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AI Within Reach.

Unlocking immediate and long-term opportunities in the water industry.

DATA.
DIGITAL.
AI.

WE CONNECT
PEOPLE TO
INSIGHT

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UKWP X AIIMI WHITEPAPER
APRIL 2025

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TRANSFORM YOUR ORGANISATION INTO THE INTERCONNECTED ENTERPRISE. GET THE ANSWERS TO YOUR TOUGHEST CHALLENGES.

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Executive summary, scope, and purpose.

As the long-term sustainability and effective resourcing of water becomes an increasingly pertinent environmental and commercial challenge, Artificial Intelligence (AI) presents the industry with new opportunities to drive progress, avoid failures, and bring about transformational change.

This whitepaper explores the potential for AI to address some of the biggest challenges faced by the water industry. Entering AMP8, the water industry finds itself under enormous pressure to deliver hugely ambitious capital plans, respond to the impacts of climate change, and demonstrate its ongoing resilience – all at an affordable price for customers.

As a society, we find ourselves at the centre of a technology revolution. AI is transforming our personal and professional lives, enabling increased productivity across all industrial sectors,

changing the way we learn, and recontextualising the vast array of data, information, and knowledge that we have collectively created.

The aim of this paper is to reassure the water industry and its stakeholders that AI is something we can now adopt and adapt to – leveraging experimental approaches to make rapid progress, while simultaneously preparing us for a future where AI and automation will power business transformation. We also aim to provide possible use cases and suggest ways in which organisations can begin to explore AI.

Addressing the challenges, risks, and opportunities of AI, we present the reader with a prospective view of our industry – aiming to equip business leaders in our sector with the knowledge and insights they need to leverage AI.

THE QUESTION IS: HOW CAN OUR INDUSTRY MAKE THE BEST USE OF THESE TECHNOLOGIES?

EXEC SUM

Scope.

This whitepaper specifically explores the use of generative AI and Large Language Models (LLMs)¹, technologies that can carry out a variety of tasks using data in unstructured, ‘natural language’ formats and structured data. It explores how this class of AI technologies may be used to tackle some of the biggest challenges faced by the water industry, some of the risks to be aware of, and a range of applications of AI to solve more immediate problems.

These are not exhaustive lists, and the reader would be advised to evaluate a wider range of potential risks and ethical considerations while forming a view of their AI strategy. Similarly, the example applications or ‘use cases’ have been designed to bring industry context to the discussion – far wider applications will of course be possible.

While referenced, this paper does not cover other classes of AI: Machine Learning, for example, which is already

in use in the water sector; Deep Learning; Robotics etc. It should be noted, however, that the true power of AI will be realised when these approaches and technologies are combined; Generative AI complementing Machine Learning outputs, for example, would equip the user with powerful tools to exploit structured and unstructured data alike.

Finally, it does not cover the costs, either financial or environmental, of AI. The technology and computing costs should not be ignored – however, it is perfectly reasonable to get started, demonstrate value, and develop business cases with modest budgets. Correspondingly, computer-hungry AI processes do have an environmental impact, with LLM training consuming large amounts of energy and carbon emissions. To close on a more positive note, the energy used to power AI tools is becoming more renewable at source, such as the wind industry providing power to data centres and cloud providers – not to mention AI solutions designed specifically to optimise and reduce energy consumption across many sectors.

¹OpenAI’s o1, o3, GPT-4.5, Google DeepMind’s Gemini 1.5, Gemini 2.0, Anthropic’s Claude 3.7 Sonnet, IBM’s Granite, and Meta’s Llama series

Purpose.

As we look forward to our 2025 Summit focusing on River Water Quality, this document aims to outline practical steps and approaches to achieving value from AI in the water industry. It also marks the start of a new journey to bring together a community of those committed to addressing and accelerating AI opportunities in water.

This journey began at the UKWP's Industry Summit in 2023 (co-hosted by British Water, Future Water Association, UK Water industry Research, SPRING and Water Industry Forum), where Aiimi CEO Steve Salvin shared an AI and data perspective for water, based on Aiimi's experience in the sector and expertise in AI. With this as our starting point, this document looks at how AI can provide value to water companies, customers, and communities in 2025 and beyond. Following the release of the UK Government's AI Opportunities Action Plan, this document has also been created with a view to establishing a forum for AI in water, to advance our collective AI capability in the sector.

Indeed, AI has been used to form the basis of some aspects of this consultation document: a transcribed recording of the UKWP presentations, covering English, Welsh, and Scottish perspectives on water industry challenges, was successfully summarised using AI, to provide key points for developing the challenge focus areas and some examples use cases in this paper.

With this as our starting point, this document looks at how AI can be applied to existing content to provide rapid insight to users, in the most relevant and useful formats. We are inviting thought-leadership contributions to this draft whitepaper, to share opportunities, experiences, use cases, and recommendations designed to advance our collective AI capability in the sector.



STEVE SALVIN,
CEO, AIIMI

WE THINK DIFFERENTLY, ACT QUICKER, AND OFFER A BETTER WAY TO FIND AND UNLOCK DEEP MEANING AND INTELLIGENT INSIGHTS FROM YOUR INFORMATION. TOGETHER, WE WILL HELP YOU TO COMBAT YOUR CHALLENGES AND FUTURE-PROOF YOUR BUSINESS.

Top-level challenges facing the water industry.

As outlined by Ofwat, the water industry faces multiple interconnected challenges, spanning climate change, population growth, and affordability. In addition, customers' demands are changing, with greater emphasis placed on the environment, customer experience, and building a culture of transparency and trust. As we begin AMP8, the shift in focus for performance and heightened spend transitions to river water quality and assets.

River water quality:

Managing river water quality requires more than just investing in new, replacement, and maintenance of physical assets; their location needs to be optimised, and the right technologies must be selected to ensure their effectiveness. The characteristics of each catchment area are unique, responding differently to weather events due to factors such as natural- and built-environmental features, population density, and the age and

condition of infrastructure. This means we must understand and manage the impacts of discharges from sewer treatment works and storm overflows into our rivers, ensuring that customers can trust the safety and quality of their local water bodies. Additionally, it is our responsibility to keep customers informed – and maintain an open and constructive dialogue with them – about river water quality.

Climate change:

As predictions change, scenario planning must incorporate the latest advice on the impacts of climate change – how can companies ensure their responses reflect the most up-to-date thinking, as well as avoid unnecessary modelling rework?

Environmental concerns (emissions and the impact on biodiversity):

Our energy-intensive sector is under increasing scrutiny to reduce the operational impact of emissions, as

well as improve transparency around embodied carbon in capital projects. As environmental custodians, we are acutely aware of our impact on biodiversity and the critical role we play in protecting it. We must also understand the impact on natural resources and demand on water that AI will have and how we can ensure that we minimise waste where possible.

Affordability:

In 2021, CEPA estimated that around 1.5 million households are spending more than 5% of their income (after housing costs) on water and 4.1 million spend more than 3%. In 2024, the Ofwat Cost of Living report showed that 38% of water bill payers believe they will struggle to pay a utility bill over the coming year, rising to 51% if there are children in the household. The sector has an obligation to provide clean, reliable water at an affordable price. With the average household water and sewerage bill in England and Wales rising by £123 in 2025, we increasingly look to innovation for solutions to this acute issue.

Resilience:

Ofwat describes 'resilience in the round' as our ability to cope with disruption and anticipate trends and variability in order to maintain services and protect the natural environment. This encompasses operational, financial, and corporate resilience. What can we learn from the disruption caused by Covid-19, for

example, to reduce our resilience risk in future?

Environmental and social value:

Ofwat states that "Companies should seek to create further social and environmental value in the course of delivering their core services, beyond the minimum required to meet statutory obligations". How can we make confident capital investment decisions on behalf of our customers that go beyond the minimum standard and add value, today and for future generations?

Understand customers and communities:

A 2024 survey showed trust in water companies had reached its lowest level in 13 years². With a widening spectrum of communications channels available, more of our customers have a voice than ever before – and it is essential that we listen. And what about those who lack the necessary platform; how do we ensure that they are heard, can participate, and are represented in our sector?

Performance improvements:

The performance commitments we set with our customers, and the price they expect to pay for us to achieve them, are increasingly challenging for companies. How can innovation, data, and AI help us to deliver outcomes and meet our targets – all at an affordable price?

² www.cw.org.uk/news/trust-in-water-companies-reaches-a-13-year-low-amid-falling-customer-satisfaction/

Digital and data progress.



The water industry has made significant progress with data and digital, especially during AMP7. Digital transformation programmes have seen investment in our people, processes, and technologies – improving the way we engage with customers and manage our assets. As a result, the amount of data we generate has grown considerably, driving us to transform our IT landscapes towards the use of Cloud technologies, data lakes, and analytics services to make better use of our data.

An increase in digitally enabled operational technologies and Condition-Based Monitoring has led to smarter operations and maintenance activity. Meanwhile, greater availability of digital channels for customers and an ongoing focus on customer satisfaction are driving more impactful use of customer data. Investment in innovation, including a regulator-led framework

for prioritisation, has increased collaboration opportunities, such as the data-centric Stream initiative and knowledge-sharing group Spring.

We are equipping our people with digital capabilities, mobile technologies, and frameworks for innovation to help them navigate through some of the most challenging and profoundly transformational times in a generation.

While the industry should be proud of what it has already achieved, we recognise that in such a rapidly emerging data and digital space, there is greater progress to be made. The opportunity to identify the right use cases and value for investment in digital and operational technologies has never been greater.

Ofwat remains focused on encouraging water companies to achieve more with data and digital; in January 2025, it announced details of a £400m fund to spur water sector transformation in AMP8³.

Technology and Innovation.



“While the first five years championed nascent technologies and new approaches to demonstrate their future potential, the next five years must see them scale and deliver a lasting and beneficial impact for customers, society and the environment.”

“The water sector must transform its environmental impact whilst encouraging growth, and innovation is crucial to end the overuse of storm overflows, cut greenhouse gas emissions and reduce leaks. It must innovate to continue improving services for customers, provide value and meet the high standards that the public demands.”

“Collaboration is at the core of the innovation fund – it fosters new thinking and new approaches to develop effective solutions that are fit for the future.”⁴

³ www.ofwat.gov.uk/ofwat-announces-details-of-400m-fund-to-spur-water-sector-transformation-in-next-five-years/

⁴ www.ofwat.gov.uk/ofwat-announces-details-of-400m-fund-to-spur-water-sector-transformation-in-next-five-years/



Progress on Open Data.

“Open data is data that anyone can freely use, modify, and share. It brings benefits to customers, the environment, and the sector by enhancing transparency, innovation, and collaboration.”

“We were pleased to see an improvement from last year and that all companies considered open data characteristics when publishing their Annual Performance Report data tables. It was positive to see that companies explained how the APR data publication is part of wider open data work and progress.”

“Stream is a group of water companies working together to co-create an open data framework and platform for the sector with funding from our Innovation Fund. This year, Stream collaborated to develop a shared and interoperable methodology to produce a machine-readable version of APR data and metadata.”

“We want companies to build on these improvements and show wider progress on open data – prioritising, triaging, publishing more datasets and applying open data characteristics when they do so. We are developing a new licence condition to underpin the development of a mature open data ecosystem.”⁵

⁵ Ofwat Water Company Performance Report 2023-24
www.ofwat.gov.uk/wp-content/uploads/2024/10/WCPR-23-24.pdf

The data challenge.

30 years ago, all information was stored on physical media, such as disks, tapes, fiche, and film negatives. Each media type had a custodian and access was strictly controlled. In the water industry, there were libraries for operating manuals and textbooks, and drawing offices were the place to find asset information relating to a site, with someone responsible for ensuring it was referenced, catalogued, and filed correctly.

Over the last few decades, we've gradually digitised many of these data assets; we've moved data to the Cloud and removed the custodians, thus divesting our responsibility for its governance. As a result, our information is a mess. We save and name files wherever and whatever we want, we email them to other people, and we never delete anything. In short, we've all

become hoarders; the Cloud is bursting with duplicates and old versions, and the vast majority of what's in there has no value and will never be used again.

Today, the whole world is excited about AI and fascinated by how it can answer our questions and do some of our work. But we can't divest our responsibility for decision-making to AI when the data we're feeding it is in such a poor state.

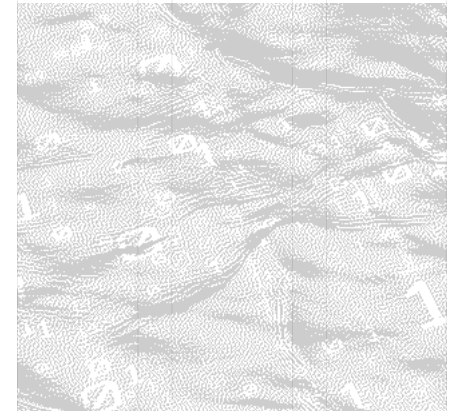
“If your data isn't ready for generative AI, your business isn't ready for generative AI.”

**McKinsey & Company,
The Data Dividend**

Foundational AI models – that is, AI models that 'learn' from a broad and generalised range of data sources – can be fine-tuned by introducing more relevant and specific data. However, data quality, preparation, and volatility are common barriers to this. This is further complicated by the risks outlined in section 10 of this whitepaper. In summary, the quality and reliability of the results can be difficult to trust – AI is generating an answer for us, but it won't tell us where it came from.

So, what's the alternative? I am only interested in accurate, trusted results.

There have been lots of TV shows about hoarders. Part of the recovery process is to take everything from the house and lay it all out on the floor of a warehouse. Everything is then grouped into different piles; throw away, give to charity, sell, put back in the house. The good stuff that comes back to the house is then organised again, this time by room name. In data terms, this is data discovery (we can see what we have), it's data classification (we know what it is), it's data labelling (we understand how it relates to other things). The good news is that AI is brilliant at these processes. And it's also brilliant at improving data quality by fixing missing or incorrect data.



So, the data is better organised, now what?

On average, only 1% of an organisation's data can be seen by employees, and Gartner research shows 44% of employees have made a wrong decision because they were unaware of information that could have helped. This highlights the importance of getting data governance right; you need to give the model not only gold-standard information, but gold-standard information that has the right permissions in place. This also underlines the importance of information search and retrieval; to find the right answer, your AI needs to pull it from the right source of information, and you need to be able to search across multiple sources internally and externally to get the right answer.



My data is now 'AI ready' – what's the approach?

Solving the permissions, search, and retrieval challenges unlocks the use of Retrieval-Augmented Generation (RAG) – which means giving AI models specific, relevant, curated, and accurate sources of data from which to answer our questions. If we can guarantee that the AI's data sources are high quality and accurate, the only limitation is the quality of our prompts. We can think of prompt engineering (constructing a question in the best way, for the best answer) as something like posing a question on Google: we'll get better or worse results based on how the question is asked – it's no accident that Google often seems to know exactly what we want to ask, better than we do.

So, our problem (and solution) statement is:

The water industry needs to use data to help solve its big challenges. But although the data is available, it's in a poor state.

Only when we get to grips with the quality and governance of our data and use AI to improve it, can we then start using AI to exploit the data and help solve our biggest challenges.

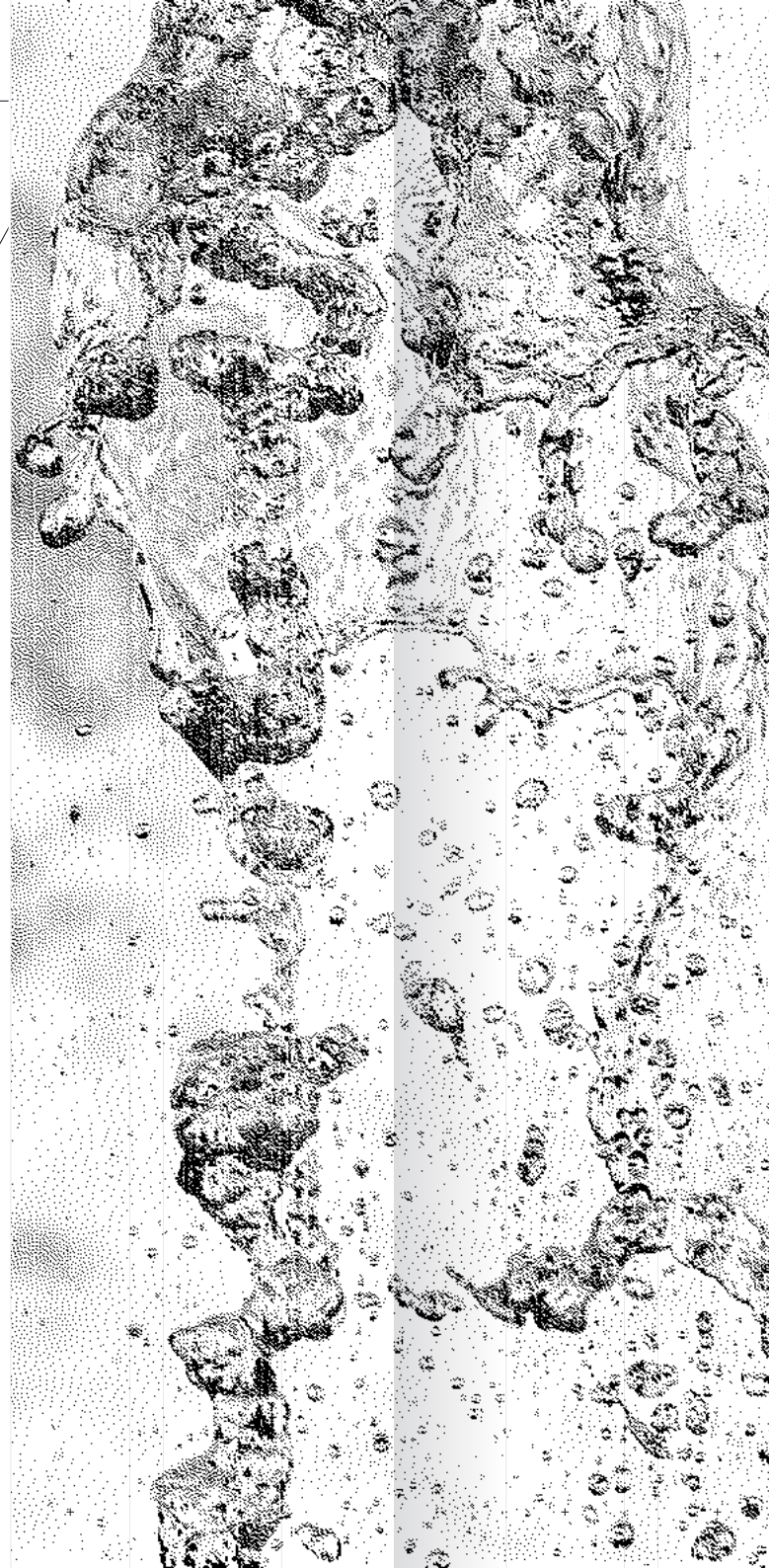
If the question is how can we make better use of data in the water industry, then the answer is, undoubtedly, AI.

An introduction to AI in water.

AI is already all around us – indeed, we take AI for granted in many aspects of our personal and professional lives: facial recognition to unlock our smartphone and use its AI software; Google predictive search (how did it know I was going ask that?); AI-driven marketing (how did they know I wanted to buy that?). The water industry is already successfully using AI in many areas – for example, applying Machine Learning and anomaly detection to help spot asset failures before they happen, or using chatbots to signpost information customers may find useful.

This whitepaper focuses on how the water industry can apply generative AI⁶ – technology that can carry out a variety of tasks using data in unstructured, ‘natural language’ formats. This means we can ask a machine a question in the same way we would a human and receive a response as if written by a human. But why is this important, and what could we do with it in the water industry?

⁶ OpenAI’s o1, o3, GPT-4.5, Google DeepMind’s Gemini 1.5, Gemini 2.0, Anthropic’s Claude 3.7 Sonnet, IBM’s Granite, and Meta’s Llama series



In August 2023, IDC stated in a whitepaper on unstructured data that:

“In 2022, 90% of the data generated by organizations was unstructured [...] organizations globally generated 57,280 exabytes of unstructured data – a volume that is expected to grow by 28% to over 73,000 exabytes in 2023 [...] Seventy-three thousand exabytes of unstructured data is equivalent to the amount of data in over 97 trillion sequenced human genomes; [...] Unstructured data is integral to supply chains, where it is in purchase orders, product inventories, and import/export records. It is in sales agreements, marketing content, contracts, patents, movie scripts, patient treatment notes. It exists in financial earnings reports and employee performance records; it represents the core of design and engineering documents, product specifications, and product roadmaps. It constitutes the overwhelming bulk of human communication in the form of emails, meeting transcripts and notes, presentations, and instant messages. Perhaps most importantly, most of our knowledge is captured, curated, and shared in the form of unstructured data. Content is therefore essential to running a business, enabling organizations to embrace complexity, manage business risk, and increase productivity in the era of data and artificial intelligence (AI).”

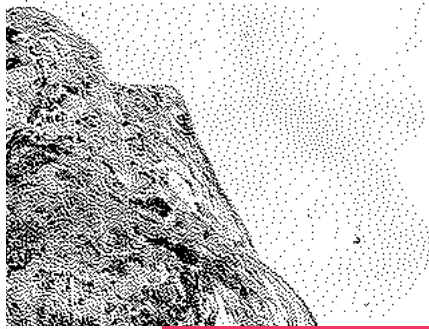
In June 2023, a McKinsey & Company report estimated that generative AI could add the equivalent of \$2.6 trillion to \$4.4 trillion in annual economic benefits across 63 use cases.

A seemingly conclusive argument that our industry must do more to make use of the vast, rich, and growing source of insights and knowledge hidden in our unstructured data, to access the benefits of generative AI and LLMs. Unlocking insight from unstructured data poses a major issue – one that cannot be resolved with human effort.

The following list describes approaches and applications of data and LLM AI, with industry-specific examples:

Enterprise search: If it exists, you will find it and can reuse it. AI extends the capabilities of search, to be contextually aware and able to handle natural language. For example, *Can you find me all the incident reports for this site?*

Q&A Chat: Most of us are familiar with chatbots for customer service, but how can this concept be used in a more commercial or operational water industry environment? Ask a question of any data and generative AI and extractive AI can quickly give you the answer. For example, *What is the most common reason for failure of this pump? What is the shut-down procedure for this asset? What was the most recent maintenance recommendation from a visual inspection at this asset? Who is currently at or near this site?* With an increasingly fluid workforce in our sector, how can we keep track of who



knows what? AI can save us time by connecting us with the right people who have the right expertise to address a challenge: *Who is the right person to validate the results I am seeing in this performance chart?*

Summarisation: Generative AI can create summaries of your documents, event data, and transcriptions of conversations, all summarised in a format that's appropriate for the intended audience. For example, *Show me a summary of all events over the past 12-hour shift. Show me a summary of instructions for this engineer. Create a customer-friendly report about the incident on their street.*

User-initiated agentic AI tasks: AI can automatically create rich text and chart-based reports, presentations, and communications, to improve productivity and promote knowledge-sharing. For example, *Prepare an event timeline in chronological order. Prepare an incident report for Ofwat. Create 1,000s of personalised communications relating to an interruption to supply.*

Sparring partner: Use smart AI to test, validate, and help you create better content. For example, *Is this document subjective or objective? How can I improve this email to customers about a recent incident? Are there any facts in this report that are not substantiated? Is there anything in this document that I shouldn't include?*

Inspect & Adapt: Learn from experience so you can predict/avoid failure and replicate success. At the end of every project, incident, event, customer complaint, or accident, AI can create a summary of what happened – effectively a knowledge base article that everyone else can use downstream. If we label these summaries with the outcomes, we start to build a powerful data set for training models to spot patterns that lead to good or bad outcomes, so it can make predictions to mitigate risks and replicate success. Data-driven retrospectives ensure you can learn from success and failure, as part of a virtuous incremental improvement cycle.

Agentic AI: The next focus areas for AI technology include Agentic AI and Reasoning Models. With Agentic AI, LLMs dynamically direct their own processes and tool usage, maintaining control over how they accomplish tasks, while Reasoning Models spend a lot of computation producing outputs that

have the appearance of 'thinking'. These AI advances are particularly powerful for tasks that require continuous decision-making, automation, or complex problem-solving.

Future AI and AI for Good: A multi-layered approach that brings all data types together delivers a more powerful AI solution. AI can itself be used to help ready your data for further AI use, by turning unstructured data into structured data. Layering structured and unstructured data on top of external data gives even more insight into potential risks. If we extend this across the whole industry by sharing Open Data, we get something even more powerful, from which we can begin to ask even bigger questions about the role that an AI-enabled water sector might play in solving some of the greatest global challenges we face today. The international scale of climate, environmental, social, humanitarian, and health issues means they can only be tackled through multi-sector, multi-agency, global collaboration – and AI is certain to play an important role in breaking down barriers and enabling positive outcomes.

AI within reach.

Early AI adopters can achieve competitive advantage over others - so, how do we go beyond experimenting with AI, to accelerate AI adoption in exchange for real value?

Here, we cover just some of the areas in the water industry that are ripe for AI solutions; where AI is well within reach and would have a hugely valuable impact, including through daily efficiencies for every employee.

AI IN WATER

Bringing AI to life.

Use Cases

CHALLENGE: RIVER WATER QUALITY AND STORM OVERFLOWS.

The water industry is under pressure to provide transparency and up-to-date, relevant information on river water quality and storm overflows.

Example Use Case

Since January 2025, water companies must provide near real-time data regarding storm overflows, including frequency, timing, and duration. How do we validate that this information is accurate and not misrepresented to customers? How do we understand the impact of this on river water quality?

AI Response

A Q&A chat feature would enable customers and stakeholders to inquire about the data, with AI providing personalised, contextual insights relevant to the user's profile - factors such as their age, and user persona (customer, researcher, environmental

activist) could be used to provide the most relevant and useful response, in the right format. Such outputs could help users to interpret the data correctly, promoting a more valuable and constructive dialogue between water companies and customers."

CHALLENGE: CLIMATE CHANGE.

As predictions change, scenario planning must incorporate the latest advice on the impacts of climate change.

Example Use Case

Research, publications, recommendations - with such a vast array of information available relating to climate change and net zero, how can we be sure we have access to the most relevant, impactful aspects? How do we know which of our assets are vulnerable to climate change risks, such as flooding, droughts, or other extreme weather events?

AI Response

AI Summarisation provides an automated approach to finding the most important pieces of insight, condensing them into a format we can quickly and easily consume in order to make informed decisions. By using AI tools that leverage state-of-the-art climate models (that also leverage AI), we can identify assets that are likely to be impacted.

CHALLENGE: ENVIRONMENTAL CONCERNS – EMISSIONS AND THE IMPACT ON BIODIVERSITY.

The water sector is under increasing scrutiny to reduce the operational impact of emissions, as well as improve transparency of embodied carbon in capital projects.

Example Use Case

Optimised energy use means leveraging our storage and generation options, as well as identification of opportunities to operate our assets more efficiently. Leveraging principles of a circular economy can reduce waste in the system and maximise sustainable practices where possible.

AI Response

Brought together in holistic energy management models, Machine Learning, Graph Databases, and Neural Networks enable decision support and

automated asset control, optimising our production, distribution, and recycling processes.

CHALLENGE: AFFORDABILITY.

The sector has an obligation to provide clean, reliable water at an affordable price and increasingly looks to innovation for solutions to this acute issue. With the average household water and sewerage bill in England and Wales rising by £123 in 2025, more people will struggle to pay their bills.

Example Use Case

Identification of customers moving into (and out of) vulnerable circumstances. Targeted support of eligible customers with mechanisms like social tariffs, especially for those facing new challenges.

AI Response

AI for Good: add social value by combining predictive analytics (ML) with chatbot technologies to better support the needs of customers in physically, mentally, or financially vulnerable circumstances. New technologies and services (for example, those that use Open Banking) can leverage ML to assess eligibility quickly and cost effectively, and to help determine the right level of support.



CHALLENGE: RESILIENCE.

The ability to cope with disruption and anticipate trends and variability, in order to maintain services and protect the natural environment. This encompasses operational, financial, and corporate resilience.

Example Use Case

Scenario modelling enables companies to quantify risk, determine network/service vulnerabilities, and enable smart investment.

AI Response

AI Inspect & Adapt: Create a library of scenarios, decisions, and outcomes – learning from the results and impact of everything we do in order to enable increased future resilience and ‘what-if’ planning.

CHALLENGE: ENVIRONMENTAL AND SOCIAL VALUE.

Ofwat states that “Companies should seek to create further social and environmental value in the course of delivering their core services, beyond the minimum required to meet statutory obligations”.

Example Use Case

Machine Learning is already being used to help offer additional services to vulnerable customers. Extending this to communities may enable companies to prioritise value-add investment in communities where it is most needed.

AI Response

AI for Good: Use image recognition technologies, combined with demographic insights, to identify communities with least access to green spaces, enabling water companies to further improve their leisure facilities in areas where it will be of greatest benefit.



CHALLENGE: UNDERSTAND CUSTOMERS AND COMMUNITIES.

More customers have access to communications channels than ever before – it is essential that we listen, as well as ensure those without a platform can still be heard.

Example Use Case

Assimilate large corpus of contact channels, social media content, call transcriptions etc. in order to perform trend analysis and highlight key challenges.

AI Response

Use AI summarisation to prepare insight reports for prioritisation of activities, interventions, and relevant support. Augmentation of existing processes and improving the accuracy of anomaly detection – increasing our ability to find urgent, yet potentially hidden, calls for assistance.

CHALLENGE: PERFORMANCE IMPROVEMENTS.

The performance commitments set with our customers, and the price they expect to pay for those to be achieved, are increasingly challenging.

Example Use Case

Identifying innovation opportunities is hard – the sheer number of research publications, performance reports, and innovation press releases makes finding the most impactful projects difficult for a human being.

AI Response

Use AI Search to scan for opportunities to collaborate, learn from others, and benefit from novel technologies in order to drive performance improvements. Machine Learning, Graph Databases and Neural Networks can be brought together to understand previous events and improve prediction models, mitigating potential issues before they become incidents.



SPOTLIGHT USE CASE:

OPERATIONAL CONTROL CENTRE

Picture an operational control centre.

A whole wall of screens and information, several dashboards and reports, each one with multiple tabs. Screens displaying numerous pollution events, bursts, and i2S events. Other screens showing weather, location of people and plants, and telemetry data of the affected sites. Alarms flashing. A live feed of conversations between everyone involved, for each of the 20 events unfolding at that time.

These are the challenges in the room.

The supervisor needs to find information quickly. They can't know about every system and where specific data is stored, so they need to be able to search across 100 sources. They want to ask questions and get answers; to filter out things that are not relevant so that they can focus on the important things. The supervisor works a 12-hour shift, then must quickly hand over to the next

person. It's impossible to transfer all that knowledge in a few minutes; they can't summarise the information from 100 apps and guarantee they won't miss anything. So, the next person on shift must read through all 100 apps too.

There are also many routine, time-consuming tasks to perform in that room. Emailing staff involved in events and customers impacted by issues. Collating reports and preparing presentations, as well as performing analysis on why things went wrong and explaining what happened. Communicating why an action is necessary, talking to people on the ground, their supervisors, senior leaders, and regulators. Preparing reports for senior leaders and regulators requires a lot of research, triple-checking facts, and pinpointing evidence. Reports have to be reviewed and verified to make sure they are accurate and a true reflection of what happened.

MOST OF THESE EVENTS HAVE HAPPENED BEFORE.

But it's almost impossible to find that information and reuse lessons learned.

AI response

This example highlights a range of areas where AI can have an immediate, real-time impact on the ability of the water company to manage control room activity (incident/event response), and provide information to a range of stakeholders during and following an event – as well as informing future responses and changes in process as a result. For example:

Q&A chat:

Enables control room operators to interrogate historic records about the same location, quickly benefiting from insights that could improve the response. *Were there issues deploying traffic management to this area in the past? How long did it take to resolve the most recent issue at this location? Who is the best person to ask about accessing this site in winter?*

By logging these interactions, we can build a library of pre-answered FAQs for future incidents. For example, if an event is occurring at a particular site, we could automatically trigger this sequence:

1. Search for previous incidents at this site
2. Search for similar incidents and responses elsewhere
3. Show the previous actions and impacts
4. Suggest the best actions based on these findings.

Summarisation:

Prepares a summary of the incident in multiple formats, for different audiences:

- ▶ A management report, describing the chronology of the event, interventions, outstanding activities, and next steps.
- ▶ A customer update providing real-time insights into how we are managing the response and expected timescales for restored services.
- ▶ A regulatory response – evidencing the company's response, for example supply interruptions timescales, in line with customer commitments.



Tasks:

Rapidly provide operators and engineers with accurate, role-specific O&M information to safely and efficiently operate the assets required in the response to an incident or event.

Sparring partner:

AI can help fact-check text statements before they are released, increasing our chances of delighting customers in spite of challenging circumstances. What information needs to be published to customer-facing channels? Are we about to contradict ourselves or set an unrealistic expectation?

Inspect & Adapt:

Enhancing our ability to learn and continuously improve – by recording the outcome of our response to an operational incident, along with the details of who did what, when, and how, we can begin to build rich sources of

learning data, allowing us to respond even better next time, avoiding making the same mistake twice, and improving our processes.

Even more powerfully, AI can be used to detect where a pattern or chain of events that led to a bad outcome previously appears to be happening again – allowing for mitigation, course correction, and improved future outcomes. By working in a more transparent way, we can also acknowledge when we deviate from AI and use this to retrain and improve our processes.

By using AI to augment Business Intelligence, we can turn thousands of previous incidents into insight that can underpin business cases and inform changes to ways of working for better outcomes in future.

Constraints.

Costs and funding: With companies under increasing pressure to reduce costs and ensure affordability/value for money for their customers, Ofwat makes a strong case for innovation. Tokens and compute are currently the main costs associated with AI, but as models grow more complex, organisations need to be adaptable. The crucial factor in determining AI costs will be the ability to marry the right models with the right use cases, as even cloud AI services can become very expensive at full enterprise usage.

Where to take action: By starting with AI pilots and experiments, organisations can see how they deliver value, then use those learnings to inform an AI strategy and build an investment case. Getting to grips with the data will require investment, but there are tools such as insight engines that help mitigate these costs. The benefits of collaboration in the AI space are also clear; shared AI/ML training data, collaborative technology development, and common objectives focused on customer and environment

outcomes make AI projects strong candidates for funding through Ofwat's Innovation Fund, for example.

Ownership: Where does the responsibility for AI lie? Who is accountable for AI (especially if it goes wrong)?

Where to take action: Organisations' ability to create a strong innovation culture and embrace AI will not be enough; it will require effective leadership, with clear and consistent governance to ensure companies gain from the benefits, while managing the risks. Responsible AI – discussed later in this whitepaper – should be defined and clearly communicated by organisations, benefiting from the same strong governance model in order to ensure the intent and application of AI is always aligned to the organisation's core ethical values.

Capabilities and data availability: AI is not a core competency at the heart of the UK water sector and capability growth will be essential to ensure AI is

an enduring (and increasingly efficient) proposition for companies. The data challenges outlined in section 06 may at first constrain the extent to which AI technologies can be implemented, and the scalability of their use. With limited AI and Machine Learning expertise, knowing how and where to start can be difficult.

Where to take action: Investment in capabilities centered on People and Process will be as important as investment in technologies – AI education should be prioritised for both technical teams and leadership teams. Companies will benefit from collaboration within and outside the sector. Internally, companies should review their existing data strategies – repositioning or reprioritising roadmap activities to enable AI use cases may be appropriate (in line with the principle that a data strategy should continuously evolve).

Risk averse: The water industry is historically risk averse. Early adoption of AI in many cases, especially in frontier tech, appears to be a case of 'leap first, then look', rather than 'look first, then leap'. While the former approach is beneficial in the context of a race to innovate, it ignores the potential risks – unintended outcomes, bias, accountability gaps, loss of trust and reputation are among many potential challenges.

Where to take action: Organisations that chose not to take on these risks at an early stage are now moving carefully and purposefully towards AI adoption. To these companies, managing risk is crucial, even if it comes at the cost of more gradual innovation. Evaluation tools will be a differentiator – AI, ML, and LLMs can all 'fail silently' in unexpected ways, so it's crucial to have insight into whether an app/model is performing well or degrading.

Water supply: The water industry faces significant pressure from its regulators to meet environmental targets as part of AMP8. With the increased use of AI technology, there will be an exponential increase in demand for data centres, which increases demand on an already strained supply of water. We need to ensure that we are not adding to this, and that we are leveraging the most efficient combination of technologies to optimise resource usage.

Where to take action: Organisations have to be adaptable and dynamic in their approach to adopting AI. Where traditional technology was more stable, companies were able to be more rigid with their infrastructure and align to individual platforms. Due to artificial intelligence technology developing so rapidly, organisations must be able to change their infrastructure, to use less process heavy technology as and when it becomes available.

AI risks and reassurance.

Ethical concerns, public perception and acceptance.

Automation of systems and processes, especially those for the critical services our industry delivers, could lead to unintended outcomes, bias, accountability gaps, loss of trust, or reputational damage. These are risks that water companies are naturally taking very seriously, and which may constrain the speed at which these technologies are adopted. In an atmosphere of growing concern about the cost of getting it wrong, customers and employees are increasingly aware of the ethical considerations (and potential consequences) of AI adoption. Therefore, it is crucial to establish robust governance and control over data when adopting automation and AI solutions, as organisations using these technologies remain accountable for the outcomes when using these tools.

Preparation and our strengths:

Transparency, participation, and regaining public trust are key. For an industry increasingly under the spotlight, this may seem like a daunting challenge. However, progress is being made; Open Data initiatives in the sector (notably Stream) have data transparency and customer participation as their core aims. Companies should focus on AI Ethics and Safety as a non-negotiable, must-have capability among their workforces. Part of our industry's response to GDPR was to equip our people with the skills to reduce the risk of non-compliance – for AI, we should focus attention on identifying and raising potentially unsafe or unethical AI practices. Embedding ethics is the practical way to codify the human values we want to prioritise for any given AI use case. Safety is about ensuring an AI tool or model behaves in the way it's intended and minimising unintended consequences.

It's important that we understand some of the ethical and safety risks of AI that companies are most worried about, so that we also understand the importance of putting governance and guardrails in place to ensure safe adoption.

Toxicity: Many text-generating AI models learn how to respond to questions from... potentially everything and anything on the World Wide Web! Unfortunately, with so many platforms eliciting offensive, abusive, or hateful comments, AI models have been known to mirror these types of characteristics in their responses. The reader should be reassured, however, that mitigation is possible through Reinforcement Learning from Human Feedback – fine-tuning models through human supervision to reduce the likelihood of toxicity occurring.

Hallucination: Examples of text-generating (or computer-vision) AI providing inaccurate, fabricated, or harmful misinformation are well known. While some examples are amusing (Microsoft's chat AI, Sydney, admitting to falling in love with users and spying on Bing employees), the potential for companies could be extremely harmful. It is essential that we have full confidence in their ability to generate, for example, regulatory performance responses based on corporate information. RAG reduces this risk, but does not eliminate it, and brings different risks around the attention mechanism and 'forgetting'.

Sensitive data permissions and security of information: It is important to understand the risks of AI accessing corporate data that we would manage very carefully with permissions for humans – simply ‘pointing’ AI tools at all of our data could lead to exposure of personal sensitive data, data compliance failures, and compromised employee, customer, or asset information. Similarly, much of our corporate IP is held across our repositories of unstructured data – we would not want this shared outside of our organisation without the right controls or permissions.

If you point AI at all unstructured data without first getting your data up to standard, you may start getting spurious results. That’s why we recommend only pointing LLMs at your own curated data – in which case, organisations are advised to consider ‘fine-tuning’ capabilities, i.e., human resource that is capable of training models appropriately. The further your data is from perfect, the more likely you’ll run into poor quality, inaccurate, or misleading outputs from your AI solutions, if you apply AI without first fixing the data.

The ‘AI Pie’ is how we describe the risks of a fragmented approach to AI adoption.

Most enterprise businesses have over 300 corporate systems, and every day one of them announces their new AI, such as Slack AI and Microsoft Copilot. But each AI is only as good as the information repository it sits on. A Slack conversation can’t answer a question relating to the staff handbook, because that’s held in SharePoint – not to mention that there are 300 versions of it spread across OneDrive, SharePoint, and email. Microsoft Copilot can’t tell you why a pump is currently failing, because that information is held in the Operational Telemetry pie. It’s an extension of the problem with data silos across an organisation. In fact, it compounds that exact problem, by putting an AI gate in front of the existing app silos of data and experience. Plus, if each app launches its own AI bot, suddenly the user is overwhelmed by notifications and it’s impossible to know which ones are important. AI should be able to provide the answers, but with all these competing voices, it’s reduced to a distraction.

Where to take action: We need to point AI at the same high-quality, owned, trusted, and joined-up data. We also need to be able to search, analyse, and ask questions of data that sits outside of our corporate systems, such as weather, news, social media, product defect alerts, instruction manuals. Only then can we provide assurance and explain why and where our answers came from.

Data cannot be an afterthought in generative AI. Rather, it is the core fuel that powers the ability of a business to capture value from generative AI.”

McKinsey & Company,
The Data Dividend



Reassurance

An optimistic view from other sectors managing AI risks

Widespread implementation of AI may feel like a daunting prospect for many organisations, the well-publicised risks often jarring with a risk-averse industry like the UK water sector. In addition, the pace with which AI is evolving may leave company leaders wondering, “Where do we start? And how do we possibly catch up?”. The sector should take comfort and reassurance from other industries, however, where AI has been applied to commercially sensitive data, critical national infrastructure data, or sensitive customer data to great effect:

- ▶ AI chatbots rapidly and safely resolving stolen customer credit cards reduce the risk of unauthorised transactions

- ▶ AI-assisted diagnosis and treatment in medical settings allowing methodical and systematic processing of patient medical records, with algorithms recommending treatment programmes – without compromising patient privacy
- ▶ Numerous examples of Telco using AI to optimise networks (loads/routing) as well as direct AI interfaces with consumers
- ▶ Automotive manufacturers using AI for predictive maintenance and customer recommendations – without compromising component design.

Taking action with AI.

AI may feel daunting, but it is well within reach, and we cannot afford to miss out on the value it offers to the water industry. Here are our key recommendations.

- ▶ **Take a use case-driven approach;** forget enterprise-wide AI for now. Focus on use cases that will release tangible business value – and quickly, to demonstrate progress to stakeholders and build momentum.
- ▶ **Adopt a mindset of experimentation and iteration;** learn by doing, not through theoretical exercises. Concentrate on practical applications, actual value, and (wherever possible) use real data.
- ▶ **Involve users in the process;** it's about what people need from AI, not the technology itself. Integration and change management are key to ensuring any new AI solution is properly adopted and embedded in processes.
- ▶ **Apply data governance where it's needed;** don't undertake a lengthy enterprise-wide data governance programme purely for the sake of AI. Approach data governance on a use-case basis and automate wherever possible.
- ▶ **Keep an open mind about how AI can help;** it's not all GenAI and chat functions. For example, look at incorporating AI into reporting and dashboard tools, or explore how ML, automation, and agentic AI could be used to enhance business processes and decision-making.
- ▶ **Don't let responsible AI and ethics be an afterthought;** it should be part of every conversation and decision along the way, not siloed into one team's responsibilities.

As we have seen time and again in our industry, great things happen when we work together – a large part of success with AI will be collaboration between companies and stakeholders, as we embrace innovation to tackle common challenges.

We therefore propose bringing together a coalition of those committed to addressing and driving forward the practical steps outlined here, and any other recommendations resulting from this document, in order to collectively accelerate the use of AI in water.

Final thoughts.

Steve Salvin,

CEO of Aiimi

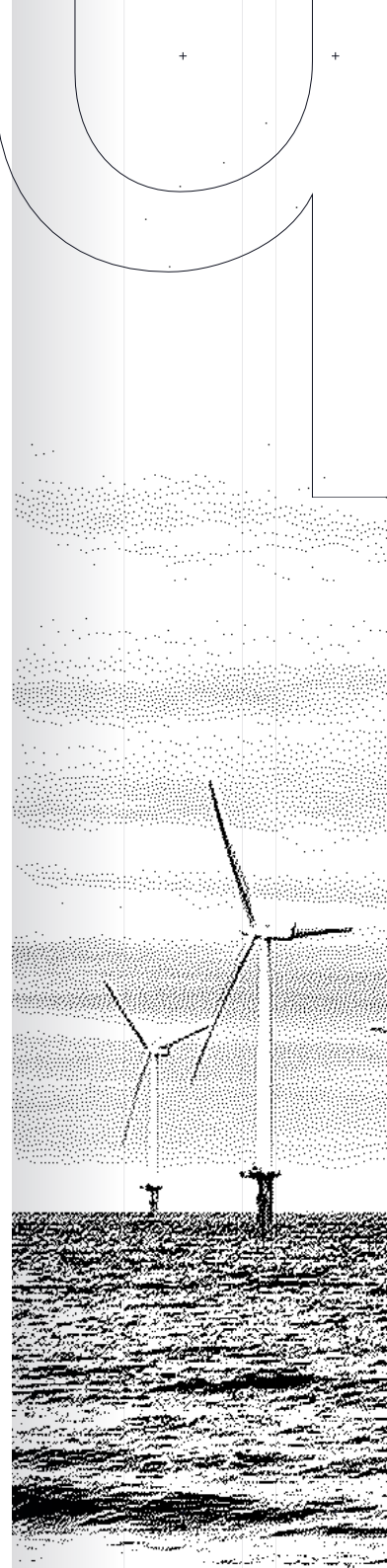
“It’s not just about the tech itself; it’s about how organisations are equipped to use AI.

Education and organisational readiness will be crucial. AI is moving faster than ever, and traditional business strategies can’t keep up with the pace. But with a more iterative, fluid approach, and some help from experts skilled in integrating new technologies, organisations can bridge the gap between ambition and execution.

This will be key to driving meaningful impact from AI and releasing value faster, especially in the sectors where it can make the biggest difference, like water. If we get to grips with our data, using AI to help us, then we can leverage AI to get the answers to our toughest challenges.

If we can get those answers, we can outperform our business plans. If we can safely share our data, we can learn from each other and unlock new insights and opportunities for everyone.

The water industry has a shot at creating a legacy; our combined data and advances in AI give us all a real and pressing opportunity to fix some of the biggest challenges we face as an industry, as a country, and as humanity. **And it all starts with data.”**



Chris Newsome,

UKWP Director

“The future of our industry depends on our ability to innovate, embrace new technologies, and often re-think how we do things. With ambitious plans in place for AMP8, AI will be crucial in the delivery of new assets; providing efficient ways to interrogate and interact with data, and enabling process automation, especially within supply chains.

Adopting these technologies incrementally enables us to learn as we go – and share those learnings through collaboration both within and outside of our sector. I’m optimistic about our ability to leverage AI to get the best outcomes for our customers, the environment, and our businesses, and I encourage our industry leaders to take action now – our future generations will thank us for it.”