UK 2050

WATER INNOVATION STRATEGY

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THE WATER SECTOR'S VISION

To create open collaboration opportunities across the water sector to drive transformational change through innovation that delivers greater value for customers and the environment.

WHAT THIS STRATEGY IS:

- Owned and driven by water companies across the UK in collaboration with the wider sector
- A UK wide strategy for transformational innovation
- Built on current work and understanding in the sector and beyond
- Focused on the societal challenges that innovation in the water sector can help to solve, through providing short, medium and long-term outcomes for the sector
- A call to innovate to existing and new partners who can co-create innovative solutions

WHAT THIS STRATEGY IS NOT:

- A detailed delivery plan with a list of solutions the water sector wants to implement
- Fixed. It will continue to be evolved and developed
- Intended to replace existing innovation activity carried out by individual companies
- A delivery plan for the Ofwat innovation fund
- A delivery plan for a Centre of Excellence

EXECUTIVE SUMMARY

The world is changing faster than ever before. We face a climate crisis, an ecological emergency and now, Covid-19.

None of us are alone in the water sector in experiencing the impacts of these global challenges. With an ageing asset base and an urgent need to decarbonise, our sector must make some big decisions in the next few years that will shape the future of water in the UK.

With great uncertainty comes the need for change, and it is this need for change which will drive transformational innovation; 'necessity is the mother of invention'.

We have come together as water companies in the UK to develop this strategy. Our track record in innovation stretches back over 400 years. From the world's first city-level water transfer project, completed in 1613 and still one of London's main water resources, to the invention of the activated sludge process in 1914 – we are proud of our innovative history and want to continue to deliver these life changing improvements for generations to come.

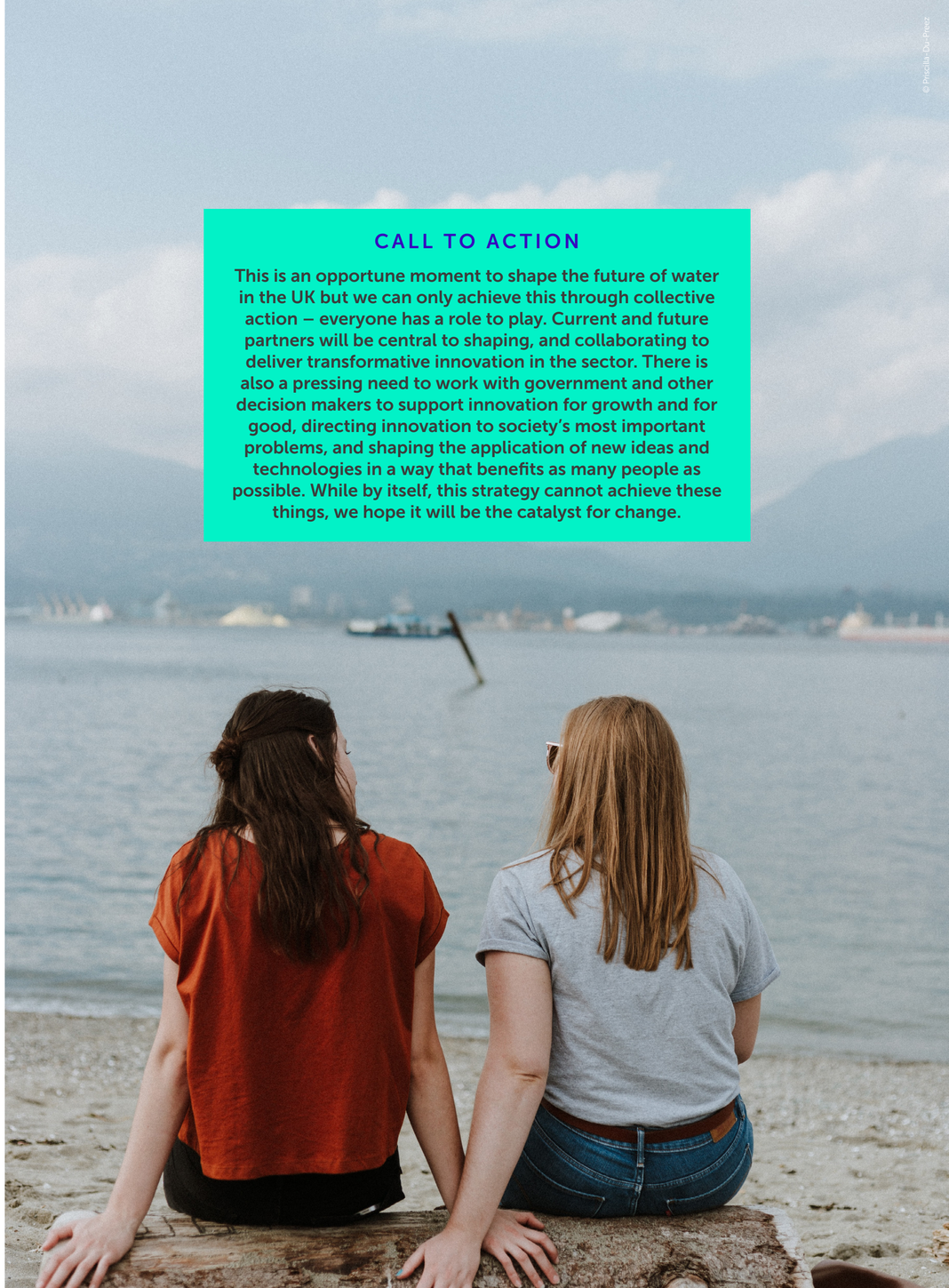
United as a coherent alliance of 19 water companies, we write this strategy supported by the wider sector and with a common purpose of driving transformational change in our sector through collaborative innovation. And we know that we cannot deliver this change alone. This strategy is a call to action for you to join us on this journey.

In the strategy, we set out how we will start to deliver transformative innovation through our key **principles** which define how we will work together. We describe the delivery of a **'Centre of Excellence'**, which will support us in delivering innovation. This will enable shared access to skills, resources, knowledge, data, and support us in creating a collaborative innovation culture.

Our strategy also defines the ends; a number of key **themes**, which describe our environmental, social and economic ambitions, which we know are important to our customers. For each theme, we have set ambitions that the sector will aspire to, and work towards, in the short, medium and long term, to 2050. These are our ambitions, rather than targets, and will guide us collectively in delivering challenge-led innovation.

CALL TO ACTION

This is an opportune moment to shape the future of water in the UK but we can only achieve this through collective action – everyone has a role to play. Current and future partners will be central to shaping, and collaborating to deliver transformative innovation in the sector. There is also a pressing need to work with government and other decision makers to support innovation for growth and for good, directing innovation to society's most important problems, and shaping the application of new ideas and technologies in a way that benefits as many people as possible. While by itself, this strategy cannot achieve these things, we hope it will be the catalyst for change.



INTRODUCTION & CONTEXT

Water is the essential ingredient to human life and a healthy natural environment. The water sector in the UK needs to rapidly adapt to our changing world.

UNDERSTANDING THE WATER SECTOR

We, the UK's water companies, have come together to develop this strategy for innovation in collaboration with the wider sector and our customers. This strategy is unique as it is a national strategy developed by a cohort of water companies in open and transparent engagement with regulators and other stakeholders.

The water sector includes everyone involved in using and providing water and wastewater services across the whole water cycle, from customers, other users like industry and farming, water companies, regulators, the supply chain to wider stakeholders. The boundaries of the sector are deliberately blurred, recognising the opportunity for new entrants.

UNDERSTANDING INNOVATION AND ITS VALUE

We want this strategy to stimulate transformational change and achieve the best value for customers, the environment and wider society in the long term. This means systemically rethinking innovation practices, culture and enablers in the water sector.

Innovation can be described as the 'the development, implementation, and exploitation of a novel idea, service, scheme, system, process or formula'. This means that innovation extends well beyond new technology.

Innovation extends from research and a better understanding of our challenges, through to testing new ideas quickly, failing fast, iterating and importantly, spreading and scaling what works, so that we achieve maximum benefit.

We have an opportunity to address society's most important problems through innovation, and to shape the application of new ideas and technologies in a way that benefits as many people as possible. Delivering this change for good also presents enormous opportunities for innovative businesses, big and small, to market their goods, knowledge and services both at home and overseas.

APPROACH TO DEVELOPING THIS STRATEGY

This strategy has been developed by representatives from across 19 water companies, with close co-operation from Ofwat and facilitated by UKWIR and Arup on behalf of the wider sector, with visual identity and outreach from Brilliant Noise.

Building on the engagement undertaken to develop the UKWIR big questions, and ongoing engagement with customers and stakeholders by partners across the sector, we have carried out engagement specifically to inform the development of this strategy with groups representing the supply chain, academia, funding bodies, other sectors, regulators and more. This has been coupled with a review of good practice from elsewhere, of societal drivers, and in particular of the UKWIR big questions and the associated routemaps.

Collaborative innovation will support the water sector in meeting ambitions for customers; improving social and environmental value in the long term.

Engagement has been supplemented by additional input crowd-sourced from experts across all of the water companies.

This approach allows the strategy to focus on meeting the needs of the stakeholders by identifying and focusing on key drivers and challenges which significantly impact that way we work now and the service we will be able to provide in the future. It also recognises the role that the water sector might play in wider societal drivers, taking a systems view of these challenges. For example, considering the water, food, energy nexus.

CONSULTATION FEEDBACK

"I think the strategy is very ambitious and identifies the correct areas for innovation to meet UK 2050 targets."

We recognise that the engagement undertaken to date is just the start of our co-creation journey. This strategy is not fixed and will need to adapt and evolve and to do that we need to reach out to more of you in an open, diverse and inclusive way. We will continue to engage widely with a diverse group to understand how we can work together to achieve the ambitions set out in this strategy.

INTRODUCTION & CONTEXT

This is not just 'another' strategy. It is a driver of the huge change that has the potential to transform the water sector. We have undertaken a programme of consultation on a draft of this strategy throughout August 2020. We held a launch webinar, for over 350 people, and a series of workshops, which were open to all, where we had an open and in-depth discussion with almost 250 stakeholders on this strategy and its implementation plan.

With our digital outreach, we have started a journey to create the ongoing excitement and energy needed to maintain engagement with those out of the sector. We have specifically distributed the draft strategy and its messages to innovation leaders, diversity and inclusion specialists and a small and medium sized enterprise (SME) and entrepreneurial audience within the UK & Europe in a bid to drive engagement with those outside of our traditional sphere of influence. Whilst we realise that this is a big and ongoing commitment the start has been positive. With the call to action "Fresh Thinkers, this way." we have reached an audience of over 150,000 people, and the draft strategy was downloaded nearly 2,000 times from our website.

Importantly we have established a community around our Water Innovation 2050 LinkedIn page and started a new conversation we aim to continue. We also had feedback from a range of stakeholders through a survey which enabled us to gather detailed feedback from over 100 of you.

The aim of this consultation was to build a two-way dialogue and to enable this strategy to truly capture the diversity of thought and aims across the UK water sector and beyond. We aimed to, and succeeded to, speak to new voices that currently do not work within the sector but wish to collaborate in the future. We recognise that we need to continue to collaborate and widen the diversity of those we speak to in the future.

We have updated this strategy based on your feedback. A high-level summary of strategy feedback is in this table and feedback on innovation implementation is detailed in the strategy to implementation section.

What you told us about the strategy	What we did
Many of you liked the strategy and the themes and agree that it will drive innovation. For example, 78% of survey respondents agreed or strongly agreed that the strategy will drive innovation and 63% agreed that it will drive innovation in the right areas.	We are really pleased and excited that so many of you feel we're heading in the right direction. We have taken these themes forward into more detailed planning on how we can collaborate and deliver a shared vision for the sector.
The strategy needs to be clearer that it aims to drive innovation across the whole water system, across England, Wales, Scotland and Northern Ireland, not just the UK water industry.	This is a UK wide strategy, to drive innovation equally across all UK countries. While it is owned and driven by the water industry, collaboration will be at the very core of implementation. Transformational innovation cannot be achieved by the water industry alone. Knowledge, skills and activities will be needed from stakeholders across the water system and beyond to reach the aims of this strategy.
While many of you liked the focus on collaboration within this strategy, others would like to see more detail on the roles of these different stakeholders.	Collaboration is central to how we propose to deliver this strategy and customers, communities and other stakeholders from across the water system will have to play key roles to deliver innovation. This is a high-level strategy to set out our aims and vision. We envisage further detail on activity and roles to follow in part through the Centre of Excellence.
You generally agreed that the themes were the right themes to focus effort in the water sector in the coming years. Some felt that a narrower focus within the themes would support action.	We have kept the seven themes within the draft strategy and created ambitions for 2050 that each theme aims to achieve. We have aims for the short, medium and long term for each of these ambitions to support action. These themes remain broad deliberately to reflect the diversity of need within the sector but can be narrowed down and work will continue to support this.
Some of you told us that we needed to be more aspirational for what the themes should achieve for the water sector.	We have worked to define ambitions and short, medium and long term aims that are aspirational rather than meeting regulatory minimums. We have updated our previous key questions with ambitions to reflect this, included specific detail from your feedback and spoken to topic experts to ensure that we reflect the needs for transformational innovation from across the UK.
Some of you told us that it wasn't clear how our themes fit with current work across the water cycle and while they clearly interlinked and overlapped we had not reflected this.	We agree that our themes overlap and are inherently interconnected in multiple ways. We have reflected this in an example solution which while it sits in one theme feeds into delivering the ambitions for other themes. We have also mapped where the themes relate to different areas of the water cycle.

INTRODUCTION & CONTEXT

UNDERSTANDING THE LANDSCAPE

Global Water Intelligence estimates that meeting the UN Sustainable Development Goals for water and sanitation between 2018 and 2030 will cost **$1,785 billion** for rehabilitation and **$4,056 billion** for new infrastructure. Activity on this scale will require significant innovation and forward thinking.

There are also huge opportunities for water innovation in the fields of energy, design, manufacturing, data science, food security, and resilience. Cross-sector collaboration to address some of these opportunities will create substantial benefits including carbon emission (which we use here as shorthand for greenhouse gas emissions) reduction cost savings and secure agricultural production.

The water sector's innovation journey

Innovation is vital to the UK water sector as it provides significant opportunities to deliver value for our customers.

There are standout cases of effective and collaborative innovation which reflect the sector's capacity to co-deliver innovation. Demonstrating this are examples from the water companies of:

- Closely working with supply chains and undertaking joint innovation sprints with third parties
- Joint innovation events across companies and with third parties which facilitate knowledge transfer
- Joint projects with stakeholders through initiatives like catchment partnerships
- Customer engagement initiatives to encourage the community to be involved with innovation
- Networks to support joint working such as through Water UK and UKWIR among others

Ofwat

£200 million

Ofwat additional funding available for innovation

The regulatory environment

Investment in innovation in the water sector is set in part by the regulatory environment, which is different across the UK. To date the sector has often invested in incremental innovation, driven by the need to deliver on regulatory business plans and meet statutory obligations within financial constraints. We believe adaption of the regulatory environment is key to supporting transformational innovation.

In England and Wales, the economic regulator, Ofwat, sees innovation as "crucial for meeting challenges in a cost-effective and sustainable way". It recognises that there are currently untapped opportunities for the sector to work together. To support this Ofwat has made up to £200 million of additional funding available for innovation in addition to existing innovation investment funded by customers. Scottish Water has co-created a sector vision with its stakeholders and set out an ambitious strategic plan. Transformational innovation is a key enabler of this plan and Water Industry Commission for Scotland (WICS) and Scottish Government have introduced ethical business regulation to allow for more agile delivery. This is underpinned by Scottish Government's Hydro Nation agenda to develop the water economy and maximise the value of Scotland's water resources. The Utility Regulator in Northern Ireland is supportive of NI Water's innovation initiatives set in context against the underinvestment challenges.

Economic regulation is one of the three regulatory pillars, alongside environmental and drinking water quality regulation. There are further opportunities for policy and regulatory reform and evolution.

We have many proven strengths including a world class science base and considerable expertise in devising and disseminating innovations that can address key water-related challenges worldwide.

Market opportunity

To win a bigger share of the global water market and position the UK as a global leader in water innovation, we have a strong foundation to build on. We have many proven strengths including a world-class science base and considerable expertise in devising and disseminating innovations that can address key water-related challenges worldwide. We also have a proud pedigree in research and innovation, funding a considerable amount of water research and innovation through our Research Councils and having established a number of centres of excellence in universities and elsewhere. Our strong supply chain has distinctive strengths, offering specialist technology providers and world class capabilities in the supply of tailored and integrated consultancy services, and our water companies are well regarded internationally, providing some of the cleanest drinking water in the world. Indeed, our track record in managing, and maximising the value of, ageing water infrastructure is just one area where we are well positioned to secure a dominant global role.

The water innovation ecosystem

Innovation is a complex, non-linear process, so the complexity of the water innovation ecosystem is perhaps no surprise.

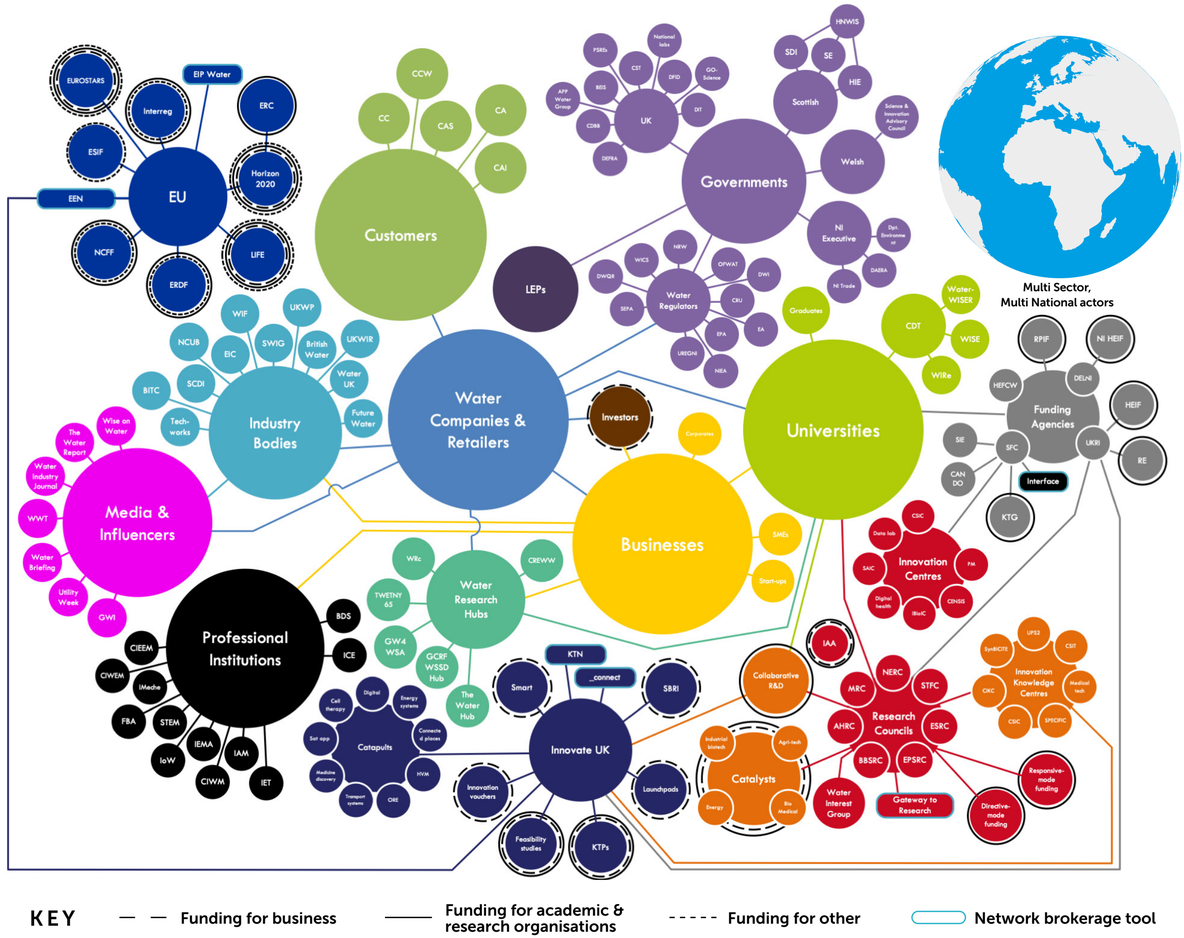
In order to lay the foundation for collaborative innovation, we have started to map the key actors that play a role in water innovation activity across the UK. We recognise this landscape is constantly changing – by identifying the gaps, establishing relationships between different actors, and continuing to develop our collective understanding over time, we hope to make it easier for people to collaborate with, and innovate within, the water sector. We also recognise that cross-sector collaboration will be central to addressing some of society's biggest challenges and we will continue to explore where those opportunities exist.

From carrying out research and developing innovative technologies, through to driving behavioural change and implementing policy frameworks, everyone has their part to play in innovation. The Massachusetts Institute of Technology, which contributes to one of the world's most dynamic and successful economies based on innovation, identifies a number of components for successful innovation ecosystems.

A strong base of research intensive universities is important and there needs to be a sufficient number of entrepreneurs with the right skills and culture to spin-out, start and scale up innovative firms. A strong group of corporates undertaking innovation and supporting and advising smaller firms is necessary. The availability of risk capital and the engagement of investors, who provide mentoring and advice, as well as finance, to entrepreneurs is also a major factor. Government has an important role to play in creating the right policy frameworks, infrastructure, and data.

We recognise the importance of customers in our ecosystem and that the opportunity to co-create to deliver maximum value is huge.

All of these actors need to work together to ensure there is the right engagement and support across the system to create a successful ecosystem that is more than the sum of its constituent parts.



KEY — — Funding for business ——— Funding for academic & research organisations - - - - - Funding for other ▭ Network brokerage tool

Note: This is a snapshot in time that captures the major actors that play a role in water innovation in the UK. Due to the complexity of the landscape there will inevitably be information missing. The 'UK Research and Innovation Landscape' from The Dowling Review of Business-University Research Collaborations (2015) was used to form elements of this map.

INTRODUCTION & CONTEXT

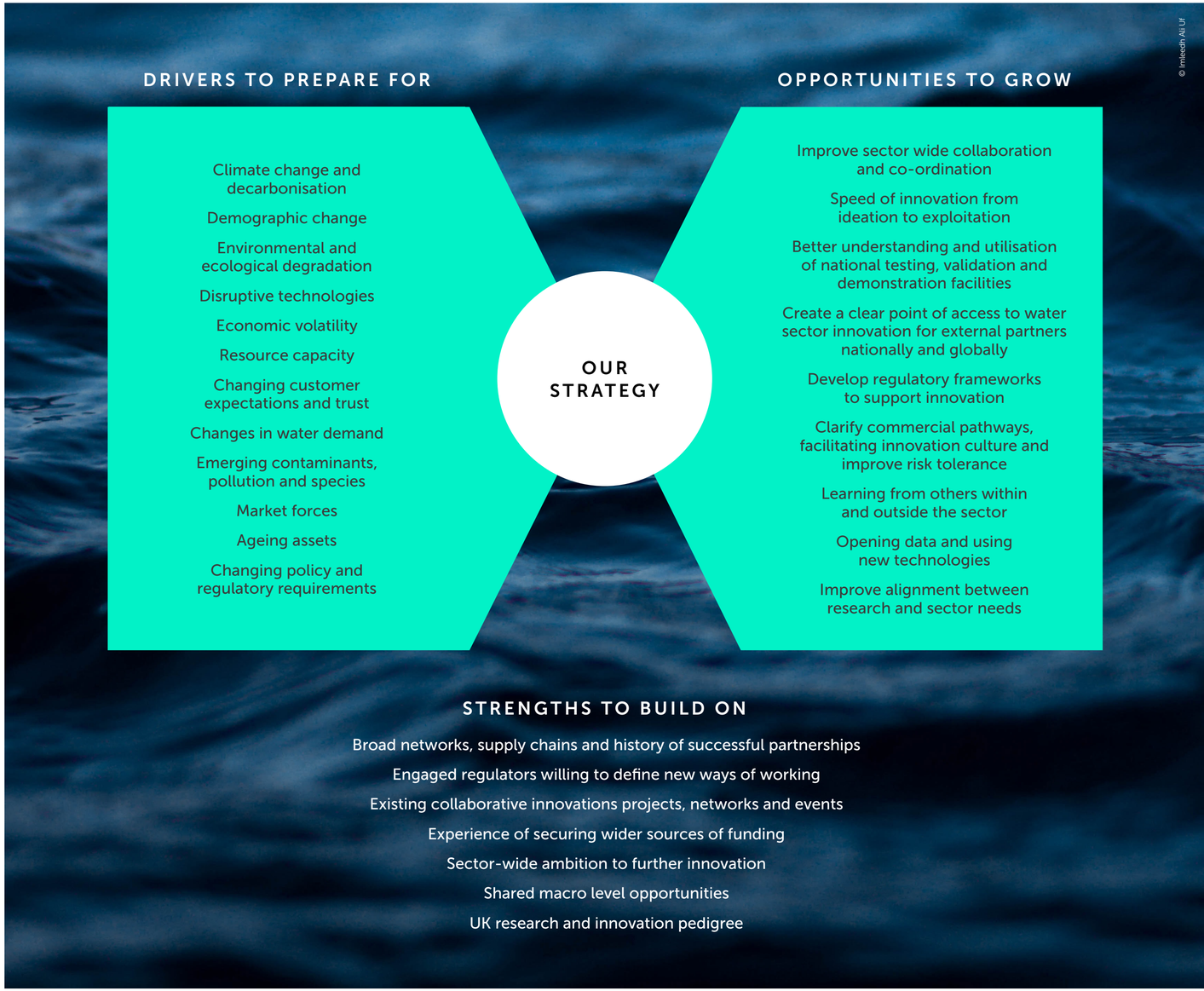
TRENDS, OPPORTUNITIES AND STRENGTHS FOR THE WATER SECTOR

This collaborative innovation strategy will allow us to embrace opportunities and prepare for future drivers by building on our strengths.

Strengths to build on

The UK has many proven strengths, including a world-class science base and considerable expertise in creating, developing and disseminating innovations that can address key water-related challenges worldwide.

We have the ambition and the support of our regulators to look for new ways of working. We can use current networks, partnerships, and experience of funding to build the resources needed to implement innovation. By recognising our strengths we can build on these to achieve sector-wide change.



While different areas and companies in the UK face different challenges and opportunities we believe that by working across the sector, with a focus on transformational innovation, we can work to address these drivers and opportunities.

Drivers to prepare for

Global trends such as population growth and climate change are forcing water companies and the wider sector to adapt and invest significantly in water supply and wastewater treatment.

We have created our themes, which are the topics we want to focus our innovation on, to prepare the sector for these drivers.

We know that these are long-term trends, but it is vital that we begin to act now, given the scale of the challenge.

Across the water sector, there is often an inherently long lead time for implementation due to long asset life, planning and investment cycles, and regulatory testing.

Opportunities to grow

There are key areas we need to address to take the opportunity to achieve our transformational innovation aims and support the sector to become recognised globally for water innovation.

In the UK there are lots of examples of water companies successfully collaborating regionally, nationally and globally. With the right enabling infrastructure, there is a significant opportunity to do even more in this space.

Improving integration between government, regulators and water companies to provide a single gateway for innovation will support effective collaboration across the sector. We believe that improving risk tolerance in the sector, learning from others and using data and technology are key tools to achieving this.

We have developed our principles, which illustrate how we will innovate, to support us in taking advantage of these opportunities.

Building the enabling infrastructure will support us in delivering our principles; we have described this as a Centre of Excellence. This in itself will not bring about the transformation we want to see, but it will provide a catalyst for change and a means of achieving that change through collective action.

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We believe that improving risk tolerance in the sector, learning from others and using data and technology are key tools to achieving this.

OUR STRATEGY

Our vision for this innovation strategy

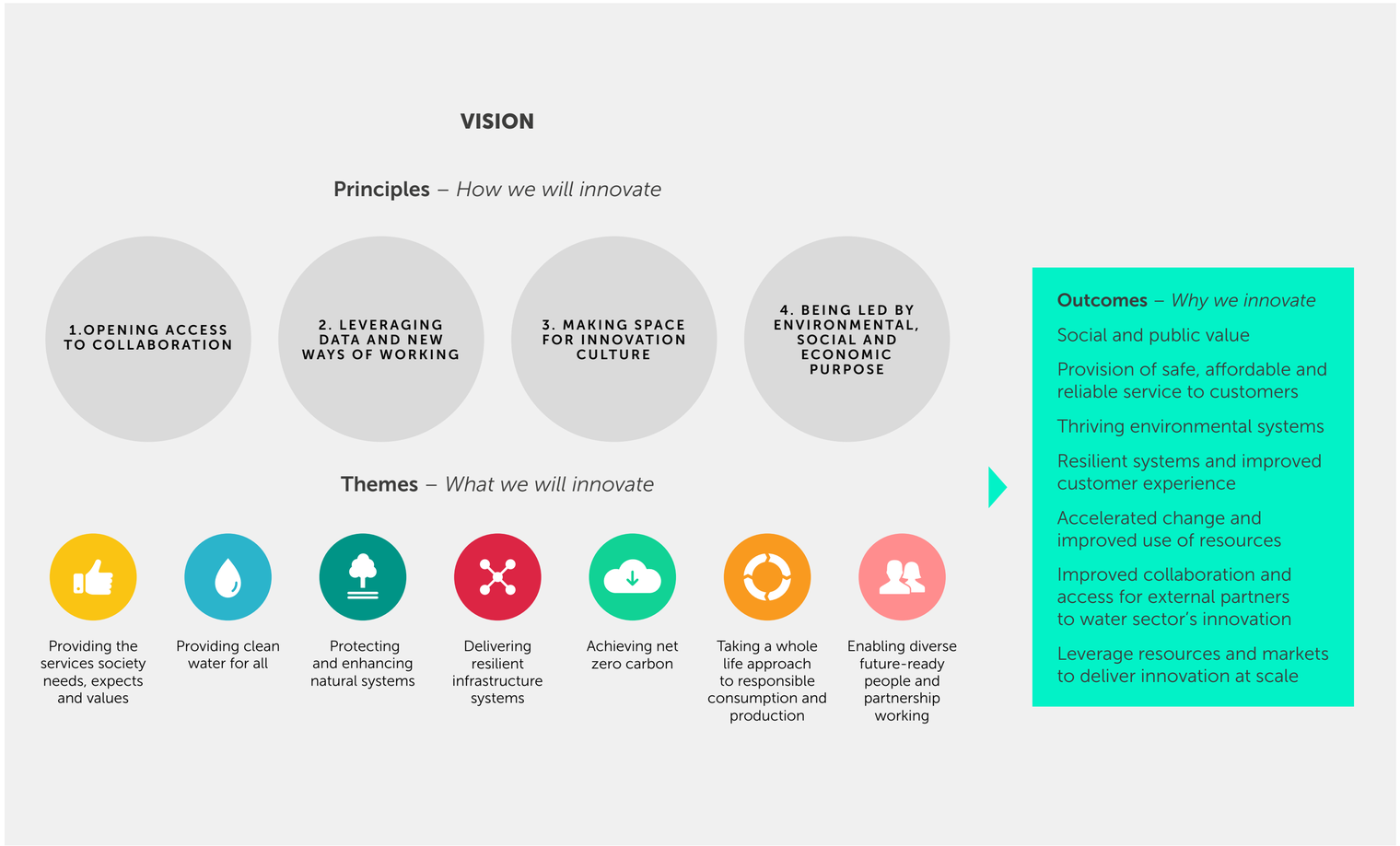
To create open collaboration opportunities across the water sector to drive transformational change through innovation that delivers greater value for customers and the environment.

This vision sets out our aim for innovation in the water sector. This vision is supported by:

Four principles which are ways of working, detailing how we plan to innovate. These are cross-cutting changes that are required to inform and guide all of our innovation activity to take opportunities to grow and further enhance strengths highlighted on the previous page.

Seven themes which are the topics we have identified to support us in delivering innovation that is led by environmental, social and economic purpose. They will support us in responding to the drivers highlighted on the previous page, and the issues that are important to our customers.

Our vision, principles and themes are designed to support us in delivering the outcomes that we have identified.



OUR PRINCIPLES

These principles are the key ways of working we believe will be essential to innovate as a sector. Our principles illustrate how we will innovate and are the enablers to implementing our strategy.

Opening access to collaboration

We will enable water companies, supply chains, stakeholders, regulators, SMEs, start-ups, academia, the public and other innovators to co-create and co-deliver innovation initiatives.

Collaboration is central to our approach, these stakeholders, along with consumers, communities and other sectors will need to play an active role to achieve transformational innovation.

We will create a joined up, transparent approach which leverages the full potential of the community rather than individual organisations.

Leveraging data and new ways of working

We will ensure that we open data and share knowledge and technology to avoid duplication. We will seek to share data freely to encourage innovation. We will create change at pace, seeking to transform the sector.

We will develop new technologies from early technology levels through to full deployment and share knowledge to secure maximum value.

Making space for innovation culture

We want to develop a shared water sector culture of innovation which supports everyone in the water sector to innovate, adapt and learn.

We want to think differently to achieve transformational innovation, putting diverse people and culture at the heart of this work.

This requires appropriate resources including access to funding, skills, and time for innovation to create the virtual and physical space required innovate in a controlled regulatory environment. We will work with others to gain new skills and leverage wider funding opportunities for the sector.

Being led by environmental, social and economic purpose

We recognise that the innovation that we create and implement has a clear purpose to contribute to addressing water sector challenges. We will implement the optimal value solutions to build trust and deliver public value through a sustainable water sector.

We will look to create genuine environmental and social benefit in the long term by prioritising innovation that will unlock long-term sustainability and resilience improvements.

Our themes will support us in defining this purpose.

More detail on how we aim to deliver these principles are detailed in our ‘Strategy to Implementation’ section. Our proposed **Centre of Excellence will be crucial to this.**

Our principles will underpin everything that we do.

OUR THEMES

To provide focus and encourage accelerated change we have identified seven themes. These are the topics we have identified as our focuses for innovation to respond to our future drivers and the long-term priorities of our customers.

These themes are opportunities for innovation both for the water sector and for other wider sectors across global geographies to inspire and encourage diverse collaboration.

We have set out key ambitions for 2050 for each theme to provide a tangible focus for innovation in the UK.

When developing these themes, we used the UN Sustainable Development Goals, for global applicability. We used the UKWIR Big Questions, which are underlined in the following section, English water companies' Public Interest Commitments, and national policy to identify the key topics for the UK water sector to address.

Full mapping of these themes is set out in Appendix 1.

These themes overlap and are inherently interconnected.

Our themes are not designed to be considered in isolation. For example, there are opportunities for nature based solutions at a catchment level that could support delivery against all of themes.

A solution like large scale sustainable urban drainage sits in this strategy within the 'protecting and enhancing natural systems' theme as it can reduce flows in sewers and improve biodiversity. However, it also has a number of benefits to feed into achieving the outcomes in other themes such as:

- Helping regulate storm water, reducing run off, and reducing flood risk (feeding into achieving outcomes within the 'delivering resilient infrastructure systems' theme)
- Improving raw water quality (feeding into achieving outcomes in the 'providing clean water for all' theme)
- Using less energy and having lower operational and embodied carbon compared to other solutions (feeding into achieving outcomes in the 'achieving net zero carbon' theme)
- Improving customer trust and confidence if created in collaboration with a community and can also provide amenity value (feeding into 'providing the services society needs, expects and values' theme)

We also recognise the need for innovation and new ideas to be encouraged without structure, and these themes are not designed to stifle new ideas or create additional processes, but rather to provide focus and common ambition as we work together with new partners.

In the following section we have set out more of the detail behind each theme, including:

- Ambitions for 2050 to focus our innovation work
- The current baseline to detail where we are now
- The enablers of innovation
- The aims to be achieved in the short, medium and long term

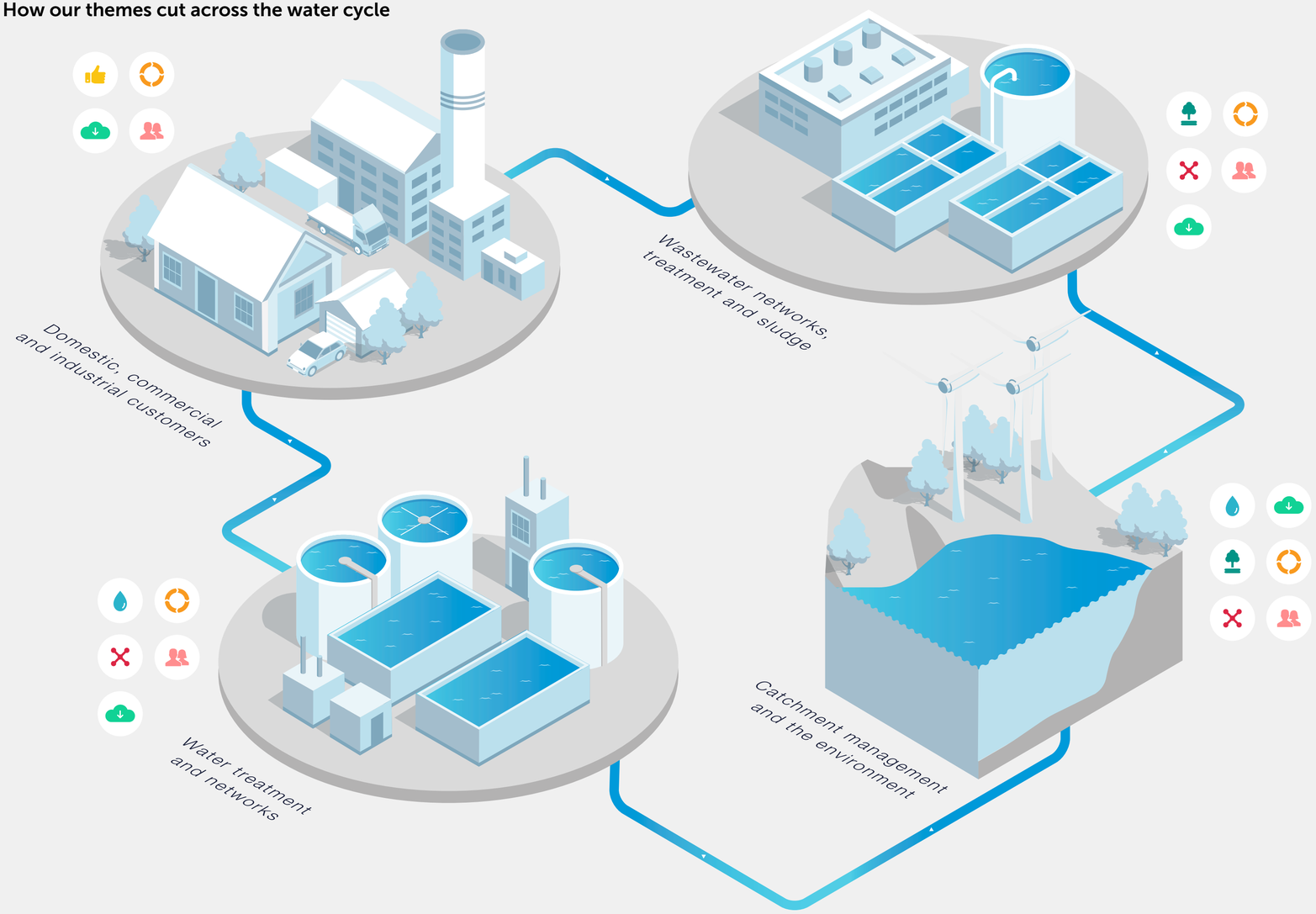
We have focused on aspirational outcomes and aims for the sector as a whole for these themes rather than targets within a regulatory context. Companies across the water sector have different maturity, different regulatory environments and different challenges. However these themes reflect the direction where innovation is needed. These themes are deliberately broad to capture these differing contexts and the diversity of need, but the outcomes and aims reflect the narrower focus that is needed. We envisage that a narrower focus within the these themes, as well as further detail on activities and roles, will be developed and work will continue to support implementation.

While these themes do not set out specific roles, as set out within our principles, we believe that active collaboration with customers, communities and other stakeholders is vital to achieve transformational innovation.

We have also included some case studies from other sectors showing our ambition to learn from new partners and sectors.

These themes are designed as long-term guides for innovation, rather than as specific programmes of projects. We recognise that others will have ideas and solutions that will support us in addressing the questions under these themes.

How our themes cut across the water cycle



Themes

- PROVIDING THE SERVICES SOCIETY NEEDS, EXPECTS AND VALUES
- PROVIDING CLEAN WATER FOR ALL
- PROTECTING AND ENHANCING NATURAL SYSTEMS
- DELIVERING RESILIENT INFRASTRUCTURE SYSTEMS
- ACHIEVING NET ZERO CARBON
- TAKING A WHOLE LIFE APPROACH TO RESPONSIBLE CONSUMPTION AND PRODUCTION
- ENABLING DIVERSE FUTURE-READY PEOPLE AND PAR TNERSHIP WORKING

THEMES AT A GLANCE

PROVIDING THE SERVICES SOCIETY NEEDS, EXPECTS AND VALUES

AMBITIONS FOR 2050

Customers have trust and confidence in the service that the water sector provides

Water services are accessible, affordable for all, protect vulnerable customers and lead to zero customers in water poverty by 2030

Service provision is transparent, and customers and communities work with water companies to improve service and decision making

PROVIDING CLEAN WATER FOR ALL

AMBITIONS FOR 2050

Drinking water supply is low impact and sustainable

UK water supply is reliable with zero interruptions

We provide enough water for all across the UK

PROTECTING AND ENHANCING NATURAL SYSTEMS

AMBITIONS FOR 2050

Wastewater services are environmentally sustainable

We work with customers to halve freshwater abstractions, leaving more water in the environment

Water companies work in collaboration with customers and communities to have zero uncontrolled discharges from sewers

Emerging contaminants and lead are dealt with effectively causing zero harm for people and the environment

We have developed, protected and enhanced our natural environment

We have used natural solutions to improve our resilience to current and future challenges

DELIVERING RESILIENT INFRASTRUCTURE SYSTEMS

AMBITIONS FOR 2050

We work with customers to develop resilient human, physical and digital systems which can adapt to known and unknown future challenges

Our assets are maintained for the long term providing economic, social and environmental value

ACHIEVING NET ZERO CARBON

AMBITIONS FOR 2050

We have achieved operational and value chain carbon negativity

We have implemented carbon sequestration across the water sector

Customers, communities, water companies and the supply chain work together to achieve carbon neutrality across the value chain

TAKING A WHOLE LIFE APPROACH TO RESPONSIBLE CONSUMPTION AND PRODUCTION

AMBITIONS FOR 2050

We have maximised the recovery and reuse of resources to support sufficient resource availability for nature and society and achieved zero waste

We have sustainably achieved zero leakage

ENABLING DIVERSE FUTURE-READY PEOPLE AND PARTNERSHIP WORKING

AMBITIONS FOR 2050

We have a shared innovation culture which improves customer experience

Collaboration pathways are paved between water companies, regulators, supply chains, SMEs, start-ups, academia, customers and other innovators to allow innovation to work

The whole sector's workforce has the skills and diversity of thought to take an active approach to prepare for and address emerging challenges

The UK regulatory framework has evolved to incentivise innovation to benefit customers and the environment

PROVIDING THE SERVICES SOCIETY NEEDS, EXPECTS AND VALUES

We need to innovate to build customers' trust and deliver transformational customer service.

AMBITIONS FOR 2050

Customers have trust and confidence in the service that the water sector provides

Water services are accessible, affordable for all, protect vulnerable customers and lead to zero customers in water poverty by 2030

Service provision is transparent, and customers and communities work with water companies to improve service and decision making

UKWIR big questions

How do we achieve zero customers in water poverty by 2030?

The water sector provides essential water and wastewater services to households and businesses. However, enabling customers to interact with this service effectively, whether for payments, problem solving, or emergency support, requires a tailored, accessible and reliable customer service.

We recognise that water companies must collaborate more closely with customers and communities including domestic, commerical and industrial customers to provide the best service.

Now more than ever, customers need to be able to engage with us through platforms and mechanisms that are accessible and that take account of additional support requirements, especially for vulnerable customers. Looking ahead, we understand that both the need and expectation of a smarter and more flexible level of customer service will become commonplace – especially when comparing the efficacy of the water sector to sectors and organisations that lead in excellence of customer service.

As a sector, we must be able to respond to the needs of our customers efficiently, through multiple channels and in a way that builds trust and strong relationships through a shared understanding and mutual level of communication.

We also recognise the need to proactively reduce water poverty and protect a broad range of vulnerable customers including the elderly, low income families, and provide a service that best meets their needs.

Current baseline

Across the sector, water poverty research to date has reviewed measures for water poverty, causes of water poverty, current interventions, consequences of prolonged water poverty and lessons learnt from other sectors in comparable economies for best practice.

Further research and innovation is required to truly understand what customers expect from us now and in the future and the mechanisms that will enable us to deliver against those expectations at a national scale.

KEY ENABLERS TO DELIVERING THIS THEME

We need new enablers and ways of working to address these key questions which include:

- Creating an open two way dialogue with customers
- A shared purpose and collaboration across the water sector
- Developing an understanding of the true value of water among customers
- Creating national benchmarks for data sharing and collaboration
- Ensuring all IT systems are agile and have inter-operability and use appropriate third party and internal data
- Sharing broader environment benefits with customers
- Improving customer engagement processes
- Cross-utility partnerships
- Working collaboratively with the non-household market
- Understanding the true extent and impact of water poverty across customers

PETA JAKARTA – CREATING CROWD-SOURCED FLOOD MAPPING

Piloting an innovative approach to citizen engagement in Indonesia, the Peta Jakarta project in 2014/15 used real-time social media engagement to generate crowd-sourced disaster maps in a period of monsoon flooding. (Holderness and Turpin, 2015). Based on the success of this pilot, this project has been expanded, called Peta Bencana, to the greater Jakarta region.

Innovative use of social media for disaster response and citizen protection

The project enables Jakarta's citizens to report the locations of flood events using the social media network Twitter. This real-time, citizen driven data collection supported:

Accurate and publicly accessible real-time mapping of flood conditions

Cross-validation of formal flood reports data sources with live data

Creation of information for flood assessment, targeted response, and management in real-time

The study demonstrated the value and utility of social media as an urban method for crowd sourcing situational information to support decision-making and response coordination in the face of extreme weather conditions. (Holderness and Turpin, 2015).

Relevance to UK water sector

This project illustrates the potential to crowd source data and to bring the community to centre of projects. This is a step change from a more traditional approach of having customer and community engagement as a one way broadcast rather than a two-way dialogue and process of co-creation.

PROVIDING THE SERVICES SOCIETY NEEDS, EXPECTS AND VALUES

We need to innovate to build customers' trust and deliver transformational customer service.

Ambitions for 2050	Short-term aims	Medium-term aims	Long-term aims
Customers have trust and confidence in the service that the water sector provides	Our communications reflect the needs of our customers and are efficient and effective (especially in an emergency). For example: • through communication platforms like 'How to' service of online videos, video calling, automated and smart payment mechanisms • through ethnographic and universal research approaches to help understand the cultural and social drivers of customer needs, expectations and behaviours • through solutions such as blockchain	All our customers have an excellent consistent customer experience from our service provision on top of delivering our regulatory service requirements and changing circumstances.	Customers are part of the journey: co-creating with customers is a routine part of all work that happens across the water sector to build customer trust and willingness to contribute to achieving common goals
Water services are accessible, affordable for all, protect vulnerable customers and lead to zero customers in water poverty by 2030	Customer service is flexible and reflects the needs of all customers inclusively. For example: • by using multiple platforms and engagement approaches • innovative tariff structures and joined up, cross sector billing Improved use and modelling of customer data allows us to better predict vulnerability, debt and other service issues The water sector has a shared understanding of water poverty (that considers future regional and external drivers) and a strategy to appropriately measure and overcome it The social value of supporting households experiencing water poverty is understood Best practice water poverty interventions, appropriate for the context, are implemented	All decision making considers optimisation of social capital (as part of introducing wider capitals beyond financial return into decision frameworks) Collaboration with public sector, private sector and customers has led to a better understanding of the role and remit of water companies in supporting the delivery of public benefit such as environmental purpose and regional connectivity There are no customers in water poverty. Tariff structures reflect ability to pay and provide improved affordability support to customers experiencing water poverty and those struggling to pay Customers consider water and wastewater services to deliver good value for money	Communities of customers are supported by the water sector to collaboratively support vulnerable customers, especially during an emergency or supply interruption
Service provision is transparent, and customers and communities work with water companies to improve service and decision making	Decision making processes are transparent so that our customers can better understand how we make decisions which provide the best societal value, regarding things such as network investments, emergency response, engagement and pricing Engagement spreads to all water users, not just bill payers to improve the visibility of the sector, enabling greater understanding of our work	The amount and type of data we openly share with customers is reviewed regularly and aligned to improve transparency in areas that customers identify as important. For example: • improved data sharing about live network conditions as an information source for customers	We share our progress and data openly, and in a way that is meaningful to our customers Customers and water companies undertake collaborative decision making
	TOWARDS 2025	TOWARDS 2035	TOWARDS 2050

PROVIDING CLEAN WATER FOR ALL

We need to provide a reliable, quality service to our customers

AMBITIONS FOR 2050

Drinking water supply is low impact and sustainable

UK water supply is reliable with zero interruptions

We provide enough water for all across the UK

UKWIR big questions

How do we achieve 100% compliance with drinking water standards (at point of use) by 2050?

How do we achieve zero interruptions to water supplies by 2050?

We believe that it is essential that when our customers turn on the tap they have a reliable, good quality water that they trust is safe to drink.

Water quality includes taste, odour and appearance. When there is an issue with water reliability, quality or safety it is a significant public health concern and erodes trust.

There has been a shift in customer expectations in recent years, with customers becoming increasingly intolerant of water supply interruptions especially during extreme events like the Beast from the East in 2018 which impacted thousands of our customers.

Current baseline

There has been significant work across the water sector to improve the quality and reliability of our clean water supply in the past decade. Water quality in the UK is consistently ranked among the best in the world where compliance with water quality standards typically exceeds 99.9%. However, we do know that our raw water supplies are subject to contamination, through events in catchments and from other contaminants such nitrates and metaldehyde (an active ingredient in slug pellets). We also know that our traditional approaches to treatment of our raw water uses significant amounts of energy and chemicals.

Water supply is becoming increasingly more reliable, but external drivers, such as climate change could put this at risk. We know that lengthy interruptions are mostly causes by the failure of large pipes that are the single source of supply to a community.

We still need to do more work to address taste, odour and discolouration issues. We also need new methods to identify and address emerging contaminants. We also need to ensure that we improve the resilience of our supply systems and protect our vital water supply assets effectively.

Water resource partnerships have recently been formed and collaboration is being developed in the sector to respond to the challenges of long-term water resource needs.

KEY ENABLERS TO DELIVERING THIS THEME

We need new enablers and ways of working to address these key questions which include:

- Developing regulatory and organisational processes which enable the timely deployment of innovative approaches for clean water treatment
- Creating trust and an open dialogue and clear communications, with customers to create a shared understanding of the value of safe, clean water beyond price
- Opening access to improved, low cost methods for monitoring, modelling and treating water
- Developing and implementing partnership approaches on a catchment scale collaborating across the water sector with organisations, communities and the non-household market.

RECYCLING INNOVATION FOR SECURITY OF SUPPLY BY WATER CORPORATION, WESTERN AUSTRALIA (WA)

Australia's water supply is facing mounting threats from increased periods of drought due to climate change. In response to this challenge, the state-owned Water Corporation (the principal supplier of water, wastewater and drainage services in WA) is leading an innovation programme to develop novel approach for scalable water recycling and supply resilience (WC, a. 2020).

A water recycling innovation hub

Water Corporation launched an innovation hub on the grounds of its Subiaco wastewater treatment plant, the Water Research and Innovation Precinct. The Subiaco innovation hub is a collaborative space that is focussed on accelerating projects that deliver novel and innovative approaches to wastewater treatment and resource recovery technologies. The hub partners with global technology providers, research institutions and local industry representatives to create mechanisms of delivering a reliant, resilient and safe water supply now and for future generations (WC, a. 2020).

By driving innovation in water recycling, Water Corporation is freeing up WA's rainwater supply for drinking water purposes. By 2030, the Water Corporation aims for 30% of water used in WA to be recycled for use in agriculture, industry, households and maintenance of natural systems.

Relevance to UK water sector

This project demonstrates how innovation, collaboration and technology acceleration can be used by the water sector to increase the security of drinking water supply and improve the health of groundwater sources. It also shows the role of innovation in improving climate resilience in a vulnerable environment.

PROVIDING CLEAN WATER FOR ALL

We need to provide a reliable, quality service to our customers

Ambitions for 2050	Short-term aims	Medium-term aims	Long-term aims
Drinking water supply is low impact and sustainable	The sector has a shared understanding of the impact of water quality on human health Low impact water treatment methods have been developed for large scale roll out. For example: • through feasibility and business case development for emerging and proven water quality technologies Methods to detect sources of drinking water taste, odour and appearance issues in 'live' environments have been developed. Raw water quality has been improved at a catchment level	All customers are satisfied with the taste, odour and appearance of their drinking water Roles and responsibilities associated with water quality are clear among all stakeholders (including customers). All play their part in sector-wide consistent compliance with water quality standards All piped systems are managed to maintain impeccable drinking water quality at point of use while extending their life. Low impact strategies are implemented when replacement is required	Zero chemical, low energy and low impact treatment processes are rolled out at scale across the sector
UK water supply is reliable with zero interruptions	The condition of water assets is well understood. For example: • through technologies for improved and non-invasive asset condition monitoring, repair and maintenance in 'live' environments Water assets are managed effectively • through best practice, asset optimisation and network risk assessments • for de-centralised supply	Potential interruption risks are identified across systems enabling timely responses to prevent issues before they occur providing our customers with a more reliable service. For example: • through reliable customer service and real-time engagement • through improved modelling and sensing of our network all water treatment and supply chains are efficient and effective	There are zero interruptions to customer water supply across the UK
We provide enough water for all across the UK	The sector as a whole understands the long term future water demands from all sectors in the UK and has clear processes to share water where required. For example: • through multi-sector adaptive planning for UK water resources to understand future demand and identify the impacts of future trends like climate change • through sector-wide communications to raise household and non-household awareness	All water supply risks are known and addressed where possible through close partnerships between everyone within the water sector and other water users such as industry	Water supply is drought resilient and there is enough water for all customers across the UK
	TOWARDS 2025	TOWARDS 2035	TOWARDS 2050

PROTECTING AND ENHANCING NATURAL SYSTEMS

We need to develop, protect and enhance our environment, both above and below water, to build resilience to degradation and environmental changes

AMBITIONS FOR 2050

Wastewater services are environmentally sustainable

We work with customers to halve freshwater abstractions, leaving more water in the environment

Water companies work in collaboration with customers and communities to have zero uncontrolled discharges from sewers

Emerging contaminants and lead are dealt with effectively causing zero harm for people and the environment

We have developed, protected and enhanced our natural environment

We have used natural solutions to improve our resilience to current and future challenges

UKWIR big questions

How will we deliver an environmentally sustainable wastewater service that meets customer and regulator expectations by 2050?

How do we halve freshwater abstractions in a sustainable way by 2050?

How do we achieve zero uncontrolled discharges from sewers by 2050?

How do we achieve zero harm from plastics via our operations and activities by 2050?

The condition of our natural systems is fundamental to the ability of the water sector to provide water and wastewater services. We understand that our interaction with natural resources has a direct impact on their quality and longevity. We also recognise the contribution of industries (including our own) to the deterioration of natural systems through pollution, unsustainable extraction of resources, ecosystem degradation and significant non-renewable energy consumption.

We aim to create integrated solutions which benefit the environment and proactively collaborate with customers, communities, non-household customers, and other innovators.

Current baseline

The reliance of the water sector on natural systems means that appropriate management of our natural systems has always been at the forefront of thinking. Particularly in recent years as knowledge of the fragility of our resources and their resilience against the changing climate has become more prominent, protection and enhancement of the environment has become a priority for many of our customers.

In the sector to date, research and progress in this area has been mainly focussed on treatment and compliance frameworks for environmental protection. Research and pilot projects have also been conducted regarding customer engagement, innovative land use for co-benefits and delivering local solutions for local problems. Similarly, a number of water companies have fully integrated consideration of natural and social capital into their decision making processes. This includes the six capitals approach which equally values financial, manufactures, intellectual, human, social and natural capital.

In the early stages of delivery are catchment level solutions for operational sustainability and environmental resilience. However, for widespread success, further progress needs to be made in the sector's ability to effectively collaborate.

KEY ENABLERS TO DELIVERING THIS THEME

We need new enablers and ways of working to address these key questions which include:

- Developing effective frameworks and business models for collaboration with wider stakeholders, environmental regulators and beneficiaries that outlines potential funding mechanisms and the total value of natural solutions
- Creating and implementing a multi-capital holistic approach to decision making which can be adopted across the sector
- Evolving a regulatory framework which fosters innovation, collaboration and delivery of long term solutions which considers net environmental impact (carbon, biodiversity and water quality)
- Engaging with customers to raise awareness of their ability to contribute and the value of their collaboration in delivering environmental outcomes
- Engaging and collaborating with the non-household market

NATURAL CAPITAL DECISION MAKING AND SUPPLY CHAIN INNOVATION AT UNILEVER

Unilever, a multinational consumer goods company, draws many of the raw materials needed for its products from nature. This has encouraged the company to take significant steps to ensure that natural and social capital are at the heart of their decision making processes at all levels.

Decision making tools consider the natural capital across the lifecycle of their products and assets through the 'Natural Capital Project'. Investment optioneering also integrates carbon pricing in anticipation of emerging carbon taxes (Unilever, 2020).

Supply chain influence and innovation

Unilever also works with the supply chain to protect and enhance natural systems.

In 2010 Unilever developed a 'sustainable agriculture code' which is followed by its suppliers around the world (Unilever, 2020). The code addresses: use of agrochemicals and fuels, soil and nutrient management, water and energy consumption, biodiversity, waste, human and animal welfare and skills development to improve local economies (Unilever, 2010).

Unilever also works to protect the natural systems upon which is relies through innovation in areas such as: sustainable sourcing, waste, water use, operational efficiency and carbon emissions.

Relevance to UK water sector

Unilever's work demonstrates how organisations that rely heavily on natural resources can innovate in their decision making and leverage their supply chain influence to realise social, environmental and economic benefits for themselves and others.

PROTECTING AND ENHANCING NATURAL SYSTEMS

We need to develop, protect and enhance our environment, both above and below water, to build resilience to degradation and environmental changes

Ambitions for 2050	Short-term aims	Medium-term aims	Long-term aims
Wastewater services are environmentally sustainable	Wastewater treatment across the sector effectively balances headroom, cost, and risk with environmental outcomes Wastewater treatment have been developed to improve effectiveness and cost efficiency across the network. For example: • through the development of opportunities to decentralise wastewater treatment where appropriate	Wastewater treatment is effective and cost efficient across the network	No deterioration in water bodies and net positive natural and social capital is achieved each year We take a regenerative approach to wastewater services
We work with customers to halve freshwater abstractions, leaving more water in the environment	All water companies actively engage and collaborate with household, retail and non-household customers for environmental protection and enhancement through significant behaviour and consumption change. For example: • through combining behaviour change engagement and campaigns with other sector efficiency programmes • through development and deployment of low cost rainwater and grey water recycling for domestic non-potable re-use	Losses from water treatment and supply systems are minimal across the UK water sector Sector wide behaviour change programmes and interventions have been rolled out at a national scale to develop a water-saving culture reducing consumptive and non-consumptive uses of water	The sector has halved fresh water abstractions without impacting service provision Household, retail and non-household customers understand the value of water and have minimised water consumption. For example: • through water neutral developments and realising the potential value of offsetting to improve water efficiency in existing properties
Water companies work in collaboration with customers and communities to have zero uncontrolled discharges from sewers	Proactive and effective customer engagement helps us keep undesirable content out of our sewers	There are proactive interventions across the network as a whole to minimise uncontrolled discharges even in the face of emerging challenges. For example: • through effective monitoring, incident response and maintenance programmes	We control the content of sewers at source and there are no pollution events
Emerging contaminants and lead are dealt with effectively causing zero harm for people and the environment	The impact on the environment of emerging pathogens, viruses and emerging contaminants is well understood and reflected in our approach to management. For example: • the impact of climate change on the spread of viruses and pathogens The sources of plastics and nanoparticles in wastewater networks are known and there is an informed approach to removal and prevention	Wastewater discharges have no negative impact on the natural environmental Across the sector there are treatment processes which can effectively remove harmful plastics and contaminants The sector has actively minimised the impact of plastics in the environment from operations	Emerging contaminants such as pesticides, pharmaceuticals, plastics and invasive species are dealt with effectively causing no negative impacts on the environment
We have developed, protected and enhanced our natural environment	The water sector has a shared future vision for holistic air, land and water management There is sector-wide understanding of implementable solutions for household, network and catchment scale sustainable interventions Improved holistic decision making and valuation frameworks help us to invest in work that will provide the greatest public benefits	Organisations across the sector use multi-criteria decision making for all investment decisions Progress to regenerative approaches	The sector manages and operates multi-functional assets that deliver net positive natural and social capital at an acceptable cost to customers and use regenerative approaches
We have used natural solutions to improve our resilience to current and future challenges	There are effective methods to identify catchment level conditions, risk and opportunities to enhance our natural systems. For example: • through dynamic data collection mechanisms (such as earth observation) and sensor technologies	Natural infrastructure and nature based solutions are core to our work. For example: • within our built infrastructure, for low impact treatment, water temperature control, minimisation of sediments and pollution, regulation of storm water runoff and flood risk management • through large scale implementation of sustainable urban drainage	Natural solutions for environmental protection, enhancement and sustainable operation are delivered collaboratively with wider environmental stakeholders and customers
	TOWARDS 2025	TOWARDS 2035	TOWARDS 2050

DELIVERING RESILIENT INFRASTRUCTURE SYSTEMS

We need to prepare our systems to be resilient to future challenges and unknowns

AMBITIONS FOR 2050

We work with customers to develop resilient human, physical and digital systems which can adapt to known and unknown future challenges

Our assets are maintained for the long term providing economic, social and environmental value

UKWIR big questions

What is the true cost of maintaining assets and how do we get this better reflected in the decision-making process?

Risk in the water sector is increasingly unpredictable due to the complexity and interdependencies between systems and the uncertainty associated with many hazards. Risk assessments and mitigation continue to play an important role in responding to business challenges.

However, resilience, as well as risk management, is needed to overcome short-term disruptive shocks, such as flooding, and chronic long-term stresses, such as aging assets. Resilience is especially essential to prepare our systems for uncertain frequency or unknown future shocks and stresses. Resilience has become increasingly central to water companies, service delivery, with regulators such as Ofwat requiring water companies to consider resilience as part of their business plans.

In 2017 Ofwat defined resilience as 'the ability to cope with, and recover from, disruption and anticipate trends and variability in order to maintain services for people and protect the natural environment now and in the future.'

Reflecting the Cabinet Office's 4Rs of resilience, it is important to not only to respond and recover to shock and chronic events, but to also build resistance, providing protection from events, reliability, ensuring that systems are designed to operate under a range of conditions, and redundancy, ensuring that there is suitable capacity in systems. Considering all these qualities of resilience is essential to develop systems with the best long-term resilience value.

Within this dynamic environment it is essential that we innovate to adapt our operations to deal with these shocks and stresses. It is also vital that we innovate to build on the recovery from extreme events to build transformative innovation solutions to ensure our sector thrives in the future.

KEY ENABLERS TO DELIVERING THIS THEME

We need new enablers and ways of working to address these key questions which include:

- Collecting, sharing and using reliable data to allow decision making over multiple timeframes and systems
- Creating an open dialogue with regulators to evolve regulation and to develop a long-term plan for maintenance and prepare our assets and networks for the future
- Developing a regulatory model that enables and encourages long term investment

Current baseline

As water companies, we have worked to identify and understand our baseline resilience and some of the wider resilience issues. Further work is still needed to develop this preliminary work into implementable solutions which incorporates systems thinking into the delivery of our service; through our assets, service, processes and finances.

We will build on the existing resilience frameworks and asset management processes that exist within companies already to develop sector wide innovative approaches. This will consider data collection, investment decision making and building resilient assets and introducing new technologies into our asset base.

INNOVATION FOR RESILIENCE IN THE ENERGY SECTOR BY NATIONAL GRID

National Grid, the electricity transmission and gas distribution company, must adapt rapidly to the changing energy sector. Energy demand is expected to increase and 65% of electricity could be being generated locally by 2050 (National Grid, 2018). Therefore optimisation of performance and infrastructure resilience are key areas of innovation (ENA, 2020).

Innovation projects to build resilience

Distributed ReStart is a project run by National Grid ESO, the electricity systems operator, and Scottish Power Energy Networks. It explores how distributed energy resources (DER) can be used to restore power in the event of a total or partial blackout of the national electricity transmission system (ENA, 2020).

The 'Virtual Site Acceptance Testing & Training' scheme run by National Grid Electricity Transmission aims to develop and demonstrate the first phase of a digital substation through the development of a platform, simulation and modelling of interoperability (ENA, 2020). This research will establish:

- The feasibility and implementation costs for scalable deployment of digital substations
- A common specification for data models, engineering process, commissioning and testing.

Relevance to UK water sector

We want to learn from the rapid pace of innovation this national infrastructure network has established to improve infrastructure resilience and performance.

DELIVERING RESILIENT INFRASTRUCTURE SYSTEMS

We need to prepare our systems to be resilient to future challenges and unknowns

Ambitions for 2050	Short-term aims	Medium-term aims	Long-term aims
We work with customers to develop resilient human, physical and digital systems which can adapt to known and unknown future challenges	Collaborative, low cost and low carbon approaches to flood risk management have been implemented. For example: • nature-based solutions for flood risk management are implemented in all appropriate circumstances Networks are considered to be reliable and interruptions are effectively managed. For example: • through implementing advanced pressure management across all water distribution networks The sector has robust modelling and a shared understanding of what the future may look like that informs our planning and processes which is widely shared. For example: • through the impacts of climate change and more frequent extreme conditions on water and wastewater services are understood and reflected in our management and planning processes Systems are designed to interact across the sector so that all systems and devices can work together and exchange data appropriately. For example: • through sector-wide approved open data and interoperability standards There is a sector-wide approach to valuing for decision making which focuses on wider resilience value rather than purely economic value and co-create with customers. For example: • through developing a robust evidence base demonstrating the efficacy and value of nature-based solutions as an alternative to grey engineered solutions The sector has effective and cost-efficient methods to understanding and monitor the condition of assets and networks which informs decision making and procurement. For example: • through the development of feasibility, cost, benefits and barriers for use of robotics, low-cost sensors and comms to monitor infrastructure asset and network health and performance Regulatory frameworks support the implementing of resilient infrastructure through ongoing open dialogues with regulators Appropriate physical and digital security is in place across the water sector systems	The sector can detect and address asset failure rapidly. For example: • through real time methods to detect the true causes of key asset failure and deterioration The sector rolls out key reliability initiatives at scale across all systems in collaboration with communities. For example: • through implementing cost effective systems to refurbish potable water storage tanks There is a sector-wide approach to valuing solutions which provide wider resilience value rather than purely economic value. For example: • through developing a robust evidence base demonstrating the efficacy and value of nature based solutions as an alternative to grey engineered solutions The sector as a whole makes decisions based on best resilience value and regulatory frameworks support investing in resilience in the long-term Resilient asset ownership and operation is achieved. For example: • through implementation of novel business and ownership model	There are no service or supply incidents and disruptions The sector uses a systems approach to designing and maintaining our assets and networks to build sector wide resilience The sector uses shared adaptive models to understand the impact of changing trends, such as demographics and climate change on the efficacy and resilience of our assets
Our assets are maintained for the long term providing economic, social and environmental value	The interconnectivity of systems and risk across the sector national asset base is understood Data is actively collected that will inform evidence based decision making There is a cross-sector approach to effectively assess portfolios of regimes for optimised outcomes	The sector has implemented processes and initiatives which prevent cascading failures, improving reliability for our customers and improving the value of our service The interactions between the water sectors' systems and risks and those of other sectors and systems are understood	Our portfolio of lifecycle regimes balance value, risk and long-term costs of asset ownership The regulatory regime supports the long-term resilience of water Robust methods to understand and predict how assets deteriorate or fail are used to inform our assessment of consequences, risks and our approach to risk mitigation Long-term strategic decisions in the sector are made with confidence using a framework that considers social and natural capital, future scenarios and the national asset base
	TOWARDS 2025	TOWARDS 2035	TOWARDS 2050

ACHIEVING NET ZERO CARBON

We need to play our part in limiting global temperature rise to under 1.5°C

AMBITIONS FOR 2050

We have achieved operational and value chain carbon negativity

We have implemented carbon sequestration across the water sector

Customers, communities, water companies and the supply chain work together to achieve carbon neutrality across the value chain

UKWIR big questions

How do we remove more carbon than we emit by 2050?

We are facing a climate emergency. We need to act now, collaborating across the water sector, between organisations and communities to affect large scale change. We recognise that this will not be easy but will provide wider environment and social benefits. There has been an estimated 1°C warming above pre-industrial levels caused by human activities. This has already impacted both human and natural systems and caused more extreme weather events including increased flooding, extreme drought and reducing biodiversity. We need urgent action to reduce carbon emissions to limit global temperature rise to below 1.5°C to prevent further catastrophic impacts.

We are clear that we need to respond to this in the long term by implementing carbon mitigation measures to reduce the causes of climate change, through reducing carbon emissions and improving carbon sinks. Therefore we will enable the decarbonisation of our systems including energy, transport, processes and procurement and improve carbon sinks through land use management and carbon capture. We know that reducing carbon emissions is a society-wide need therefore we will also encourage our customers to reduce their carbon emissions. Achieving net zero carbon can have wider societal benefits, like opportunities for the UK economy, but it is essential we achieve a fair transition.

Current baseline

The water sector has a good understanding of the carbon challenge we face with respect to significantly reducing our emissions and our contribution to climate change. Indeed, many companies have set ambitious individual timebound targets relating to reducing the carbon impact of their operations. Furthermore, WaterUK is delivering a net zero carbon route map for the water sector focussing on operational emissions.

Looking forward, our ability to achieve carbon neutrality as a sector will be strongly supported by a robust and consistent approach to data collection, analytics, scenario modelling, costing of carbon reduction options, and monitoring of emissions. It is important to note that while some companies have made commitments with respect to their operational carbon emissions, tackling embodied and value chain carbon emissions remain significant challenges for the sector that need to be considered. It is understood that many of the tools for proper quantification, monitoring and management of carbon emissions already exist. However, innovation and progress are required to ensure that evidence-based consideration of carbon is integrated into our decision-making processes across the board.

KEY ENABLERS TO DELIVERING THIS THEME

We need new enablers and ways of working to address these key questions which include:

- Developing a regulatory framework that drives investment to reduce carbon ahead of government targets and avoids carbon-intensive water and wastewater treatment options
- Updating codes and standards, including engineering and health and safety, and procurement regulations to facilitate innovation around carbon management
- Developing a framework or guidance for carbon offsetting to enable funding to be directed towards management activities such as peatland restoration
- Developing a consistent ‘net zero’ definition, terminology, and sector ambitions and route map
- Accelerating the implementation of emerging low carbon technologies integrated with advanced digital tools
- Exploring partnership opportunities

CARBON NEUTRALITY AT ACCIONA

ACCIONA, a firm which develops and manages infrastructure and renewable energy around the world, “considers the fight against climate change, and the effects it causes, to be a strategic priority.” (ACCIONA, 2018).

The company has achieved carbon neutrality each year since 2017 through a combination of renewable energy generation, efficiency interventions, robust carbon pricing in decision making and offsetting residual emissions through Certified Emissions Reduction schemes.

The role of innovation in decarbonisation

ACCIONA invest ~3% of annual revenue back into collaborative and operational innovation with a focus on maximising operational efficiency and pioneering new, sustainable business models. Collaborative innovation is delivered through start-up accelerators, innovation challenges and a digital innovation hub.

Each year their progress unlocks ~€30m of operational savings and enables them to deliver low carbon infrastructure for clients whilst achieving carbon neutrality as a company (ACCIONA, 2018).

Relevance to UK water sector

ACCIONA’s work demonstrates how investment in innovation enables implementation of asset upgrades and extensions based on the principles of circular economy, develop low carbon value chains and rapid integration of emerging technologies into their procurement streams.

ACHIEVING NET ZERO CARBON

We need to play our part in limiting global temperature rise to under 1.5°C

Ambitions for 2050	Short-term aims	Medium-term aims	Long-term aims
We have achieved operational and value chain carbon negativity	The sector has a joined up approach to quantifying and reducing operational greenhouse gas emissions, which is widely shared The sector has extended energy efficiency and low carbon energy and heat initiatives. For example: • through low or zero carbon water cycle management, optimising energy use and expanding generation or use of renewable electricity, gas and heat • through developing digital enablers such as real time control for moving and treating water and wastewater. Process emissions from across the sector are better quantified and where possible, reduced. For example: • through monitoring and potentially modifying treatment regimes The water sector is transitioning to sustainable transport	The water companies have achieved their medium-term net zero emissions targets. For example: • through prevention, optimisation or capture of water company emissions and engagement with the supply chain There is consistent accounting of operational greenhouse gas emissions which is linked to investment opportunities. For example: • through developing certified emission reduction methodologies to attract carbon offset project funding The sector is a significant contributor to wider decarbonisation through the production, use and export of low carbon energy generation. For example: • through renewable energy, hydrogen and energy from waste fuel sources The sector has a joined up approach to quantifying and reducing greenhouse gas emissions from water and wastewater treatment processes The water sector has transitioned to sustainable transport	The whole UK water sector has achieved operational and value chain carbon neutrality. For example: • through minimised emissions in materials, consumables, products and services as well as neutralising operational emissions The sector has decarbonised all energy and transport. For example: • through avoidance, efficiency and alternatives to fossil fuels • through previously innovative energy generation and storage becoming commonplace Emissions from treatment processes are minimised, and improvements in nutrient recovery from wastewater and sludge are achieved
We have implemented carbon sequestration across the water sector	Carbon capture and storage opportunities have been explored and the knowledge shared across the sector. For example: • through pilots of land-based carbon capture and storage; and through testing the feasibility of non-land-based options • through the development of a land carbon sequestration tool and low carbon farming guidance	Carbon storage and scalable sequestration has been developed. For example: • through soil improvement programmes using water process residuals; or wetlands, marine algae and peatland restoration	Carbon sequestration, including non-land-based carbon storage, has been implemented across the sector as a whole
Customers, communities, water companies and the supply chain work together to achieve carbon neutrality across the value chain	The sector works in collaboration with customers and communities to reduce demand. For example: • through promotion of the service's associated carbon footprint The sector has a clear understanding of embodied and value chain carbon for the sector. For example: • through quantification and measurements of all emissions Procurement and supply chain emissions have reduced. For example: • through individual company procurement strategies and policies to prioritise low carbon decision making that includes carbon cost considerations and criteria Focused work takes place with regulators and land users to promote low carbon and nature-based solutions for the water environment	Emissions have reduced linked to reductions in customer demand and the water sector is working with customers and communities to reduce this further, potentially with the help of water use labelling. Decarbonisation has been enabled across our value chains through collaborative working and knowledge sharing with innovators, solution providers, suppliers and communities. For example: • through sustainable procurement or enhanced carbon sequestration practices The sector is collaborating with environmental stakeholders to collectively deliver against net zero targets	Stakeholders and customers are central to the sector's approach to carbon neutrality The whole UK water sector has achieved operational and value chain carbon neutrality through water and wastewater processes. For example: • through minimised emissions in materials, consumables, products and services and developing credible offsets
	TOWARDS 2025	TOWARDS 2035	TOWARDS 2050

TAKING A WHOLE LIFE APPROACH TO RESPONSIBLE CONSUMPTION AND PRODUCTION

We need to transform our processes and the way we work to deal with resource scarcity

AMBITIONS FOR 2050

We have maximised the recovery and reuse of resources to support sufficient resource availability for nature and society and achieved zero waste

We have sustainably achieved zero leakage

UKWIR big questions

How do we maximise recovery of useful resources and achieve zero waste by 2050?

How will we achieve zero leakage in a sustainable way by 2050?

Sustainable and responsible consumption and production is essential for the sector as many of the resources we rely on are finite and in critical condition. Drivers, like climate change, are set to put further strain our water supplies through more frequent and extreme events.

Therefore we need to improve the way we consume resources, including water, energy and materials. We need to move away from the current linear model of consumption to a regenerative, circular approach to maximise the recovery of useful resources, minimise resource use, design out waste and pollution and get the best value out of all our resources.

People from across the sector working together are essential to achieve this, from suppliers, market operations, water companies to communities and individuals in their own homes.

Water is a precious resource that should be treated as such, moving from our current 'take-use-discharge' approach to a 'restorative by design' approach. Tackling leakage is vital to our approach to responsible consumption as it directly impacts amount of water abstracted rivers and aquifers.

To achieve responsible consumption and production, it is important that we consider the lifecycle of our activities and assets. This allows identification of inefficiencies, opportunities for savings and resource recovery value chains.

Current baseline

On maximising resource recovery, research to date has been focussed on developing low-cost recycling routes for organic wastes as a source of energy. This has enabled a preliminary understanding of the value of waste recycling as an additional value chain for the water sector.

However, further work is needed to help deliver a significant step change in efficiency and sustainable consumption and production in the water sector.

In general household water consumption has been reducing over the past few years across the UK, though fluctuations are seen throughout the year. Technologies such as smart meters have been deployed which reduce water use by about 30 litres per person per day (Waterwise, 2017). Leakage has reduced by 40% since 1997. Work is still required to address the 20% of drinking water lost through leakages from homes, businesses and water company pipes (UKWIR, 2018).

KEY ENABLERS TO DELIVERING THIS THEME

We need new enablers and ways of working to address these key questions which include:

- Flexibility in the regulatory frameworks to enable circular economy principles to be applied across organisations and the wider sector
- Building customer acceptance of metering and valuing water as a scarce resource
- Developing low cost metering and insight on usage patterns for domestic customers
- Enforcement of regulation and incentives to ensure more conservative use of water and encourage grey water use
- Engaging our customers so that they feel truly part of the water cycle and understand their role in reducing leakage
- Developing markets and value chains for raw materials
- Creating methods to evaluate the scale of consumption and production over the lifecycle of assets

CIRCULAR ECONOMY AT GSK

GSK researches, develops and manufactures pharmaceutical medicines, vaccines and consumer healthcare products. Recognising the social, environmental and economic benefits of resource efficiency and sustainable consumption, GSK work to integrate principles of circular economy and resource recovery into their value chains. This extends to their procurement, production and internal processes.

A company-wide approach to resource recycling and efficiency

In 2010, GSK sent 17,200 tonnes of waste to landfill. Recognising the damage of creating this level of waste, they set a target to achieve zero waste to landfill at all of their sites by 2020. Since setting this ambitious target, GSK has adjusted its thinking to consider waste as a valuable resource. Some examples of resource recovery being integrated into their production processes include:

- Composting egg waste from flu vaccine manufacturing
- Recycling packaging waste into the material mix for waterproof flooring
- Generating green gas from food waste
- Re-using refrigerated packaging from distribution of vaccines in insulation materials for construction projects

Relevance to UK water sector

GSK's work demonstrates how integrating principles of circular economy and resource recovery into supply chains and operational activities can lead to significant savings and additional value streams.

TAKING A WHOLE LIFE APPROACH TO RESPONSIBLE CONSUMPTION AND PRODUCTION

We need to transform our processes and the way we work to deal with resource scarcity

Ambitions for 2050	Short-term aims	Medium-term aims	Long-term aims
We have maximised the recovery and reuse of resources to support sufficient resource availability for nature and society and achieved zero waste	There is a shared understanding across the water sector on the opportunities for implementing a shared circular economy approach. For example: • through a lifecycle assessment of consumption and production associated with delivering core responsibilities, identifying opportunities for resource efficiency, and identifying highest value resources The sector has shared approaches to designing out waste and pollution from service provision to reduce impact on the natural environment. For example: • through the creation of methods for efficient and effective recovery of resources from wastewater process including resources like phosphorus, nitrogen, plastics, precious metals, grit, methane and nitrous oxide The sector focuses on keeping products and materials in use to optimise resource yields and resource extraction (including water, energy and chemicals). For example: • through developing regulatory processes and business models around resource recovery • through developing processes for extracting biofuels from sludge and heat from sewers	Decision making, planning, and regulatory guidance are driven by whole life assessments of assets and processes to achieve social environmental and economic capital gain for society to provide the best service for customers. For example: • through updated resources use and recycling approaches • through collaborating with end-users to develop markets for recovered materials and with customers, policy makers and regulators to remove regulatory and public perception barriers Waste and pollution is designed out across the sector, through rolling out circular economy approaches to water and wastewater systems to optimise the amount of energy, minerals, and chemicals used in operation of water and wastewater systems Operational energy consumption and waste production is minimised and resource recovery is maximised. For example: • through applying circular economy principles and deploying technologies to enable all waste streams recycled and resources recovered with the most cost efficiency Ownership and responsibility for resources management is clear and all play a partnership role in driving resource efficiency	The economic and regulatory frameworks have been updated to effectively support and incentivise resource recovery and reuse in the water sector The sector produces zero avoidable waste The sector as a whole keeps products and minerals in use: • Water treatment processes use recycled water to provide different water quality for different purposes • Wastewater treatment have become resource factories, energy generators and used water refineries
We have sustainably achieved zero leakage	The English and Welsh sector has achieved a 16% reduction in leakage over the last five years Leakage detection is rapid and allows for rapid cost effective repair. For example: • through deploying monitoring technology The sector understands how water assets age and has methods to predict future leakage and burst rates for different types of pipes. For example: • through processes to identify how deterioration of pipes and joints evolves into leakage • through techniques for tracing non-metallic pipelines The scale of background leakage is understood The sector understands how customer behaviour impacts leakage rates	English companies have tripled the rate of sector-wide leakage reduction All new leaks are found quickly after they break out All new pipework is leak free New leaks on existing networks are minimised	Zero leakage is achieved and quantified Background leakage is eliminated Repairs are quick and economic with minimal disruption
	TOWARDS 2025	TOWARDS 2035	TOWARDS 2050

ENABLING DIVERSE FUTURE-READY PEOPLE AND PARTNERSHIP WORKING

We need to ensure we have the culture, skills and partnerships to innovate to prepare for future change

AMBITIONS FOR 2050

We have a shared innovation culture which improves customer experience

Collaboration pathways are paved between water companies, regulators, supply chains, SMEs, start-ups, academia, customers and other innovators to allow innovation to work

The whole sector's workforce have the skills and diversity of thought to take an active approach to prepare for and address emerging challenges

The UK regulatory framework has evolved to incentivise innovation to benefit customers and the environment

UKWIR big questions

How do we ensure that the regulatory framework incentivises efficient delivery of the right outcomes for customers and the environment?

The world is a rapidly changing place and the water sector needs a culture which is adaptive and agile to respond to major challenges, changing trends and expectations. We recognise the importance of having people who are empowered and have the skills to create new innovative ideas, develop and implement them. Working with new partners and sectors allows us to learn new skills and ways of working to support this.

Developing a culture which is inclusive, diverse and adaptable will not be easy to achieve but we believe it is vital to work in collaboration with the wider sector and beyond to genuinely affect change.

Current baseline

Currently innovation in the water sector is mainly focused within companies, with each water company taking a different approach to innovation development, investment and delivery. There are some collaboration networks which support sector wide collaboration between water companies (examples include Water UK and UKWIR). There are significant opportunities to create a sector wide shared innovation culture.

Often partnerships are highly contractual and the speed and flexibility of procurement systems can present problems. For example, inflexible procurement can make long payment periods which can hamper collaboration with SMEs who need to manage their cash flow. This lack of flexibility can stifle innovation.

There is a perception in the water sector that the relationship between regulators and water companies is highly hierarchical. Regulators often require evidence of short-term return on investments which makes it difficult to implement truly transformational innovation projects. Many in the water sector would welcome more open two-way dialogue between regulators and water companies. Water companies horizon scan for future short and medium-term skills development needs and opportunities, though longer-term sector wide planning could be improved.

There is an opportunity for further sector wide understanding of these issues and more communication across organisations. We recognise that there are a range of future trends, such as an ageing workforce or technological advances that reflect the need or opportunity to change the future model of work.

KEY ENABLERS TO DELIVERING THIS THEME

We need new enablers and ways of working to address these key questions which include:

- Trust as a foundation for equal partnerships across the sector, with other sectors and with our customers and community
- Working with with partners, regulators and the non-household market to enable innovation to provide multi-generational best value from lowest cost, rather than needing benefits to be realised in a short timeframe
- Adapting the workforce bringing new skills, such as social scientists, and upskilling the operational workforce to support the businesses to adapt
- Embedding new ways of working to develop innovation, such as design sprints, and communicate and share the outcomes of this work and good practice
- Using open data and compatible digital infrastructure across water companies, supply chains, other innovators and customers
- Measuring of value wider than purely economic value considering whole-life social environmental costs, value and solutions which are supported by our regulators, legislation and policy makers
- A review of policy and regulation to restructure incentives to transform the sector
- Political leadership to drive and embrace diversity

INNOVATION DISTRICTS

The innovation district model was developed by the Massachusetts Institute of Technology (MIT) to deliver innovation through place-based entrepreneurial ecosystems. It works to join innovators with a university or research centre, capital investment, corporate acceleration and government or regulatory support.

The UK Autodrive project

Reflecting the MIT innovation model, the UK Autodrive project in Milton Keynes was a government supported scheme to test and develop connected and driverless cars. The project was supported by industry partners and an industry testing centre before trials moved to live city environments in Coventry and Milton Keynes (UK Autodrive, 2020).

The trials demonstrated how connected and autonomous vehicles (CAVs) could be integrated into real-world city scale urban environments to support stakeholders and decision makers to implement CAV schemes.

Relevance to UK water sector

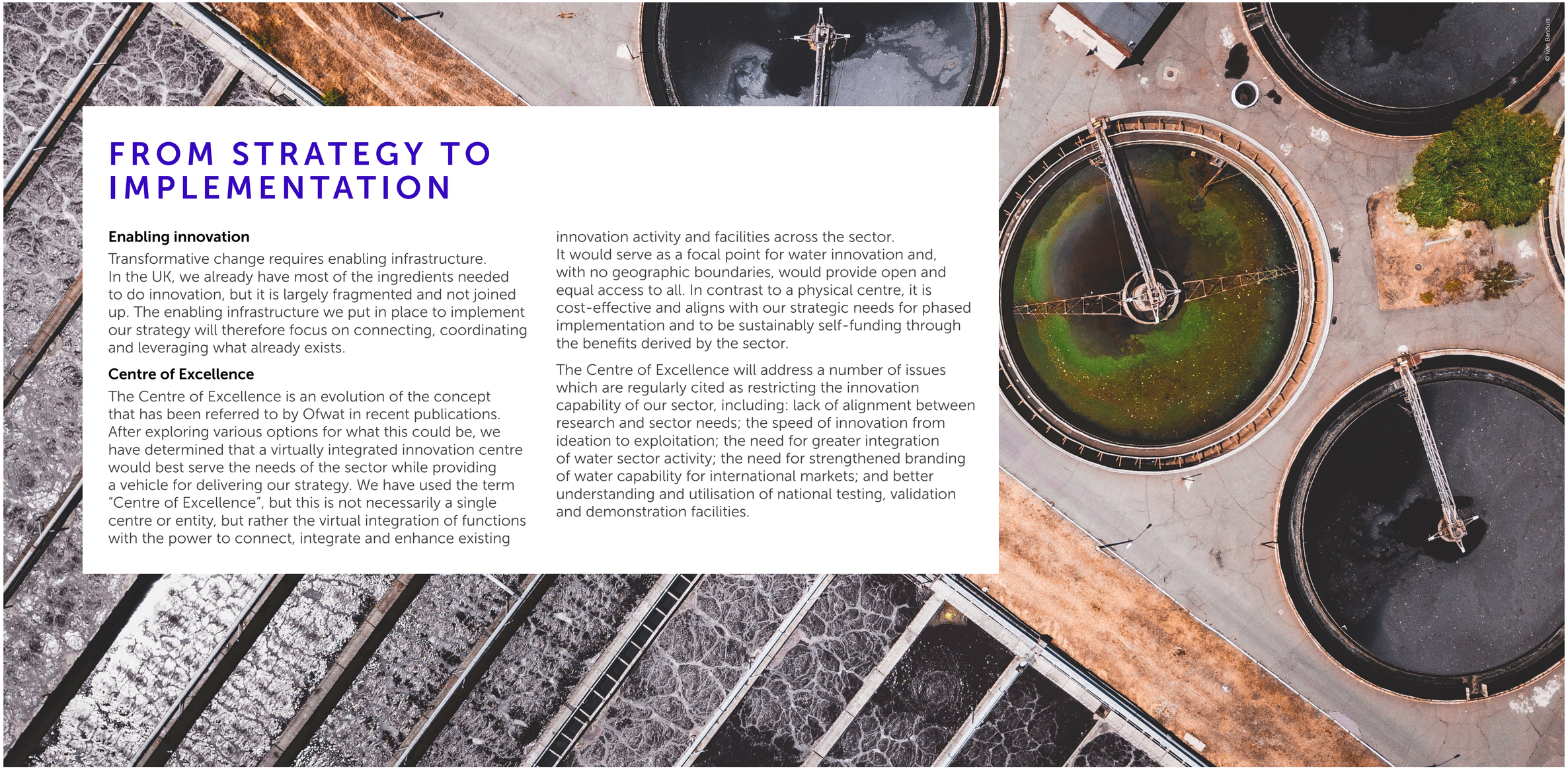
'Innovation districts' demonstrate to the water sector how a hub of excellence can be a catalyst for inclusive economic growth by:

- Providing leadership for high skilled, focussed teams
- Creating geographical areas of excellence and technical innovation
- Building cross-sector collaborative networks to deliver shared goals
- Supporting real-world test beds for emerging technologies and innovations to be trialled in live environments

ENABLING DIVERSE FUTURE-READY PEOPLE AND PARTNERSHIP WORKING

We need to ensure we have the culture, skills and partnerships to innovate to prepare for future change

Ambitions for 2050	Short-term aims	Medium-term aims	Long-term aims
We have a shared innovation culture which improves customer experience	Staff across the sector are empowered; they create, develop and implement innovation, facilitated by the provision of time, space, resource, and leadership buy in and endorsement. For example: • though supporting structures to allow greater connectivity between communities of practice • through rolling out employee engagement strategies and reward strategies which promote innovation The sector has clear guidance on capabilities, rewards, which can be used to deliver a nationwide level of service. For example: • through a clear framework for flexible working	Our organisations are structured to ensure that we have the best talent, the right workforce numbers for the best cost New business models and partnerships are implemented which have arisen out of and enable innovation culture and promotion of successful innovation Long-term partnerships are built around trust, without barriers to collaborative endeavour	The UK has a sector wide innovation mindset. For example: • through organisational design, social networks, skills, culture and promotion of successful innovation • through the development common values across the water sector
Collaboration pathways are paved between water companies, regulators, supply chains, SMEs, start-ups, academia, customers and other innovators to allow innovation to work	Collaboration and co-creation are key criteria for innovation undertaken in the sector. For example: • through sharing ideas, findings and solutions between water companies, other sectors and interested groups. Key areas that would benefit from collaborative working relationships are set out through strategic planning activities. Partners work together to create mature, functional and trusting relationships between parties. For example: • through identifying and communicating the shared values and mutually beneficial successes that unite group and encourage longer term buy in • through an effective framework to support collaboration with a wide range of stakeholders which addresses collaboration issues such as intellectual property	Public, private and third sectors work together with communities and individuals to innovate and reduce the risk of harm to our customers and environment. For example: • through the successful execution of collaboration networks that include diverse mix of contributors	Collaboration between a range of innovators which delivers the most efficient and best value service to customers is central to all of our innovation work
The whole sector's workforce has the skills and diversity of thought to take an active approach to prepare for and address emerging challenges	Training, upskilling, resource sharing, and employment development programmes support the creation of a diverse, representative and future ready workforce, which reflects are open to innovation and able to adapt to future challenges. For example: • through development programmes to ensure that diversity of thought, innovation skills and wider supporting skills, such as collaboration, digital, product develop and customer research, are key water sector skill-sets The sector has a shared understanding of where future skills gaps could emerge and sector wide plans and training programmes to address any gaps identified	The sector can upskill, attract and retain the best people, from diverse backgrounds, with the right skills to provide public value	The sector has developed the organisational mindset to have representative workforce and flexible and diverse talent planning and development which has the adaptive capacity to effectively meet changing demands
The UK regulatory framework has evolved to incentivise innovation to benefit customers and the environment	Decisions are made based on new approaches to value wider social and environmental long term benefits. For example: • multi capitals assessment	Regulators measure and incentivise service based on value wider social and environmental long-term benefits rather than short-term economic returns	Regulators have adapted regulatory frameworks to enable innovation, co-delivery and co-production and also share regulatory risk
	TOWARDS 2025	TOWARDS 2035	TOWARDS 2050



FROM STRATEGY TO IMPLEMENTATION

Enabling innovation

Transformative change requires enabling infrastructure. In the UK, we already have most of the ingredients needed to do innovation, but it is largely fragmented and not joined up. The enabling infrastructure we put in place to implement our strategy will therefore focus on connecting, coordinating and leveraging what already exists.

Centre of Excellence

The Centre of Excellence is an evolution of the concept that has been referred to by Ofwat in recent publications. After exploring various options for what this could be, we have determined that a virtually integrated innovation centre would best serve the needs of the sector while providing a vehicle for delivering our strategy. We have used the term "Centre of Excellence", but this is not necessarily a single centre or entity, but rather the virtual integration of functions with the power to connect, integrate and enhance existing innovation activity and facilities across the sector. It would serve as a focal point for water innovation and, with no geographic boundaries, would provide open and equal access to all. In contrast to a physical centre, it is cost-effective and aligns with our strategic needs for phased implementation and to be sustainably self-funding through the benefits derived by the sector.

The Centre of Excellence will address a number of issues which are regularly cited as restricting the innovation capability of our sector, including: lack of alignment between research and sector needs; the speed of innovation from ideation to exploitation; the need for greater integration of water sector activity; the need for strengthened branding of water capability for international markets; and better understanding and utilisation of national testing, validation and demonstration facilities.

To address these issues, the Centre of Excellence has a number of objectives and principles that align to the wider principles of innovation that we set out earlier in this strategy.

Centre of Excellence Objectives:

- Enable effective delivery and implementation of end-to-end innovation at the right pace
- Improve access to the skills and resources needed to deliver innovation
- Increase the visibility and transparency of innovation needs, opportunities and priorities
- Facilitate collaboration, remove duplication and increase knowledge sharing
- Provide a focal point for water innovation to attract global talent and investment

Centre of Excellence Principles to help guide design:

- To connect and integrate existing excellence, not to compete with, control or stifle it
- To be inclusive and accessible to all, not to be exclusive or in any way biased
- To meet the needs and priorities of today, and continue to evolve and adapt to meet the emerging needs and priorities of tomorrow
- To be led by environmental, social and economic purpose to ensure innovation provides best value for customers
- To leverage data and new ways of working to exploit innovation opportunities

There has been ongoing work to further develop detailed functionality that will make up the Centre of Excellence. This has included collaborating to define the principles and objectives of the Centre of Excellence, delivery of stakeholder workshops, gathering further case studies, exploring funding and delivery options, and qualitatively assessing options against key success criteria. Through the collaborative workshops with stakeholders, as described, we have gathered feedback about what functionality will be included in the Centre of Excellence, what success would look like and how it should be funded and delivered. From this, we have developed a range of options that will be assessed to ensure they deliver value for money for our customers.

At its core, the Centre of Excellence priorities include a proposals portal, access to information about innovation opportunities and needs statements and a focal point for collaboration. The CoE will include an integrator role to actively drive engagement and foster relationships to innovate more effectively. This aims to bring together existing innovation work not replace existing work.

We will take and build on what you told us during the consultation period to further develop our approach. A summary of your feedback is set out in the table to the right.

Further detail on the development of the Centre of Excellence can be found in the Emerging Business Case in **Appendix 2**.

Phased implementation

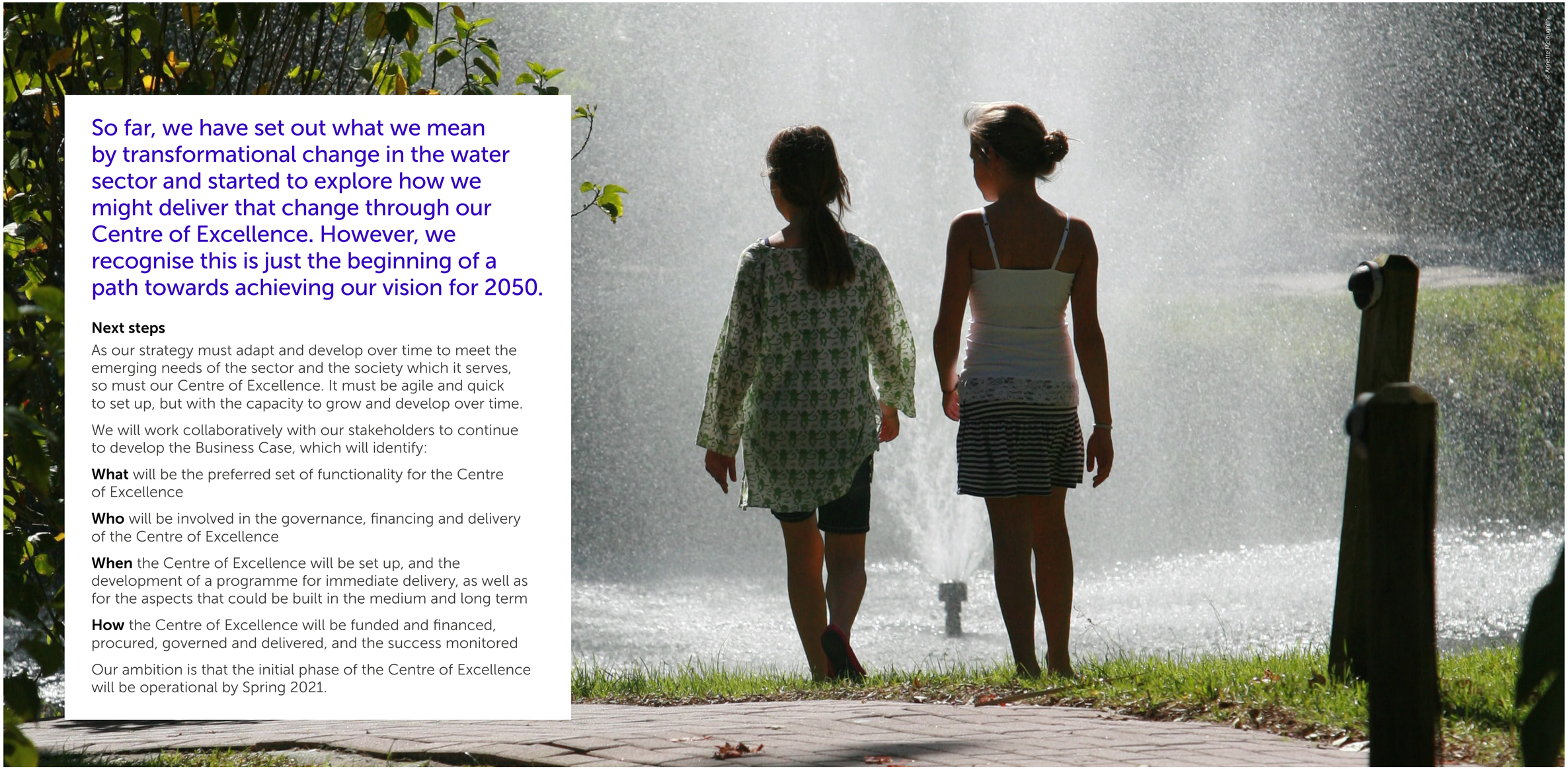
We recognise that achieving the short, medium and long-term objectives of our strategy will require an agile, phased implementation plan. In the short term, we will accelerate innovation activity around the industry's biggest challenges, as set out under each of our themes to deliver tangible benefits to society and the environment over the next five years.
In parallel, we will lay the foundation for delivering transformation through innovation in the medium and long term by developing the enabling infrastructure and relationships needed to address multi-sector, multi-national challenges and create an optimal sustainable and self-funding entitiy

Catalyst for change

This is an opportune moment to shape the future of water in the UK but we can only achieve this through collective action – everyone has a role to play. All of our stakeholders will be central to shaping, and collaborating to deliver transformative innovation in the sector. There is also pressing need to work with government and other decision makers to support innovation for growth and for good, directing innovation to society's most important problems, and shaping the application of new ideas and technologies in a way that benefits as many people as possible.

While by itself, the Centre of Excellence cannot achieve these things, we hope it will provide the catalyst for change.

What we heard from our consultation	What this means for the Centre of Excellence (CoE)
There needs to be better visibility of innovation needs and a clearer and collective understanding of the issues	Access to information about innovation opportunities and needs statements will be a core functionality of the CoE as this was deemed a top priority for stakeholders and a key enabler for innovation
To generate value, it takes more than publishing data and information. Engagement and buy-in is needed and the consulting exercise has been a good example of how to keep people engaged	We recognise that the value of the CoE will come from facilitating collaboration and connections and engagement with users. The CoE will include an integrator role to actively drive engagement and foster relationships
There is a tension between collaboration and competition. A CoE needs to make innovation visible while keeping competitiveness of the idea. Intellectual Property Rights will be a key consideration	We will carefully consider how to strike the right balance between competition and collaboration in the design of the CoE and the end-to-end innovation process
The CoE should not be an exclusive club. It needs to be independent and unbiased, and accessible to all	A key principle for designing the CoE will be: "To be inclusive and accessible to all, not to be exclusive or in any way biased." We are considering a variety of funding, governance and delivery models and will assess each against this key principle
Success would be generating solutions to problems and opportunities, connecting the right skills and capabilities to deliver solutions effectively, and these being adopted, shared, scaled and deployed at the right pace	Measures of success for the CoE will be developed, monitored and reported to ensure that it is helping to facilitate the end-to-end innovation process
It is key to get the governance and roles of different parties right from day one	We are exploring a number of governance and delivery models from good practice examples around the world and will be assessing which of these helps best enables the CoE objectives to be met
The CoE should make it culturally acceptable to fail – so lessons can be learnt for future innovation, but also shout about the sector's success	The core functionality of the CoE will be underpinned by a culture which supports our people through building skills and capabilities, fosters openness and collaboration, and provides space to share success and failure



So far, we have set out what we mean by transformational change in the water sector and started to explore how we might deliver that change through our Centre of Excellence. However, we recognise this is just the beginning of a path towards achieving our vision for 2050.

Next steps

As our strategy must adapt and develop over time to meet the emerging needs of the sector and the society which it serves, so must our Centre of Excellence. It must be agile and quick to set up, but with the capacity to grow and develop over time.

We will work collaboratively with our stakeholders to continue to develop the Business Case, which will identify:

What will be the preferred set of functionality for the Centre of Excellence

Who will be involved in the governance, financing and delivery of the Centre of Excellence

When the Centre of Excellence will be set up, and the development of a programme for immediate delivery, as well as for the aspects that could be built in the medium and long term

How the Centre of Excellence will be funded and financed, procured, governed and delivered, and the success monitored

Our ambition is that the initial phase of the Centre of Excellence will be operational by Spring 2021.

CONTINUOUS EVOLUTION

It is critical that our strategy is able to adapt and develop over time in order to reflect the emerging needs and priorities of the sector and the society which it serves. Through sound monitoring processes and measuring impact, we will be able to learn from our experiences and improve our approach over time.

Monitoring and review

This strategy will be reviewed annually and updated in 2022 at which stage we will check with you, our stakeholders, that the principles and innovation themes are still the right ones.

We will continue to develop a process to monitor progress and measure impact to support our annual review and biennial update.

Measuring success

We recognise that success comes in many forms. Changing the culture of innovation, building trust with our stakeholders and changing the perception of our sector, while all difficult to quantify, will be key indicators of success in the long term. Accelerating the speed and efficiency of innovation from ideation to adoption is central to our strategy and we will look at various ways to measure this (e.g. speed of decision-making, amount of shared and open data). The successful realisation of our strategy should also lead to a growth in the number of jobs and SMEs active in our sector, and increase our collective share of the global water market.

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CONTRIBUTORS & CONSULTEES

A wide range of contributors who engaged through our social media account, our online survey and our online workshops in summer 2020. Through our webinar and workshops we spoke to almost 600 stakeholders, we had detailed feedback from over 100 stakeholders through our online survey and our digital outreach reached an audience of over 150 thousand people. The following people provided additional contributions:

Adela Simonova, SEPA
Alastair Moseley, Future Water Association
Alison Hoyle, Southern Water
Andrea Gysin, Thames Water
Andy Schofield, GW4 Water Security Alliance
Ann Cousins, Arup
Anna Rios-Wilks, DEFRA
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Caroline Cooper, South Staffs Water
Caroline Wadsworth, Twenty65
Cath Preston, SEPA
Chris Bagley, Knowledge Transfer Network
Chris Jones, Northumbrian Water Group
Chris Thomas, Bristol Water
Christine McGourty, Water UK
Claudia Sequeira, Energy Innovation Centre
Clothilde Cantegreil, Ofwat
Dan Green, Wessex Water
Daniel Haire, South Staffs Water
David Preece-Phillips, Southern Water
David Smith, Energy Networks Association
Denise Massey, Energy Innovation Centre
Dominic Shepherd, Environment Agency
Eadaoin Joyce, Irish Water
Eifiona Williams, Welsh Government
Elin Williamson, Southern Water
Elise Cartmell, Scottish Water
Gail Walker, Citizen's Advise Scotland
Gary Curran, Northern Ireland Water
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Gemma Frisby, South East Water
George Ponton, Scottish Water
Helen Orton, Portsmouth Water
Ian Gray, Arup
Ian Meikle, Innovate UK
Isabelle Durance, GW4 Water Security Alliance
Jacky Wood, NERC
Jamie Jones, Portsmouth Water
Jamie Stone, BBSRC
Jan Hofman, GW4 Water Security Alliance
Jason Tucker, Anglian Water
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Jeremy Heath, Sutton and East Surrey Water
Joby Boxall, Twenty65
John Casey, Irish Water
Jon Brigg, Yorkshire Water
Jon Rathjen, Scottish Government
Jonathan Abra, Knowledge Transfer Network
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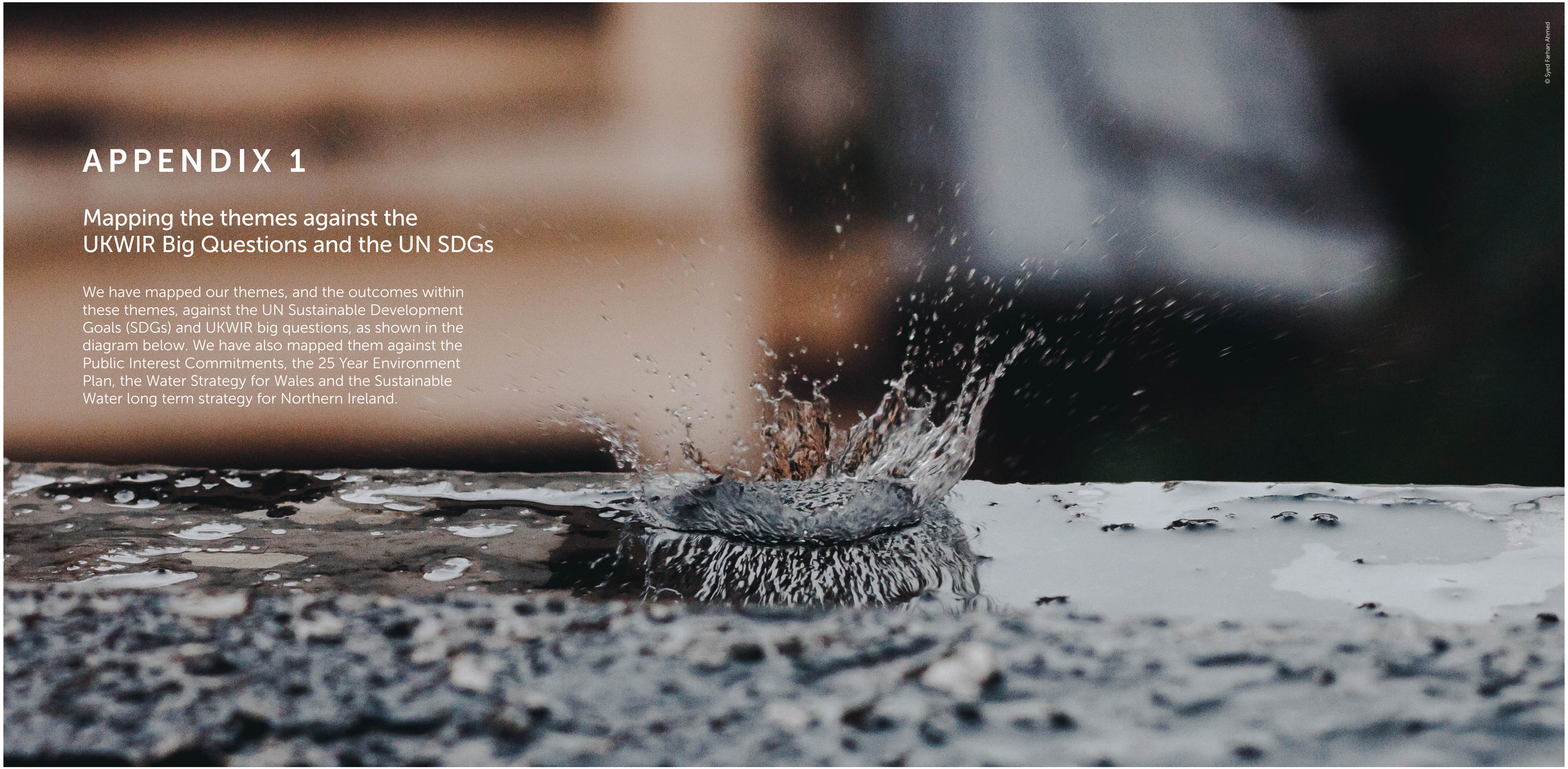
Steve George, South East Water
Steve Kaye, UK Water Industry Research
Steven Wood, Digital Catapult
Sue Petch, DWQR
Susannah Rae, Scottish Environment Protection Agency
Thorsten Wagener, GW4 Water Security Alliance
Tim Corcoran, Brilliant Noise
Tom Doyle, Arup
Tom Stephenson, University of Cranfield
Tony Conway, Twenty65
Tony Harrington, Welsh Water
Virginie Vinel, Future Water Association



APPENDIX 1

Mapping the themes against the UKWIR Big Questions and the UN SDGs

We have mapped our themes, and the outcomes within these themes, against the UN Sustainable Development Goals (SDGs) and UKWIR big questions, as shown in the diagram below. We have also mapped them against the Public Interest Commitments, the 25 Year Environment Plan, the Water Strategy for Wales and the Sustainable Water long term strategy for Northern Ireland.

Themes	Ambitions for 2050	UKWIR big question that links to this theme	SDGs
Providing the services society needs, expects and values	Customers have trust and confidence in the service that the water sector provides Water services are accessible, affordable for all, protect vulnerable customers and lead to zero customers in water poverty by 2030 Service provision is transparent, and customers and communities work with water companies to improve service and decision making	How do we achieve zero customers in water poverty by 2030?	
Providing clean water for all	Drinking water supply is low impact and sustainable UK water supply is reliable with zero interruptions We provide enough water for all across the UK	How do we achieve 100% compliance with drinking water standards (at point of use) by 2050? How do we achieve zero interruptions to water supplies by 2050?	
Protecting and enhancing natural systems	Wastewater services are environmentally sustainable We work with customers to halve freshwater abstractions, leaving more water in the environment Water companies work in collaboration with customers and communities to have zero uncontrolled discharges from sewers Emerging contaminants and lead are dealt with effectively causing zero harm for people and the environment We have developed, protected and enhanced our natural environment We have used natural solutions to improve our resilience to current and future challenges	How do we halve freshwater abstractions in a sustainable way by 2050? How will we deliver an environmentally sustainable wastewater service that meets customer and regulator expectations by 2050? How do we achieve zero uncontrolled discharges from sewers by 2050? How do we achieve zero harm from plastics via our operations and activities?	
Delivering resilient infrastructure systems	We work with customers to develop resilient human, physical and digital systems which can adapt to known and unknown future challenges Our assets are mainted for the long term providing economic, social and environmental value.	What is the true cost of maintaining assets and how do we get this better reflected in the regulatory decision-making process?	
Achieving net zero carbon	We have achieved operational and value chain carbon negativity We have implemented carbon sequestration across the water sector Customers, communities, water companies and the supply chain work together to achieve carbon neutrality across the value chain	How do we remove more carbon than we emit by 2050?	
Taking a whole life approach to responsible consumption and production	We have maximised the recovery and reuse of resources to support sufficient resource availability for nature and society and achieved zero waste We have sustainably achieved zero leakage	How will we achieve zero leakage in a sustainable way by 2050? How do we maximise recovery of useful resources and achieve zero waste by 2050?	
Enabling diverse future-ready people and partnership working	We have a shared innovation culture which improves customer experience Collaboration pathways are paved between water companies, regulators, supply chains, SMEs, start-ups, academia, customers and other innovators to allow innovation to work The whole sector's workforce have the skills and diversity of thought to take an active approach to prepare for and address emerging challenges The UK regulatory framework has evolved to incentivise innovation to benefit customers and the environment	How do we ensure that the regulatory framework incentivises efficient delivery of the right outcomes for customers and the environment?	

APPENDIX 2

UK National Water Centre of Excellence

Emerging Business Case

September 2020

UK NATIONAL WATER CENTRE OF EXCELLENCE

EMERGING BUSINESS CASE

Contents

Purpose

The development of our UK 2050 Water Innovation Strategy has highlighted the need for the sector to undertake new activities to enable innovation. This appendix to the strategy is an emerging business case for the UK National Water Centre of Excellence (the Centre) which will provide the enabling infrastructure needed to deliver our shared vision for transformative change. The overall ambition is to add to what the sector is already doing in terms of innovation and build on this to make innovation in the water sector truly transformational.

A business case helps support thinking and decision making around investments. It also provides an evidence base to support an investment decision.

This business case is structured using the Five Case Model which assesses several aspects of an investment:

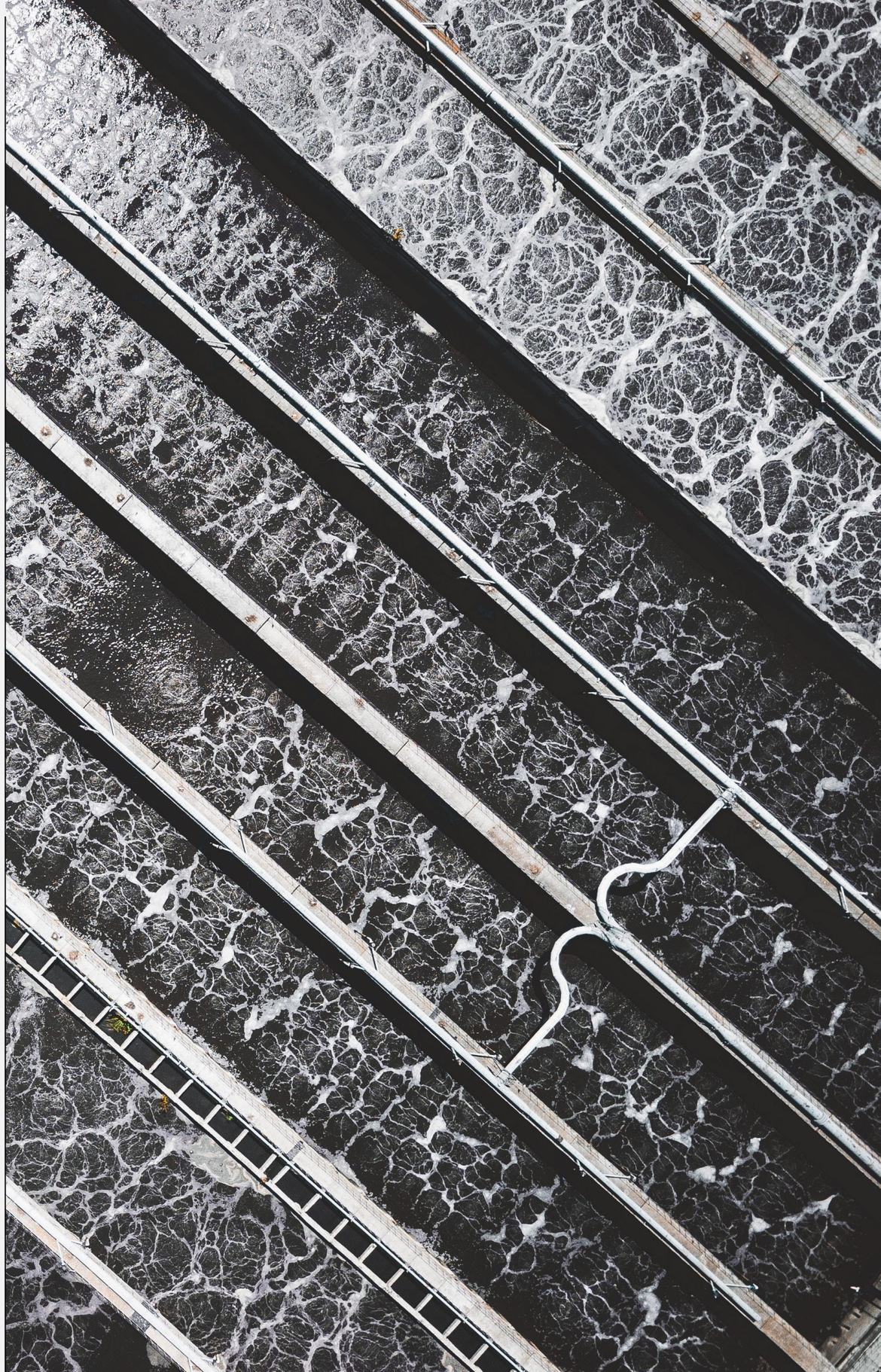
- The strategic case – what is the case for change and how does it provide strategic fit?
- The economic case – what is the best choice for optimising value for money?
- The commercial case – what is the Deal and can the supply side deliver it?
- The financial case – is it affordable within budget?
- The management case – are the necessary arrangements in place for successful delivery?

This business case builds on an initial business case document developed in July 2020. It will continue to be developed to provide further detail for the economic, commercial, financial and management cases.

Summary of the Approach

To develop the business case, we have:

- Continued our journey by building on the work done so far including: research, initial options analysis, and stakeholder engagement
- Engaged with stakeholders to prioritise options for the functionality of the Centre to build the economic case and gather feedback for the other cases
- Aligned the functionality to the end-to-end innovation process
- Set out next steps for further articulation of the business case and creation of the Centre



Our Journey...

In order to provide best value for customers, the environment and the economy, we have considered a range of options, looked at examples from around the world, and consulted widely with key stakeholders to understand the sector's views. This section briefly describes the process that we have been through so far.

Initial Options Analysis

Based on our research, we developed four options for consideration and analysis: Option A. Do Minimum, Option B. Physical Innovation Centre, Option C. Hybrid Innovation Centre, Option D. Virtually Integrated Innovation Centre

We assessed each option against how well they could deliver certain functionality while meeting our assessment criteria (value to customer, principles, inclusivity, sustainability, timescales)..

Based on our analysis, we decided on a preferred option and started to map out what needs to happen next in terms of design, development and delivery.

1

Research

We talked to our stakeholders to understand their views. We also researched examples and case studies from around the world to learn about what works and what doesn't. We categorised these and looked at their features to better understand what we need to enable transformative innovation in our sector.

CATEGORY
- Physical
- Virtual
- Hybrid

FEATURES
- Provides access to skills and capability
- Promotes collaboration and knowledge sharing
- Provides access to open and shared data
- Promotes a culture of innovation

2

3

Business Case Development

We worked with stakeholders and water representatives to further develop the emerging business case:

- Strategic case: Developed Centre of Excellence principles and objectives, and completed landscape mapping analysis
- Economic case: Developed and assessed functionality options, through two stakeholder engagement workshops and working sessions with water company representatives
- Financial, commercial and management cases: Gathered ideas and feedback on delivery and funding options. Identified the governing and commissioning body for the next stages of the project

4

Next Steps

Detailed development of the business case including:

- Strategic case update
- Economic case update
- Completion of the financial case, commercial case and management case.

This will help establish details such as who will run the Centre of Excellence and how it will be funded.

Following on from the completion of the business case, the Centre of Excellence will be set up and operations commenced. Our ambition is to grow and evolve the Centre of Excellence to become self-sustaining.

Stakeholder engagement approach

To develop the business case, we have taken a stakeholder engagement-led approach. From customers and supply chain groups through to academics and government bodies, we have engaged our stakeholders in every step of the journey so far.

At the very beginning of this process, we mapped the key actors that play a role in water innovation activity across the UK and we engaged a group of representative stakeholder bodies to inform and help shape our early thinking on the concept for a Centre of Excellence. After listening to stakeholders and carrying out a high-level qualitative assessment of potential options, we published a document for public consultation and subsequently engaged a much wider audience for thoughts, feedback and ideas.

During the most recent consultation process, which took place from July to September 2020, we reached out to over 150,000 people, established an online community of innovators, and ran two design workshops with over 100 participants to focus specifically on the Centre of Excellence.

These workshops helped us to prioritise a list of functionality that stakeholders wanted to see in the Centre of Excellence.

The graphic to the right shows some of the feedback received.

100+ **workshop attendees** helped to co-design and co-develop our plans for the Centre of Excellence

#1 **innovation opportunities and needs statements** was consistently ranked as the top priority for stakeholders

55% of stakeholders ranked a **proposals portal** as one of their Top 5 priorities

"Innovators don't know where to go or who to talk to, to get their ideas into the market."

"There is already a wealth of research, testing and demonstration facilities spread across the UK, we need to make best use of what already exists."

"It should be accessible to all."

"Sharing data would help the water industry address common challenges, optimise the supply chain, benchmark success, and demonstrate trustworthiness."

"Improving the visibility of projects and opportunities across the sector will help to drive innovation in the right areas."

SECTION 2.EMERGING BUSINESS CASE

Summary of the business case

Building on stakeholder engagement, we have further developed the strategic, economic, financial, commercial and management cases. A summary of the cases is in the diagram to the right.

Summary of cases

Strategic Case

The strategic case presents the drivers for change, the policy and regulatory context, the opportunity, and the need for a Centre of Excellence to enable innovation.

It also sets out the principles and objectives of the Centre of Excellence.

Economic case

The economic case sets out the options for the future functionality of the virtually integrated Centre of Excellence and demonstrates how they have been prioritised using stakeholder engagement and qualitative assessment. They have also been aligned to the end-to-end innovation process.

The Economic Case presents an agreed short list to be taken forward for further assessment which includes the following options:

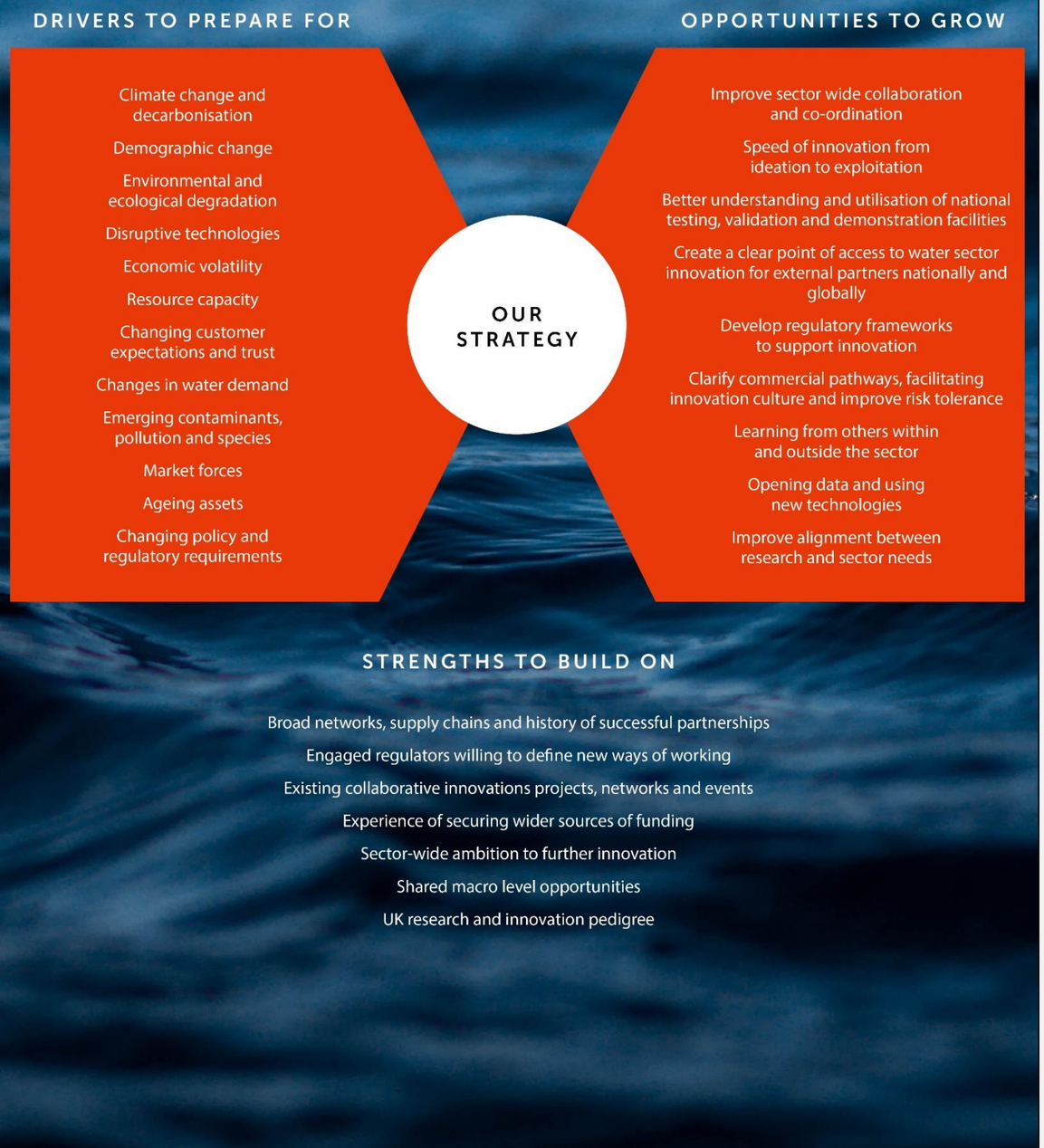
- **Option 1:** Business As Usual (to set a baseline for comparison)
- **Option 2:** Proposals portal, innovation opportunities and needs statements, integrator, and collaboration groups and community of practice
- **Option 3:** Option 2 function plus library knowledge sharing, network of test facilities, data strategy and access, external communication, scale-up facilitation, and training and skills

Financial, commercial and management cases

These cases explore options for funding, phasing, delivery and governance.

Through work on these cases, it was determined that there is an ambition for the Centre of Excellence to be self-funding and sustainable in the future. In addition, it has been agreed that Water UK will be the governing and commissioning body for the Centre for the next stages of the project.

Currently, a Project Steering Group has oversight of the Strategy and Centre of Excellence development.



Strategic case

Transformational change requires enabling infrastructure.
Our solution: the Centre of Excellence.

In this section, we begin to set out a strategic case for the Centre of Excellence. We look at what is driving change in the sector, and we explain how the Centre of Excellence could bring about that change, for social and economic good.

What are the drivers of change?

As identified in the UK 2050 Water Innovation Strategy, population growth, urbanisation, climate change and ageing infrastructure are forcing nations, governments and organisations to rethink their approaches to water, and to invest significantly in managing their water and wastewater infrastructure to ensure it is fit for the future.

International and national policy

Policy is a key driver of change and helps to inform the development of the Centre of Excellence. Globally, the United Nation's 17 Sustainable Development Goals (SDGs), provide a shared ambition for peace and prosperity for people and the planet, now and into the future.

At a national level, the UK Industrial Strategy of 2017 and the National Infrastructure Assessment set out the need for innovation and the upgrades required to the UK's economic infrastructure, respectively.

England, Northern Ireland, Scotland, and Wales have specific sector wide ambitions for water.

In England, the 25 Year Environment Plan sets out a long-term approach to protect and enhance England's environment. In Northern Ireland the long-term water strategy for presents a framework to achieve a sustainable water sector in the country.

In Scotland, a sector-wide vision sets out that "Scotland's water sector will be admired for excellence, secure a sustainable future and inspire a Hydro Nation". This will ensure that the sector will support the health and wellbeing of the nation, that all of Scotland gets excellent quality drinking and that waste water will be collected, treated and recycled in ways that generate value and protect the environment.

The Water Strategy for Wales aims to improve the resilience of their national water system and the Environment Wales Act 2016 aims to support the country in meeting the demands on natural resources. In addition, the Well-being of Future Generations Act 2015, places a duty on public bodies to improve the social, economic, environmental and cultural well-being of Wales.

Regulation

In England and Wales, the economic regulator, Ofwat, sees innovation as "crucial for meeting challenges in a cost-effective and sustainable way". It recognises that there are untapped opportunities for the industry to work together, and has made up to £200 million of additional funding available for innovation in addition to existing innovation investment funded by customers.

Scottish Water has co-created a sector vision with its stakeholders and set out an ambitious strategic plan. Transformational innovation is a key enabler of this plan and WICS and Scottish Government have introduced ethical business regulation to allow for more agile delivery. This is underpinned by Scottish Government's Hydro Nation agenda to develop the water economy and maximise the value of Scotland's water resources.

The Utility Regulator in Northern Ireland is supportive of NI Water's innovation initiatives set in context against the underinvestment challenges. These are particularly in wastewater where competition for innovation funds has to be carefully managed within the overall regulatory funding determination.

What is the opportunity?

We have an opportunity to address society's most important problems through innovation, and to shape the application of new ideas and technologies in a way that benefits as many people as possible. Delivering this change for good also presents enormous opportunities for innovative businesses, big and small, to market their goods, knowledge and services both at home and overseas.

The strengths which the UK water sector can capitalise on include:

- World-class scientific community, research environment, and universities
- Innovation expertise, funding and dissemination
- A strong supply chain with a wide range of capabilities, from specialist technology to tailored and integrated consultancy services
- Excellent reputation of UK water companies at an international level, with a track record of providing some of the cleanest drinking water in the world while managing ageing water infrastructure

There are also huge opportunities for water innovation in the fields of energy, food security, and resilience. Cross-sector collaboration to address some of these opportunities will create substantial benefits including carbon reduction, cost savings and secure agricultural production.

We have carried out a mapping process of the water innovation ecosystem to explore gaps and opportunities to further strengthen the coordination of existing capabilities. The resulting innovation landscape can be found in the UK 2050 Water Innovation Strategy.

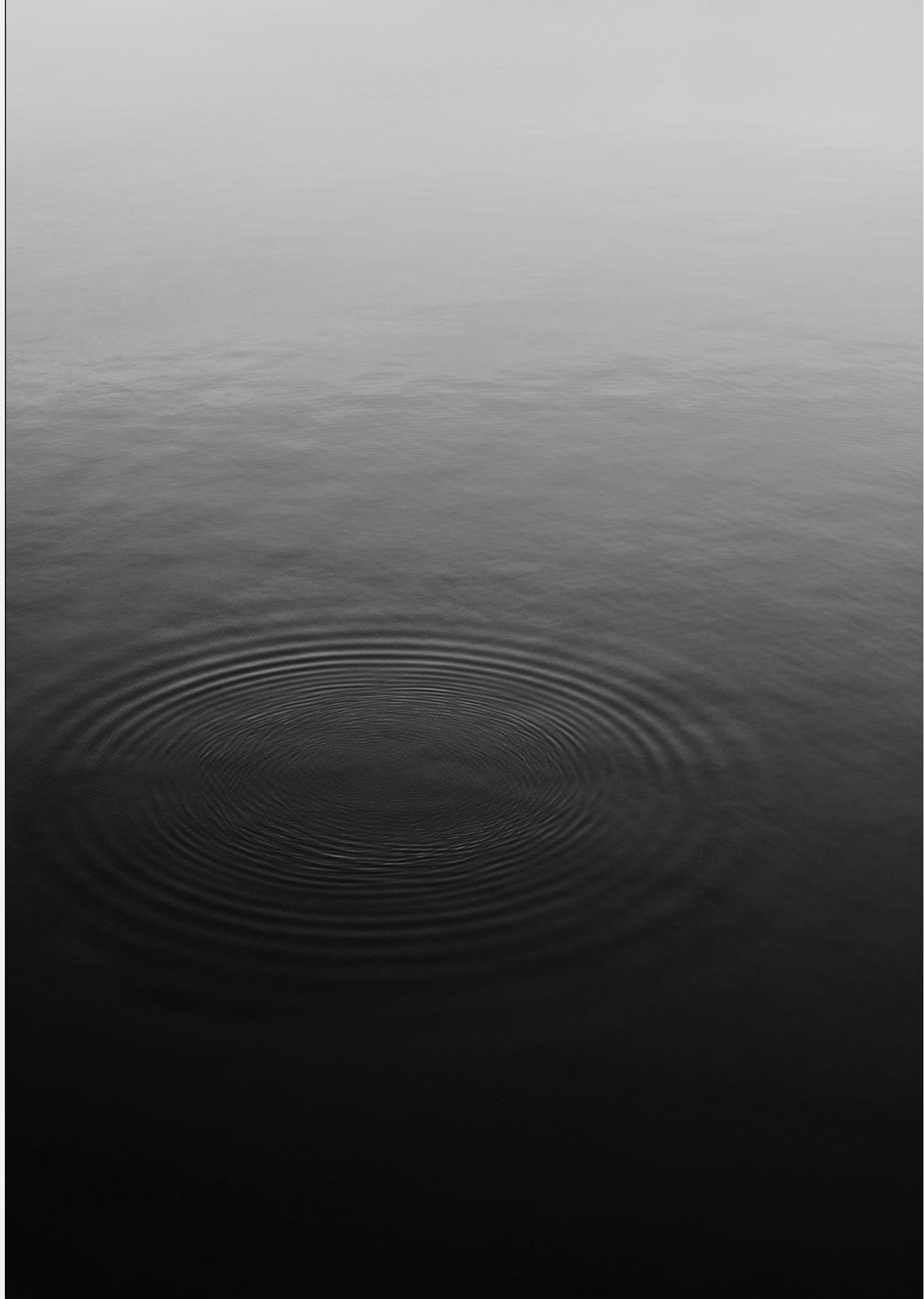
How would the Centre of Excellence help?

Some of the issues regularly cited as restricting the innovation capability of our sector include:

1. Lack of alignment between research and sector needs
2. Speed of innovation from ideation to exploitation
3. Need for greater integration of industry activity
4. Better understanding and utilisation of national testing, validation and demonstration facilities
5. Need for strengthened branding of water capability for international markets
6. No overarching research or innovation strategy for water

Some of these issues highlighted above will require collective action by our sector, including policy makers and government bodies. Building the enabling infrastructure in itself will not bring about the transformation we want to see, but it will provide a catalyst for change and a means of achieving that change through collective action.

Building on existing collaboration between our water service providers at a regional, national and international scale will be central to achieving success.



The UK 2050 Water Innovation Strategy sets out principles and objectives for the strategy. To guide the design of the Centre of Excellence, specific objectives and principles were also developed for the Centre.

CENTRE OF EXCELLENCE PRINCIPLES

1. To connect and integrate existing excellence, not to compete with, control or stifle it.
2. To be inclusive and accessible to all, not to be exclusive or in any way biased.
3. To meet the needs and priorities of today, and continue to evolve and adapt to meet the emerging needs and priorities of tomorrow.
4. To be led by environmental, social and economic purpose to ensure innovation provides best value for customers.
5. To leverage data and new ways of working to exploit innovation opportunities.

CENTRE OF EXCELLENCE OBJECTIVES

1. Enable effective delivery and implementation of end-to-end innovation at the right pace.
2. Improve access to the skills and resources needed to deliver innovation.
3. Increase the visibility and transparency of innovation needs, opportunities and priorities.
4. Facilitate collaboration, remove duplication and increase knowledge sharing.
5. Provide a focal point for water innovation to attract global talent and investment.

Economic case

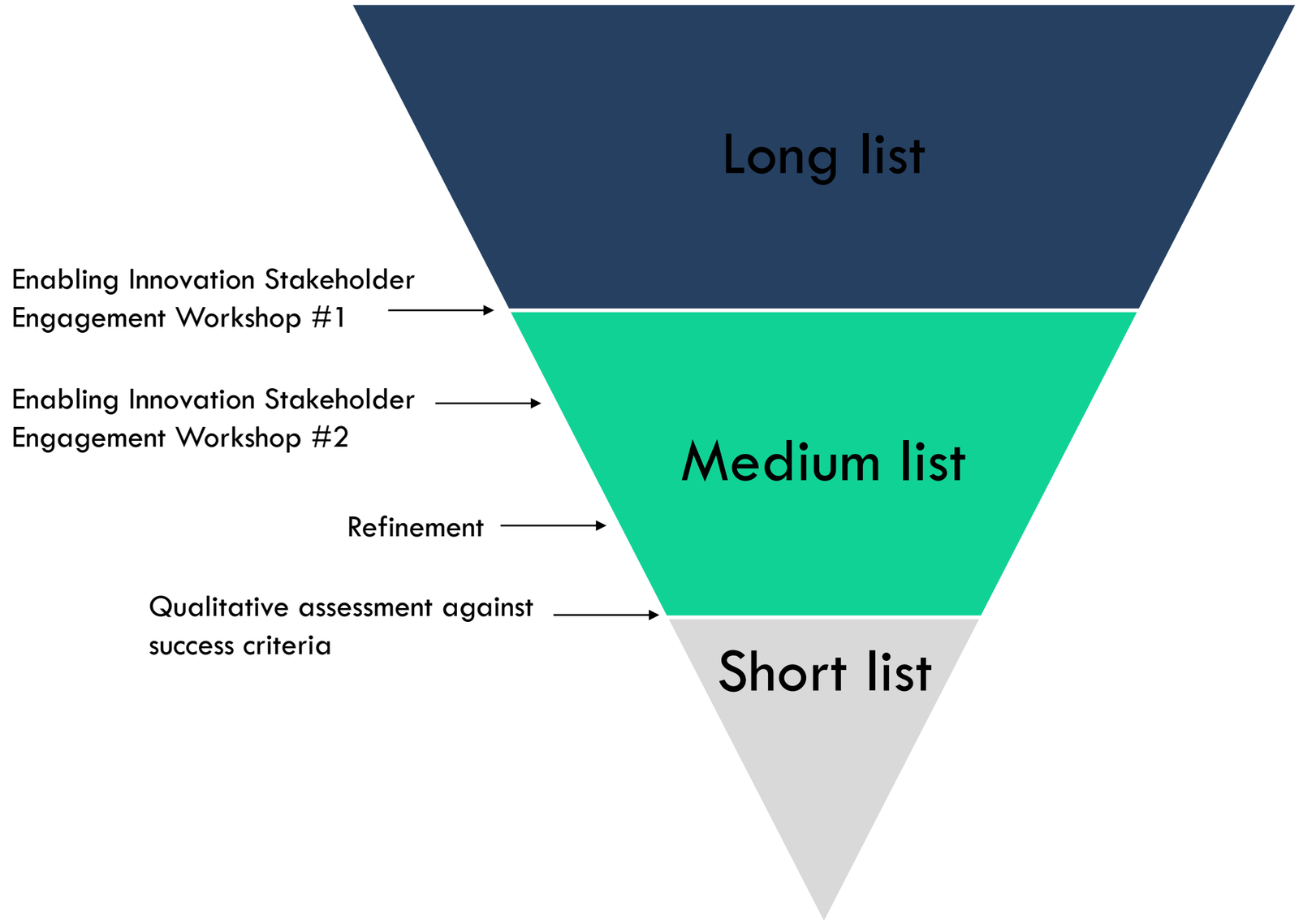
The purpose of the economic case is to determine which option is the best choice for optimising value for money to UK society.

The process of developing the economic case starts by developing sets of options for the scope and services of the solution proposed to meet business needs and opportunities.

An initial options assessment was conducted which considered whether the Centre of Excellence should be a virtual or physical entity, with the preferred option being a virtually integrated entity.

In considering the economic case we have developed options for the functionality of the Centre of Excellence. The initial long-list of functionality has been iterated and refined through stakeholder engagement workshops to create a medium list for qualitative assessment against success criteria.

After qualitative assessment, a short list to take forward for further development in the business case was agreed.



Functionality

- Long list

The Centre of Excellence functionality was developed through an iterative and collaborative process. This section provides an explanation of how the options were developed and evolved.

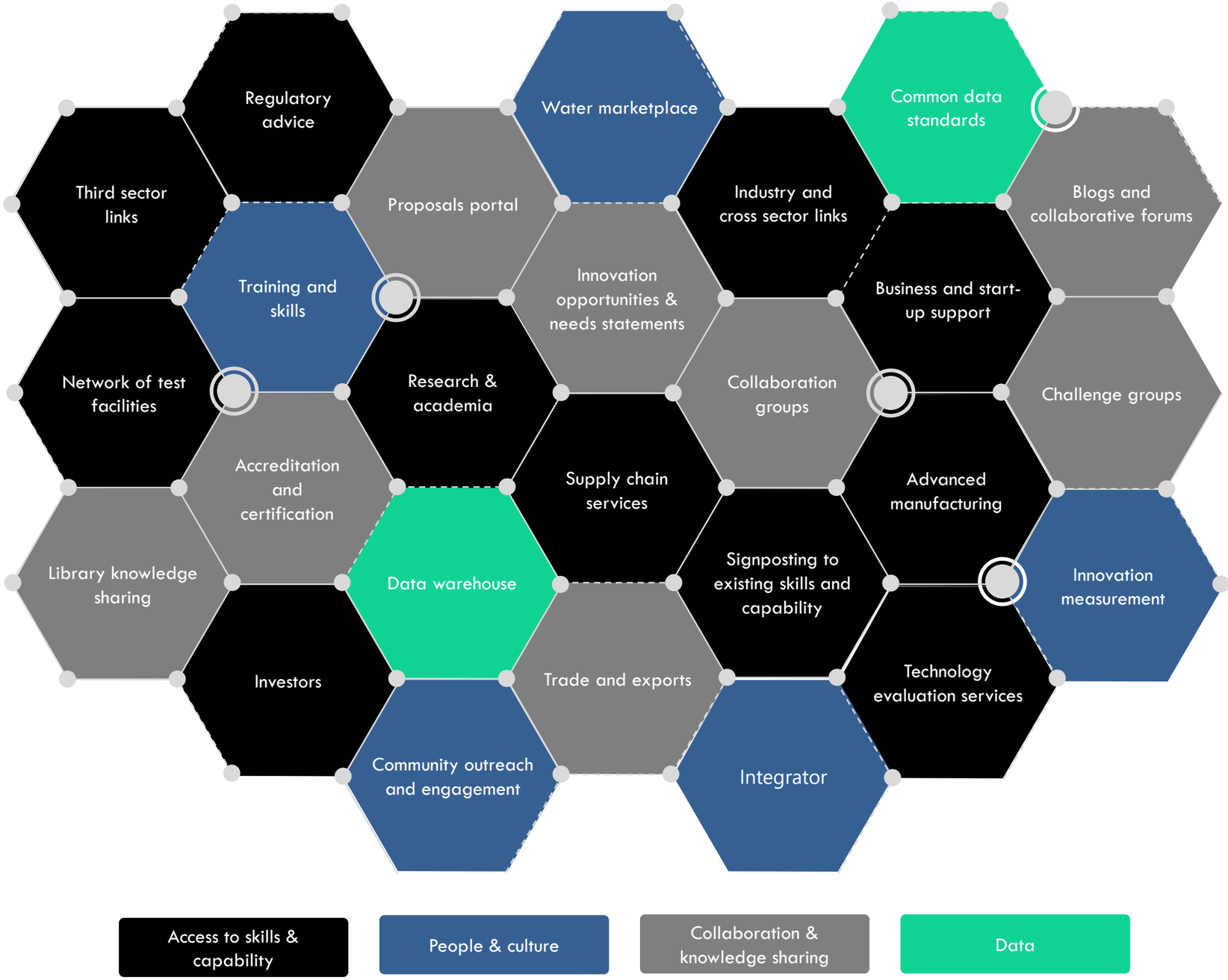
We first identified a long list of functions that the Centre of Excellence could perform. These are shown in the diagram on the right hand side.

Many of these functions already exist. The Centre of Excellence will focus on connecting, coordinating and integrating them in a way that doesn't currently happen, to enable the effective delivery and implementation of end-to-end innovation

These were tested at the first Enabling Innovation Stakeholder Engagement Workshop. Participants discussed the options in groups and were able to vote on their Top 5 and Bottom 5 options. Participants were also asked to choose which options they would invest in after being presented with the relative costs of each option.

Participants were also asked for their viewpoints on:

- Key players and contributors;
- Governance and ownership;
- Funding and resourcing;
- Potential issues; and
- What does success look like?



Functionality

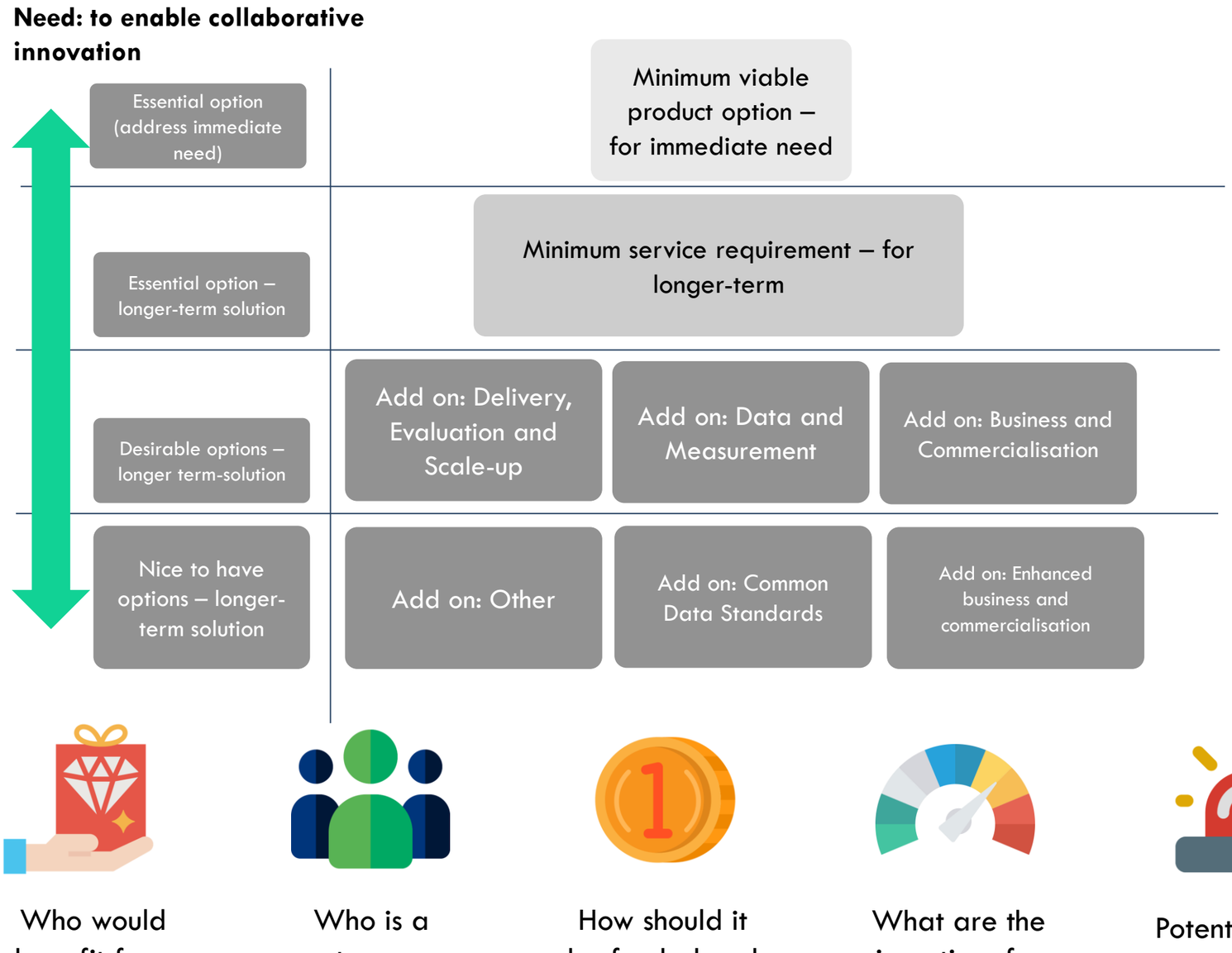
- *Medium list*

Following the outputs and feedback from the first Enabling Innovation Workshop, the Centre of Excellence functionality was further refined and the detailed functions were bundled into option mixes to form a medium list of functionality options to be further assessed.

These medium list options to the right were presented at the second Enabling Innovation Stakeholder Engagement Workshop. Similarly to the first workshop, the options were discussed in groups and participants voted on their Top 5 and Bottom 5 options. Participants were also asked to choose which options they would invest in after being presented with the relative costs of each option.

Participants were also asked for their viewpoints on:

- Beneficiaries, customers and users of the Centre of Excellence;
- Funding;
- Incentives for performance;
- Potential issues; and
- What does success look like?



Functionality

- *Short list*

With clear direction from the Enabling Innovation Stakeholder Engagement Workshops, the Centre of Excellence functionality options were further refined.

Using key success criteria around alignment to principles and objectives, stakeholder value, affordability, and delivery feasibility; the medium list of options was qualitatively assessed.

From this assessment, a short list of options to take forward for further quantitative assessment was prioritised and agreed by the Project Steering Group. This short list is presented in the diagram to the right.

OPTION	FUNCTION	REQUIREMENT	DESCRIPTION
1	Business as usual	-	-
2	Proposals portal	New	An online proposals portal through which innovators and businesses can submit their ideas and solutions to sector and cross-sector challenges. Ensure that projects do not duplicate past work.
	Innovation opportunities and needs statements	New	Access to information about the latest opportunities and innovation challenges. Initially a webpage with the strategy, “grand challenges”, challenge statements and open calls around themes.
	Integrator	New	Active facilitation and brokerage of collaboration, relationships, and opportunities, and engagement with industry stakeholders, cross-sector organisation, funders, academia and other entities.
	Collaboration groups and community of practice (including industry and cross sectors links and links to research and academia)	Enhance existing	Access to and integration of existing water sector entities that focus on collaborative research and innovation. Links to industry and cross-sector organisations, entities and function providers, research and academia. Connecting ideas to needs. A one-stop shop for collaborative innovation and virtual meeting point with dynamic and active facilitation for the joint development of water innovation ideas; connecting and integrating existing blogs and forums to create a growing community of practice.
3	Library knowledge sharing	Enhance existing	Access to a central repository for information, and a platform for sharing and disseminating knowledge. Easy to interrogate and access. Curation of a industry-level corporate memory. Repository for future information and learning.
	Network of test facilities	Connect existing	Providing advice on facilities and facilitating introductions and access to the wealth of research and testing facilities spread across the UK including water company assets, university facilities, and commercial testing sites.
	Data strategy and access, with eventual data repository	New	Basic strategy and access to water industry data.
	External communication	Enhance existing	Public relations, communication, promotion of water industry innovation, and branding of innovation in the water sector. Access to clear and understandable information about the community benefits of water innovations.
	Scale-up facilitation	Enhance existing	Promotion of innovations developed through the CoE to the wider industry, developing industry implementation plans, education on how to interact and succeed in the sector. Advice on developing benefits cases and exploiting innovations.
	Training and skills	Connect existing	Access to training opportunities and visibility of training needs, focused on innovation skills and capacity building within the sector

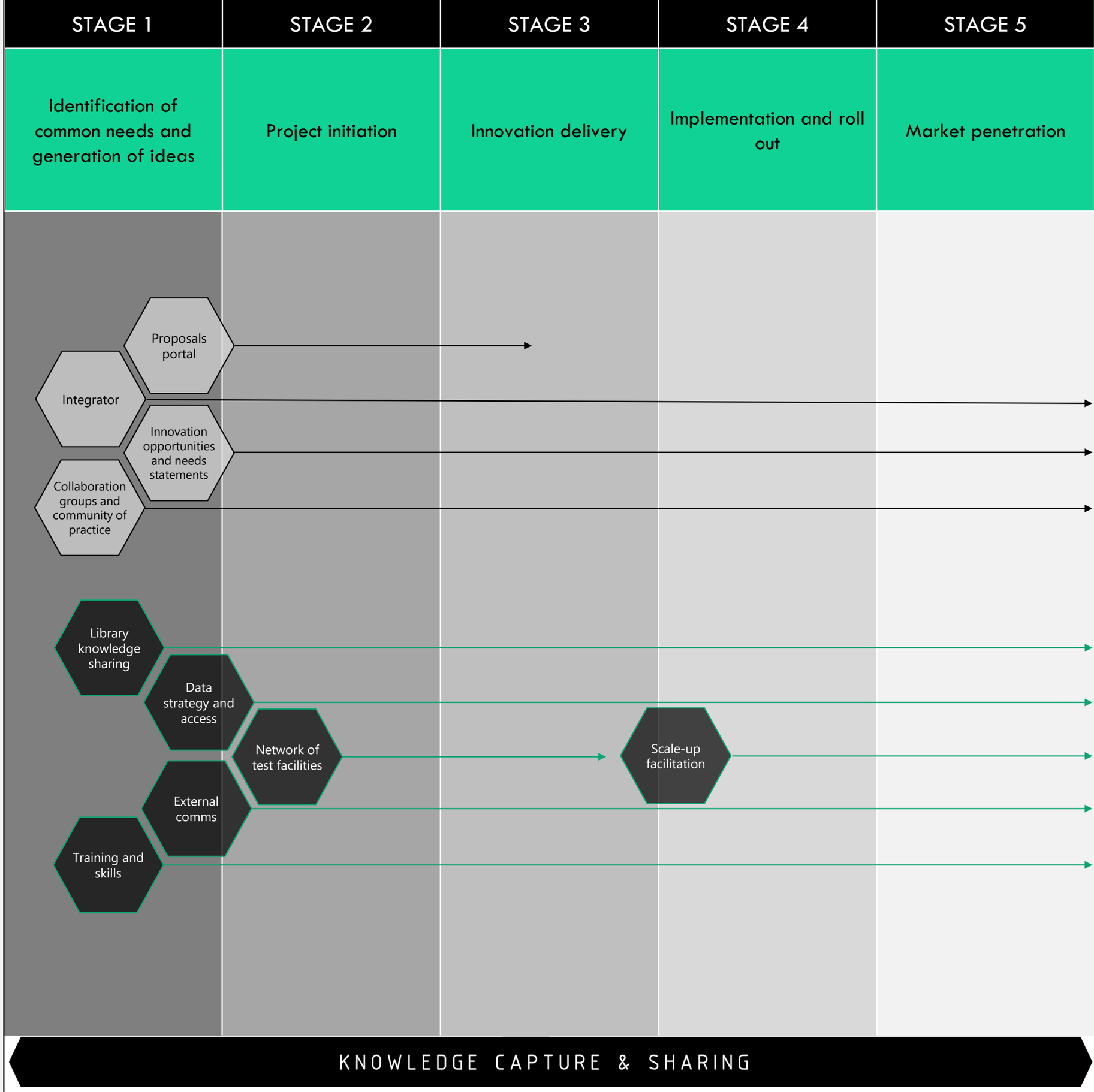
Functionality

- End-to-end innovation

To ensure that the functions of the Centre of Excellence enable the effective delivery and implementation of end-to-end innovation, we mapped the respective functions against each stage of the innovation cycle from ideation through to market penetration. This is shown in the diagram on the right hand side.

It can be seen that a number of functions span multiple stages of the innovation cycle. It is envisaged that the nature and level of support will be tailored to the stage of the innovation cycle. For example, the training and skills needed to 'pick the winners' and undertake effective triage assessments will be different to the training and skills needed for scale-up and roll-out.

While not a function in itself, knowledge capture and sharing will be central to every function and every stage of the innovation process.



Financial case

The purpose of the financial case is to determine whether the preferred option is affordable or within budget.

At this stage, we have undertaken a review of initial options for funding the Centre of Excellence. This needs to be developed further at the next stage.

Funding options

A number of funding models were discussed in the stakeholder workshops as well as in working sessions with water company representatives. The graphic to the right illustrates some of the options which have been discussed, with illustrative case studies.

The following types of funding could be available for the Centre of Excellence:

- Capital funding: Grants, equity, loans, bonds, and crowdfunding
- Operating funding: Grants, memberships fees, return from innovation, billing, advertising, and revenues from services

Our aspiration is that the Centre of Excellence is self-funding and sustainable in the future.

EXAMPLES

Option 1. Single Major Investor

CASE STUDY: Station F Paris (France)

Station F Paris is a private sector initiative backed by Xavier Niel, a French billionaire entrepreneur who invested €250m into the project.

The initiative comprises: a physical innovation campus with affordable housing and in-house support programmes; access to external partner programmes and jobs; and direct access to over 100 VC funds.

The risk associated with this funding model is that it is potentially not sustainable in the long-term and reliant on third-parties.

STATION F

Option 2. Industry Funding

CASE STUDY: Energy Innovation Centre (UK)

The Energy Innovation Centre was originally set up using grant funding from the Northwest Regional Development Agency and European Regional Development Fund. After its initial setup, the EIC switched to an industry-funded model whereby the energy network operators and energy providers fund its operations. It also has access to Ofgem's Innovation Fund and the Low Carbon Network Fund.

It is essentially a not-for-profit entity that connects innovators directly to challenges posed by industry partners and wider industry bodies.

EIC
Together we innovate

Option 3. Innovator Funding

CASE STUDY: RTC North (UK)

RTC North was established as a small, publicly-funded organisation in 1987, and is now a self-financing business through paid consultancy and support services.

It is an example of how a small technology centre has become a successful business and innovation accelerator. Support is offered to innovators through a mix of funded programmes. Innovators pay for: consultancy and access to funding support; training; and work space.

RTC
inspiring growth

Option 4. Grant Funding

CASE STUDY: LIS-Water (Portugal)

The Lisbon International Centre for Water (LIS-Water), a proposed non-profit centre of excellence, was heavily reliant on EU grant funding. After failing to secure funding for its final phase of development, this case study highlights the risk of a grant funding model.

LIS-Water aimed to respond to global water challenges by operating across five core work streams: research and innovation; education, training and capacity building; reflection and strategic advice; support and industry start-ups; communication and social participation.

The risk associated with this funding model is that it is potentially not sustainable in the long-term.

LIS-Water
Lisbon International Centre for Water

Option 5. Government Funding

CASE STUDY: Centre of Excellence for Universal Design (Ireland)

The Centre of Excellence for Universal Design is funded by the National Disability Authority, a government body reliant entirely on public sector funding.

The organisation works to develop standards of best practice in universal design, educate practitioners, support professional development, raise awareness for universal design and support competitions for innovative projects

Centre for Excellence in Universal Design
NDA

Option 6. Mixed Funding

CASE STUDY: Dutch Water Alliance (Netherlands)

The Dutch Water Alliance is funded by participants and partners. It also accesses funding through the Enterprise Europe Network.

Operational tasks are executed by a small entity that reports to a Supervisory Board comprising leading figures from regional government, knowledge institutions and industry. The alliance focuses on innovative and sustainable water technology, from first idea through to research and development, specialised labs, a water application centre, various demo sites, and ultimately market penetration.

wateralliance

Commercial & management cases

The purpose of the commercial case is to determine what the Deal is and whether suppliers can deliver it.

The management case demonstrates that the necessary arrangements are in place for successful delivery and that delivery is feasible.

At this stage, it is appropriate to start considering options for delivery and ensure that the right management mechanisms are in place to continue to take the Centre forward.

Phased implementation

We recognise there will be short, medium and long-term objectives for our strategy and that an agile, phased implementation plan is essential. In the short term, we will accelerate innovation activity around the industry's biggest challenges, as set out under each of our themes to deliver tangible benefits to society and the environment over the next five years. In parallel, we will lay the foundation for delivering transformative innovation in the medium and long term by developing the enabling infrastructure and relationships needed to address multi-sector, multi-national challenges.

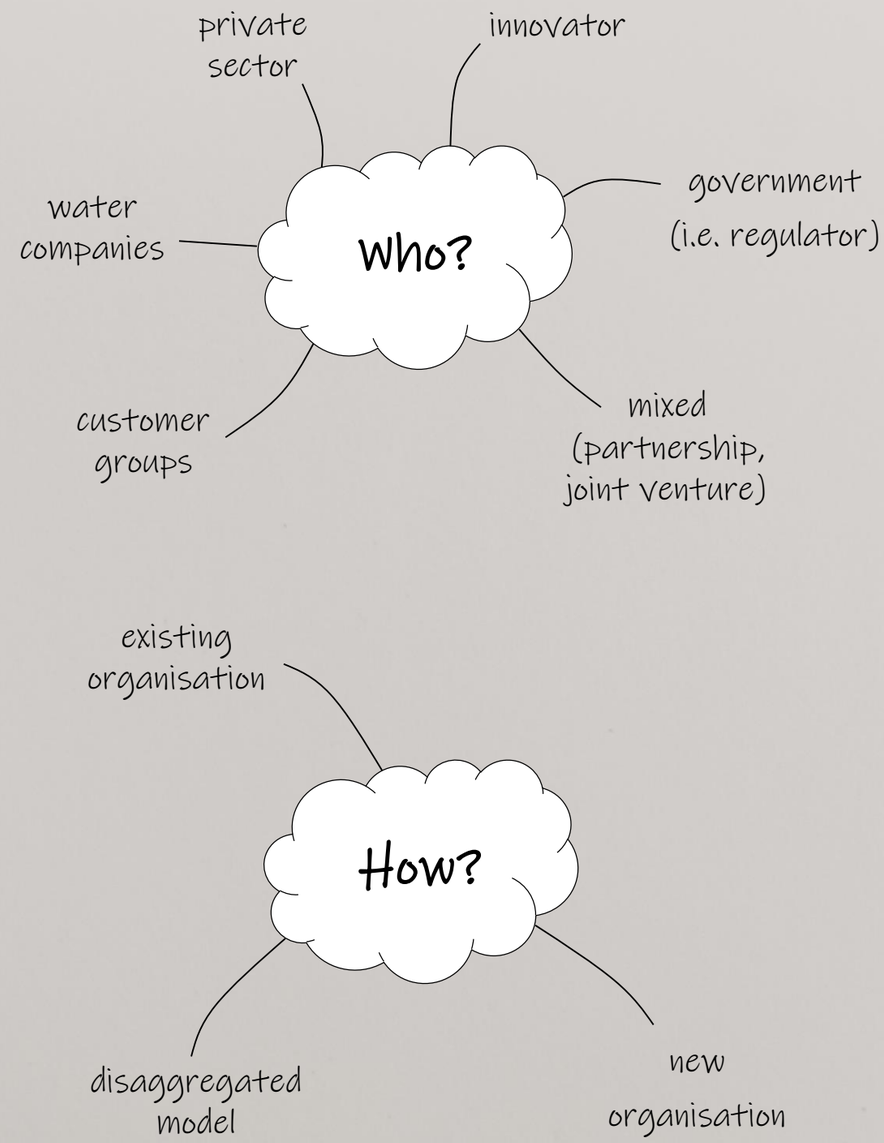
Governance and Delivery

Selecting the right governance and delivery model will be key to the sustainability and success of the Centre of Excellence.

Currently, a Project Steering Group has oversight of the Strategy and Centre of Excellence development.

A number of governance and delivery models were discussed in the stakeholder workshops as well as in working sessions with the Project Steering Group of water company representatives. The graphic to the right illustrates some of the options which have been discussed. Over the coming period, we will assess and agree on a sustainable model for managing the Centre of Excellence. We will further explore the pros and cons of various options and look at ways to share costs, risks and benefits between partners.

For the next stages of the development of the Centre, it has been agreed that Water UK will be the governing and commissioning body for the Centre.



Next Steps

This document sets out our thinking so far on ***what*** is required to enable transformative innovation in the water sector. However, we recognise this is just the beginning of our path towards change.

We have demonstrated the Strategic Case and gained wide agreement from a range of stakeholders on the need for change. We have agreed the options to take forward for quantitative assessment and have explored options for funding and delivery. Moving forward, we will work collaboratively with our stakeholders to continue to develop the Business Case, which will:

1. **Update the Strategic Case**
2. **Update the Economic Case to quantitatively assess the Value for Money of options and identify a preferred option**
3. **Complete the Financial, Commercial and Management Cases to determine:**

- **Who** will be involved in the governance, financing and delivery of the Centre of Excellence;
- **When** the Centre of Excellence will be set up, and the development of a programme for immediate delivery, as well as for the aspects that could be built in the medium and long term; and
- **How** the Centre of Excellence will be funded and financed, procured, governed and delivered, and the success monitored.

Our ambition is that the initial phase of the Centre of Excellence will be operational by Spring 2021.