



The
University
Of
Sheffield.

Department Of Civil & Structural Engineering.

Innovation consultation
Ofwat
21 Bloomsbury Street
London
WC1B 3HF

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Prof Joby Boxall
Sheffield Water Centre
Sir Frederick Mappin Building
Mappin Street
Sheffield S1 3JD

Tel: [REDACTED]
Fax: [REDACTED]
Email: [REDACTED]
Internet: <http://www.twenty65.ac.uk>

Dear Rachel,

Re: Innovation Consultation Response from TWENTY65

TWENTY65 is the EPSRC-funded Grand Challenge Centre for Water, encompassing research at the Universities of Sheffield, Newcastle, Exeter, Reading, Manchester and Imperial College London. Through our Water Innovation Hub, we are working in partnership across the water sector to spark innovation to deliver water systems of the future so that they positively impact health, the environment, the economy and society.

TWENTY65 fully supports Ofwat in its efforts to transform the water sector and to ensure it is resilient enough to respond to, and meet the demands of, the future challenges the UK will face. The key points of our response are as follows, these are then expanded upon for each of the specific questions posed below.

- The proposed centre of excellence to administer the innovation competition is critically important and must be independent. It should not be set up, run by or directly accountable to any existing organisations. A new independent, not-for profit entity is required and ideally should be funded outside of the 5-year AMP cycle.
- The centre should coordinate and leverage existing UK water sector innovation activities alongside the proposed innovation competition, be a central knowledge and data repository, and owner of long-term vision and ambition. It should be the UK focal point to drive and inspire innovation. The centre should act as a hub drawing on existing spokes across the UK and beyond to accelerate the development and sector-wide uptake of innovation. The scale of resource to deliver this and the level of expertise required of those involved is significant.
- The centre must collaboratively lead in defining long-term ambition for the sector in terms of sustainable, resilient water services for the greater good, in particular driving cultural change.
- The activity of the centre should focus on mid-range technology readiness levels, enabling and supporting innovation through the 'valley of death'. It should coordinate closely with UKRI to align with and leverage the world-leading water research it enables, and complement that work to deliver solutions that are so evidently beneficial that water companies will be drawn to implement them within the incentives of existing AMP mechanisms. Implementation of currently available (mainly technical) solutions alone will not deliver the transformation necessary to address the challenges faced by the water sector. Focus on ROI over a 5-year time period will similarly fail to deliver transformational innovation.

Q1. What are the main barriers to innovation in the water sector and why?

TWENTY65 has been studying the barriers to innovation in the water sector for several years¹ and this topic has been examined in multiple collaborative workshops with stakeholders, including a recent Thought Leadership Club workshop about this consultation on 5 September 2019 (attended by 35 participants spanning water companies, regulators, consumer groups, SMEs, supply chain companies, consultants, contractors, and academics). This workshop made use of our co-creation theme of research, utilising our CLEAR IDEAS methodologies for collaborative innovation². The issue of innovation within the water companies and wider sector is uniquely complex as numerous conflicting drivers, enablers and blockers are simultaneously at play. Our work has revealed a number of barriers to innovation:

- **Culture.** Cultural issues contribute strongly to the fragmentation of the sector. Water company staff are viewed as conservative and risk-averse while innovation providers are seen to lack awareness about the sector's problems and to inflate performance claims. A focus on technical change, with limited understanding of social and institutional innovation, is also contributing to the barrier related to culture.
- **Risk Aversion.** This theme cuts across many barriers to innovation. Change to risk appetite will need to be led from the top, with room for failure cited by many as an important factor for success.
- **Lack of Strategic Direction and Coordination.** The sector as a whole in the UK lacks a long-term vision.
- **Regulation.** The 5-year AMP cycle has been a much-discussed barrier (and sometimes enabler) of innovation. Transformational innovation will likely not deliver the necessary ROI within a 5-year time frame. The timescales required for planning, procurement, and execution preclude radical changes in many cases. Regulatory penalties can lead to an increased risk aversion. However, a regulatory framework that offers the potential for rewards for innovation was seen by many as a positive feature, particularly if innovation activities can be funded outside of the traditional AMP.
- **Procurement.** Innovation in procurement could be beneficial to delivering transformation across the sector, through elements such as risk-sharing, flexibility, and adaptability. Related to risk aversion and regulatory cycles, procurement processes and framework contracts have been cited by many as significant barriers to innovation. Better tools for life-cycle costing, performance monitoring, and sector-wide cost-benefit analysis are needed.

Q2. 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?

We believe that financial support is needed to incentivise and de-risk innovation across the UK water sector. The suggested £200m innovation competition and related support such as the centre

¹ For example:

Speight, 2015. Innovation in the water industry: barriers and opportunities for US and UK utilities, *WIRES Water*, 2:301-313.

Porter & Birdi, 2018. 22 reasons why collaborations fail: lessons from water innovation research, *Environmental Science & Policy*, 89:100-108.

² Birdi, 2016. Creativity Training. In Shipton, Budhwar, Sparrow and Brown (Eds.) *Human Resource Management, Innovation and Performance*, London: Palgrave Macmillan.

<http://clearideas.sheffield.ac.uk/>

of excellence is therefore very welcome. However, when considering that the Industrial Strategy has a goal for R&D investment of 2.4% of GDP by 2027³, the figure of £200m is actually relatively small. In fact, when broken down to a per company basis (equally across the 17 companies quoted in the consultation document) it equates to approximately £2.3m each per year, which is smaller than many of the non-compliance penalties. There is a danger that water companies will not see the value of engaging with the innovation competition at these levels, given the overhead expenses they will need to bear in terms of staff resources, enabling works for trials, etc. A strong investment in innovation that not only improves the water company performance but also builds a strong ecosystem of innovative R&D for export by linking fundamental research through to implementation could have a far-reaching impact on the UK economy.

As an example, Singapore is well known as a global leader in water innovation. Their Environment and Water Industry Development Council (EWI) was created to promote a whole-of-government approach to Singapore's R&D/innovation activities. The EWI facilitates cross-sector coordination among government agencies involved in water management, and aims to reduce potential conflicts of interest across sectors. It also works with stakeholders to support R&D into new water technologies, and to develop an ecosystem for anchoring the activities of local and international players in the water industry. Together, EWI and PUB (Singapore's only water company) bridge the gap between upstream research and the testing of new technologies for downstream applications. The Singapore government have invested S\$670m⁴ in R&D and innovation since 2006, which equates to approximately £975m, or £75m annually and £375m per 5 year period for a small country with 5.8m people. Thus, scaled on a per capita basis to the UK population, the investment would be £874m annually (£4.4b over 5 years).

Q3. Do you agree that our proposal draft principles for additional financial support will effectively safeguard the interests of customers?

In principle, we agree that the draft principles for additional financial support will safeguard the interests of customers. Independence from the water companies and other existing organisations, particularly those in a position to profit from participation, will help to ensure the interests of customers are kept at the heart of the activities. Furthermore, the ambitions for and applications of the additional financial support should be focused at a national and long-term level to remove any 'short-termism' and drive truly transformational innovation on behalf of customers. The goal of transformational innovation should be explicit and customer engagement should be designed into all processes for co-creation.

Q4. 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?

We believe that a collectively funded innovation competition, managed by an independent centre of excellence, would be a useful way to stimulate innovation in the sector. Our view is that this should have a rolling cycle of review and refresh that explicitly breaks it away from the restrictions of the AMP cycle and this view was strongly expressed by our September 2019 workshop participants.

Based upon our research and September 2019 workshop results, we further recommend:

³ <https://www.ukri.org/about-us/increasing-investment-in-r-d-to-2-4-of-gdp>

⁴ <https://www.pub.gov.sg/watersupply/singaporewaterstory>

- **Independence.** The innovation competition should be independently managed and implemented (by the centre of excellence) to avoid all potential conflicts of interest and to foster cooperation on pre-competitive innovation development.
- **National and International Coordination.** There is considerable activity across many facets of the UK water sector and these are delivering some great examples of innovation. However, the whole could be much greater than the sum of the parts if better strategic coordination was provided. The centre of excellence should coordinate and leverage these existing innovation activities alongside the proposed innovation competition because avoidance of duplication will be an important element of managing the limited funds for innovation. It should co-create and subsequently own/manage the long-term vision and ambition for the sector. It should be the UK focal point to drive and inspire innovation. The centre should act as a hub drawing on existing spokes across the UK and beyond to accelerate the development and sector-wide uptake of innovation.
- **Knowledge and Data Repository.** A key function that should be delivered by the centre is central knowledge and data management (possibly in collaboration with the Data and Analytics Facility for National Infrastructure⁵ to leverage UKRI investment and expertise in this field). Open data aspirations are difficult to realise without significant preparation, data architecture, and hardware/software solutions. Our workshop participants cited the need for better data and data sharing as an important function that the centre of excellence could fulfil.
- **Centre Resources and Staff.** The centre of excellence should be resourced with highly skilled staff to serve the critical purpose of gathering, synthesising and communicating learning about the entire innovation process including cultural changes, benefits to others, and wider implications. Without this linking functionality, the innovation competition could result in completion of a series of individual pet projects whose results, positive or negative, are not widely shared or acted upon by others.
- **Open Competitions.** All funding calls for the innovation competition should be open to all within and outside of the sector. Many water innovations could come from organisations who are not currently active in the sector. Furthermore, partnerships with universities, research institutes, technology developers and others will be required for successful innovation. Joint funding mechanisms to leverage UKRI and other external funding sources, including those in other sectors such as energy, should be implemented.
- **Assessment.** The innovation competition will need assessment and evaluation metrics that drive adventurous approaches and long-term benefits for society and the environment. A variety of expertise and perspectives, particularly those beyond science and engineering, should be incorporated along with ethical considerations and customer engagement.
- **Monitoring and Reporting.** A strong monitoring and reporting framework is needed. This framework should recognise and fund evaluation processes drawing on the variety of stakeholders who are involved in and affected by the innovation. For example, it should include the contractors involved in the day to day delivery of the innovation. Often these workers can offer a different perspective on the innovation from those who are managing and overseeing it.
- **Clawback.** Clawback in any form, other than for non-performance of the work, should not be included. The clawback approach contradicts the fundamental tenet of innovation that accepting failure is an essential part of innovation. Our research and workshop findings both indicate there is a strong preference for incentives rather than penalties.

⁵ <https://www.dafni.ac.uk/>

Q5. 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?

We believe that the regulatory process already rewards against end-of-period innovation successes in the form of increased profit for the company in question. We also feel that this type of incentive could drive short-term thinking and behaviours, which are not desirable for transformational innovation.

Q6. What other potential alternative mechanisms for funding/rewarding innovation not discussed do you think we should be considering?

Another possible funding model for innovation projects is the US Environmental Protection Agency's Clean Water State Revolving Loan Fund⁶. This fund is a permanent, independent source of low-cost financing for a wide range of water quality infrastructure projects. As projects are completed and loans repaid, those funds are then loaned out to new projects. The fund is managed by each state.

Which financial support mechanism or combination of mechanisms should we introduce and why? What would be an appropriate split of available funding/reward?

We believe that the innovation competition managed by the centre of excellence is the mechanism that should be introduced, for the reasons outlined above.

Q7. 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 UK water industry needs a coherent approach, with easy access to science, engineering, research, test facilities, expertise, investment and routes to market. In other sectors this has traditionally been delivered through government-funded Catapults, however, new Catapult centres are no longer supported. We feel that the creation of a centre of excellence by Ofwat to administer the innovation competition could deliver many of these services to result in a transformation of the innovation landscape for the UK water sector. The alternative of not innovating carries far more risk.

There are a number of international examples of national innovation hubs to learn and draw from, including (see also Q2 discussion about Singapore EWI):

- **KWR, Netherlands.** KWR⁷ is a not-for-profit research centre with the Dutch water companies as its shareholders. KWR's 178 staff members including researchers generate scientific and engineering knowledge to bridge the gap between theory and practice. Their strength lies in their generation and translation of knowledge into applicable, practical solutions for end-users in the Dutch and international water sector. In this model, the water companies are shareholders but not direct management which brings commitment and buy-in, but still allows for independence. KWR co-produces an annual research agenda with nominated staff

⁶ <https://www.epa.gov/cwsrf>

⁷ <https://www.kwrwater.nl/en/>

from the water companies, thereby coordinating the overall ambition and vision for the sector.

- **IKT, Germany.** IKT⁸, the German Institute for Underground Infrastructure, is a not-for-profit organisation with the mission of solving practical and operational issues affecting underground sewers, pipes and other conduit engineering. They conduct research, material testing, provide training and consultancy services. 80 percent of their funding is from public regional sources (primarily regulators/government agencies). They co-create technical challenges and projects with water company members, who fund the remaining 20% to demonstrate commitment and buy-in. Results are published openly for all, including objective testing results for proprietary products.

Q8. 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?

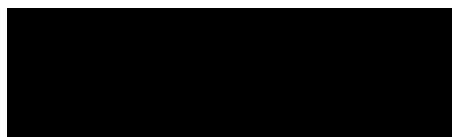
A more coordinated approach to innovation across the different Regulation bodies is welcomed. Best practice examples from around the world show that innovation flourishes when there is a coordinated regulatory approach (e.g. Singapore, see Q2). The Netherlands offers another excellent example of how Regulators can promote and facilitate innovation. Here the Regulator actively encourages water companies to engage them in the challenges they face, particularly for problems faced by multiple utilities. The Regulators work in partnership with the company to identify solutions, openly share findings, facilitate communication, and even relax permit limits in affected areas.

We believe that Ofwat, in cooperation with the centre of excellence, could also have a pivotal role in attracting and directing other sources of public funding towards water related challenges.

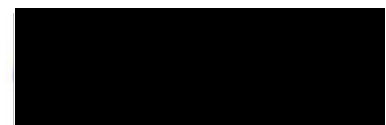
Yours sincerely,



Prof Joby Boxall
Technical Director/PI,
TWENTY65



Dr Vanessa Speight
Managing Director, TWENTY65



Mrs Caroline Wadsworth
Water Innovation Hub
Manager, TWENTY65

⁸ <https://www.ikt-online.org/>