DIGITISATION AND BUSINESS INTELLIGENCE – SUPPORTING AFFORABLE WATER REFORM

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ABSTRACT

The New Zealand water industry is undergoing significant change. Effective management of change is critical to the success of the Affordable Water reform and, to ensure key stakeholders and the New Zealand public are informed, accurate data and business information will be heavily relied upon.

The digital challenge of the data management lifecycle (collation, storage, update, disposal, and security) whilst ensuing its consumers and users have access to the latest accurate data, whilst maintaining its credibility, is widely recognised by users as an area of concern. Legacy corporate data enterprise, relationship management systems, and local data storage databases and spreadsheets have resulted in disconnected and duplicated data sets that have morphed into a hybrid model of secure and non-secure data, with variable integrity. Users' trust in available data and information is often depleted.

There is an opportunity to continually embrace data and information digitisation to enable access to up-to-date Business Intelligence (BI) for effective change management, planning, and efficient stakeholder communications, whilst ensuring decision making is timely and fact-based. This approach can greatly assist with efficiency and, as a result, ease the load on resources during the current skills shortage. It will also support an integrated approach as organisational activities are planned and transitioned into new Water Service Entities. Shared and common data enables efficient transition planning and execution, whilst maintaining critical services to New Zealand customers and stakeholders' and incorporating provisions relating to Te Mana o te Wai.

This paper will explore data management though a change management lens. It will discuss the importance of data accuracy, commonality, security, and currency of data, as well as the value of ease of user access to data and business information.

Strategic and operational pitfalls and benefits of data digitisation and the information lifecycle will be explored, with local and international examples referenced based on extensive organisational change and asset and programme management experience. Opportunities for a digital strategy and BI-centric approach to form the foundations for performance monitoring and cross entity benchmarking as the industry reforms will be discussed, as will challenges and opportunities associated with data identification, sourcing, collation, and management including planning and harmonised approaches, shared data with

common analytics, change management, data security, confidentiality, business intelligence access and user interaction.

The paper explores effective processes relating to reform activity collation, integration and progress tracking, and risk and opportunity management associated with accountability shift including wider stakeholder management, IWI / Hapū and environmental commitments, service performance and continuity, and workforce safety and wellbeing.

Ultimately, the audience will gain a greater appreciation of how a digitised data and business intelligence approach will reduce the workload of key stakeholders reduce service continuity risk and, as a result, benefit everyone associated with the Affordable Water Reform.

KEYWORDS

Affordable Water reform, digitisation, and Business Intelligence (BI), change management, Te Mana o te Wai, workforce and wellbeing, service levels, performance benchmarking

PRESENTER PROFILE

Peter is an Honorary Fellow of Chartered Institution of Water and Environmental Management (CIWEM) and passionate strategic thinker, having worked in the water and environmental sectors for over 25 years. Peter is focused on achieving solutions, minimising cost, and optimising delivery by developing trusted relationships throughout all levels of organisations, clients, business partners and stakeholders.

INTRODUCTION

The ongoing process of digital transformation is undoubtably one of the most important ways that organisations continue to adapt and thrive in our fast-paced, increasingly competitive, and challenging industry. However, we have also seen the challenges and pitfalls of when digital transformation doesn't go so well or the promised returns on the required investment aren't what they first seemed.

On a global scale, the COVID-19 crisis has accelerated the adoption of digital tools and techniques by four years across Asia-Pacific and caused a more-than ten-year increase on the average rate at which companies are developing and offering digital products and services (McKinsey, 2020). Refer figures 1 and 2. This means that companies have jumped ahead in their digital transformation by around 4-10 years because of the pandemic. Some of the biggest enablers of this change include an increase in cloud storage, remote working, artificial intelligence (AI) and investments in data security. However, the importance of the alignment between business strategy and digital strategy, coupled with a significant investment in digital initiatives is being recognised as critically important to see successful digital transformation across the water industry.

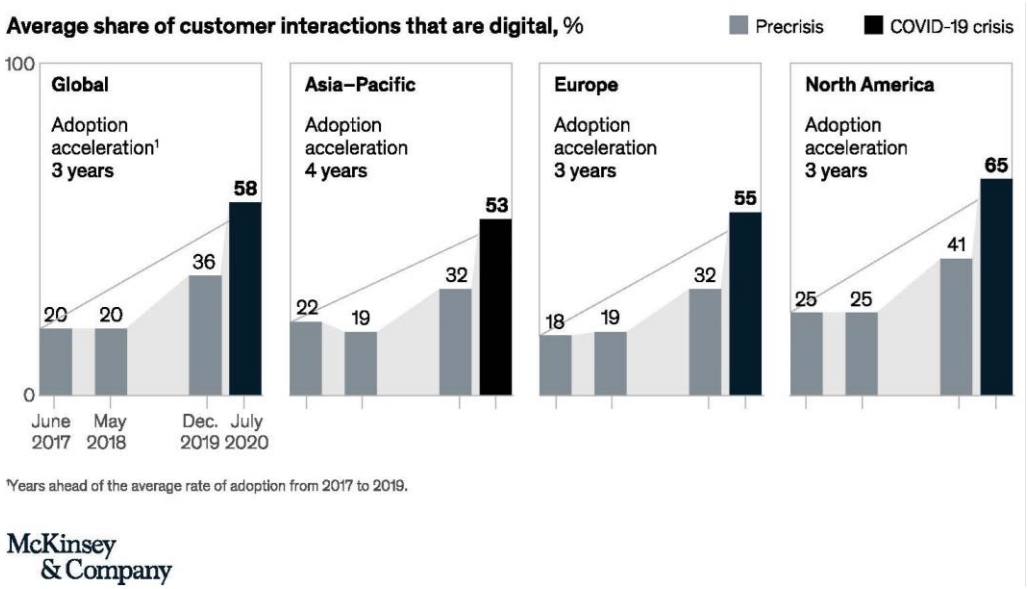

Figure 1: The COVID-19 crisis has accelerated the digitization of customer interactions by several years

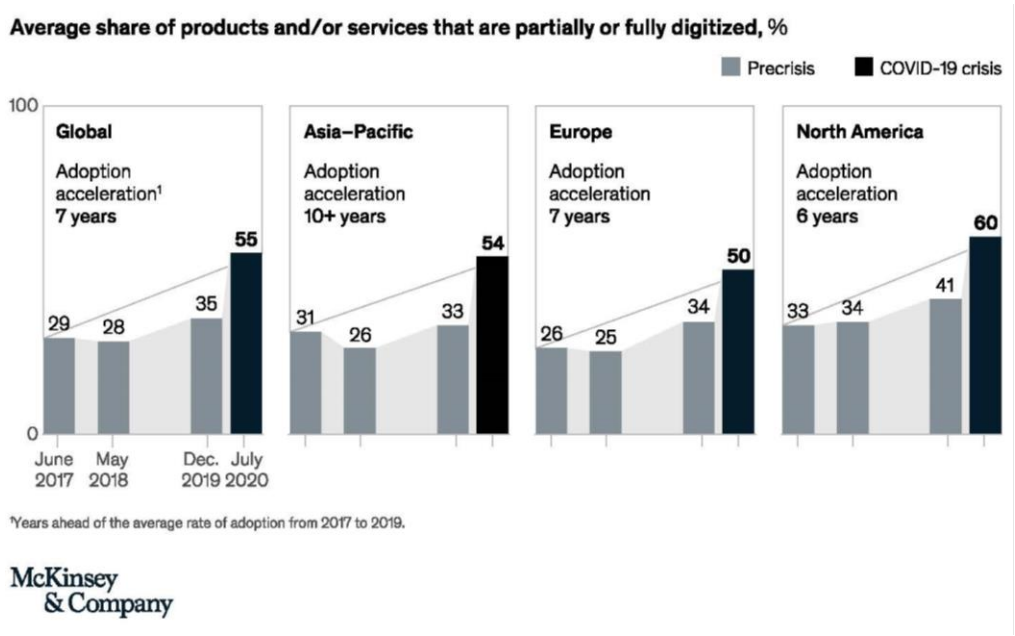

Figure 2: Across business areas, the largest leap in digitization is the share of offerings that are digital in nature

Locally, the current Water Reform process in New Zealand is causing a significant amount of re-framing of existing processes, priorities, and governance. New Zealand's water industry has a unique opportunity associated with the affordable Water Reforms to be a catalyst for digital innovation. It provides the potential to significantly accelerate digital innovation across various industries, particularly in infrastructure and resource management. As organisations embrace these technological advancements, they must also adapt their digital, data and communications practices to remain efficient, effective and engaging. It's a massive amount of change and organisational restructuring but with that comes the opportunity of a fresh perspective, a renewed sense of new direction and

opportunities, and an openness to different ways of working. It provides the opportunity to introduce technological advancement and to re-think existing norms and processes for the better.

Recognising the essential effort required for a seamless realisation is of utmost importance. Amidst the extensive upheaval within the industry, the challenges posed by legacy systems and outdated data management processes are compounded by the need for a fresh organisational structure. Furthermore, the ongoing community pressure and the imperative of data privacy and security contribute to a landscape filled with risks. The absence of a clear strategy, defined objectives, and prudent investments for the future exacerbates the peril inherent in navigating this intricate terrain.

A path to success emerges when these foundational elements are put in place. With a well-defined strategy, precise objectives, and astute investments, the trajectory can be navigated with heightened assurance. This strategic approach sets the stage for a successful outcome, underscoring that with proper preparation and resources, the challenges brought about by industry transformation can be overcome, leading to a triumphant realisation of objectives. There is potential to have too much change and there is a risk that the people are not ready to embrace it, therefore it is vital the change management process is effectively led and managed.

New Zealand's Digital Government Initiative

New Zealand's digital government initiative encompasses various technological advancements aimed at enhancing government functions and connecting with Kiwis digitally. The country's transition to digital government began around ten years ago with New Zealand's Global Digital Solutions (GDS), which facilitated the shift from paper-based models to digital. The primary goal was to increase efficiency for government workers and citizens.

However, New Zealand's journey towards digital governance started in 1996 with the use of technology to improve government processes, and online services were available from as early as 2000. The adoption of electronic documents, e-forms, e-billing, and digital records access has been instrumental in transforming government operations.

The Common Web Platform (CWP) is a platform-as-a-service used to create and host government and public sector websites with various digital services. Over a million citizens now interact with the government online each week through CWP. Additionally, the government website govt.nz provides convenient services, such as applying for citizenship or renewing driver's licenses online, eliminating the need to visit a physical location.

New Zealand's efforts have been recognised globally, as evidenced by its impressive rankings in international assessments. In the United Nations 2020 E-Government Development Index (EGDI), New Zealand was ranked 8th out of 193 countries, indicating its progress in e-government development. Moreover, it secured the 4th position in the e-participation index, showcasing its commitment to engaging citizens through digital platforms.

The Digital Strategy for Aotearoa has been built around three connected themes that form the structure of the Strategy:

- Mahi Tika — Trust,
- Mahi Tahi — Inclusion, and
- Mahi Ake — Growth.

These themes are supported by goals and measures.

Measuring progress against Trust, Inclusion and Growth will help us to realise our vision for a digital Aotearoa New Zealand:

- Te whakaāhei i te puāwaitanga me te taurikura o te katoa o Aotearoa i roto i te ao matihiko.
- Enabling all of Aotearoa New Zealand to flourish and prosper in a digital world.

*"**A vision for a digital Aotearoa***

Our vision is that Aotearoa New Zealand's people, communities, economy, and environment are flourishing and prosperous in the digital era.

"Aotearoa New Zealand is a more equitable, innovative place with a healthy democracy and a strong economy. Our country is resilient, sustainable, and ready for the future. Digital technologies and data support wellbeing, providing opportunities to 'earn, learn and thrive'. Everyone accesses and uses the internet and digital technologies in ways that work best for them. Digital tools and services are trustworthy and accessible. We can trust organisations to collect, use and store our data in secure and culturally appropriate ways. Te ao Māori views on data are a key part of our digital and data system. Our ways of doing things and the products and services we build reflect our country's unique features and history. Online spaces where we interact are safe and welcoming." Ref: Te Rautaki Matihiko, mō Aotearoa The Digital Strategy for Aotearoa

Successful Ongoing Digital Transformation

There are seven key areas of focus needed to digitally transform the New Zealand water industry in alignment with the broader New Zealand vision for a digital Aotearoa. They will make the most of the opportunities that this change period provides for accelerating us forward with a clear digital strategy. The seven key areas of focus are:

1. **Strategic alignment, objectives and investment** – by creating a digital strategy, objectives and investing in the future, we can set this new direction up for success.

2. **Data strategy and management** – the focus is on data strategy and management, involving a well-defined approach to enhance organisational efficiency and integration. This entails establishing agreements on data formats and standardisation, while enforcing rigorous standards for accuracy across departments and organisations, all the while promoting uniform formats and structures.

3. **Smart water and digital investment** – Internet of Things (IoT), AI, data management platforms, community engagement and reporting. Live and real or near-time reporting.

4. **Community and iwi engagement and education** – a change program where the community are key stakeholders involved in the process and require input, engagement, excitement,

5. **Sustainability and environmental impacts** – ensuring that the environmental outcomes are a major priority when decisions are being made for how technology can improve outcomes.

6. **Continuous improvement and change management** – feedback and adaptability for when things don't go to plan, not seeing things as a failure, but as an improvement where you can be adaptable and open to change. Ongoing measurement and motivation to improve.

7. **Pilot projects and phased implementation** – start on pilot projects, get it right, then phase implementation out to others.

There are seven key priorities within any digital transformation, each will be investigated below including some examples of each. We'll share some global examples of where we are seeing this in practice and what success is looking like.

1. 1. STRATEGIC ALIGNMENT, OBJECTIVES AND INVESTMENT

Digital transformation necessitates significant changes in processes, technology, and culture. Identifying a clear programme strategy and focused objectives, backed by investment, ensures a purposeful, measurable, and achievable transition. These objectives facilitate progress measurement and success evaluation through Key Performance Indicators (KPIs), holding teams accountable for their contributions.

While digital transformation brings risks like technological challenges and stakeholder resistance, a well-defined strategy and objectives enable proactive risk identification and mitigation. Organisations can adapt to unforeseen challenges and make informed decisions in uncertain situations.

Digital transformation is an ongoing process, not a one-time event. The current timeframe for the strategy is over the next five years. A strategic approach ensures long-term sustainability by continuously evaluating progress, adjusting the strategy as needed, and remaining adaptable in the dynamic digital landscape.

Incorporating these aspects into the digital transformation process enhances the likelihood of success and maximises the value that an organisation can derive from its digital initiatives. It provides a solid foundation for informed decision-making, effective resource management, and the achievement of tangible business outcomes.

2. DATA STRATEGY AND MANAGEMENT

One of the challenges of structural change is that there are often different data sources, formats, and management systems. Integrating these diverse data sets can be a complex and time-consuming task. Ensuring that data from all entities can be effectively combined and utilised is crucial for the success of the new bodies. To begin to align data that's coming from a range of disparate locations, systems and organisations, it's important to focus on a set of key focus areas.

Efficient data management encompasses several crucial components that are vital for an organisation's success. Data accuracy lies at the core of reliable information and informed decision-making. Through meticulous data validation and cleansing procedures, the integrity of the data is upheld, bolstering the foundation upon which strategic choices are based. Moreover, standardising data formats and structures facilitates seamless integration and collaboration across diverse departments, ultimately amplifying organisational efficiency. By fostering a common framework, this practice streamlines processes and enhances communication, fortifying the organisation's ability to adapt and thrive in a dynamic environment.

In the digital age, data security assumes paramount significance. Employing robust measures such as encryption, access controls, and vigilant monitoring mechanisms fortifies data against unauthorised access, breaches, and manipulation. This protective shield instils trust among stakeholders and preserves the sanctity of sensitive information. Simultaneously, data currency is an imperative that cannot be overlooked. Regular real-time updates stave off reliance on obsolete data and allow timely decision-making. By establishing mechanisms to ensure data remains current, organisations cultivate a forward-looking perspective, harnessing the power of up-to-date insights.

To navigate this landscape effectively, well-managed user access plays a pivotal role. Granting authenticated users user-friendly interfaces and data visualisation tools promotes a culture of data-driven decision-making. This access, coupled with stringent controls, safeguards against erroneous data dissemination. Data collation is equally significant, involving the implementation of standardised processes and systems for gathering and aggregating data from disparate sources. This practice guarantees data integrity and consistency, thus providing a solid foundation for accurate analysis.

Centralised data storage infrastructure emerges as a cornerstone of efficient data management. Whether through cloud-based solutions or dedicated data centres, this framework ensures secure storage and swift retrieval of information. Meanwhile, diligent data updating practices underpin data accuracy and timeliness. By adhering to robust protocols, such as regular data audits and automated feeds, organisations sustain data relevance and reliability. Additionally, the responsible handling of data extends to its eventual disposal. By aligning data retention policies with regulations and best practices, obsolete data is retired appropriately, while valuable historical insights are preserved.

Data integration stands as a linchpin in fostering synergy across the organisation. Investment in modern integration technologies connects disparate systems and datasets seamlessly, curbing duplication and nurturing data consistency. Meanwhile, a comprehensive data governance strategy is paramount. Through clearly defined policies, roles, and responsibilities, including data ownership and compliance measures, organisations ensure that data management practices are not only well-structured but consistently upheld. In these multifaceted ways, a robust data management framework propels an organisation toward agility, innovation, and enduring success.

If well managed, data becomes a massive opportunity to inform business strategy, priorities and proactive management of water assets and infrastructure.

3. SMART WATER AND DIGITAL INVESTMENT

Investment in smart water infrastructure, including IoT devices, sensors, AI, data analytics, real time monitoring and controls and advanced metering systems will provide real-time data on water usage, distribution, and identify potential issues, leading to improved efficiency and reduced wastage. These investments in smart water solutions can provide enhanced public health, proactive system maintenance, cost savings and create a sustainable industry in the long-term.

An example where we are seeing this smart water infrastructure in practice is in AI analysis of sewer and stormwater pipe networks. Instead of previously manual analysis of CCTV footage of pipe networks, AI tools are now providing a significant time reduction, more consistent and accurate condition assessments and providing superior capital improvement programs – increasing the overall understanding of sewer and stormwater system health and management.

4. COMMUNITY AND IWI ENGAGEMENT AND EDUCATION

The successful transition of New Zealand's water sector is particularly reliant on Taumata Arowai as an independent water services regulator. The aim of these reforms is to achieve Te Mana o Te Wai, which emphasises the importance of effective stakeholder engagement, equal representation of communities, and establishing trust in the governance of the new entities.

To support community participation and ensure accountability, the Water Services Act 2022 and amendments the proposed Water Services Entities Bill (WSEB) introduce new requirements for governance, Iwi participation, and consumer engagement. These requirements include reporting obligations, such as publishing plans and incorporating consumer and community input into those plans. The legislation also emphasises the establishment of consumer forums and annual consumer "stocktakes" to gather feedback on the performance of Water Services Entities and address consumer and community needs. However, although the legislation outlines the "what" in terms of requirements, it doesn't delve deeply into the "how" of effective community engagement. The legislation provides broad guidelines, allowing water services entities to determine appropriate forums for seeking community input. It stops short of defining the specific measures necessary for engagement to be considered appropriate, adequate, meaningful, or effective. This raises questions about consistency in assessing different engagement approaches.

Within the regulatory framework, operating principles are established to foster progressive and ambitious community engagement. These principles, such as openness, transparency, and early and meaningful engagement, align with the intention to give effect to Te Mana o te Wai and represent the diversity of consumer interests across the regions. The principle of innovation also calls for a fresh approach to community engagement in the design and delivery of water services and associated infrastructure.

Again, we have seen significant progress in this space recently with the introduction of online portals providing community members with the ability to access information in a way that is easy to understand, accessible and available any time. We know as consumers and community members ourselves, that we expect information at our fingertips, and we expect organisations to be transparent and accessible. Additionally, there is now an increased level of scrutiny on a project's environmental impacts.

No longer do we rely on in-person, hard-copy documents in a local library to provide us with information, but now we expect online, virtual sessions where we can drop in at any time, easily find the information that is relevant to us without trawling through thousands of pages of hard-copy documents and maps and being able to provide quick and easy feedback to the organisations involved to ensure our voice is heard and our concerns are being acted on. We've seen virtual consultation rooms, drop-pin online map feedback portals and fully digital Environmental Impact Statements (EIS), project information websites and fully online digital reporting becoming commonplace in the industry. No longer is this type of engagement with the community considered going above and beyond, but it's considered essential by the community and organisations who want to do the right thing by their stakeholders, the organisations involved and the environment. Recently, an expansion application for a US waste to energy facility used an engaging, online website to communicate with the community and they were able to fulfil their engagement requirements and saved up to a year and $50,000 from their project costs due to the efficiency of their engagement and the lack of objection to the project.

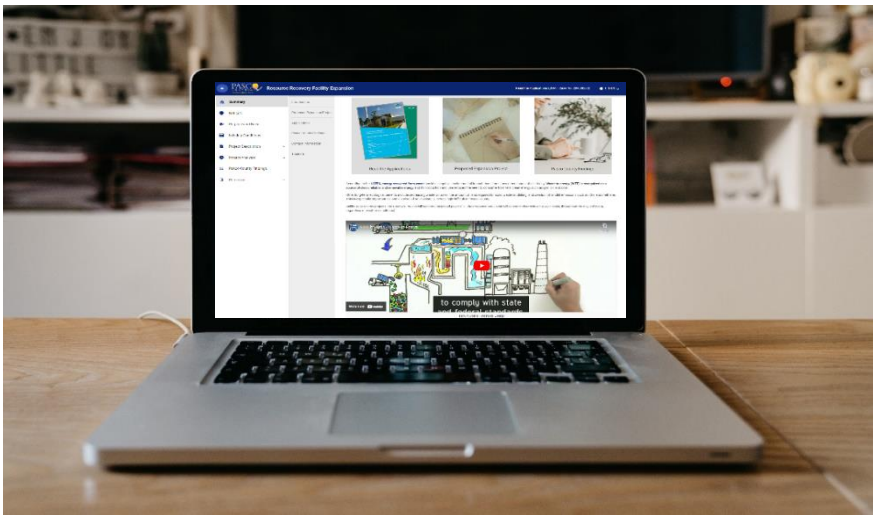

Figure 3: Community online website communications

5. SUSTAINABILITY AND ENVIRONMENTAL IMPACTS

When it comes to developing and managing water infrastructure, the community has high expectations for responsible environmental stewardship. They envision infrastructure projects that not only meet their water needs but also safeguard the environment and natural resources. Communities expect transparent and inclusive planning processes that involve public consultations and consider the concerns of various stakeholders. They seek sustainable water management practices that prioritise conservation, efficient use of water resources, and the protection of ecosystems. The community anticipates measures to mitigate potential environmental impacts, such as minimising habitat disruption and reducing pollution. They also expect ongoing monitoring and maintenance of water infrastructure to ensure its long-term sustainability and resilience to climate change. Overall, the community demands a commitment to ecologically sound practices, ensuring that water development and management efforts harmoniously coexist with environmental preservation for the well-being of current and future generations.

We are seeing a massive amount of investment and focus on environmental management across our organisation and with our clients across the world. The acknowledgement that we need to do better and the contribution of the infrastructure industry to the environmental degradation is really becoming a focus.

We have also seen a number of recently developed digital solutions for the collection, monitoring and management of carbon reduction efforts. Through the use of smart data analysis, AI and machine learning, these platforms provide a mechanism for collecting, analysing and refining decarbonisation efforts and capabilities over time – continuously improving decarbonisation efforts. What we refer to as our "Scope-X" approach considers materials, site locations, logistics, construction methods and energy sources to reduce both the embodied and operational carbon footprint of the project.

Figure 4: Scope-X A holistic approach to decarbonisation

6. CONTINUOUS IMPROVEMENT AND CHANGE MANAGEMENT

In the New Zealand water industry, developing a digital transformation strategy is essential for driving innovation, efficiency, and sustainability. However, the success of such a strategy heavily relies on two critical factors: continuous improvement and change management. Continuous improvement is vital as the digital landscape evolves rapidly and embracing the latest technologies and best practices ensures the water industry stays ahead of the curve. It allows for the optimisation of processes, data analysis, and the identification of opportunities for further enhancement.

Concurrently, effective change management is equally crucial as it enables seamless integration and adoption of new digital solutions across the industry. Engaging stakeholders, including water utilities, government bodies, and communities, and fostering a culture of openness to change is necessary for successful implementation. By prioritising continuous improvement and implementing robust change management strategies, the water industry in New Zealand can harness the full potential of digital transformation, delivering improved water management, enhanced service delivery, and a sustainable future for water resources and the environment.

Openness to feedback and adaptability for when things don't go to plan will provide the opportunity for continuous improvement, adaptability and openness to change. Ongoing measurement and adjustment will ensure that a digital strategy does not become stale but acknowledges that digital transformation is not an end game – it's a continuous journey and just like the phones we hold in our hands are constantly being upgraded and replaced, so does our organisational digital transformation need constant evaluation, adjustment, improvement and investment.

A digital transformation often involves a cultural shift within an organisation. When the strategy and objectives are clear, it becomes easier to communicate the vision and rationale behind the changes to employees, the community and key water bodies to foster a sense of purpose and motivation.

7. PILOT PROJECTS AND PHASED IMPLEMENTATION

By conducting pilot projects and adopting a phased implementation approach, the water industry in New Zealand can maximise the benefits of its digital strategy, minimise risks, and foster a culture of continuous improvement, ultimately leading to more efficient and sustainable water management practices.

This piloted approach will ensure that risks are well managed through identifying potential risks and challenges in these pilot projects, testing on a smaller scale and assessing the impact of any issues on a limited scale. Pilot projects provide valuable data and insights to help understand the potential benefits of a full-scale implementation and allows for adjustments before a full-scale implementation is complete.

Significantly, it also allows stakeholders to understand the impact of the changes, have time to become comfortable with any changes or impacts and adapt to these

changes gradually – reducing resistance to the change and allowing time for buy-in from key stakeholders.

In the water industry, we have seen a promising opportunity to use Digital Twins and 3D modelling. However, not every project or organisation across the industry globally is ready for Digital Twins or even has the need for them. If we did try to implement them on every project, we could quickly and easily waste money, energy, and time. By implementing pilot projects, we can simulate and monitor various scenarios, optimising the efficiency of systems and identifying potential issues before they escalate. One of these projects was the 4D design of the Durleigh water treatment plant in the UK, which provided the team with reliable and automated information across a highly complex and technically challenging project. Designed to BIM Level 2, this project included a common data environment, 3D Engineering and visualisation, laser scans, resolution of over 100 automatically detected clashes and a virtual reality model of the site as well as a 4D time-based construction sequence to optimise construction within a physically constrained site.

Figure 5: 3D Engineering and visualisation

The integration of Digital Twins and 3D modelling in the New Zealand Water Industry has the potential to revolutionise maintenance practices, enhance asset management, and lead to more informed decision-making, ultimately ensuring a more sustainable and reliable water supply for communities in the future.

CONCLUSION

The digital transformation of the New Zealand water industry has the potential to be profound, revolutionising its operations and to realise efficiency. A key factor behind this success will be the adoption of a clear digital strategy and providing the industry with a well-defined roadmap for implementation. Setting specific objectives and making strategic investments in cutting-edge technologies will

enable the water sector to streamline its processes, optimise resource allocation, and enhance overall service delivery.

The integration of a robust data strategy will play a pivotal role in the transformation process and ensure that our data is trustworthy, well managed, secure, and available. By harnessing the power of data analytics and IoT technologies, the industry will gain valuable insights into water usage patterns, infrastructure performance, and demand forecasting. This data-driven approach will empower decision-makers to make informed choices, leading to smarter water solutions and targeted investment in critical areas.

The success of the future digital transformation in the New Zealand water industry needs to involve key stakeholders and the community. By involving residents and stakeholders in the process, the industry will foster a sense of ownership and understanding among the public, ensuring greater support for sustainable water management practices. Strong commitments to sustainability and environmental management will also be a driving force behind the transformation, with the industry implementing eco-friendly solutions and meeting strict environment standards adhering to strict environmental standards.

In conclusion, digital transformation and the seven key factors we have outlined here are essential elements of organisational success in the digital era. By embracing digital innovations, addressing challenges, and adopting best practices, organisations across the New Zealand water industry, can leverage digital tools and approaches to drive sustainable growth, innovation, and positive change.