

Transforming Research Results into Innovation Uptakes

This paper summarises a workshop held at the International Water Association (IWA)'s World Water Congress & Exhibition in Copenhagen, Denmark from 11 – 15 September 2022. The workshop was organised and run by the European Water Association.

The aims of the workshop were to:

- Identify the bottlenecks in the innovation uptake process
- Share experiences on tools, incentives, processes and practices
- Consolidate guidelines of good practices accelerating the innovation uptake

Over 90 attendees from across the water sector participated, including universities, suppliers and utility end users.

Background

The water sector needs to innovate if it is to achieve its goals of addressing human health, climate change and pollution challenges. Innovation can also drive new legislation. This requires the sector to focus on emerging contaminants, reduction of organic pollutants and nutrients, reduction of carbon and physical footprints, building resilience, being more energy efficient and employing a greener and circular economy approaches.

However, whilst the research community is carrying out intensive and comprehensive research and development on these issues, the water sector has been slow to take up innovations. The European Innovation Partnership on Water (EIP Water) identified several barriers and bottlenecks for innovation in the water sector including lack of funds for SMEs; general risk aversion; a lack of demonstration sites; inconsistency and fragmentation in policies and regulations; fragmentation in water authorities and water sector; and conservative procurement.

The workshop further mapped these bottlenecks and shared ideas for tools, processes and practices to accelerate innovation in the sector.

The workshop process

Leaders of the two leading water organisations, European and International Water Associations outlined the need and ambitions of their membership. Four academic and industry experts talked about the lessons learnt during uptake of innovations by water utilities - outlining bottlenecks; paths to overcome challenges; and motivating utilities for faster uptake.

This was followed by a moderated, digital brainstorming session with all workshop attendees. The brainstorming session asked participants to identify bottlenecks in innovation uptake and successful tools, incentives, processes and practices. Participants individually listed their ideas, which were then collaboratively grouped into common themes. Each participant was then given five votes, with multiple votes allowed per idea.

Examples of challenges to human health and environment:

- Emerging contaminants and micropollutants
- Microbiological quality
- Organic and nutrients loads
- Carbon and physical footprints
- Chemicals and energy use in water utilities

Top bottlenecks hindering innovation uptake

Policy and regulatory barriers within the sector

Policies and regulations are, at times, cumbersome, inconsistent and fragmented. There is a lot of red tape leading to long approval times for new projects. Examples include strict regulations due to health risks, data/cyber security risks, and competition laws which hinder sharing of best practice between companies.

Poor business investment case

Much water infrastructure is long lasting (100+ years) and has high investment costs. This makes it difficult to build the business case, with companies operating on short term business cycles and seeking acceptable returns on investment. To make the business case positive often requires a large-scale roll-out. Changing long lasting existing infrastructure that is already in place is both unsustainable and expensive. In addition to this the low cost/value of water affects the business case.

Lack of funding mechanisms

Given the risks of new technologies and the high Technology Readiness Levels needed in the sector, there is little encouragement to take on these risks, with no structural risk funding available. Financial support is needed from the initial idea through to full scale operations.

Expectation mismatch

There is often a mismatch in expectations between the business' needs and the researchers' innovation offering. Many researchers lack industrial exposure and are unfamiliar with the challenges of water services. There is a lack of understanding across the sector, including researchers, buyers and regulators, on how to encourage innovation development and uptake.

Industry conservatism

The water industry is generally conservative and risk averse with a business-as-usual approach, focussed on operations. Key Performance Indicators are linked to operations not innovation. In this context innovation is seen as a threat or a risk. Procurement is normally conventional and linear and tends to pre-describe solutions rather than seek new ways of doing things.

Lack of human capital – resources, knowledge and skills

End users lack time to explore innovations and often don't know about them. They are focussed on daily operations. Businesses have low scientific knowledge and researchers have low business and management skills.

Other issues identified also included:

- A lack of demonstration projects and sites
- Publishing language barriers.

Key messages

- **Improve industry-university collaboration**
The key message was that solutions must be co-designed with end users, with all stakeholders engaged throughout the R&D process, using a cross-disciplinary approach. Some ideas to encourage this collaboration included: developing joint organisations between universities and industry; research students being given industrial exposure to familiarise them with the challenges faced by industry e.g., through industrial internships; joint PhD projects between industry and universities.
- **Funding** – regional and national funding is needed to support innovation from the initial idea right through to full scale operations. Funding needs include for research in the digitalisation sector; project development and structural risk funding/investment.
- **Operational testing and demonstrations** - any solution must be resilient, robust and reliable with testimonials being very important. Demonstration sites such as at the water and wastewater utilities are critical.
- **Make data accessible** - consider ways to allow for sharing of information and improved data accessibility across the sector, maintaining GDPR and data safety
- **Improved procurement processes** – procurement needs to move away from pre-defining the solution, focussing instead on identifying the specific challenge or problem to allow bidding for innovative solutions. The R&D for these solutions could then be supported if necessary. Innovation should be a key criteria and procurement policy needs to be based on circular economy principles and full product life cycle analysis. This includes requiring information about the carbon footprint of products, upstream suppliers, contractors and partners.
- **Human capital** – researchers need to receive more industrial exposure allowing them to better understand the challenges faced by users in the field. Operators/end users need to know about innovations and have opportunities to explore them. There should be more development opportunities for end users to increase their skills e.g. in programming and handling large data sets. Research project development should be undertaken jointly between universities and industry, drawing on the different and complementary knowledge and skillsets. The water sector needs to ensure that they employ people with the necessary skills and knowledge to deliver outcomes.
- **Move from value chains to value networks** – by including utilities, engaging all stakeholders, collaboratively creating the revenue model, and employing a cross-disciplinary approach to project development.
- **Increase the marginal cost of water** – this will make business cases for innovative technologies more competitive, shortening the time to achieve a return on investment.

Example of focus areas for action

- Infrastructure material choices
- Green blue infrastructure
- Focus on data science
- New processes for N and P recovery
- Decentralised concepts with resource recovery at the source
- Energy efficiency
- Reduce leakages and transport costs
- Virtual tax model

The speakers and the panel:

- Johannes Lohaus, General Secretary, EWA,
- Kala Vairavamoorthy, Executive Director, IWA,
- Harsha Ratnaweera, Professor, Norwegian University of Life Sciences/EWA/IWA,
- Wendy Franken, CEO, VLARIO, Belgium/EWA;
- Sudhir Murthy, CEO NewHUB, USA;
- Ashish K Sahu, Marketing Manager, Cambi Group, Norway
- Thomas Wintgens, Professor, RWTH Aachen University, Germany
- Zakhar Maletskyi, Associate Professor, Norwegian University of Life Sciences