

Driving Innovation in the Water Industry

Introduction

This paper discusses the blockers and enablers to innovation in the engineering and construction industries based on research the author carried out on behalf of the Institution of Civil Engineers (ICE). It further explores how these specifically affect the UK water industry and how the regulator and organisations are responding, with the example of Thames Water's AMP6 Alliance, Eight20.

Context

Construction 2025 (Government and Industry in Partnership, 2013) is a joint strategy launched in 2015 between industry and Government which sets out how the different parties will work together to improve the UK industry in order to become a global leader in construction in the coming years. Four main targets are presented in the report:

33% Lower costs: Reduction in the initial cost of construction and the whole life cost of built asset

50% Faster Delivery: Reduction in the overall time, from inception to completion, for newbuild and refurbished assets

50% Lower Emissions: Reduction in greenhouse gas emissions in the built environment

50% Improvement in exports: Reduction in the trade gap between total exports and total imports for construction products and materials

A key driver alluded to throughout the report is a step up in innovation for the industry, so research was carried out to help inform the industry how to do this.

Meanwhile, we entered AMP6, the Water Industry's Asset Management Plan period for 2015-2020, where water companies have been challenged by the regulator OFWAT to reduce customer bills while delivering an improved service. This price review means water companies must deliver 'more for less', which is unlikely to be achieved by continuing business as usual; innovation will be key to achieving this.

Methodology

In 2015 the author carried out research, through literature reviews and interviews with key leaders in innovation, both within the construction industry and in other sectors such as pharmaceutical and aerospace. The research sought the answer the following key questions related to improving innovation in the UK construction industry:

- Why does the construction sector seem to be lagging behind other industries?
- Why is there a perception that it is too hard for the construction industry to innovate?
- What are the blockers to innovation in our industry?
- How can we overcome the blockers to enable and embed innovation in our industry?

Drivers for innovation/Reasons to innovate

There are many business reasons that companies should embed and invest in innovation, such as:

- Deliver increased value and exceed client expectations
- Improve reputation and gain a market advantage
- Reduce costs and maximise time efficiencies through increased productivity
- Drive improvements in safety
- Adapt to changing markets and diversify revenue streams
- Reduce resources, waste and carbon emissions
- Resist increased competition from other organisations
- Develop and retain a skilled workforce
- Adapt to technological change

Building Blocks of Innovation

The research showed that there is no single way to create an innovation culture, but rather, a collection of changes that when addressed together, can influence organisations and their ability to innovate. Presented here are the eight building blocks that can make this transformation happen, turn barriers into drivers and most importantly, unlock innovation across the UK Construction Industry.

- People
- Strategy and Delivery
- Procurement
- Investment
- Knowledge Sharing
- Standards and Regulation
- Research and Development
- Embracing Technology

People

Under the pressures of everyday delivery, people often require incentive to bring ideas to the table and when they do, it is important that they are not discouraged. The way in which ideas are received is critical. It is therefore important for leaders to offer high level support and set a vision for their organisation, with people at the centre of this. This means striving to encourage positive changes within the work environment so that employees feel valued.

Strategy and Delivery

There is often a misperception is that innovation and ideas are random, or arrive as 'a brainwave' but this notion is actually holding the industry back. In organisations that have embedded innovation, the process is highly systematised. This is observed more widely outside of the industry, where companies in the pharmaceuticals and agriculture industries have successfully implemented stage-gate processes to evaluate their ideas, produce prototypes and bring new products to market. Innovation needs to be well managed with a process and strategy.

Procurement

Traditional procurement approaches in the industry push risk down the supply chain, while any benefit from innovation goes to the client or end user of an asset. If there are contract types which share both the risks and rewards of doing things differently, this will provide incentivisation to innovate.

Investment

Investment is a crucial input in innovation. Investing in upskilling people and developing platforms, as well as traditional Research and Development initiatives, will create an environment where innovation can thrive. Investment is required in people, incentivisation, acquisition of new technologies, materials and processes, acquisition of data, marketing, innovation and knowledge platforms as well as R&D.

Knowledge Sharing

Traditionally, the construction industry has not been particularly proactive in sharing and learning from its successes and failures. The lack of knowledge capture from previous projects results in 'reinventing the wheel' and repeated mistakes. Learning should be shared cross-organisation and cross-industry, for the advancement of the whole industry together.

Research & Development

Currently, the UK construction industry does not invest heavily in Research & Development (R&D). This is proven at both a national level where construction lags behind other industries and internationally where despite increased investment, the UK as a whole "ranks only 13th within the EU member states" for the level of R&D intensity as a measure of GDP, for all industries. The Europe 2020 strategy has set a target for all EU members to achieve 3% of GDP being invested in R&D activities, but in 2011 this figure for the UK was recorded at only 1.77%.

On top of the UK's European competitors, China is aiming to invest 2.5% of their GDP in R&D by 2020, South Korea is aiming for 5% by 2022 and Brazil a target of 2.5% by 2022. Thus there is a clear need for the UK construction industry to step up its R&D activities to be able to compete in the innovation challenge.

Standards and Regulation

Standards and regulation that are highly prescriptive can stifle innovation. There has been little incentive or reward for exceeding or diverting from standards, encouraging the same tried-and-tested solutions to be re-used to meet requirements and prohibiting advances in technology from being driven forward, especially when not supported in regulated industries.

If designers and constructors have a better relationship with the regulators, it can sometimes be demonstrated that standards can be deviated from to incorporate innovation, without compromising safety, introducing increased risk or increasing costs.

Embracing Technology

BIM, sensors, drones, smart construction technologies and more are transforming the way assets are designed, built and operated. Embracing and exploiting the technology that is already available to in this industry, in a safe way, will enable innovations to move from concept to reality.

Innovation in the UK Water Industry

The UK water industry already has embraced and embedded many of the factors presented in the building blocks of innovation to drive efficiencies against their business plans, reduce emissions and offer a better customer experience.

Eight₂O Alliance

Eight₂O is an alliance of seven companies, put together to deliver AMP6 improvements to Thames Water's infrastructure. The alliance is made up of two joint ventures: Skanska, MWH & Balfour Beatty (SMB) and Costain & Atkins (CA), as well as Thames Water and IBM as a technology partner to

help facilitate innovation and promote best practice in data management. The alliance aims to achieve 20% efficiency against their business plan.

The key aspects of this alliancing partnership are:

- Painshare/gainshare mechanism in the contract to encourage a collaborative approach to innovation and efficiency. The risk and reward of innovation is shared, all parties stand to benefit from the savings, so all are incentivised to innovate and find efficiencies.
- Early Contractor Involvement stage – Eight2O was put together 2 years before the start of AMP6 to allow extra time to consider new opportunities; the best opportunities for innovation are at project outset before solutions are committed.
- A focus on the Needs and Outcomes of the business plan, not prescribed or assumed Solutions to issues.
- Focus on TOTEX (Total Expenditure) as opposed to favouring CAPEX (capital expenditure) over OPEX (operating expenditure) to ensure the best value on whole lifecycle cost.
- Stagegate reviews – projects do not pass to the next stage of design if innovation has not been considered.
- An ‘Innovation Hopper’ and a Risks, Opportunities and Investment (ROI) fund to implement these. Business cases for ideas come through the ‘innovation hopper’ and are reviewed to determine the likelihood of success and Return on Investment which will drive eight2O’s appetite to invest. Investment may be in terms of time, piloting projects, evaluation or financial.

Recommendations

The key recommendations for action for both companies and individuals to accelerate innovation are:

Recognising and celebrating the value of innovation at all scales

Innovation tends to be celebrated when it is ‘the big, the shiny and the new’. But often it’s the smaller improvements that can bring efficiencies and real value to clients and the supply chain, and can be classed as innovation, whatever the scale. Individuals and teams with bright ideas have the potential to change how we do things in the industry, it just needs to be shared. With increased visibility of the innovation, this will also increase future buy-in and engagement from our clients.

Taking individual responsibility and supporting others to innovate

Innovation should be everyone’s responsibility. Engineers often have the potential and capability to see things differently, come up with alternative solutions, if the right support is there. If an employee comes up with an idea, it might be a different person to put together the business case, and another who develops it. With support mechanisms in place to allow these networks to form and ideas to be taken forward, this will ensure innovators are encouraged, or they may take their ideas elsewhere.

Changing our culture and procurement approaches to embrace and embed innovation

In the construction industry, the value chain is not aligned to the risk chain. Clients might ask for innovation, but they won’t get it unless the contract reflects the relationship and risk distribution required. More collaboration and risk sharing is required. Early Contractor Involvement, getting designers, contractors and the client together as early as possible after project inception, to identify opportunities to innovate early, and Target Price Contracts with a pain gain mechanism means that

the whole supply chain is encouraged to innovate, because they stand to benefit from it, are good mechanisms to do this.

Investing in Innovation

To really accelerate innovation and make it 'business as usual' to innovate, what is really required is significant commitment and investment. Funding should be invested in sound science, good data and the knowledge that flows from this to foster innovation, in addition to training the workforce so they can embrace new technologies required for a digital economy. This can be supported by making use of existing funding initiatives such as through the European Commission and Innovate UK.

Conclusion

In order to accelerate innovation across the construction industry and specifically water industry, organisations, both clients and supply chain, must address the building blocks of innovation to turn them into enablers for innovation. Many organisations in the UK Water industry are already taking on board, as shown by the structured approach to efficiency within the Thames Water Eight₂O Alliance.

References

Partnership, G. a. (2013). *Construction 2025*. London: HM Government, Industrial Strategy.