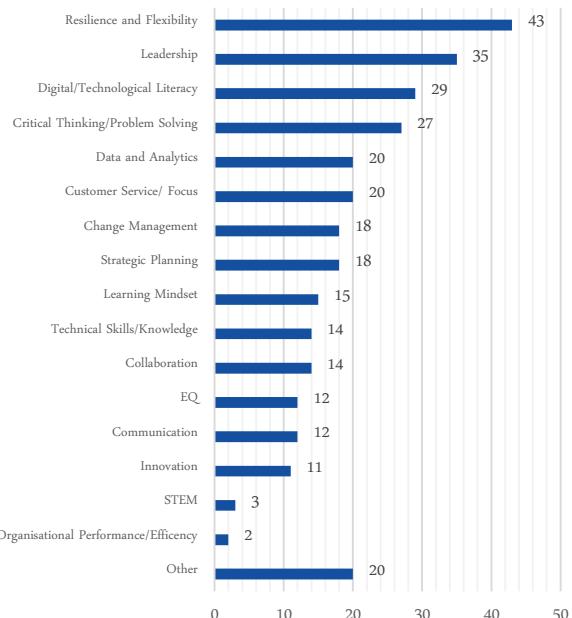


Figure 6 Top Skills and Capabilities, Australian 2-day Industry Workshop

Subsequently, this list has been synthesised, and further developed into the following 8 key enablers for a successful water utility, up to the long term time horizon of 2040, and then refined during the US workshop as shown in Figure 7.

1	Resilience – Flexibility, agility, critical thinking	2	Data and Analytics – Digital literacy, internet of things
3	Leadership – Change management, strategic planning, learning mindset, communication, culture	4	Customer – Service, culture, experience, focus
5	Technical Skills – Network operation skills, engineering, general operations, risk management, knowledge management	6	Delivery Models – Contracting, commissioning, outsourcing, insourcing
7	Entrepreneurship – Innovation	8	Collaboration – Partnerships within the water sector, partnerships with other sectors

Figure 7 Key enablers, as identified and refined during the Australian and US 2-day Industry Workshops

The eight enablers, identified and refined during the 2 day Industry Workshops, were subsequently unpacked to provide a series of initiatives to address the issues identified as relevant to those enablers. The types of initiatives identified include:

- **Skills tests** (e.g. skills investment plans; data skills; general enterprise skills, including leadership, learning mindset and cultural charters; and customer and stakeholder skill);
- **Competency frameworks** (e.g. recruitment and performance management; and digital);
- **Strategic Workforce Plans**, including annual reporting;
- **Sector specific organisational development** (e.g. career pathways; employee value propositions; and external branding);
- **Collaboration** (e.g. innovation fund and accelerator program; secondment programs; and digital marketplace); and
- **Use of technology** (e.g. Automation and robotics; tools; digital roadmap).

Within each of these enablers there is a **continuum**, as there will always exist a need for human resources. A particular example of this is where redundancy operations require an element of manual labour, in the event of a failure of automated systems.

Enabler 1: Resilience – Flexibility, agility, critical thinking

Mastering and building a workforce around these soft skills will reduce brittleness and resistance to change, meaning the utility workers of the future will be capable of adjusting to new situations and circumstances.

Initiatives to support this enabler comprise a range of strategic and tactical activities to build individual, organisational and sector wide capability. Key features include competency frameworks, enhancing resilience, encouraging innovation and new ideas, and diversity programs.

Enabler 1 Initiatives

E1a: Develop and implement competency frameworks to guide recruitment and performance management activities (See E3a)

E1b: Develop and pilot sector specific program(s) to enhance organisational resilience, flexibility and agility e.g. health and wellbeing initiatives, flexible working arrangements

E1c: Continue to further promote the WSAA diversity and inclusion programs to better promote flexibility and agility within water utilities

E1d: Perform scoping study to investigate specialist testing arrangements for enterprise skills such as resilience and flexibility to assist recruitment and performance development. When considered as part of suite of other indicators, testing instruments are an important part of best practice recruitment selection.

E1e: Utility Excellence Committee to run an annual future focused critical thinking seminar for individuals in the water sector to attend. This would be a forum for sharing innovative ideas.

Enabler 2: Data and Analytics – Digital literacy, internet of things

The availability and use of data will continue to grow, making it increasingly critical that water utilities embrace new and emerging technologies, backed by employees who have the skills to analyse the data collected.

Initiatives to support this enabler strategic activities to encourage the sector to embrace digital disruption, including digital competency frameworks, Internet of Things benchmarking and smart water networks to assist in identification of data-specific skills required in the water sector.

Enabler 2 Initiatives

E2a: Commission industry wide research on **specific data skills required in the workforce of the future**. These may include data engineering (architecture of data systems), data modelling (mathematical and quantitative skills to derive insights) and business analysis (working with sophisticated data and its application to business and operations).

E2b: Develop a **digital competency framework** across main “network” job types within the water sector, across management, business support, engineers, science / technicians, trades and operators.

E2c: Perform **benchmarking activities for the entire water sector** on use of the Internet of Things to connect a range of devices, sensors, and machines to the internet in order to broaden the base of data acquisition. Compare to benchmarking data from other sectors.

E2d: Identify the core skills and competencies required to maintain and **promote stakeholder trust** in an environment of automation and increased data analytics capabilities. These may include: cybersecurity; information technology controls; data governance; algorithmic reliability; and ethics associated cognitive computing.

Enabler 3: Leadership – Change management, strategic planning, learning mindset, communication, culture

These soft skills will help develop a workforce that is capable of working together to thrive in an uncertain future.

Initiatives to support this include establishing a range of frameworks for the sector whilst still allowing “freedom within the frame” for local customisation. Targeted strategies for existing and emerging leaders address a perceived gap in current capability and transition into leadership positions.

Enabler 3 Initiatives

E3a: Develop a **sector wide strategic workforce plan** to provide better quantitative and qualitative understanding of the skill requirement and likely supply of those skills in the market. Specific elements of the plan:

- Detailed workforce profiling/analysis,
- Workforce segmentation and identification of critical roles,
- Supply and demand analysis,
- Building capability – development of an integrated workforce management plan, and
- Establishing mechanisms to monitor and evaluate effectiveness of strategies.

E3b: Based on the initial strategic workforce management plan and data skills research undertake **annual workforce skills reports** to understand changes to the workforce mix and required skill investment areas.

E3c: Develop **sector wide principles** to support a learning mindset/culture of continuous learning. Establish forums and other channels to share ideas/ best practice as well as feedback mechanisms

E3d: Develop and pilot **sector specific leadership program(s)** for existing, new and potential leaders. Modules to include change leadership, agile working, succession planning, dealing with uncertainty and ambiguity, transition to leadership

Enabler 3 Initiatives	Enabler 4 Initiatives
E3e: Map career pathways within the sector including indicative skills, capabilities and education/training required at each level to support recruitment and professional development opportunities	
E3f: Establish a mentoring and secondment program with individuals/organisations outside water sector to support continuous learning, diversity in thinking	E4c: Develop an industry wide maturity model to assess for level of maturity in customer centricity , potentially using the 6 pillars of customer experience excellence (Integrity, Resolution, Expectations, Time & Effort, Personalisation, and Empathy). Encourage WSAA membership to complete the assessment annually, to foster a culture of continuous improvement and reinforce the “customer at the centre” mindset.
E3g: Disseminate thought leadership via WSAA and WE&RF distribution channels with tips for cultivating leadership resilience through physical fitness, flexibility in thinking and a focus on culture	
E3h: Create an ‘Industry of Choice’ Employee Value Proposition (EVP) for the water sector to increase attractiveness of working in water sector, retain high performing talent and be proud to work in water.	

Enabler 4: Customer – Service, culture, experience, focus

The importance of keeping the customer at the centre of the business will continue to grow, as they become more informed, involved and connected than ever before.

Initiatives which focus on how the sector promotes itself to the public and developing a sector-mindset of customer first will support the adoption of a more customer-driven focus for all aspects of operations.

Enabler 4 Initiatives
E4a: Promote an industry wide set of guidelines for all external branding – including job advertisements, website graphics, and community engagement activities – to get most value from the image presented to potential recruits.
E4b: Develop a cultural charter that involves changing organisational mindset from delivering a product to providing a service to your customers. Encourage staff to genuinely think about the customer first to improve interactions.

Enabler 5: Technical Skills – Network operation skills, engineering, general operations, risk management, knowledge management

The water utility of the future will also need a strong focus on technical skills. Initiatives to support this enabler relate to skills retention; automation of tasks in areas of future skills gaps, a “Community of Excellence” and improved access to technical skills training for both the current and future workforce.

Enabler 5 Initiatives
E5a: Given the long lead times in training network operators and engineers, consider short to medium term investments in skills retention and development relating to understanding manual network operation. This would be a mitigation strategy for risks associated with major power failures or extreme weather events
E5b: Consider accelerated automation of tasks in areas of forecast short to medium term skill gaps or shortages, particularly if the tasks are likely to be automated over the medium to long term
E5c: Develop a national industry rotation program in areas of critical safety or operational performance to develop a national “community of excellence” in those areas. High performing teams visit other facilities and share processes and identify areas for improvement

<p>Enabler 5 Initiatives</p> <p>E5d: Improve access to technical skills training for both the current and future workforce - Establish brokering services in regional areas to increase the viability of training delivery in those markets.</p>	<p>Enabler 7 Initiatives</p> <p>professionals within the water sector or opened to all data scientists and business analysts with relevant skills.</p>
<p>Enabler 6: Delivery Models – Contracting, commissioning, outsourcing, insourcing</p> <p>Initiatives to support this enabler involve competency frameworks for the key functions and responsibilities for various alternative delivery models of the future.</p>	<p>E7b: Develop self-learning tools (e.g. apps) for water sector participants on leadership and other skills development with the content based on agreed competency framework</p>
<p>Enabler 6 Initiative</p> <p>E6a: Develop a competency framework for the key functions and responsibilities associated with different delivery models, including designing, commissioning and contracting, partnering, contract management, and operating and maintaining services</p>	<p>E7c: Establish sector wide innovation fund to support discrete projects that enhance the efficiency and effectiveness of the workforce and operations.</p>
<p>Enabler 7: Entrepreneurship – Innovation</p> <p>Entrepreneurship activities should encourage water utilities to work together, and also to branch out beyond the water sector to generate new ideas. Initiatives to support this include creating a Water Digital Marketplace and tools and apps for skill development, supported by crowdsourcing through Infrastructure Hubs to generate new and innovative ideas that can be applied to the water sector.</p>	<p>E7d: Open up access to the Infrastructure Hubs between organisations within the water sector to customers, in order to enable proactive customers to have their say in what gets developed, designed or manufactured in the future, also known as crowdsourcing.</p>
<p>Enabler 7 Initiatives</p> <p>E7a: Create for the Australian water sector, and separately for the US water sector, a Water Digital Marketplace whereby industry challenges can be issued to data scientists who self-form into teams based on the skills required to solve the challenge. Relevant data sets can be made available through the Marketplace (within privacy guidelines) to enable sophisticated analysis. Teams could compete for reward and / or recognition in solving the challenge. The teams could be formed by</p>	<p>E7e: Develop a sector-wide technology and innovation roadmap to address R&D pathways, risks, performance targets, impacts, and learning curves. Strong analysis will highlight potential synergies for technologies that span multiple programs. This should be linked with annual skills reviews and will continue to inform future skills.</p>
<p>Enabler 8: Collaboration – Partnerships within the water sector, partnerships with other sectors</p> <p>Innovation will also be driven through increased partnerships and collaboration within the water sector.</p>	<p>Initiatives to support this include a number of sector wide activities of developing a prioritised skill investment plan, an innovation accelerator program, using Infrastructure Hubs as an area for collaboration within the water sector with involvement from both metro and regional utilities, and also external organisations.</p>

Enabler 8 Initiatives

- E8a:** Develop prioritised skill investment plans with industry, education providers and government to ensure continuity of technical skills and development of new skills. This could include identifying the highest priority skills for particular support and reviewing education and training packages across the sector.
- E8b:** Commission a water sector innovation accelerator program in line with Energise or METS Ignite in the energy sector, focused on pairing strong-potential start-ups/early-stage technology companies with existing water utilities. The program would support both the utilities and technology start-ups by helping identify major operational problems and then giving Australia's best and brightest tech start-ups the opportunity to present their solutions. The selected start-ups would undergo business readiness training to enable them to effectively partner with larger companies. This is similar to the WE&RF Lift program in the US.
- E8c:** Collaborate to form Infrastructure Hubs to increase industry collaboration within states and also between states. Strategic and coordinated investments could maximise synergies and enable the integration of assets, information and protocols between organisations to improve operations.
- E8d:** Incentivise partnerships between large metro and regional utilities to improve accessibility to industry-wide training programs for both the current and future workforce. A metro-regional partnership would help to reduce some of the barriers in relation to access to training (i.e. cost of training is higher when delivered to a thin market; regional and remote locations may have limited choice of RTO and delivery mode for required training).



6 Recommendations

The research results have identified two key foundation programs, which should be viewed as the priority next steps. These foundation programs are recommended to take priority over the others explored in the previous section as the outcomes of these have the potential to shape how all subsequent initiatives are undertaken in the water sector.

The two priority foundation programs, explored in detail below, are the development of an Employee Value Proposition and a Strategic Workforce Plan.

Employee value proposition

Enabler addressed:

Enabler 3: Leadership – Change management, strategic planning, learning mindset, communication, culture

Initiatives addressed:

E3h: Create an ‘Industry of Choice’ Employee Value Proposition (EVP) for the water sector to increase attractiveness of working in the sector, retain high performing talent and be proud to work in water.

Description:

An EVP is a tailored, unique and impactful framework which encompasses employees’ intrinsic and extrinsic motivators in order to engage the desired level of time, effort and loyalty from the workforce. An employee’s connection with the EVP determines the strength of the psychological contract formed, and directly influences their engagement, productivity and performance. A well-defined, communicated and embedded EVP can increase employee attraction, engagement, retention and productivity. An EVP needs to be measured and continually refreshed to remain relevant.

A strong EVP should link the water sector’s overall strategy and core values. A sector wide EVP would also need to be aligned to the water sector’s vision for the future and the brand the sector wants to be known for, and differentiate the sector from their competition as the ‘Industry of Choice’ to attract diverse talent in the future.

Key issues to cover:

Developing an Employee Value Proposition (EVP) for the water sector will involve exploring the following issues:

- **Brand / reputation** – To what degree does the image, vision and values of the water sector create excitement and motivation for current and potential employees
- **Career development** –The extent to which the water sector and associated organisations help their employees meet their career goals, and whether they offer a clear route for progression
- **Passion for customers** – The degree to which the water sector workforce are energised by always meeting customers’ needs, and how well they are supported to do this
- **Diversity** – The mix of employees represents a cohesive social group, and is well represented by people who bring different viewpoints and principles

- **Influence / input** – The degree to which employees have a sense of purpose, feel they can influence things, and that their input is valued and appreciated
- **People / relationships** – The degree to which people are reliable and most economical in achieving their targets in the most efficient way. Authority is given to experts
- **Employee experience** – The type of experience an individual has as an employee in the water sector.

Next Steps:

- 1 Scope and plan** – essential to develop a clear understanding about why an EVP should be created for the sector
- 2 Analyse and assess** – internal and external analysis will result in a clear view of the current position, future vision, and key gaps to address
- 3 Design and develop** – key considerations include alignment with the business strategy, future vision, and core values of the organisation
- 4 Communicate** – a thorough communications plan will assist in distilling the EVP to current and potential employees
- 5 Integrate** – continuous reinforcement of the EVP at all levels will embed the EVP into the sector and member organisations
- 6 Measure** – the EVP should be measured around baseline indicators developed during the ‘analyse and assess’ process to determine whether it is delivering on its promise

Strategic workforce plan

Enabler addressed:

Enabler 3: Leadership – Change management, strategic planning, learning mindset, communication, culture

Initiatives addressed:

E3a: Develop a sector wide Strategic Workforce Plan (SWP) to provide better quantitative and

qualitative understanding of the skill requirement and likely supply of those skills in the market. Specific elements of the plan could include:

- Detailed workforce profiling/analysis, including development of reliable data collection methods for both existing resourcing and anticipated future supply and demand across key job types
- Workforce segmentation and identification of critical roles e.g. operator, engineer, supervisory/management, executive and enterprise. Consider impact automation and digital labour on workforce and roles
- Supply and demand analysis to quantify and highlight gaps between future workforce needs and current workforce profile using scenarios, including undertaking labour market and educational profile of agreed workforce segments
- Building capability – development of an integrated workforce management plan to address potential gaps between current and future workforce needs e.g. recruitment, learning and development, retention strategies
- Establishing mechanisms to monitor and evaluate effectiveness of strategies to determine success of planned changes and impact on industry performance.

Description:

Developing a sector wide SWP will help the water sector and its workforce position itself to adapt and thrive in an uncertain future. There are a series of activities to undertake to establish and implement a SWP. These activities include strategy, planning and implementation, specific sub tasks should include:

- Workforce segmentation
- Planning design
- Scenario design or simulations
- Gap analysis
- Gap closing
- Business case
- Talent management
- Process and system integration.

These activities act as an iterative cycle to ensure the SWP remains relevant.

An effective SWP for the water sector will need to provide a clear understanding of the current workforce and identify the future needs to enable evidence based decisions in the areas of management, succession planning, business/industry continuity, and additional resourcing and capability development.

Key issues to cover:

When producing a SWP, it is critical to link strategy to workforce segmentation in order to ensure all critical roles have been identified.

For the water sector, there will need to be a focus on putting more time and effort up front into the strategy planning to ensure the workforce simulations and scenarios planning, and subsequent activities have a relevant and valuable outcome for the whole sector across Australia.

Considering this will be a sector wide initiative, the planning horizons will likely vary across organisations within the sector, however, where possible, it is recommended that they align with business planning horizons. For a SWP, most

organisations would adopt 3-5 year time horizons. It should be noted that a SWP is different from an Operational Workforce Plan, which covers the in-year planning and is more likely to be managed by individual organisations separately.

The water sector SWP will explore how to plan for and approach workforce of the future, including effectively integrating a hybrid workforce of humans and digital ‘colleagues’; management of the supply of STEM skills to meet future skills demands; preparing for the rise of automation technology and the need to refocus the responsibilities of the human workforce towards more complex and strategic tasks; and a planned step-change to meet the adaptive and flexible leadership needs to successfully lead an increasing culturally diverse and complex workforce.

Next Steps:

As outlined in the figure below, a SWP should undergo an iterative cycle. The initial strategy phase will identify actions to be resolved during the planning and implementation phases. The designed solutions are then implemented across the water sector and reanalysed on a regular basis.

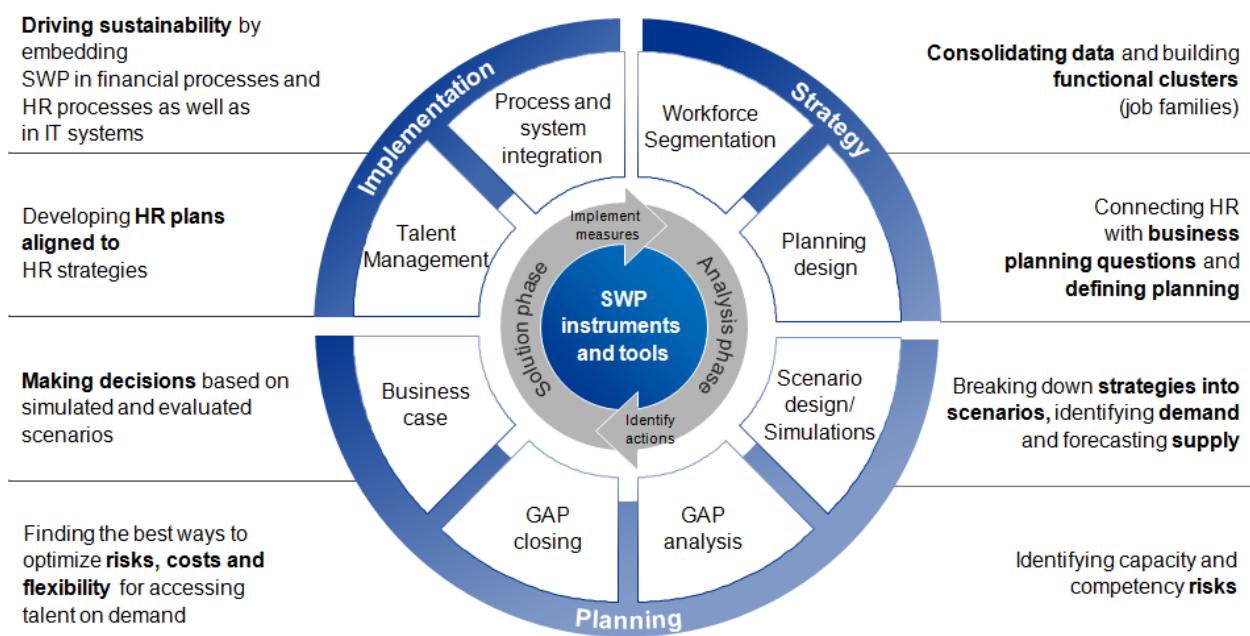


Figure 8 Strategic Workforce Planning



7 Conclusion

Change and disruption is the new constant in the global economy. Almost all aspects of the way work is organised and performed in the water sector will be impacted in some way. Effective strategic workforce planning will be critical to our ability to evolve and remain competitive in this changing labour market. This Report will provide a solid basis that informs both the sector's and individual participants workforce planning efforts.

Kenan Hibberd, Executive Manager Unitywater / Chair of WSAA People and Culture Network

The Water Services Association of Australia (WSAA), in partnership with the Water Environment & Reuse Foundation (WE&RF) and the UK Water Industry Research (UKWIR), have taken the first step towards preparing their members in the water sector for the workforce skills of the future.

As this paper has outlined, there have been a number of skills and capability gaps identified in the current workforce, which have the potential to impact on the water sector's ability to respond to the changes that the future will bring. Key gaps in leadership, digital literacy and critical thinking skills need to be addressed through recruitment, and up-skilling and professional development for current employees, as well as supplementing the existing workforce with external contractors. Developing an industry Employee Value Proposition and Strategic Workforce Plan will be the first steps towards minimising the main barrier water utilities are experiencing in achieving this uplift in skills and capabilities, being organisational culture and change management.

The water sector needs to be conscious of the water specific trends impacting the sector, and also global megatrends currently disrupting all industries

across the world. By integrating an understanding of these trends into the Employee Value Proposition and Strategic Workforce Plan, water utilities will be far better placed in the future to create a more engaging customer experience, enhance the liveability of urban areas and provide greater development opportunities for their workforce. These key trends include utility megatrends, future of work trends and customer trends.

Scenario planning has been used to explore the plausible impact of the key drivers of change in the future, and from this process, key enablers to be successful in an uncertain future have been identified. Further exploration of these key enablers have given rise to a series of initiatives relating to skills tests, competency frameworks, strategic workforce plans, sector specific organisational development, collaboration, and use of technology.

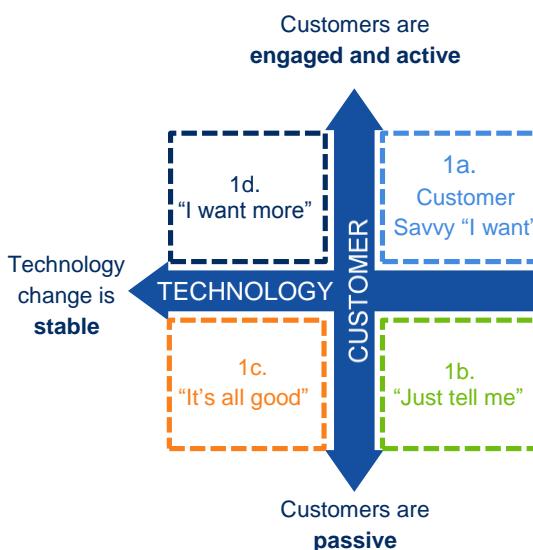
Embracing these initiatives, starting with the industry foundation programs of the Employee Value Proposition and Strategic Workforce Plan, will provide direction for all subsequent activities, and ensure the water sector and their workforce is in the best position to adapt and thrive in the future.

Appendices

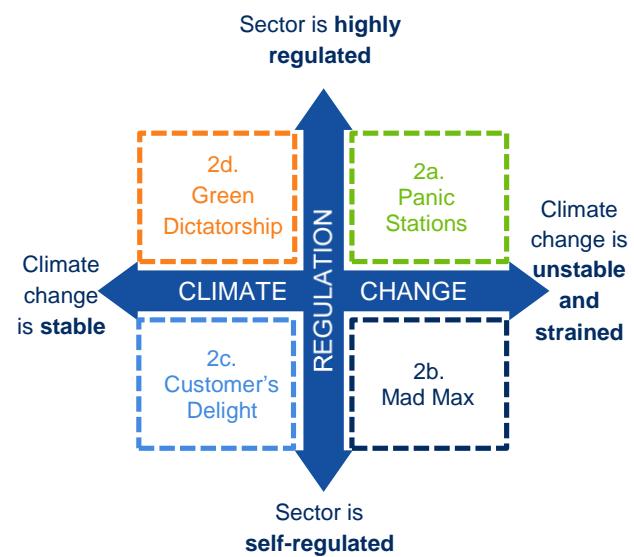
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Appendix A: Description of the scenarios

Scenario 1



Scenario 2



These scenarios were developed during the Workforce Skills of the Future 2-Day Industry Workshop held in Melbourne in April 2017, and are 'snapshots' of what the water sector in 2040 may look like. They are not meant to be accurate predictions, rather they are meant to show a wide range of potential options. We recognise that the water sector system is unlikely to develop according to one particular scenario; rather a mixture of potential scenarios is likely to emerge.

Within each scenario, the 3 key themes of the workshop are explored, including customer, utilities megatrends, and future of work, giving all scenarios a consistent framework.

Scenario 1, which explored the interaction between the key driving forces of Customer and Technology, was selected during both the Australian and US 2-day Industry Workshops. Therefore, Scenario 1, as described on the following pages, is a combination of what was developed during both 2-day Industry Workshops. Given the number of participants at the Australian 2-day Industry Workshop, a second scenario planning exercise was run concurrently, which explored the interaction between the key driving forces of Regulation and Climate Change.

Scenario 1

	1a. Customer Savvy "I want"	1b. "Just tell me"	1c. "It's all good"	1d. "I want more"
Utility Megatrends	Water businesses and their current operating models become irrelevant (i.e. stranded assets, high debt levels, need to write off debt, underinvestment). This results in costs spiralling upwards. In response, there is political intervention and loss of control by water businesses.	There is a push to embrace emerging technologies, but not at the same level as other industries (e.g. telecommunications). There is no lobbying for innovation in technology in water industry. There is complacency around understanding water security.	Risk appetite is low, and utilities are late adopters of new technology. Any technological improvement is incremental, and on an as-needs basis. ROI is expected and results in price rises. The old and new technologies are integrated, creating a patchwork network. Utilities are at the mercy of	New technology is used to develop unbreakable / self-managed assets, and water treatment plants are run by AI. Future prediction enabled technology allows customers to pre-order water. Utilities have increased their CSR activities, with carbon balancing and bioremediation. Customers

	1a. Customer Savvy “I want”	1b. “Just tell me”	1c. “It’s all good”	1d. “I want more”
			the environment, rather than proactive. They are under the government radar, and wait to be ‘pushed’.	would trade their waste water, given advances in waste to energy technologies.
Customer	A combative environment, industry brand suffers, as there is a high level of customer complaints and low trust. Frustration leads more and more customers move to off-grid arrangements. There is a rise in water theft through new technologies. Increases in off-grid numbers and water theft results in a significant loss of revenue base. These new technologies from the private sector and customers and new market entrants will cause large-scale disruption in the water sector.	Customers want fast, transactional interactions with no bells and whistles. Must meet customer expectations in relation to your core service. Customers have a “do it for me” attitude, and are only interested in getting just the information they ask for, not anything else that is potentially irrelevant that they will need to sift through.	Customers are disengaged and passive. They expect service levels to improve over time, however, as they do not communicate this, the utility does not know if customers are happy or unhappy with service. The Regulator is the customer voice, and Utility decisions are not specifically informed by the customer. Services are segmented rather than personalised. The utility does not know if they are meeting customer demands and expectations. The gap between utility and customer grows larger.	Consistent and reliable supply of water and customers have a variety of sources to choose from. Utility customers’ expectations include quality and the availability of “consumption options”. Many business decisions are customer driven. Customers want to choose their own service, enabled by apps, including the ability to pay when they want, and interact with data. Customers want 24/7 access to individualised information.
Future of Work	It is difficult to attract new talent, with current staff numbers high and inefficient, and high staff turnover. There is a need for a large complaints section, potentially outsourced to a call centre. Other roles will also be outsourced to companies with more advanced technology capabilities. Key skills include crisis management, negotiation skills, resilience, customer service, community education, managing expectations, and more hands-on operations.	Key skills and capabilities include emotional and social intelligence, critical thinking and problem solving, tech savvy, and skills from other industries. Change management programs need to explain the purpose effectively to staff.	Utilities would need to retain current skills and workforce mix, supplemented by steady growth and continuous improvement. The continuous improvement should include a mix of the traditional approach plus new technology and skills.	App development and management skills need to be developed in-house or outsourced. Technology capabilities will require continuous improvement to avoid complacency. Customer service will have to be focused and personalised, with fast response rates (i.e. through “chat now” options in the app). Increased need for data and analytics capabilities as there is an increasing amount of data available, provided by the future prediction enabled technology and the customer app.

Scenario 2

	2a. Panic Stations	2b. Mad Max	2c. Customer's Delight	2d. Green Dictatorship
Utility Megatrends	<p>There is increasing climate change denial. As the climate is becoming more strained, there are increasing instances of water theft. Rising sea levels lead to displaced assets and people. Public debt increases and there is a rise in the number of mega-projects. There is better data on water availability, and the Government starts to influence population growth in areas of water.</p>	<p>All water management is taken away from the government and there is a pure market economy. Water is potentially owned by foreign investors.</p> <p>The population moves to areas of water. The agriculture sector becomes strained and many farming families start to move to cities, with farms increasingly bought by foreign investors.</p> <p>Water prices spiral as disruption increases and the population moves off-grid, aiming for self-sufficiency with desalination plants in their backyard. Greater disparity between the rich and poor.</p> <p>Australia will move to the forefront of innovation, with opportunities for international partnerships to share the new technologies.</p> <p>Lack of regulation leads to undesirable environmental outcomes, with unpredictable floods and draught reducing certainty about demand and supply.</p>	<p>The utility business model is changing to privatisation and commercialisation as the market becomes more and more competitive.</p> <p>There is an increased push to embrace new emerging technologies and increase R&D investment into developing new products for diversification.</p>	<p>Barriers to entry are high and there are a steady leaders in the industry. Utilities are less commercial and costs have been driven down.</p> <p>There is tight regulation around resource efficiency, and utilities also strive for productivity efficiency internally.</p> <p>3rd parties become the driver for innovation as there is a decrease in internal R&D and low risk appetite. There is little entrepreneurship, as the focus is on just maintaining the existing infrastructure. Customers remain on the network.</p>
Customer	<p>Reduced choice for the customer means they develop a greater level of adaptation. The government provides incentives for customers to go off-grid.</p>	<p>Customers demand more choice, and move off-grid in increasing numbers as new houses and developments with new technology make it easier to opt out. There is a rise in Water Cooperatives, to connect and increase access to water.</p> <p>Utilities left with a small customer base who can't afford to go off-grid. Prices increase dramatically for remaining customers as the utilities still have the same infrastructure.</p> <p>Industrial / manufacturing customers look at options to become self-sufficient.</p>	<p>Customers have a variety of choice in products and services, and have more control over what these options include. Utilities need to focus on customer segmentation and transparency of information in order to maintain trust and loyalty of customers.</p>	<p>Utilities are using technology to create efficiencies and communications rather than innovate. With improved forecasting capabilities and rigid pricing, it is easier to manage customer expectations</p> <p>The utility and its customers are a community, and there is an increase in collaboration.</p>

	2a. Panic Stations	2b. Mad Max	2c. Customer's Delight	2d. Green Dictatorship
Future of Work	<p>Key skills are disaster management, negotiation and communication with customers, engineering and innovation with a focus on security, project and risk management skills, and a workforce that is resilient, flexible and highly mobile.</p>	<p>Leaders of utilities need to be like a navy seal, with advanced skills in emergency management. Other key skills the utilities need include risk management and environmental management, an entrepreneurial mindset with investment in R&D to develop new products, market analysis skills, and a focus on security.</p>	<p>Lean, agile workforce, where streamlining and partnerships create efficiency.</p> <p>Utilities need commercial acumen, business development and marketing skills, and specialised project management skills.</p> <p>Soft skills and relationship management to improve customer engagement and build a culture of customer centricity.</p> <p>Innovation will be through technology, and the workforce will require digital literacy skills to use data for predictive customer analytics.</p>	<p>Low risk taking behaviour results in a lack of entrepreneurship, with innovation and skills being outsourced to contractors or other businesses.</p> <p>Steady as you go leadership has a focus on monitoring, reporting and measurement. Community involvement is more collaborative and there is no urgency.</p>

Appendix B: Australian survey results

WSAA Workforce Skills of the Future Survey

As part of this engagement, KPMG conducted a short survey among WSAA members and select senior leadership across the water sector to collect information on five key facets of the workforce: cost, capacity, capability, connectivity and compliance. The aim of this survey was to highlight key workforce trends and future skills required in the water sector over a long term horizon, and identify key enablers for success through more well-informed strategic planning and investment by water service providers and the sector.

Recipients of the survey were encouraged to seek input from members of their Executive Leadership Teams. Only one survey was provided per organisation.

The survey was opened on Friday 31 March 2017 and remained open until midday on Tuesday 18 April 2017. This was a short extension on the original close date of COB Friday 14 April 2017.

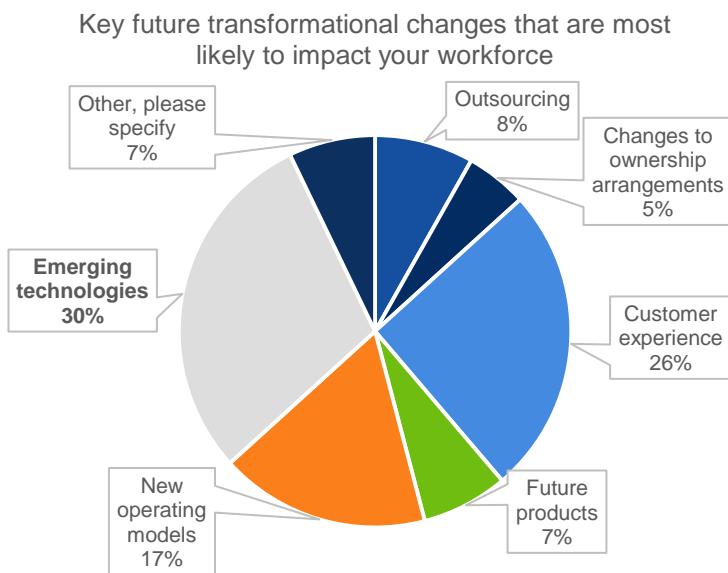
Information obtained from the survey was presented for discussion at the 2-day Industry Workshop held in Melbourne on 27 and 28 April 2017.

Total Participants: 33 WSAA member organisations

Location	Number
Victoria	12
New South Wales	7
Queensland	8
South Australia	2
Western Australia	2
Australian Capital Territory	1
Tasmania	1
Northern Territory	0

Size of Organisation (approximate no. of connected properties)		Number
Small	0-24,999	7
	25,000-49,999	1
	50,000-99,999	4
Large	100,000 or more	13
	Not applicable	8

What do you consider key future (5-10 years) transformational changes that are most likely to impact your workforce?



Top responses:

1. Emerging Technologies
2. Customer Experience
3. New Operating Models

Text responses for "Other, please specify":

Digital Transformation; Overseas Staff; Integrated Water; Energy Efficiency; Customer Expectations; Population Growth; Political Impacts; Regulatory Impacts.

Survey questions were grouped according to 5 key facets of the workforce:

1	Cost	Cost drivers include factors that impact the efficiency and effectiveness of the workforce.	
2	Capacity	Capacity drivers include factors that impact on having sufficient resources in the right locations.	
3	Capability	Capability drivers include factors that impact on having a skilled, agile and diverse workforce.	
4	Connectivity	Connectivity drivers include factors that impact on having motivated and innovative employees.	
5	Compliance	Compliance drivers include factors that impact on financial, legal, regulatory and reputational compliance.	

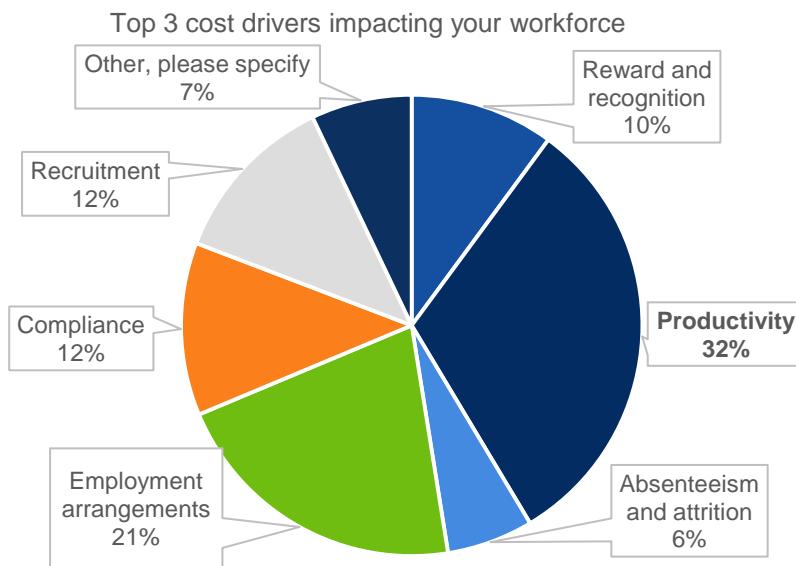
1

Cost

Cost drivers include factors that impact the efficiency and effectiveness of the workforce.



Please select your top 3 cost drivers impacting your workforce.



Top responses:

1. Productivity
2. Employment Arrangements
3. Compliance; Recruitment

Text responses for “Other, please specify”: Service Area; Proactive Safety; Ageing Workforce; Work Organisation; Capability; Flexibility; Leadership; Retention

Differences only exist for third-rated cost driver impacting the workforce, with reward and recognition being more important for small organisations compared to large organisations.

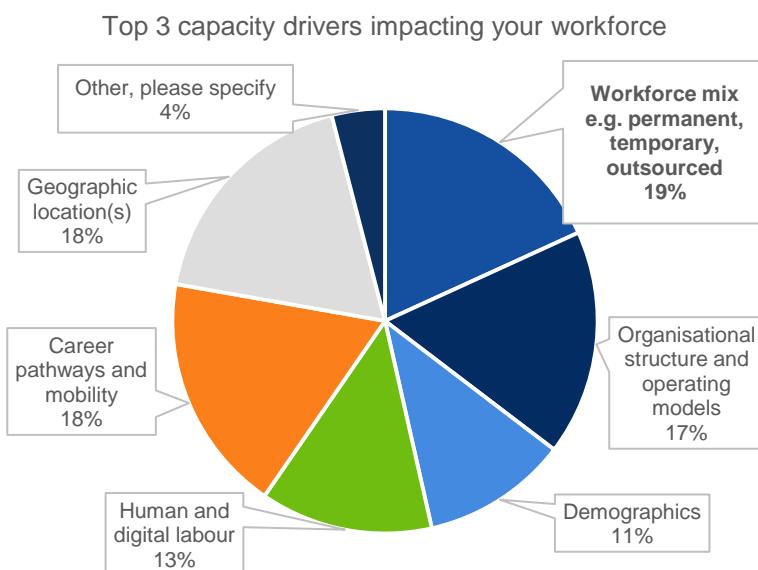
2

Capacity

Capacity drivers include factors that impact on having sufficient resources in the right locations.



Please select your top 3 capacity drivers impacting your workforce.



Top responses:

1. Workforce Mix;
2. Career Pathways; Geographic Location
3. Org Structure and Op Models

Text responses for “Other, please specify”: Capability; Willingness to Change Roles; City Expansion; Population Growth; Ageing Workforce; Current Financial Position; Commercial Uncertainty

- | Large Org. | Small Org. |
|--------------------------------|--------------------------------|
| 1. Org Structure and Op Models | 1. Geographic Location |
| 2. Workforce Mix | 2. Demographics; Workforce Mix |
| 3. Human and Digital Labour | 3. Org Structure and Op Models |

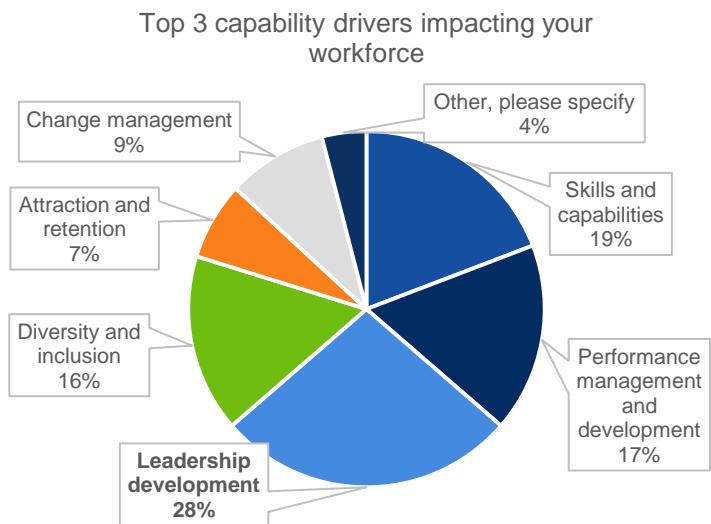
3

Capability

Capability drivers include factors that impact on having a skilled, agile and diverse workforce.



Please select your top 3 capability drivers impacting your workforce.



Top responses:

1. Leadership Development
2. Skills and Capabilities
3. Performance Management and Development

Text responses for "Other, please specify":
Learning Agility; Geographic Location;
Attraction; Geographic Location.

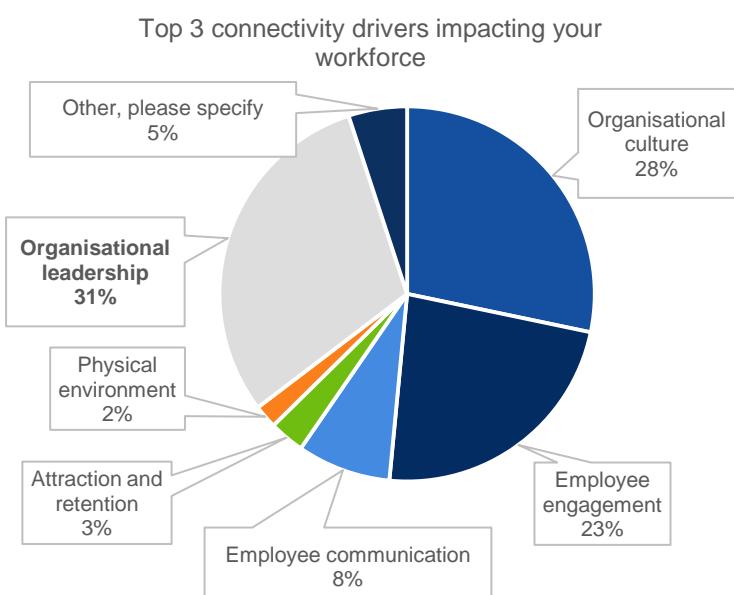
4

Connectivity

Connectivity drivers include factors that impact on having motivated and innovative employees.



Please select your top 3 connectivity drivers impacting your workforce.



Top responses:

1. Organisational Culture
2. Organisational Leadership
3. Employee Engagement

Text responses for "Other, please specify":

People Management; Technology – Connectivity and Mobility; Workload; Politics; Innovation; Size of Transport Market > Water Market

5

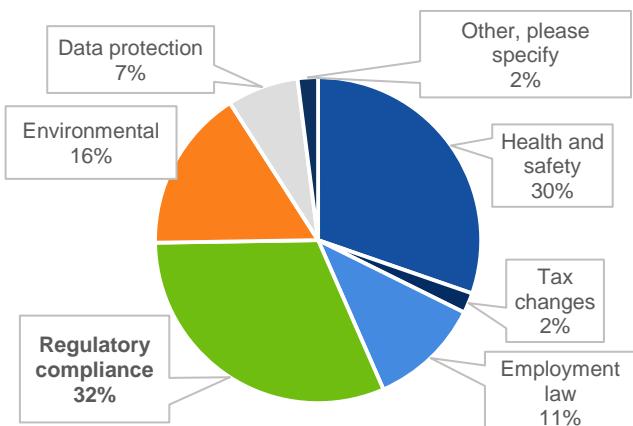
Compliance

Compliance drivers include factors that impact on financial, legal, regulatory and reputational compliance.



Please select your top 3 compliance drivers impacting your workforce.

Top 3 compliance drivers impacting your workforce



Top responses:

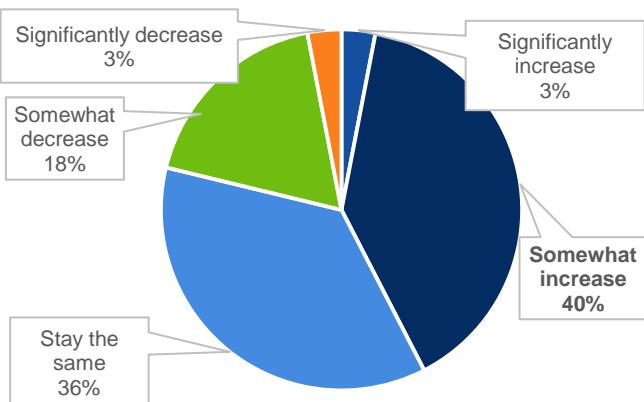
1. Regulatory Compliance
2. Health and Safety
3. Environmental

Text responses for "Other, please specify":
Customer Engagement

Differences only exist for third-rated compliance driver, with employment law being rated higher than environment for large organisations, and environment being rated higher than employment law for small organisations.

Over the next 12-24 months, what do you expect will happen to your staffing levels?

Staff levels over the next 12 - 24 months

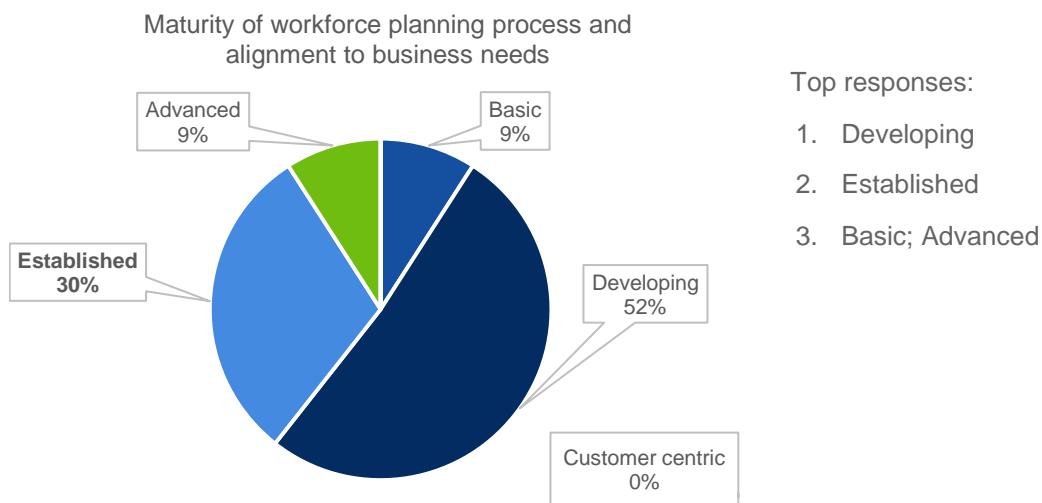


Top responses:

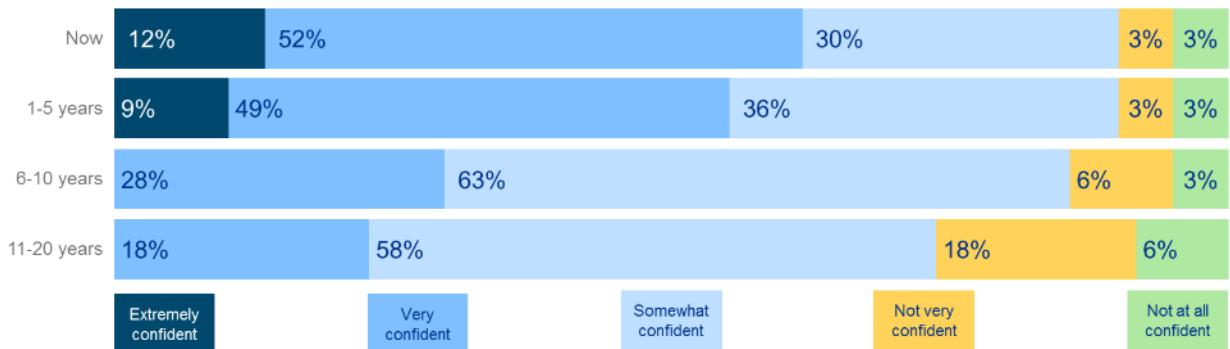
1. Somewhat increase
2. Stay the same
3. Somewhat decrease

To what extent does the workforce planning (WFP) align workforce (WF) to business needs:				
Basic	Developing	Established	Advanced	Customer Centric
The outputs of the process have little to no impact on aligning the workforce to business needs. Where workforce development strategies are described, they do not include action plans or assign responsibility. Workforce planning is essentially an exercise to produce a document.	Formal WFP activities have been undertaken however the result has little to no impact on the workforce which exists currently or into the future. Most recruiting and L&D activities seek to address immediate need without consideration to long term implications or business needs.	The WFP is somewhat effective in aligning the WF to the needs of the organisation. Roles critical to the organisation achieving its objectives or maintaining its reputation have been identified and risk mitigation strategies have been designed to retain critical skills or employees.	WFP identifies the current and future workforce (including critical roles) and strategies to develop this workforce, there is confidence amongst executive and line managers that WFP interventions will be effective in enabling the human requirements of the organisation.	The organisation is highly confident that the current and future workforce necessary to achieve its objectives has been identified and that appropriate strategies are in place to mitigate workforce risks. Future workforce information is a driver for the organisation's accommodation and IT resourcing cycles and is the main driver for strategic HR activities.

Considering the maturity matrix above, how would you assess the maturity of your workforce planning process and alignment to business needs?

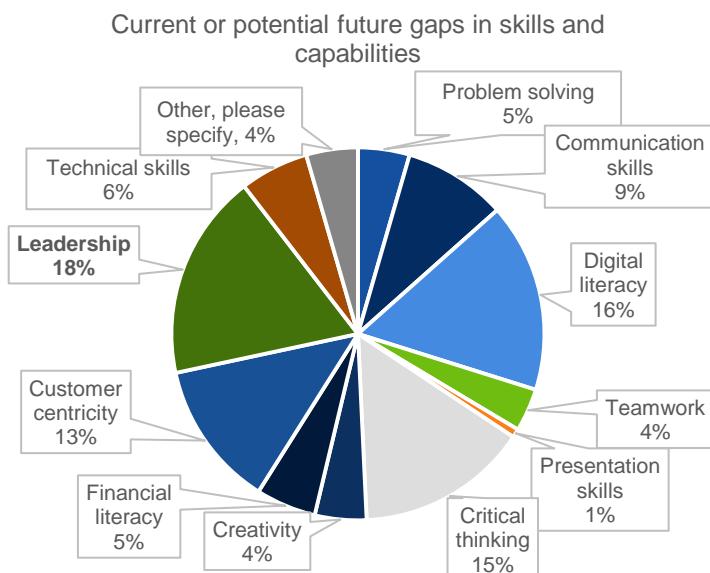


Considering the skills and capabilities of your workforce, how confident are you that these will enable you to deliver against your current, medium, and long term business objectives?



Results indicate a similar trend between small and large organisations as confidence in delivering business objectives decreases over time. Results also indicate that small organisations are more confident than large organisations in delivering against current, medium and long term business objectives.

Considering the previous question, what current or potential future gaps do you see in the following skills and capabilities?

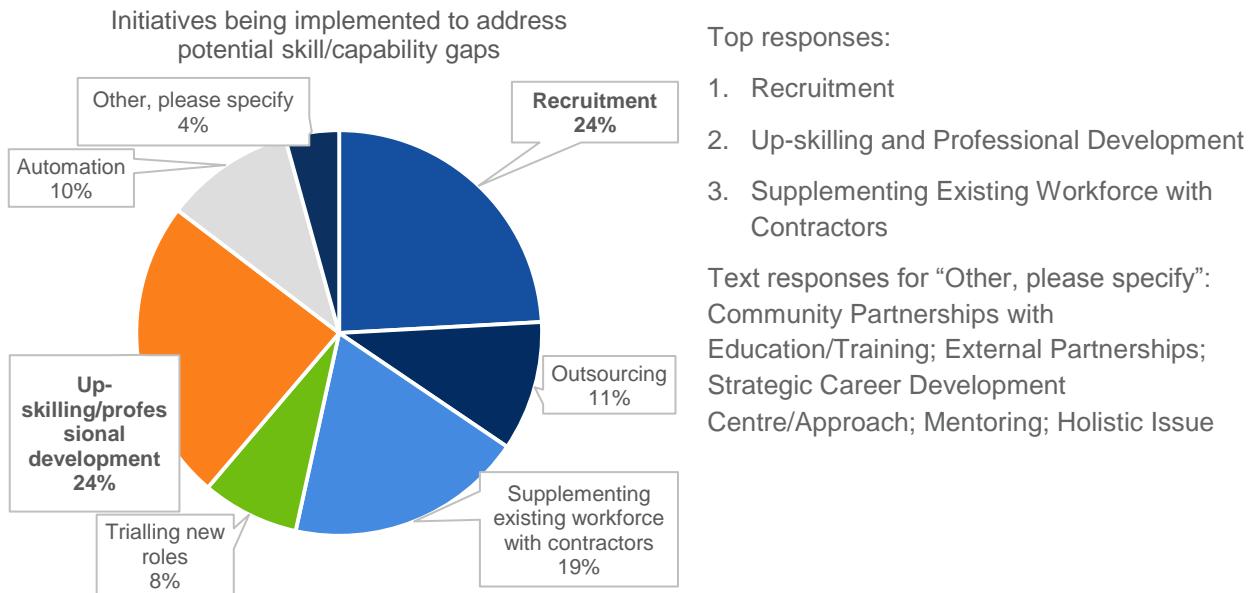


Top responses:

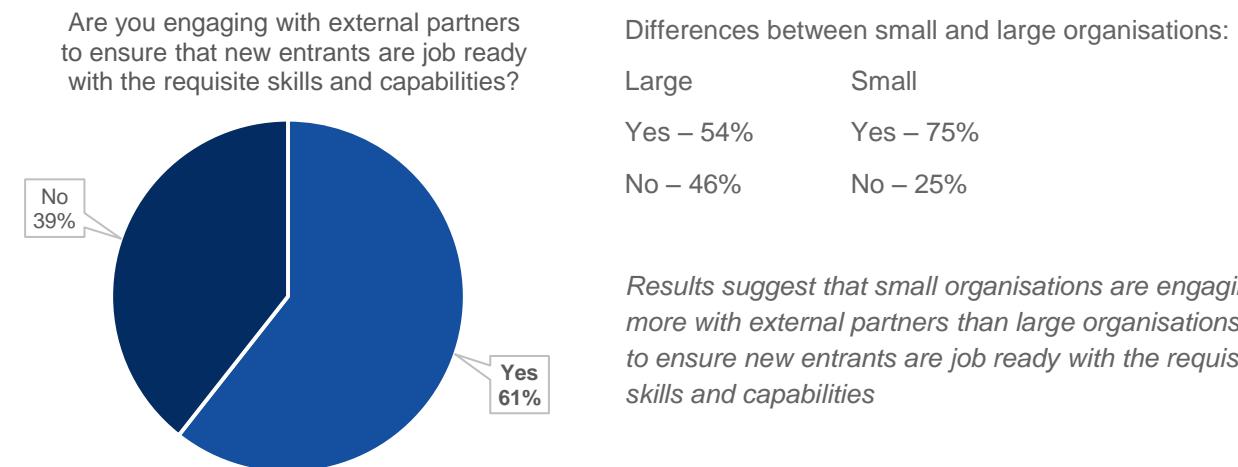
1. Leadership
2. Digital Literacy
3. Critical Thinking

Text responses for “Other, please specify”: Collaboration/Inclusive Thinking; Change Management; Strategic Workforce Planning; Relationship Management; Technical Skills – Talent and Attraction, STEM, Science Fundamentals, Digital Workforce, Field Expertise, Project Management

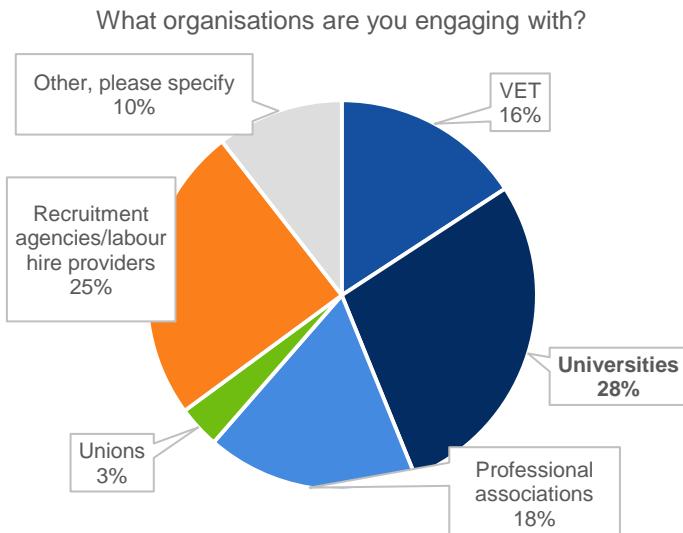
What initiatives are you implementing to address potential skill/capability gaps?



Given the current and anticipated changes in the sector, are you engaging with external partners to ensure that new entrants are job ready with the requisite skills and capabilities?



If so, what organisations are you engaging with? Select all that apply



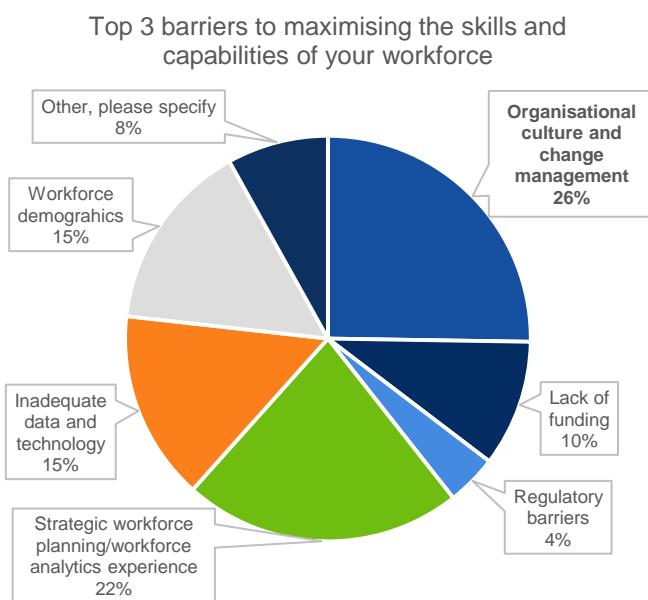
Top responses:

1. Universities
2. Recruitment Agencies
3. Professional Associations

Text responses for "Other, please specify": Community Partnerships; Other International Utilities (Best Practice); Contractors

Results suggest that small organisations are engaging more with recruitment agencies, and large organisations are engaging more with universities, to ensure that new entrants are job ready with the requisite skills and capabilities.

What do you consider are the top 3 barriers to maximising the skills and capabilities of your workforce?



Top responses:

1. Organisational Culture and Change Management
2. Strategic Workforce Planning and Workforce Analytics Experience
3. Inadequate Data and Technology; Workforce Demographics

Text responses for "Other, please specify": Remuneration; Industrial Instruments; EVP/Talent Attraction; Individual Learning Agility; Time Restraints; Operating Models; Geographic Location; Competing Priorities; Strategic Workforce Planning

Differences between small and large organisations:

Large	Small
1. Org Culture and Change Management	1. Workforce Demographics
2. Strategic Workforce Planning	2. Strategic Workforce Planning
3. Inadequate Data and Technology	3. Org Culture and Change Management

Appendix C: US survey results

WE&RF Workforce Skills of the Future Survey

As part of this engagement, KPMG conducted a short survey among WE&RF members and select senior leadership across the water sector to collect information on five key facets of the workforce: cost, capacity, capability, connectivity and compliance. The aim of this survey was to highlight key workforce trends and future skills required in the water sector over a long term horizon, and identify key enablers for success through more well-informed strategic planning and investment by water service providers and the sector.

Recipients of the survey were encouraged to seek input from members of their Executive Leadership Teams. Only one survey was provided per organisation.

The survey was opened on 22 May 2017 and remained open until 19 June 2017.

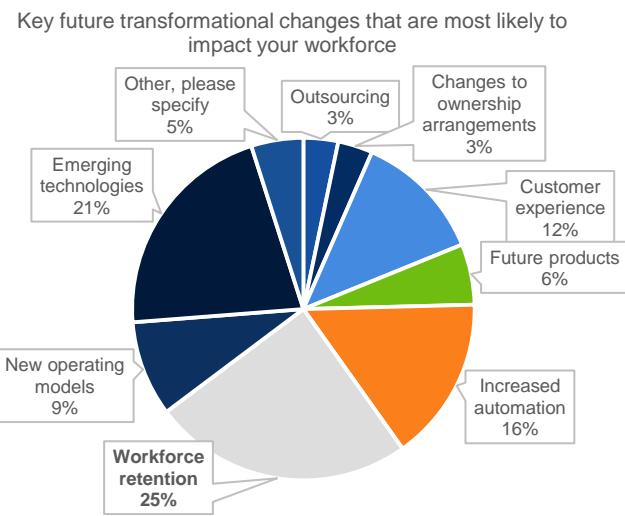
Information obtained from the survey was presented for discussion at the 2-day Industry Workshop held in Virginia on 12 and 13 July 2017.

Total Participants: 36 WE&RF member organisations

Location	Number	Location	Number	Location	Number
Alabama	1	Louisiana	1	Ohio	2
Alaska	1	Maine	1	Oklahoma	1
Arizona	3	Maryland	3	Oregon	2
Arkansas	0	Massachusetts	4	Pennsylvania	4
California	10	Michigan	4	Rhode Island	0
Colorado	3	Minnesota	1	South Carolina	2
Connecticut	0	Mississippi	0	South Dakota	0
Delaware	0	Missouri	5	Tennessee	3
Florida	6	Montana	0	Texas	4
Georgia	2	Nebraska	1	Utah	0
Hawaii	0	Nevada	1	Vermont	0
Idaho	1	New Hampshire	1	Virginia	7
Illinois	4	New Jersey	2	Washington	2
Indiana	1	New Mexico	2	West Virginia	1
Iowa	1	New York	4	Wisconsin	2
Kansas	2	North Carolina	1	Wyoming	0
Kentucky	2	North Dakota	1	Other, please specify	1

Size of Organization (approximate no. of connected properties)	Number
Small	0-24,999
	25,000-49,999
	50,000-99,999
Large	100,000 or more
	Not applicable

What do you consider key future (5-10 years) transformational changes that are most likely to impact your workforce?



Top responses:

1. Workforce Retention
2. Emerging Technologies
3. Increased Automation

Text responses for "Other, please specify":

Expanded service boundary and recycled water service; retirement; weather extremes and changing ocean chemistry/level; due to low unemployment and high demand outsourcing is less of an option; pension plan change; benefit packages for workforce

Survey questions were grouped according to 5 key facets of the workforce:

1	Cost	Cost drivers include factors that impact the efficiency and effectiveness of the workforce.	
2	Capacity	Capacity drivers include factors that impact on having sufficient resources in the right locations.	
3	Capability	Capability drivers include factors that impact on having a skilled, agile and diverse workforce.	
4	Connectivity	Connectivity drivers include factors that impact on having motivated and innovative employees.	
5	Compliance	Compliance drivers include factors that impact on financial, legal, regulatory and reputational compliance.	

1

Cost

Cost drivers include factors that impact the efficiency and effectiveness of the workforce.



Please select your top 3 cost drivers impacting your workforce.

Top 3 cost drivers impacting your workforce



Top responses:

1. Aging Workforce
2. Recruitment
3. Productivity

Text responses for “Other, please specify”:

Increased treatment requirements and distribution of recycled water; Retiree Healthcare; heat-caused productivity drops.

2

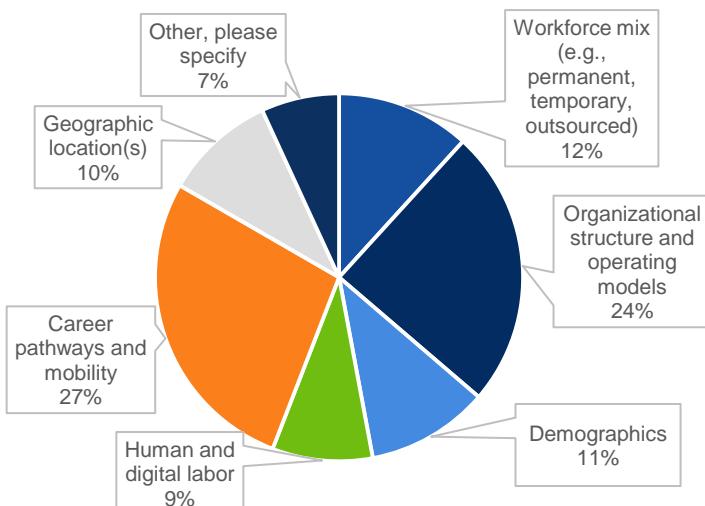
Capacity

Capacity drivers include factors that impact on having sufficient resources in the right locations.



Please select your top 3 capacity drivers impacting your workforce.

Top 3 capacity drivers impacting your workforce



Top responses:

1. Career Pathways and mobility;
2. Org Structure and Op Models
3. Workforce Mix

Text responses for “Other, please specify”:

Vehicle Refresh, including heavy equipment & rolling stock; Organisation Policies - Domicile Requirements; ability to integrate resources from varying locations; subject matter expertise; regulatory limits; Legacy Union Contracts & Civil Service; Union cooperation

3

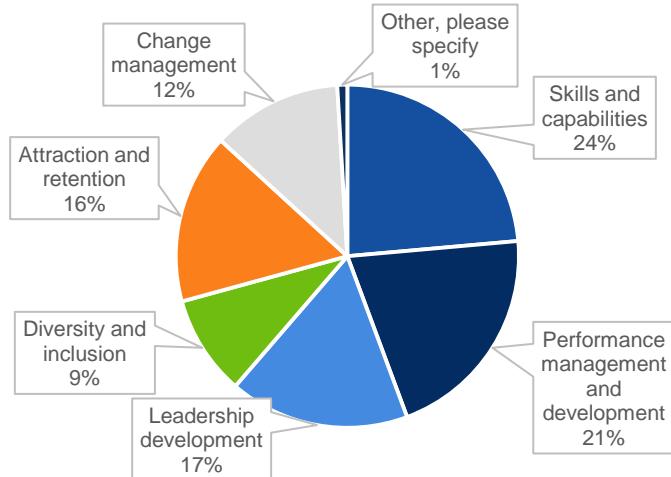
Capability

Capability drivers include factors that impact on having a skilled, agile and diverse workforce.



Please select your top 3 capability drivers impacting your workforce.

Top 3 capability drivers impacting your workforce



Top responses:

1. Skills and Capabilities
2. Performance Management and Development
3. Leadership Development

Text responses for “Other, please specify”:

Availability and attracting skilled labour.

4

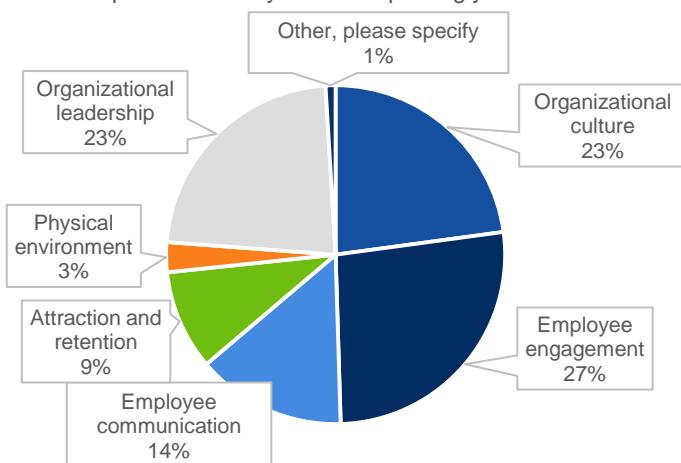
Connectivity

Connectivity drivers include factors that impact on having motivated and innovative employees.



Please select your top 3 connectivity drivers impacting your workforce.

Top 3 connectivity drivers impacting your workforce



Top responses:

1. Employee Engagement
2. Organisational Culture / Organisational Leadership
3. Employee Communication

Text responses for “Other, please specify”:

Positive Labour Relations.

5

Compliance

Compliance drivers include factors that impact on financial, legal, regulatory and reputational compliance.



Please select your top 3 compliance drivers impacting your workforce.



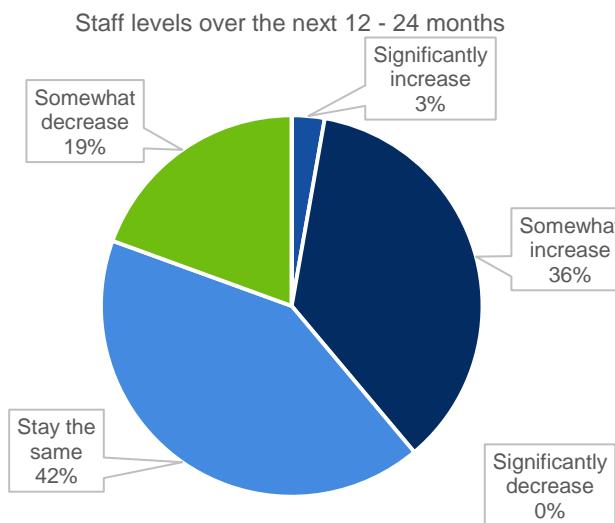
Top responses:

1. Compliance with existing regulations
2. Health and Safety
3. Environmental regulations

Text responses for “Other, please specify”:

Pressure to hold down rate increases; Organisational Requirements - Domicile Requirements; influencing future regulations; subject matter expertise; rate regulation process; financial stability of retirement system.

Over the next 12-24 months, what do you expect will happen to your staffing levels?

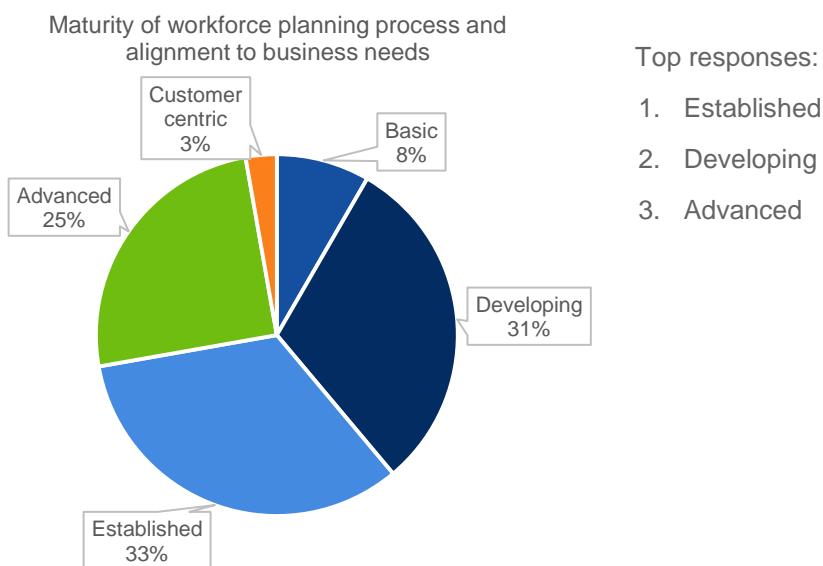


Top responses:

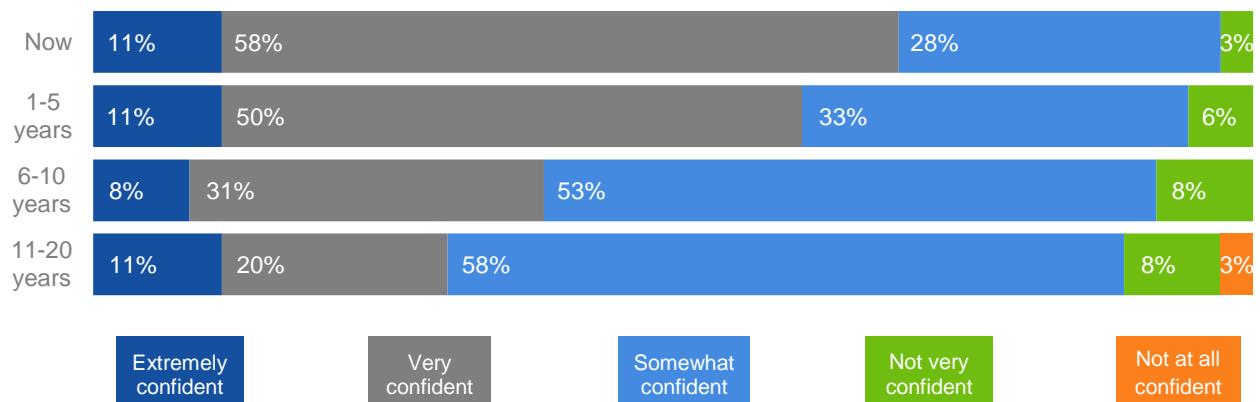
1. Stay the same
2. Somewhat increase
3. Somewhat decrease

To what extent does the workforce planning (WFP) align workforce (WF) to business needs:				
Basic	Developing	Established	Advanced	Customer Centric
The outputs of the process have little to no impact on aligning the workforce to business needs. Where workforce development strategies are described, they do not include action plans or assign responsibility. Workforce planning is essentially an exercise to produce a document.	Formal WFP activities have been undertaken however the result has little to no impact on the workforce which exists currently or into the future. Most recruiting and L&D activities seek to address immediate need without consideration to long term implications or business needs.	The WFP is somewhat effective in aligning the WF to the needs of the organisation. Roles critical to the organisation achieving its objectives or maintaining its reputation have been identified and risk mitigation strategies have been designed to retain critical skills or employees.	WFP identifies the current and future workforce (including critical roles) and strategies to develop this workforce, there is confidence amongst executive and line managers that WFP interventions will be effective in enabling the human requirements of the organisation.	The organisation is highly confident that the current and future workforce necessary to achieve its objectives has been identified and that appropriate strategies are in place to mitigate workforce risks. Future workforce information is a driver for the organisation's accommodation and IT resourcing cycles and is the main driver for strategic HR activities.

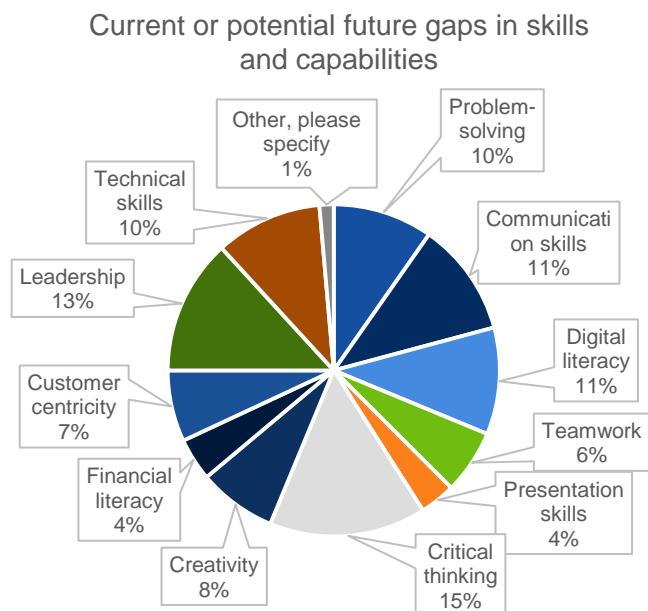
Considering the maturity matrix above, how would you assess the maturity of your workforce planning process and alignment to business needs?



Considering the skills and capabilities of your workforce, how confident are you that these will enable you to deliver against your current, medium, and long term business objectives?



Considering the previous question, what current or potential future gaps do you see in the following skills and capabilities?



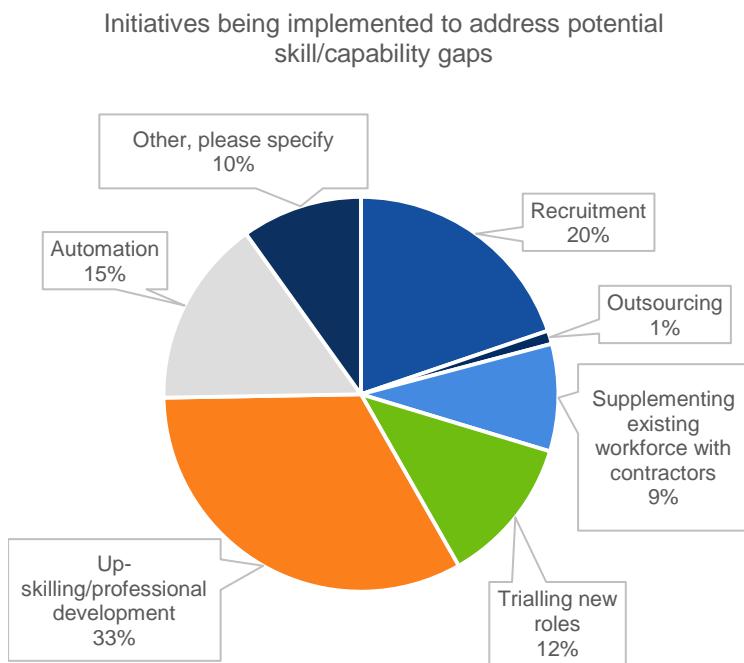
Top responses:

1. Critical Thinking
2. Leadership
3. Communication Skills

Text responses for “Other, please specify”:

Employee engagement; Cognitive Agility.

What initiatives are you implementing to address potential skill/capability gaps?



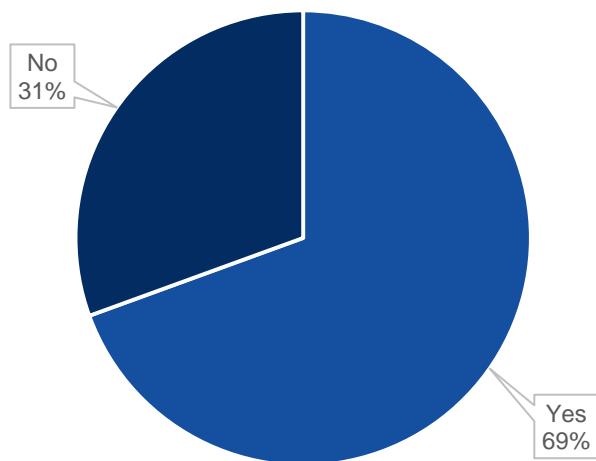
Top responses:

1. Up-skilling and Professional Development
2. Recruitment
3. Automation

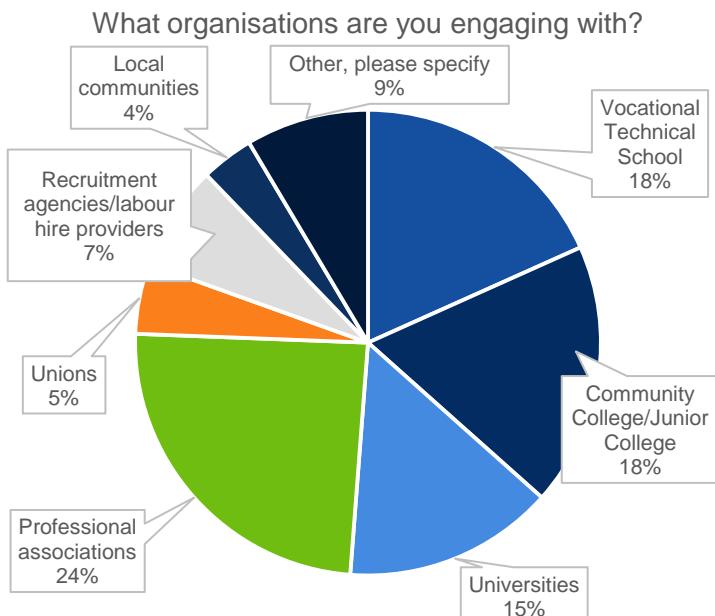
Text responses for "Other, please specify":

Revamping existing succession plan; working with local high schools on employment pathways; not sure - we are too busy working to address concerns; we have a succession development plan in place, as well as a dedicated Technical Training Program Manager; career pathing and training on soft skills; attempting to create more entry level opportunities; Performance Improvement and Matrix, Succession Planning; apprenticeship programs, leadership training

Given the current and anticipated changes in the sector, are you engaging with external partners to ensure that new entrants are job ready with the requisite skills and capabilities?



If so, what organisations are you engaging with? Select all that apply



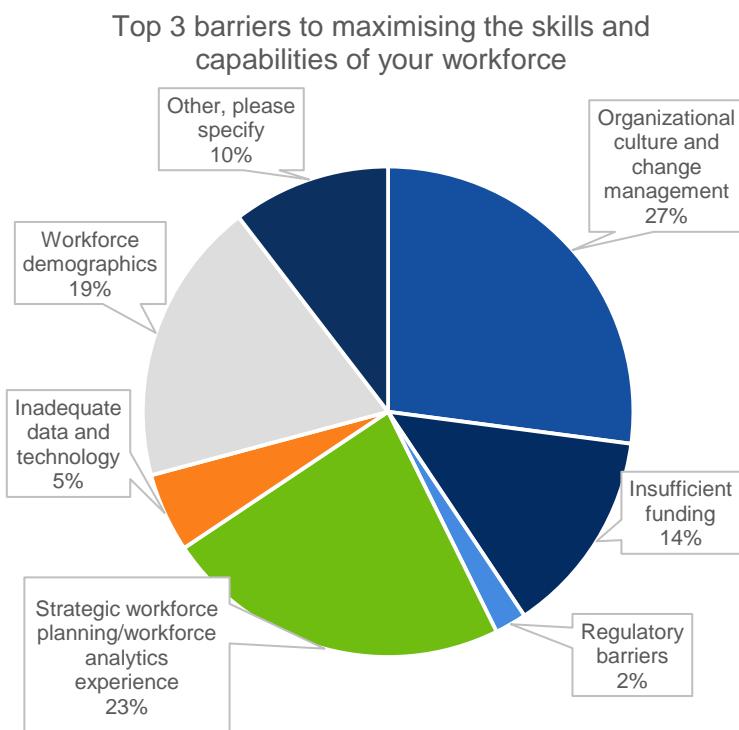
Top responses:

1. Professional Associations
2. Vocational Technical School; Community College / Junior College
3. Universities

Text responses for "Other, please specify":

Regional council; Community Based Organisations; high schools; BAYWORK (www.baywork.org); MBE organisations; SC and US Dept. of Labour.

What do you consider are the top 3 barriers to maximising the skills and capabilities of your workforce?



Top responses:

1. Organisational Culture and Change Management
2. Strategic Workforce Planning and Workforce Analytics Experience
3. Workforce Demographics

Text responses for "Other, please specify":

Offering competitive compensation with other government and private employers; Organisational Requirements; time (staff are too busy to go to training); expensive housing; resources to implement; inability to find qualified diverse candidates for specific jobs; some front line supervision lacks training to lead subordinates in maximising skills and capabilities; inadequate basic skills of workforce pool; overall City Budget Constraints.

Appendix D: Global comparison

Table 1 Global comparison of current state

WSAA, Australia	WE&RF, United States	UKWIR, United Kingdom
Top cost drivers		
The factors that impact the efficiency and effectiveness of the workforce.		
1. Productivity 2. Employment Arrangements 3. Compliance; Recruitment	1. Aging Workforce 2. Recruitment 3. Productivity	1. Aging workforce 2. Productivity; Reward and recognition 3. Employee arrangements
Top capacity drivers		
The factors that impact on having sufficient resources in the right locations.		
1. Workforce Mix; Org Structure and Op Models 2. Career Pathways; Geographic Location 3. Human and Digital Labour; Demographics	1. Career pathways and mobility 2. Organisational structure and operating models 3. Workforce mix	1. Workforce mix 2. Geographical locations; Career pathways 3. Demographics; Organisational structure & operating models
Top capability drivers		
The factors that impact on having a skilled, agile and diverse workforce.		
1. Leadership Development 2. Skills and Capabilities 3. Performance Management and Development	1. Skills and capabilities 2. Performance management and development 3. Leadership development	1. Skills and capabilities 2. Performance management and development 3. Leadership development
Top connectivity drivers		
The factors that impact on having motivated and innovative employees.		
1. Organisational Culture 2. Organisational Leadership 3. Employee Engagement	1. Employee Engagement 2. Organisational Culture / Organisational Leadership 3. Employee Communication	1. Organisational leadership 2. Employee engagement 3. Employee communications
Top compliance drivers		
The factors that impact on financial, legal, regulatory and reputational compliance.		
1. Health and safety; Compliance with existing regulations 2. Environmental regulations 3. Employment law	1. Compliance with existing regulations 2. Health and safety 3. Environmental regulations	1. Health and safety 2. Compliance with existing regulations 3. Environmental regulations

Appendix E: List of terms

Acronyms

- EVP: Employee Value Proposition
- GDP: Gross Domestic Product
- IoT: Internet of Things
- METS: Mining Equipment, Technology And Services
- RTO: Registered Training Organisation
- SCADA: Supervisory Control and Data Acquisition
- STEM: Science, Technology, Engineering And Mathematics
- SWP: Strategic Workforce Plan
- UEC: Utility Excellence Committee
- UKWIR: UK Water Industry Research
- WE&RF: Water Environment & Reuse Foundation
- WSAA: Water Services Association of Australia

Definitions

- Blockchain: a continuously growing list of records, called blocks, which are linked and secured using cryptography. It forms an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. A blockchain is typically managed by a peer-to-peer network collectively adhering to a protocol for validating new blocks.
- Customer at the heart: integrating customer insights into the traditional network business.
- Omni businesses: the products and services they provide are identical, regardless of the medium through which the customer accesses them (i.e. bricks and mortar / call centre / online).
- Six pillars of customer experience excellence: the universal characteristics of all brilliant customer experiences. Strong performance across all six is shown to increase acquisition, via advocacy; create long-term shareholder value; and guarantee a market leading customer experience ranking.
- Six pillars of operational excellence: Industry disruption from consumer shifts and technological advances is accelerating the pace of change faster than conventional business processes can react. Six pillars of operational excellence will help leading consumer manufacturers and retailers keep in front of change, and transform themselves into fully integrated omni businesses, able to respond to the needs of customers across all channels and at any point during their customer journey.
- Vulnerable customers: customers who are suffering hardship or are otherwise less able to afford essential services such as water.

Appendix F: List of sources

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