DIGITAL TRANSFORMATION AND SUSTAINABLE DEVELOPMENT AT THE PORT OF TYNE

Rakin Rahman, Staff Reporter, Port Technology International, in conversation with **Ian Blake**, Head of Innovation and Technology, Port of Tyne

Exploring the transformative potential of digitalisation, PTI delved into the prospects of enhancing efficiency, safety, and sustainability at the Port of Tyne during the Maritime Innovation Week in November 2023, hosted at the 2050 Maritime Innovation Hub in the North East and at the BT Tower in central London. As we navigate the evolving landscape of port development, the question arises: How can the integration of digital technologies revolutionise operations and propel the Port of Tyne towards a more streamlined and resilient future? In this exploration, Ian Blake, Head of Innovation and Technology at the Port of Tyne, dissects the manifold ways in which digitalisation stands poised to redefine the maritime domain, shaping a narrative of progress and innovation within the port's infrastructure.

IB: We are at the beginning of our digitalisation and smart port journey, which has accelerated since 2019 when the UK government launched Maritime 2050. Here at the port, we launched Tyne 2050, which is our own 30-year transformational strategic plan, which is in line with Maritime 2050. Intentionally ambitious, our targets look to exceed UK government targets extensively, and we want to be net-zero by 2030. We think we will smash this target and hit it by 2027 or 2028.

I'm looking after the smart port initiative within the port for which the initial part of that strategy is the implementation of a 5G network. I see the 5G network as an enabler to many of the projects across the business. Once we have that wireless connectivity in place, and we can connect everything to everything, then the 5G network will act as a data-gathering platform to allow the port access to unprecedented levels of operational data that we've never had before. In the past, we've always relied on the exceptional knowledge of our operational staff, now we will be able to supplement

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that fantastic knowledge with critical information to allow the business to make data-led decisions in near real time.

We can look at the potential scenario planning and optimisation algorithms to ensure we're using the correct resources both manpower and equipment-wise to streamline the operation for the benefit of the customer and for ourselves at the port. We will add sensors to our equipment, plant, and machinery that will provide data to find optimal routes, relieve bottlenecks, and optimise fuel consumption, excessive idling, and emissions from the vehicles. We'll also be able to identify the optimal levels of equipment required. For example, we might be able to reduce the machinery and resources we use but still perform the way we are at the minute by using the equipment a little smarter.

We can use predictive monitoring and Artificial Intelligence (AI) to help with preventative maintenance around the site, we can find areas where we have frequent flooding, potential potholes, issues with street furniture, and missing signage, and we can reduce downtime and repair costs. We'll feed this information into our Digital Twin, which will then help the engineering departments deal with those repairs more quickly and efficiently than they are now.

We're currently trialing the use of AI over CCTV, and this will help us identify areas of poor practice and issues around things like not wearing Personal Protective Equipment (PPE), and near misses between equipment and pedestrians or people. Our VR simulation tools will then help to target training in specific areas. So, if you notice an issue in a warehouse, for example, we can target training for warehouse staff or quayside operations. We can then use the information from the Virtual Reality (VR) and AI tools to monitor improvements and compliance with best practices or for continuous improvement. Some of the technology may also allow us to relocate staff from the more hazardous areas of operations and allow remote monitoring, keeping our colleagues safer from harm. If we can take people away from the quayside and move them into the back office, there's a lower risk of harm and a more comfortable working environment. They don't have to be outside in the cold and rain.

The wireless network will also allow staff to report issues in real time at the point of issue, rather than requiring staff to return to the office as they do now to log something on a physical desk computer. All our staff will have been issued with smart devices that allow them to access the system's corporate communications across all aspects of the business. And we look to feed data from sensors in real time to operational systems, allowing us to remove the historic paper-based manual systems, spreadsheets, and the dual entry processes that were prevalent in the port. Simply put, we'll be able to do more with less, and as a business will be quicker, faster, safer, and smarter.

So how do I see the port's 5G private network helping with the decarbonisation targets?

The 5G network will be integral across the business and the data gathered will benefit all our 2050 objectives. From an operational perspective, we anticipate the data around vehicle movements across the sites will help us identify unnecessary journeys and excessive vehicle idling. This is going to lead to reduced fuel consumption and emissions generated once the data is analysed. Our data analysts and environmental team are already creating CO_2 dashboards around operational areas of the business to identify where we are undertaking unnecessary or excessive work. So, having this data will allow operations to plan work more efficiently and to utilise the storage that we have in a more effective manner. Learnings from this is already making a huge difference in key areas towards our net zero targets. We can also link building smart meters and water meters around the site to a centralised dashboard, allowing us to identify trends and produce targeted reduction strategies. More importantly, we can then monitor the success of these targets.

We are working with numerous accelerator programmes and SMEs to try and bring best practices, new emerging technology, and cross-sector successes into the maritime sector. Our aim is to promote maritime as an attractive proposition for new companies. Whereas in the past, we've been

seen as a sleeping dinosaur, the maritime sector is now open, ready, and ripe for improvement, especially around decarbonisation targets.

Initially, the port will be looking at its landside operations and we have an excellent team in place who are looking at those targets. Information from the 5G network will help create targeted strategies for the areas of the business that produce the most emissions and find ways to reduce them. It will also help us with our electrification strategy. If we know which areas of the business are using more diesel fuel or generating more emissions, we can target those areas as a

priority to help with reduction strategies.

When we start to think about challenges and obstacles that we've encountered while looking at digitalisation, the thing we need to understand and probably didn't grasp initially is the sheer size and scale of the challenge. The maritime industry is a very old industry with a lot of old data practices. I think it's generally accepted that the industry is behind the curve when it comes to the implementation of technology. Investment historically has been in plant and machinery around infrastructure and buildings. The IT back end has probably not been

as well funded as it could have been, but this is changing now with Maritime 2050 and the transition to smart ports.

There's still quite a lot to change and a lot of manual processes, spreadsheets, and disparate systems. We are looking at the systems that we've got to see where we can streamline them and make better use of information and systems integrations. The 5G network itself hasn't been without its challenges, the implementation of the physical infrastructure was quite smooth and went in quite well. We did have issues around scale because the size of the site around the port is a vast area of

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land and it's constantly evolving. For example, when we planned the network, we had specific cable routes and locations for antennas. During the installation, some of those locations changed. We've taken down lattice masts for health and safety reasons or for lighting improvement reasons. Some areas of land have been demolished and new buildings are being built, we have put in new roads, which have disrupted cable routes. Trying to install a sitewide infrastructure within a port is a constantly changing target due to the nature of how things move and change over time.

Also, with 5G being a relatively new technology, a lot of the use cases we're looking at are new and leading edge. Trying to prove a return on investment for infrastructure enhancements like this is difficult because the data isn't readily available in the marketplace to do that. At the Port of Tyne, we've been really lucky to have a supportive board and leadership team, who can see the future benefits of this technology.

One thing we want to do at the Port of Tyne and through the Innovation Hub is to lead the way and provide the ports that follow us with 5G implementation and use cases. We see the 2050 Innovation Hub here within the Port of Tyne as a lighthouse for the UK maritime sector and we want to help guide other ports and to collaborate, sharing our work with other UK ports. Our view is that we can become smarter if we work together. There are plenty of opportunities within maritime to work together on non-commercial areas, things like developing 5G use cases, helping realise energy savings, and improving cybersecurity. These are all ways we can work together for the greater benefit of the industry.

The key thing for us is to ensure we can deliver Tyne 2050 to bring our colleagues with us on the journey, so we're putting in a lot of time and effort into digital upskilling. We have provided all operational staff with smart devices so they can now access systems in real time and move away from paper-based forms. They need help and support to do that, and we are providing that, we want to make sure our staff are ready for the future. We want to ensure that the maritime industry is an attractive target for school leavers and graduates with our apprenticeship programme and our graduate programme. We want to bring in fresh blood, fresh ideas, and fresh impetus into our business and the wider sector. It's a long journey and we're just at the beginning. But we're fresh, we're ready and up for the challenge.

ABOUT THE AUTHOR:

Ian Blake, a seasoned Head of Innovation & Technology in the maritime industry, excels in IT Governance, Strategy, Service Desk, Security, and Management. Spearheading the groundbreaking 2050 Maritime Innovation Hub in the UK, he fosters cross-sector collaboration and explores emerging technologies for port advancements. Leading Smart Ports, 5G, Autonomous Logistics, and decarbonisation efforts, Ian holds an MBA in strategic leadership and is a CMI chartered manager.

ABOUT THE PORT:

The Port of Tyne, a key UK deepsea port in North East England, thrives as a vital trade gateway with £150 million ($190 million) invested in the last decade. Evolving into a major car exporter, it excels in handling diverse cargoes, providing secure logistics, and running a bustling passenger terminal. As a Trust Port, it operates commercially, reinvesting profits to benefit stakeholders. Recognised for innovation, the port envisions sustained growth, contributing significantly to North East England's economy and job market.