

Opportunity Statements for the 2050 Innovation Hub

- ***Automation and Real Time Information for Customers, Employees and Suppliers***
The implementation of a standardised community platform that will maximise efficiencies from our data and help us to operate collaboratively. Let's work smarter!

Port operations comprise multiple, disparate systems and are undertaken in ways that haven't changed for years. There are a lot of manual tasks that are routine and un-coordinated. Much of this is limiting the Port's ability to share useful data internally or externally in a timely manner. There is an increasing demand for data to be handled more efficiently to improve value for customers and stakeholders.

The vision:

- 1 year from now: standardisation of data sources; gap analysis completed; culture shift champions appointed; strategy for staggered roll-out, starting with operations.
- 5 years from now: sensors installed for monitoring positions of people and vehicles in the port; dashboard platforming all available data; API to external parties for blockchain, weather, Google traffic.
- 10 years from now: acting on trends – predictive maintenance and internal / local traffic flows; automated and responsive shift planning; process sandboxing based on past data; digital facility to interact with dashboard and automated operation.

The opportunity is to:

- Leverage advances in technology.
- Work collaboratively.
- Connect with all stakeholders.
- Standardise systems and processes.
- Harvest data.

Examples of current practices that could benefit from efficient handling of data are:

- Berth utilisation and scheduling.
- Warehouse utilisation.
- Resourcing of plant and people.
- Maintenance planning.

Opportunity areas for automation for safety and efficiency are:

- Autonomous feeders and barges.
- Quayside crane operations.
- Movements on site.
- Environmental monitoring – e.g. drones.
- Autonomous and remote assistance pilotage.
- Docking.
- Freight loading and unloading.

Functional requirements:

- Open app developer platform for data.
- Incorporate weather.
- Needs predictive and comparative capability - metrics and trends.
- Capable of storing huge volumes of data.
- Capable of high availability as a communal system with multi-layered data.
- Security – able to protect from cyber threats and cross-infection of data feeds.

- **Regional Distribution Centre**

Developing smart distribution centres for the consolidation of deliveries into urban areas.

The evaluation and development of an environmentally-friendly freight consolidation centre for urban areas to address the Government's challenge to reduce NOx emissions by 2021 to legal levels utilising multi-modal transportation.

Concern about health impacts of air pollution has led Government to order urban councils to bring down excessive levels of NOx emissions by 2021. One of the major contributors to urban congestion emissions are freight deliveries to city centres. A smart freight consolidation system could contribute to the solution.

The vision:

- 1 year from now: clarify rationale and impact to stakeholders; data analysis, collection and prototyping of freight consolidation system – who, what and where should the consolidation point be; further development of clean vehicle technology.
- 5+ years from now: use of clean transport for the above; development of network of centres.
- 10+ years from now: reduction in environmental impact; cost and time reductions; extend process to households and new transportation such as drones and robots on dedicated routes.

The opportunity is to:

- Reduce NOx.
- Have fewer vehicles in urban areas.
- Connect and develop regional transport ecosystems.
- Use innovative delivery approaches.
- Take a multi-modal approach.
- Optimise land in distribution centres.

Target benefits are to:

- Avoid the introduction of a congestion / emission tax for the public and business.
- Improve health and reduce care costs.
- Have more attractive and accessible urban areas, with a revitalised city centre.
- Have cleaner air, in line with Government legal levels or better.
- Generate upskilling and new jobs,
- Attract more business to the region via the distribution centre.

Functional requirements:

- Open technology solution.
- Technology on an accessible, open platform.
- Scalability.
- No constraints on what could be transported: chilled; perishable; hazardous etc.
- Initially able to use existing road, rail, air, river infrastructure.

- **Predictive Safety and Environmental Impact Modelling**
Using data to understand the impact of decisions before they are implemented to create a safer, cleaner workplace, comply with regulations, reduce cost and support stakeholders.

Port of Tyne to become a zero-harm, sustainable and resilient port by 2030 via this predictive modelling project.

A digital twin view Safety and Environmental data that will enable a holistic view of the safety and environmental landscape. This will facilitate a proactive approach to the management of these issues and challenges and help to identify opportunities.

All incidents are currently being recorded, but there are multiple systems in use which do not speak to each other. Environmental issues are not continuously monitored via sensors, but all issues are recorded. There is minimal forecasting and no current modelling.

Benchmarking is done in line with industry practice.

The vision:

- 1 year from now: benchmark of current environment and safety / accident data, problem definition, environment data gathering – land, sea, air – understanding what to measure and how, as well as the baseline; understand patterns of safety incidents and impact; culture that is more safety and environmentally aware;
- 5 years from now: zero harm and zero negative impact on the environment. Health and Safety predictive model created and technology used to reduce incidents; aggressive, benchmarked targets across the industry.
- 10 years from now: proactive management of the future risks and environmental impacts.

Proactive approach:

- Full stakeholder engagement, with the creation of steering groups.
- Culture change and staff upskilling.
- Use of technology to validate decisions.

Target benefits are to:

- Have less, or no, impact on the environment.
- Exceed Health & Safety and Environmental compliance requirements and targets.
- Have a positive social impact.
- Be more attractive to customers.
- Improve stakeholder engagement.
- Have a positive financial impact – e.g. reduction in insurances.

Functional requirements:

- Predictive analytics dashboard with machine learning element.
- IoT sensors to capture environmental data.
- One system / systems that communicate with each other.
- Modular, APIs, scalable – with different permission levels.
- App and desktop functionality.
- Legacy data from site and around the industry to be used.
- Virtual reality training.
- Augmented reality to be used on the job.