LCR4.0
HOLISTIC

PORT CITY
INNOVATION HUB

WAVE OF
INNOVATION

Contents

The Vision for Liverpool's Maritime Sector

Between 1815-1914, the Liverpool docks were considered a major world port and became the second port of the British Empire and one of the biggest ports in the world. Facilitating migration to America, achieving royal approval and being home to where the famous Titanic was registered, the Liverpool waterfront is embedded in lustrous history.

Liverpool's docks dominated global trade through the 19th century and to this day continues to generate a great deal of trade, being an integral part of the former World Heritage status for the city.

Today the docks and ports of Merseyside are thriving, following a £1Bn investment which enables Liverpool to take 95% of the world's largest ships, service four of the world's top five shipping lanes, attracting national attention following the development of the famous vessel RRS Sir David Attenborough, and even welcome many cruise lines including the bustling Disney Magic cruise ship.

With 3,400 port and logistics businesses residing in Merseyside, the region is home to several centres of excellence and the multiple large investments which contribute toward a thriving maritime industry. The successful sector brings £5Bn to the Liverpool City Region economy through business turnover, supports over 48,200 jobs and holds a predicted 7.2% expected growth between 2021 and 2025.

This data suggests there are countless opportunities for maritime businesses in the region, however, these are continuously matched with pressures for innovation and competitive challenges across new regulations coming into play, skills gap, security risks and rising costs.

The introduction of emerging digital technologies and tools is transforming the maritime sector, improving processes, product development, data collection and analysis, but many businesses are unsure what the first steps are for their own digital transformation. That's where LCR4.0 Holistic and Port City innovation Hub can help you capitalise on emerging opportunities through access to world-class advice and cluster networks.

LCR4.0 Holistic   LCR4.0 HOLISTIC

LCR4.0 HOLISTIC is a European Regional Development Fund initiative (ERDF), delivering the first city region-wide digital supply chain ecosystem; cross-linking traditional supply chains and clusters to create a city region supply chain network for offering greater business resilience, growth opportunities and diversification that will facilitate greater innovation in products and services and a unique proposition for inward investment and export post-COVID & Brexit.

Our team of technology and digital specialists will help your business to overcome industry challenges and barriers by improving visibility with analytical insight to enhance productivity, efficiencies, confidence, and drive practical and cost-effective solutions.

LCR4.0 Holistic is delivered by the Virtual Engineering Centre (University of Liverpool), Liverpool John Moores University, Science and Technology Facilities Council and the Growth Platform. The project offers businesses unique access to world-class facilities whilst supporting SMEs to forge new links between sectors, providing tailored technical & business support for encouraging business growth through diversification.

LCR4.0 Holistic follows the success of LCR4.0, an ERDF project which supported over 250 manufacturing SMEs across Liverpool City Region, generated an estimated £2.6m in Net GVA and supported the creation of over 80 jobs. LCR4.0 Holistic is extending the support available, reaching out to a magnitude of sectors, and collaborating cross-industry to strengthen the local supply chain.

The project has come to the region at an ideal time, as more and more businesses are looking to adopt digital technologies, realising their full potential for remaining competitive and for developing innovations like never before.

Port City Innovation Hub (PCiH)   PORT CITY INNOVATION HUB

PCiH is a first-of-its-kind, Innovation Accelerator initiative led by Wirral Council. The project of maritime sector expertise delivers region-wide business advice and support to increase the number of SMEs and start-ups, bringing new products and services to market for the maritime sector.
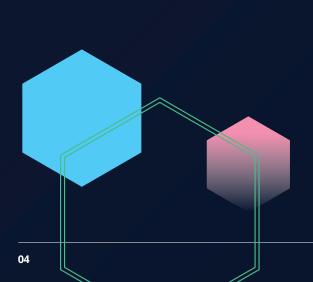
Participants can access distinct support offerings in innovation strategy, research and technology expertise, sprint masterclasses, mentorship, and market insight. The unique mix of accelerator services available means no two participant experiences will be exactly the same but there are some common activities which help structure the support SMEs receive.
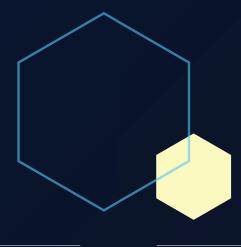
The programme is led by Wirral Council and jointly funded by the Liverpool City Region Combined Authority and the European Regional Development Fund (ERDF).
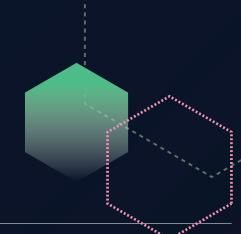
PCiH delivery partners include The University of Liverpool, the Wirral Chamber of Commerce, and international innovation consultancy Rainmaking.

In addition, a bespoke programme of events run by Mersey Maritime can help participants grow their presence in maritime industries with the opportunity to develop new markets and commercial partnerships.

Delivery partners Rainmaking has already led two successful cohorts of businesses looking to innovate within the maritime sector and is now accepting further applications. As part of this sprint, businesses that complete the program may be eligible to access further support through LCR4 START and LCR4.0 Holistic, where they can access fully funded expertise and support for developing a prototype of their product. This is an incredible opportunity to access a wealth of knowledge as well as secure early traction and test your business model. The Rainmaking team are global industry experts, leveraging their know-how to gain the tools and skills to launch and grow your new product.

WAVES OF **INNOVATION**

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Andrew Borland,
Head of Commercialisation

Virtual Engineering Centre,
lead partner for LCR4.0 Holistic

The LCR4.0 Holistic project is thrilled to be able to support and work with a magnitude of SMEs across the Liverpool City Region, particularly across the maritime sector. Liverpool has such a rich maritime history, and our teams are excited to be able to bridge the gap between traditional operations and use our unique expertise to introduce new and innovative ways of working through emerging technology and digital tools.

The LCR4.0 Holistic project aims to support businesses large and small for exploring how we can create and develop a new supply chain that provides a new paradigm for inclusive economic growth within the maritime community.
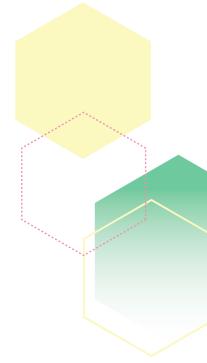
Technologies such as virtual reality, simulation, big data and the Internet of Things are proving to not only support businesses on their mission but also to help in overcoming industrial challenges, enabling us to become more competitive and resilient to future barriers to innovation.

The resources and groups behind the LCR4.0 projects and the Port City Innovation Hub (PCiH) are invaluable for businesses within the region and we urge any local businesses to get in touch to maximise these opportunities.

Cllr Tony Jones,

Chair of Wirral Council's Economic, Regeneration and Development Committee

"Port City innovation Hub will provide much-needed support for our maritime sector, which is an essential part of this region's economy. Bringing together businesses, industry expertise and world-class resources will allow dynamic new ideas, services and products to grow and flourish. This will create a welcome boost for the sector, offering economic growth, job creation and re-affirming Wirral as a place of innovation."

Steve Rotheram,

Metro Mayor of the Liverpool City Region

"The River Mersey and our docks have been the lifeblood of our region's fortunes for centuries. As a western-facing port, our maritime economy remains a key local industry... We've invested almost £700,000 in the Port City innovation Hub to help nurture the next generation of successful maritime businesses – and all the jobs and growth that they will create. Alongside the Wirral Waters Knowledge Hub, it will help to ensure that our maritime sector doesn't just remain strong, but becomes even stronger."

TRAINING AND UTILISING VISUALISATION TOOLS FOR SUPPORTING SKILLS DEVELOPMENT

The use of visualisation tools can enhance and transform training across the maritime industry. Not only new, but existing teams can utilise virtual tools for improving and enhancing the skills and capabilities of their workforce, meeting industrial regulations and increasing the resilience from within the business.

The development of high fidelity, animated interactive augmented reality applications can help maritime SMEs to introduce remote training, avoiding delays whilst collecting valuable data throughout training results, enabling businesses to tailor their training to specific areas including existing and new equipment or even to become better accustomed to new facilities on a 1:1 scale with precise accuracy and haptic technology for unlocking realism.

- Eye tracking for detailed reporting and findings
- De-risk environments through training findings through the identification of hazardous areas
- Keep teams safe through virtual tolls as part of a training programme, before staff members are placed within dangerous physical environments with irreversible consequences
- Increase worker confidence and motivation levels for improved productivity
- Reduced training times in addition to potentially large cost savings

The Virtual Engineering Centre rolls out remote learning and digital skills development to drive innovation

Shipyard and maritime company Cammel Laird and project partners, the National Nuclear Laboratory (NNL) worked in partnership with the Virtual Engineering Centre (VEC) through Project FAITH (Fuel Assemblies Incorporating Thermal Hydraulics), a two-year research and development project funded by the Department for Business, Energy and Industrial Strategy (BEIS) that aimed to build experimental rigs for thermal hydraulics tests as a model for implementing the shipyard's modular construction techniques for the nuclear industry.

FAITH collaborators learnt how advanced digital solutions and the continued development of digital skills within the workforce, can support their businesses to overcome project delivery challenges. The VEC provided Cammel Laird and NNL with a safe and unique hands-on experience for exploring how digital tools and visualisation techniques can help to improve their project review processes, exploring opportunities across teams and departments, especially whilst working remotely.

Through a digital testbed, the project investigated navigation and interactions for environmental demonstrations. Understanding the business benefits, the companies have prepared their Computer Aided Design (CAD) data and visionary renders for the use of Virtual Reality (VR) within their own teams. The VEC made unbiased software recommendations based on specific needs, including functionality comparisons and benefits to the partners.

Utilising the VEC facilities, Cammel Laird and NNL representatives were able to create and safely test interactive Virtual Reality VR environments which will be used for HAZOP testing, using navigational functionalities to ensure they meet best "good practice guidelines" and increase the safety of their teams. The specific digital skills which have been developed through these sessions will enable Cammel Laird and NNL to work confidently and remotely, using new skills and developing an understanding in-house and beyond Project FAITH.

02

DEVELOPING SMART PORTS FOR ENHANCED SECURITY AND EFFICIENCIES

A Smart Port focuses on automated and smart technology for enhanced data collection. This includes the use of Artificial Intelligence (AI), Big Data, Internet of Things (IoT) 5G connectivity and Blockchain technologies for improving performance throughout the company.

Industry 4.0 technologies can support port businesses in better tracking cargo and traffic by improving their handling systems and control management, digitalising integrated systems for improved booking and planning of activity whilst also monitoring environmental data for managing impact and carbon footprint.

Benefits of a Smart Port

• Increase efficiencies and productivity

• Informed decision making

• Enhanced economic competitiveness through increased port traffic

• Improve security levels

• The port becomes more environmentally sustainable

• Build complex logical queries with multiple criteria, gaining greater insight

Track Analytics for Effective Triage of Wide Area Surveillance Data

Following on from a preceding collaborative project where the VEC, the University of Liverpool's Professor Simon Maskell from the School of Electrical Engineering and Computer Science and the Defence Science and Technology Laboratory (Dstl) co-developed a system using existing Dstl data to improve on existing methods used to track, analyse and predict global maritime movement. Dstl wished to explore further how the use of these digital tools could be expanded upon by looking into other forms of transport and behavioural trends.

Accessing a High-Performance Computer (HPC), the VEC can run hundreds of simulated scenarios within a short period of time, allowing a range of different situations to be tested and considered. Analysis of activity, trends and the prediction of irregular behaviour could possibly highlight unusual and suspicious activity quickly for alert intervention to improve security around the ports.

The resulting solution successfully combines these multiple platforms to track, analyse and subsequently predict urban traffic movement, behaviours and destinations. This then allows alerts to be raised when inconsistent or suspicious behaviour is detected, and appropriate interventions activated.

This allows data analysts to quickly build complex logical queries with multiple criteria, leading to greater insight compared to a manual system which can also support improved detection rates and confidence levels through better informed decision making.

03

DIVERSIFICATION INTO NEW MARKETS FOR MAXIMISING NEW OPPORTUNITIES

Innovation is closely linked with the improvement of products and services, but diversification into new markets can offer a magnitude of additional benefits to maritime businesses. Diversification can not only offer improved business insight but introduces new opportunities for upskilling the current workforce and expanding opportunities for growth.

Maritime businesses looking to diversify into new markets, can maximise opportunities through the adoption of Industry 4.0 technologies, improving efficiencies across systems and processes whilst also driving cost-effective practical solutions which can help to overcome business and industry challenges and barriers.

Benefits of a diversification

- Attract a new workforce who brings a new and developed skill set
- Upskilling of existing staff with new technologies and operative methods
- Business resilience and strength against current and upcoming challenges
- Growth opportunities
- Accelerate greater innovation across products and services

Real Sphere Eco World

Real Sphere Eco World received support from Port City innovation Hub (PCiH) Innovation Adviser Lead, Ivo Kerkhof at the Wirral Chamber of Commerce, for developing new market opportunities for their high-performance cleaning products.

RS Eco World products are redefining cost, performance, and sustainability expectations for the most important cleaning products used in maritime industries. The dangers to crew and passenger health of untreated or poorly treated water tanks and pipework has long been understood. 'Shock' treatments to counter threats such as legionella and biofilm microorganisms currently rely on the standard industry practice of super chlorination which introduces the significant environmental risk of escape and disruption to vessel operations. Even when qualified individuals undertake application, chlorine has been proven to not effectively remove or strip away embedded biofilms.

Occidere Biofilm Disrupter is RS Eco World's game-changing product now taking the leisure marine industry by storm. The Biofilm Treatment coating provides long-lasting and cumulative protection preventing biofilm formation. The product will remain effective in all use cases as it contains no antibiotics and therefore poses no risk of microbial resistance.

RS Eco World is already reaping the rewards of real-world tests, justifying their confidence in the product. During the summer of 2022, independent live testing has been performed for private yacht water treatment. Treatment was conducted with crew onboard and with minimal disruption. Laboratory verified results revealed a complete eradication of harmful contaminants.

"We couldn't be more pleased with the results of the trials," says Co-Founder Paul Griffiths. *"Word-of-mouth spreads quickly in shipyards and we're now fulfilling new Occidere orders across Europe and further afield. There's also interest in our products from other industries and research organisations, so this is just the start of the Real Sphere Eco World journey".*

RS Eco World was recognised at the 2021 Mersey Maritime Awards as winners of the Micro Business Award and are nominated for the 2022 Technology & Innovation Award.

04

IMPROVING DATA CAPTURE AND MONITORING THROUGH 5G CONNECTIVITY FOR IMPROVED CUSTOMER SERVICE AND THE REDUCTION OF CARBON EMISSIONS

Managing big data can become a mammoth task which can take up a lot of resources including time and effort from allocated team members. With the growing pressure on businesses to support the Net Zero 2030 Agenda within the Liverpool City Region, even more businesses are assessing how they can exploit valuable and existing data for predicting their carbon footprint throughout the distribution chain and identify where changes can be made to reduce their environmental impact.

Technology Demonstrator

The Virtual Engineering Centre (VEC) can use data from reporting systems including ERP (Enterprise resource planning software) to monitor, analyse and interpret the insight of business activities. The patterns discovered in the data can be used to support business decision-making, as well as to predict future business events.

A company may use and develop hundreds of simulations based on the discovered knowledge with access to a High-Performance Computer (HPC) in a short period of time, allowing business owners to arrive at the best solution for their company, using exact figures and reducing the time for testing and research, supporting them in confidently making changes to their existing processes, knowing what the outcomes will be.
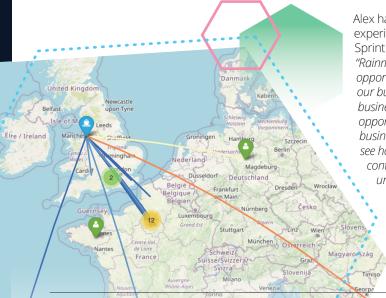
Enturi Solutions – PCiH Rainmaking Sprint Cohort 1

Enturi Solutions Ltd is a start-up venture with the vision to cultivate direct action to reach 2050 net-zero via diversifying the green-tech sector. Their mission is to conceptualise, sustainably manufacture, and operationalise disruptive green-tech hardware, starting with their unique Enturi Turbine, utilising aerospace design features to revolutionise wind power at a decreased cost to the market.

Enturi's goal is to retrofit compact turbines to existing infrastructures across the UK and beyond, creating a discreet yet widespread green energy network to transition societies away from fossil fuel usage, simultaneously mitigating noise pollution, biodiversity impacts, unsustainable sourcing of materials, and landscape scarring.

CEO Alex Shakeshaft headed up Entruri's participation in the Sprint and was initially referred to the PCiH via the ERDF-funded University start-up Programme, LCR Founders. Both Alex and co-founder, Stuart, had come through the University of Liverpool. Alex received world-class weekly coaching, attended expert workshops on a variety of key topics on innovation including Maritime, and had the opportunity to pitch to Peel Ports. This engagement resulted in Peel Ports supporting Enturi in a major grant funding bid as part of the Clean Maritime Demonstration Competition.

The business continues to grow from strength to strength and to date has received seed funding, recruited an advisory board, and has a number of experienced industry leaders supporting its development.

Alex had this to say about his experience on the Rainmaking Sprint programme –
"Rainmaking is a fantastic opportunity for start-ups and helped our business robust and refine the business to what it is today. This opportunity truly accelerated our business over 20 weeks and we can see how far we have come. The content is fantastic, simple to understand, and well presented, and the additional sessions are extremely valuable."

05

UTILISING COMPUTER VISION FOR RAPID DETECTION AND TRACKING MARITIME ASSETS

Maritime piracy and illegal importation can have massive economic impacts to nations globally. Rapid developments in computer vision (CV) and artificial intelligence (AI) means we can eliminate the process of manually reviewing security footage in our mission to keep local waters safe through early identification of vessels, people, or even marine life.
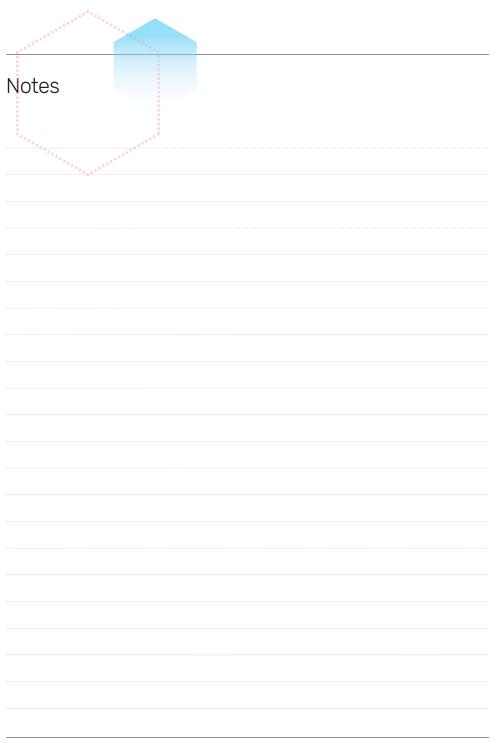
With this technology, the process for tracking and identifying anomalies in bodies of water can be automated, which can support the maritime industry for assisting search and rescue missions, border patrol, marine conservation, and national security.
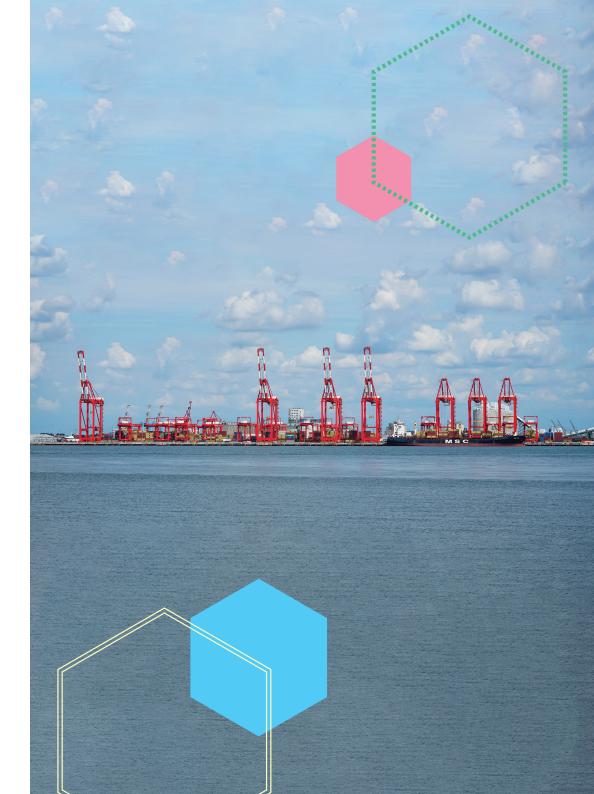
The Virtual Engineering Centre (VEC) have already used these same tools and techniques within an array of other industries such as logistics, manufacturing, and security. Some of these projects have included the use of unique ID numbers, barcodes and QR codes, developing robotic objects for sorting systems and detecting vehicle types in Wide Area Motion Imagery (WAMI).

Benefits of Adopting Computer Vision Technologies within the Maritime Sector:

• Automation of highly manual work reduces time and efforts spent

• Assist with jobs requiring high levels of concentration

• Improve security levels with early identification of objects

• Ability to autonomously track and count objects

• Provide research analytics through imagery

Notes

Get in touch

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