

Response to Ofwat Consultation questions

1. *What are the main barriers to innovation in the sector and why?*

I believe that Ofwat have broadly identified the main barriers to innovation. However there are a number of drivers of these barriers. In their 2018 paper on why collaborations fail in water innovation James Porter and Kamal Birdi¹ identify 22 core themes (see table 1) that are important in delivering effective collaborative innovation. Whilst financial support is one of these factors there are 21 others that need to be considered in the development of effective collaborative innovation in the sector. These are listed in rank order in table 1. I have highlighted below some of the key factors I believe are the main barriers to innovation.

- **Capability of Innovation:** The top ranked factor in enabling innovation is the ability of the business to enact change. Regulatory frameworks can help support this. Also companies need to ensure the industry has the people with the skills to drive and implement new ways of doing things.
- **Risk and failure:** The need for effective engagement with stakeholders highlights that successful innovation requires not only water company change but the need for all actors, including customers and regulators to accept that innovation is required to improve the water sector and with that comes inherent risk associated with change.
- **Regulation and the precautionary principle:** In their paper exploring innovation in the sector Spiller et al², show that although regulation is unlikely to stimulate and innovation culture it does shape the innovation space. Regulators have a great influence on both the type of innovation implemented through performance measures as well as enabling companies to innovate. Given the importance of an effective water sector to human health and the environment the sector is understandably risk averse and regulatory structures which encourage businesses to be sure that performance measures are met can disincentivise implementation of new ways of working as this carries inherent risk. However, in other highly regulated sectors which impact the health of people and the environment (such as the pharmaceutical and automotive industries), companies are still able to innovate. In her paper entitled Innovation in the water industry: barriers and opportunities for US and UK utilities³ Dr Vanessa Speight highlights that *'the successful drivers of innovation in the water industry are shown to include: a supportive culture at the water utility; a regulatory regime that allows or even promotes innovation; the financial ability to undertake research and implement improvements; and crucially, the backing of the public'*. In considering the creation of this innovation fund Ofwat are recognising their role in allowing and promoting innovation through financial mechanisms. This paper also highlights the importance of customers as active actors in the innovation process as well as those whose interests need to be safeguarded.
- **Identifying need/opportunity for change:** One of the main roles of changes in regulation on innovation is that it can prompt companies to change to meet new performance targets. This is a good driver and necessary, but companies also need to identify the need for change and look beyond the sector for new ways of working.

- **Diffusion of Innovation across businesses and the industry:** Spiller *et al.*² propose a five stage framework in the innovation process (Figure 1). The regulatory drivers highlighted above enable the agenda-setting phase. Company innovation teams, UKWIR, events such as Innovate East an, the Northumbrian Water Festival, Engagement with supply chain partners and Academic collaboration can produce alternative solutions. However, companies find the diffusion of new ways of doing things across the business challenging. SMEs often find they have to trial their technologies with individual water companies, enhancing business risk I the supply chain and slowing the implementation of innovation. Procurement processes can also hinder uptake of these innovations. These are areas on which the innovation programmes should focus.

2. Do you think that the financial support cited in section three is required to stimulate innovation in the sector? If so, what do you believe is the appropriate amount of funding and why?

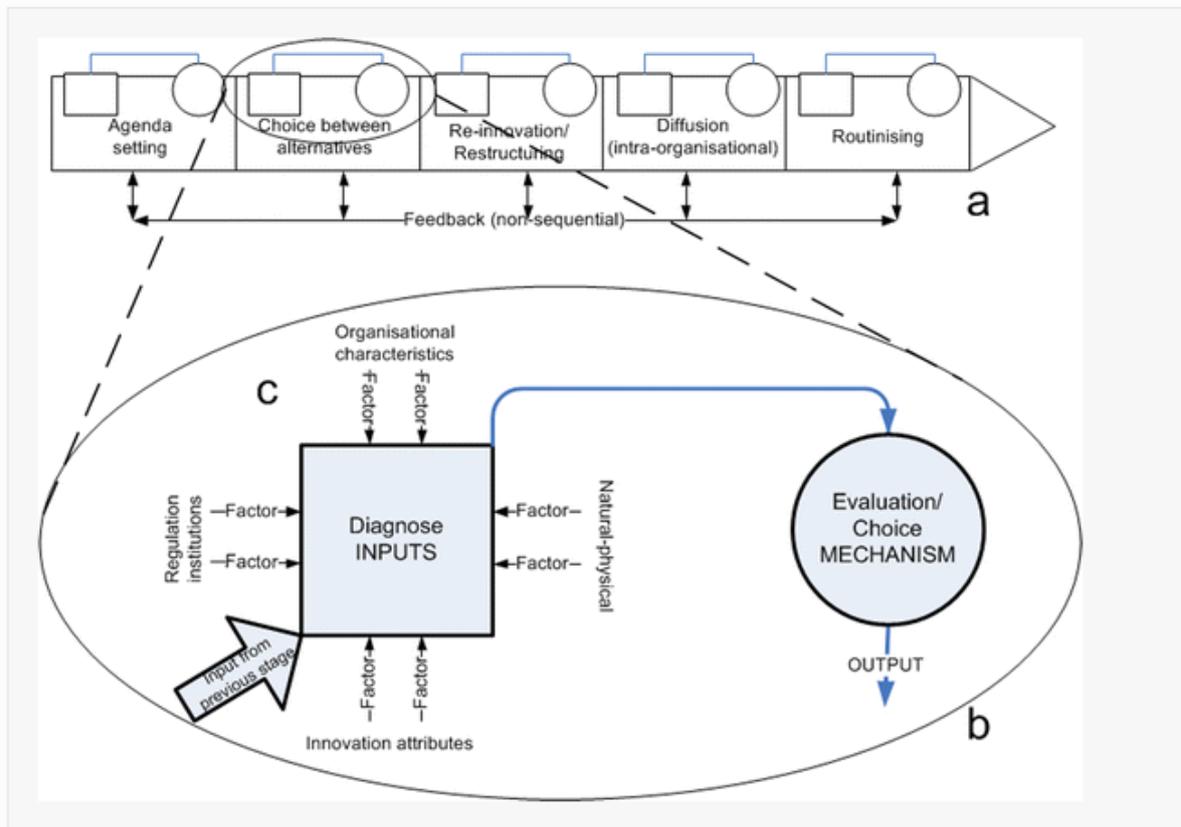
Financial support is only one factor needed to stimulate innovation in the sector, with companies also needing to address cultural factors around risk and failure.

In 2017 expenditure on innovation in the sewerage, waste management, remediation activities sector was ranked 30th and the Electricity, gas and water supply 26th of 34 product groups according to the Office of National Statistics⁴ With the additional investment these two groups combined will be about the median spend on R&D but well below the UK average of £697m. Given that these figures also include the electricity, gas, waste management and remediation sectors the water industry investment in R&D will still be significantly below that of other significant sectors, including public administration.

Table 1 Core themes that enable effective collaborative innovation. Porter and Birdi 2008¹

Theme	Definition
Stakeholders have the capacity to enact change	Those involved have the skills, resources and time needed to be actively involved in deliberations and any future actions, or at least have the opportunity to learn and develop these capacities.
Clear roles and responsibilities	The roles and responsibilities of the institutions and individuals involved are clear (not fragmented).
Acceptance of different social values, norms and cultures	Efforts are made to ensure different group values, norms and cultures are treated equally alongside more Westernised or scientific approaches.
A strong or clear vision	Everyone involved agrees on the purpose of the collaboration, the priorities and long-term goals, their role and responsibilities within it, and what is needed to resolve the problem at hand.
Participation is open to all stakeholders	Every effort is made to ensure as many stakeholders affected are included in the process, or at least had the opportunity to participate.
Funding	Sufficient money is set aside to run the collaborative-innovation process and implement the actions selected.
Trust	A firm belief that all stakeholders are acting in good faith, sharing relevant experiences and materials, and not pushing their own agenda or one that disadvantages others.
An effective coordinator or bridging organisation	Where a neutral person or organisation is appointed to facilitate conversations and coordinate actions between different, often disparate, stakeholders to ensure a fair, impactful, outcome.
Strong leadership	Either from a personal or organisational level, strong leadership can involve setting agendas, keeping the process moving, or ensuring the best solution is reached.
Low risk or high willingness to experiment	There is a willingness to take risks, accept failure as normal practice, so that experimentation is welcomed and encouraged.
Sensitivity to power imbalances	An appreciation that different stakeholders have more or less power to effect change and their willingness to engage in the process may be impeded by perceptions of being subjected by other more powerful actors.
Introduction of new Government legislation, regulation or policies	Where Governments, agencies or departments introduce new legislation, regulations or policies to support of new working practices.
Activities are bounded by a small geographical area	All stakeholders, and actions under consideration, concern a well-defined geographical area with clear local commitments at stake.
Sustained participation	Importance of encouraging and supporting stakeholders to stay involved throughout the collaborative-innovation process.
Clear methods for evaluating and measuring outcomes	Necessity of implementing comparable and long-term methods to quantitatively assess the extent to which actions have been successful and identify what has changed.
Adequate time to plan and execute actions	No one part of the collaborative-innovation process is prioritised at the expense of the others so that there is time to discuss, formulate, and execute actions without rushing.
Effective communication, data sharing	All stakeholders have access to the data or evidence used to make decisions by the group and efforts are made to ensure that everything is communicated clearly and effectively to everyone.
Clear and accessible scientific information	Availability of scientific information used to inform decisions is circulated to all stakeholders involved and presented in a non-technical, or exclusionary way.
Low costs or investment required	Little money, time or resources are needed from stakeholders to enable the process to proceed.
Low or medium levels of conflict	All the stakeholders refrain from creating new, or exacerbating old, lines of conflict so that everyone works together harmoniously.
All actors are fully committed	Not only do all stakeholders participate in discussions, pooling ideas, and sharing experiences, but they are also committed to achieving meaningful change.
Clear decision and process rules	The procedures for consulting, prioritising, and deciding upon different courses of action are fair and explicit from the outset.

Fig.1 Framework to conceptualise environmental innovation in the water industry²



3 Do you agree that our proposed draft principles for additional financial support will effectively safeguard the interests of customer?

- It is good to see that Ofwat believe that innovation should be understood to not just be about the development of new technologies and the importance of having the right systems, processes and people to support activities.
- Whilst the principles for additional financial support are generally good, for the interest of customers to be safeguarded Ofwat need to be clear as to the definition of **Transformational** Innovation to understand what is in scope for this fund.
- Innovation activities are often clustered into three types:
 - **Core innovation** which is the innovation required to deliver the core business
 - a. Implementation of currently available technologies, systems and processes which have been proven to deliver business and customer benefit would fit under this definition and should be funded through standard business R&D budgets.
 - **Adjacent or Breakthrough innovation** that extends the innovation activities to explore new areas. This type of innovation carries more risk than core innovation and should be in scope for this funding stream. This type of activity could include large scale roll out of new technologies, systems and processes and innovation which will realise benefits beyond the current AMP

cycle. However If technologies are already available that deliver better outcomes than those traditionally used in the current AMP period then the implementation of these technologies at scale should be business as usual for companies and additional financial support should not be needed and companies may need to focus on culture change programmes that enable this to happen.

- **Transformational innovation** which Stephen Denning, a leading writer on innovation defines as: *entailing a transition from a mode of operating that is known and secure to one that is unknown and potentially chaotic. Transformational innovation requires offering or doing something fundamentally different.*⁵ Transformational innovations are likely to occur infrequently and Ofwat should therefore extend the scope of this fund to encompass adjacent / breakthrough innovation.
- ***To safeguard the interest of customers only projects which deliver adjacent (breakthrough) and transformational innovation should be in scope for this fund.***

The principles that I believe require further consideration are:

- **There will be an “open by default” approach to data and learning generated through customer-funded activities, including where projects have been unsuccessful**

Whilst an open by default process is the right approach consideration will need to be given to the appropriate IP protection needed to ensure that a new product or service can be fully exploited. This is particularly important where technology innovation is the topic of a project.

- **Mechanisms will be time-limited to the 2020-2025 period. We will review the effectiveness of these mechanisms at least at the end of the period, and as required during the period;**

The impacts of innovative solutions can take many years to be realised so Ofwat need to carefully consider what success measures are used to evaluate success within a five year time frame. Given that the details of any competition need to be agreed and applications made this could further reduce to 4 years. Whilst adjacent / breakthrough innovation projects may see results in this timeframe projects that focus on culture and behavioural change programmes as well as development of technologies that are far from market, but have the potential to drive truly transformational change, are unlikely to be ready for evaluation. Assessments of return on investment and success of individual projects as well as the programme will need to take this in to account.

It is good to see that Ofwat recognise that innovations are not always successful. Indeed part of the need for this additional funding is to mitigate the impacts of failed projects. Acceptance of failure is essential to creating an innovation culture. Ofwat need to be prepared that if this fund supports truly innovative projects that the failure rate could be as high as 20-30% with a further 50% of projects achieving no significant improvement over current systems⁶. If no projects fail I believe that companies are not being ambitious enough in their innovation proposals. Rather than **accept** failure of individual projects Ofwat need to **expect** failure and ensure that evaluation of the scheme reflects this.

- **Companies will need to provide evidence of how they are working together and with others (including other water companies, their supply chain, companies in other sectors), and/or a commitment to transparent sharing of progress and findings with others within the sector and beyond;**

The principle of collaborative working is a good one, but consideration needs to be made of projects which address issues which are company specific such as those which address company culture or result in changes to internal company processes.

Many innovations are likely to originate from research organisations, supply chain companies or those outside the sector with new ways of doing things that meet industry need. There should be a mechanism whereby these organisations can bid for funding independently, perhaps with WoCs or WaSCs acting as a 'sponsor' for the project.

4. *What are your views on the collectively funded innovation competition model which we describe in section three? What other key considerations not highlighted should we take into account in designing/ implementing the competition?*

Throughout the consultation document Ofwat have emphasised the need for cross company and cross sector collaboration. A competition model could undermine this ambition for collaborative working. Table 1 above highlights some of the main factors Ofwat may want to ensure are in place for each project so there is effective collaboration.

Administration of a competitive fund can be significant and Ofwat may wish to consider partnering with UK Research and Innovation, and particularly Innovate UK, to design the scheme and manage the bidding process. Working with Innovate UK would provide a mechanism for organisations who do not normally work in the sector to understand industry challenges and bring in innovative solutions from different sectors. It would also provide the opportunity to leverage further funding through joint calls. Innovate UK have an online application process and mechanism for assessing innovation projects. This would remove the need for the industry to support a separate process. This could be similar to the relationship between Innovate UK and the Aerospace Technology Institute⁷.

An annual process for bidding for projects will delay implementation of new innovation and only provide a maximum of five opportunities for companies to bid for funding. A more responsive and flexible processes would better support innovation.

The diversity of potential projects, which may range from significant technology development through to changes in administrative processes, will mean that a 'one size fits all' process is not appropriate. This relates to the format of the application, assessment and review of projects. Particular care will have to be given to the assessment of proposals as to how innovative and viable they are.

5. *What are your views on the end-of-period innovation roll-out reward we describe in section three? What other key considerations not highlighted (e.g. whether it*

should be collectively funded or individually funded) should we take into account in designing/ implementing the reward?

I agree with the risks identified in the consultation document around the development of an end of period innovation roll-out award. T.P. Lyon in his paper on Regulatory hindsight review and innovation by electric utilities⁸ shows that retrospective reviews ‘*may discourage utilities from investing in promising but risky new technologies. When innovative technologies have lower expected costs but greater cost variance than conventional technologies, the threat of hindsight review may cause a utility to switch from an innovative technology to a more costly conventional one, and may cause underinvestment*’. An end of period roll-out may therefore lead to utilities undertaking less transformational innovation projects as these are often inherently more risky. This relates to previous comments made in this document about the value and assessment of ‘failed’ innovation projects.

As previously mentioned a one-size-fits-all approach to these innovation projects is unlikely to work. If Ofwat do decide to implement a competitive fund and end of period roll out approach they may want to consider if different types of project are managed/rewarded by the different mechanisms. The end of period innovation roll out reward may be more appropriate for projects focussed on the implementation of currently available technologies or processes which are more likely to succeed and deliver the additional/breakthrough innovation. The competitive fund could then be used to support more speculative, higher risk projects that if successful are more likely to deliver the transformational innovation being sought.

6. What other potential alternative mechanisms for funding/ rewarding innovation not discussed do you think we should be considering? Which financial support mechanism or combination of mechanisms should we introduce and why? What would be an appropriate split of available funding/ reward?

UK Research and Innovation programme has a number of funding streams relevant to the sector and Ofwat should consider how to maximise the opportunities to leverage some of this funding.

7. Do you think the potential industry activities discussed in section four could help drive innovation? Are there other activities not identified which you think the industry should be considering?

The sector wide innovation strategy described in section four is beginning to be developed by UKWIR with the articulation of the big questions and the associated roadmaps. What is outside the scope of the UKWIR work is any focus on creating innovation cultures within companies and company specific innovation in systems, processes and contractual arrangements and these need to be included in any strategy.

The creation of a water centre of excellence along the lines of the UK Catapult centres would help innovation in the sector by providing a focal point for business, researchers and policy makers. The centre would be able to take a number of co-ordination and funding support roles such as: facilitating access to testbed and other facilities identified by the UK

Water Partnership LitSoN project¹⁰, co-ordinating funding programmes, supporting SMEs to enter the supply chain and supporting the UK economy through the development of new products and services relevant to the global water industry. The catapult model may also be helpful in designing funding mechanisms and IP arrangements for the proposed competitive funding stream. It could also act as the effective bridging organisation identified as being essential for effective collaboration in Table 1. The UK Water Partnership has undertaken a significant amount of work to develop plans for a potential water catapult. It is important that this type of centre has longevity outside the normal AMP cycles and therefore a commitment from companies and Ofwat that any funding given in this cycle will continue into AMP7 and beyond.

8. Do you think the proposals in section five will help drive innovation? Are there other activities not identified which you think Ofwat should be considering?

In January 2013 the Manchester Institute of Innovation Research published report entitled The Impact of Regulation on Innovation: Compendium of Evidence on the effectiveness of innovation policy intervention¹¹. This report highlights the impacts of different types of regulation (Economic, Social – including environmental, and institutional) on innovation. The design of both economic and environmental regulation can greatly impact the development of innovative products and services, with environmental regulation prompting more innovation than economic regulation. The impact of regulation on innovation is sector specific and Ofwat could make a useful contribution to this agenda by working with other regulators to understand how their different regulatory structures support an innovation culture. It would be good if Ofwat were to commission work to better understand the impact of the different regulators and other actors in prompting innovation in the sector.

Whilst there is a need for co-ordination and advice to enable new products and services to be effectively trialled I believe this should be broader than the regulatory advice given by Ofgem through their sandbox programme. The diversity of potential innovations that may include new products based on nanotechnology, novel chemistry, micro-robotics, systems and processes means that a range of expertise will be needed. I therefore think that this co-ordination role would be better delivered by an organisation intrinsically involved in the innovation process, with Ofwat as the key stakeholder providing regulatory advice.

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