

An aerial photograph of a wide river flowing through a city. Several boats are on the water, including a large green and white cargo barge in the foreground, a smaller blue boat, and a long dark barge further upstream. The right bank is lined with lush green trees and modern buildings, including a prominent tall glass skyscraper. The city skyline extends into the distance under a cloudy sky.

# Digitalisation Masterplan for inland ports and terminals

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Senior port expert

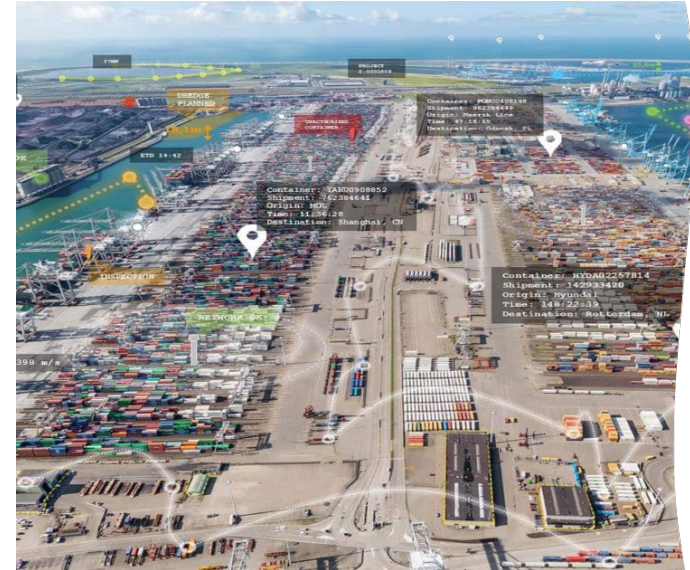
**Expert Meeting on Development of Ports and Port Operations (EM PORTS)**  
Danube Commission, Budapest, 26 March 2025.

## Objective and activities of Task 3 - Digitalisation

**Objective:** assess the potential of digitalisation for greening port operations, for ensuring multimodality and for facilitating sustainable development of inland ports

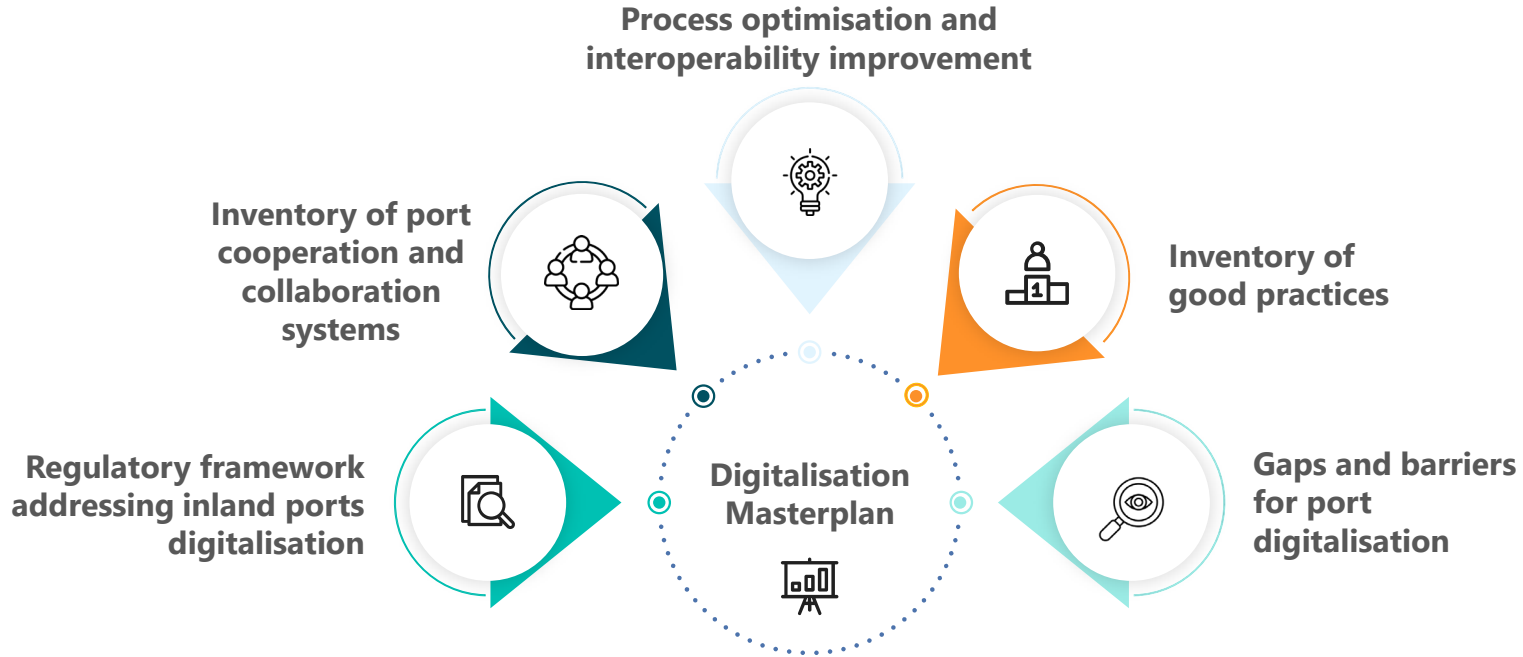
**Activities:**

1. **Regulatory framework** addressing inland ports digitalisation
2. **Inventory** of port cooperation and collaboration systems
3. **Process optimisation** and **interoperability improvement**
4. Inventory of **good practices** at EU and international level
5. **Digitalisation Masterplan** for inland ports and terminals comprising of the lessons learned based on the above results, a gap analysis being rolled out currently and further interviews/inputs from stakeholders



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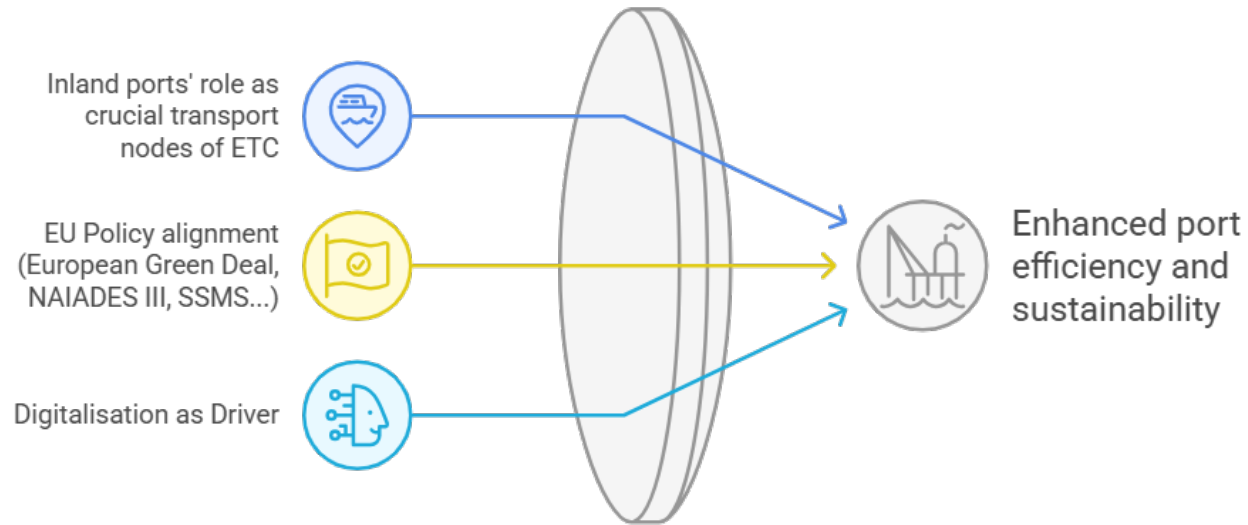
# Digitalisation Masterplan- input elements



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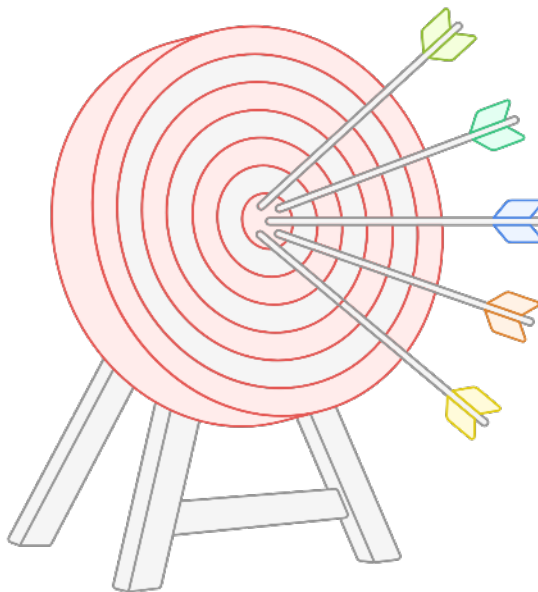
# Background



## Background for the Digitalisation Masterplan



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## Objectives of the Digitalisation Masterplan



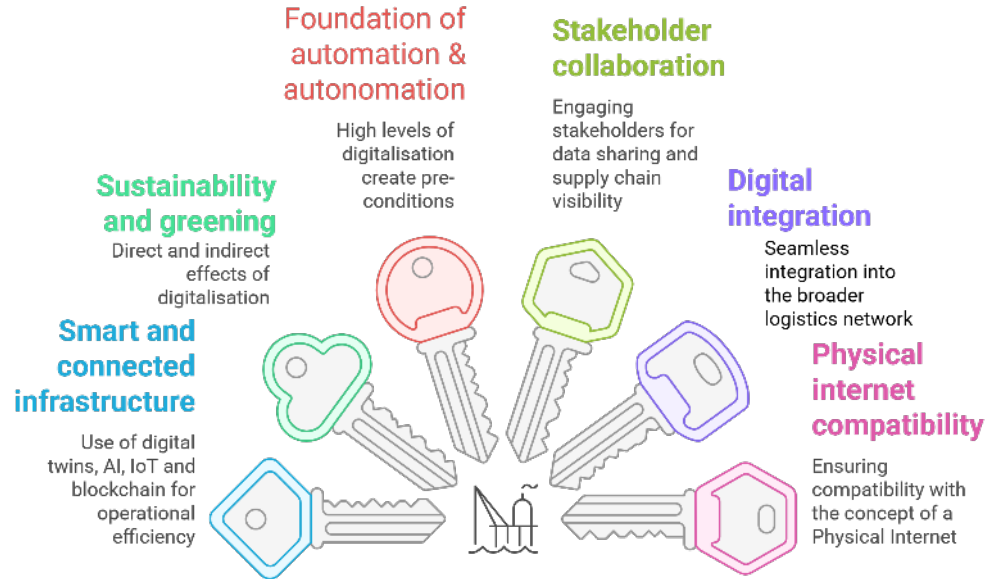
- 
**Vision**  
 Define clear vision for inland ports digitalisation
- 
**Strategy, Roadmap, and Action Plan**  
 Framework for achieving vision
- 
**Bridging the gaps**  
 Transitioning from the current to desired digitalisation levels
- 
**Self-assessment tools and guidelines**  
 Resources for evaluation
- 
**Stakeholder engagement and data-driven decision-making**  
 Collaborative and informed process

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# Vision statement

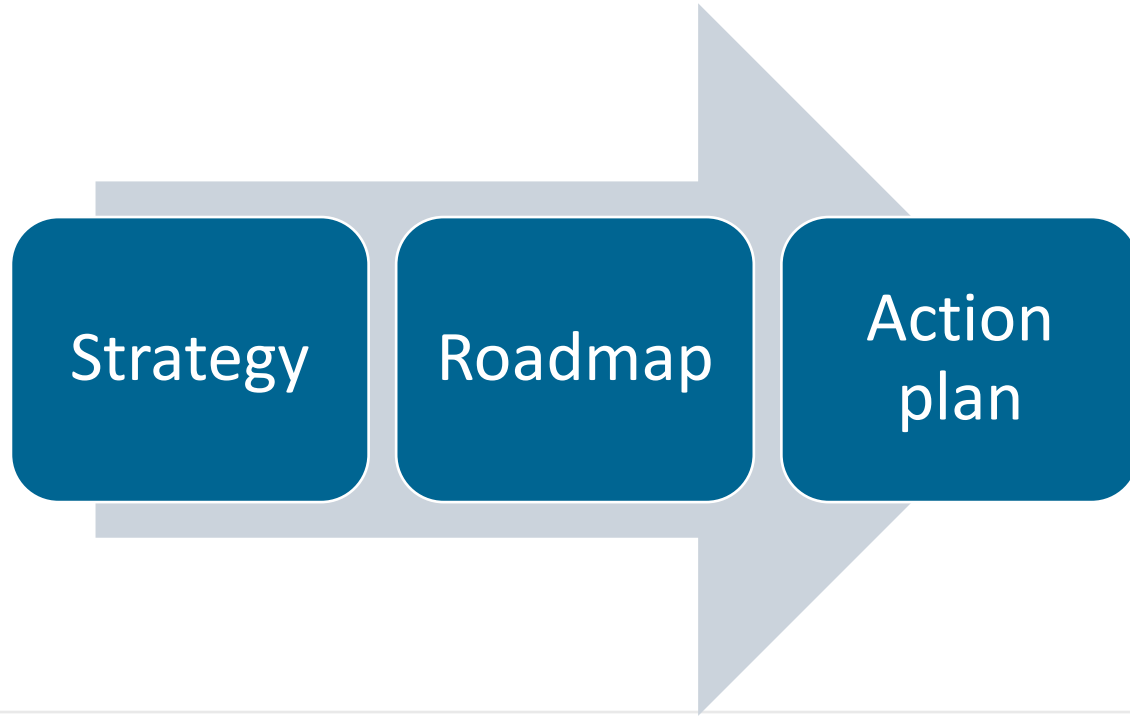
- “Inland ports in Europe are transformed into smart, interconnected, and sustainable logistics hubs that are digitally integrated in the broader logistics network. Inland ports use advanced digital technologies, including, but not limited to, digital twins, artificial intelligence, blockchain, and advanced data analytics, with the purposes of optimisation of freight and passenger flows, facilitating the performing of efficient, transparent, and sustainable operations that are aligned with the goals of the European Green Deal, Sustainable and Smart Mobility Strategy, and Inland Waterway Transport Digitalisation Vision. Inland ports are also fully compatible nodes in the concept of Physical Internet. Collaboration with all relevant stakeholders and related data-sharing facilitates the contribution of inland ports to end-to-end visibility and control over supply chains.”*

## Key elements of the inland ports digitalisation vision



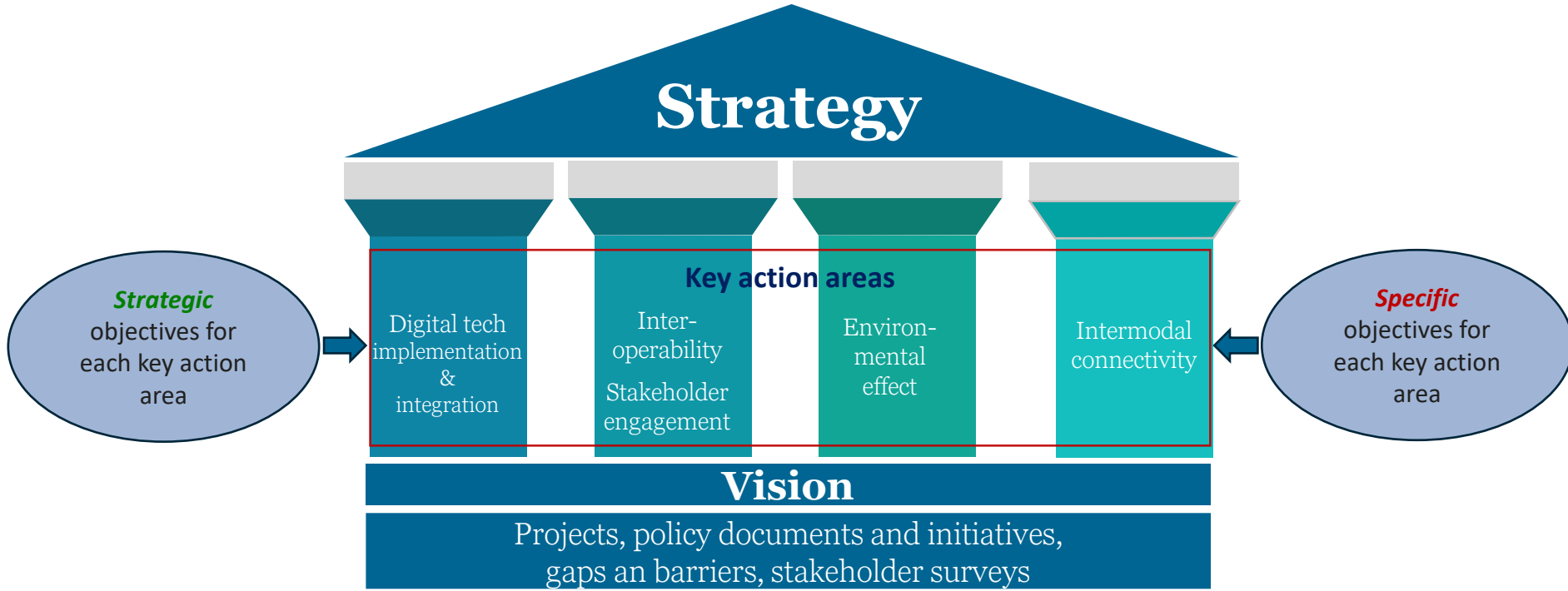
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# Framework for vision achievement



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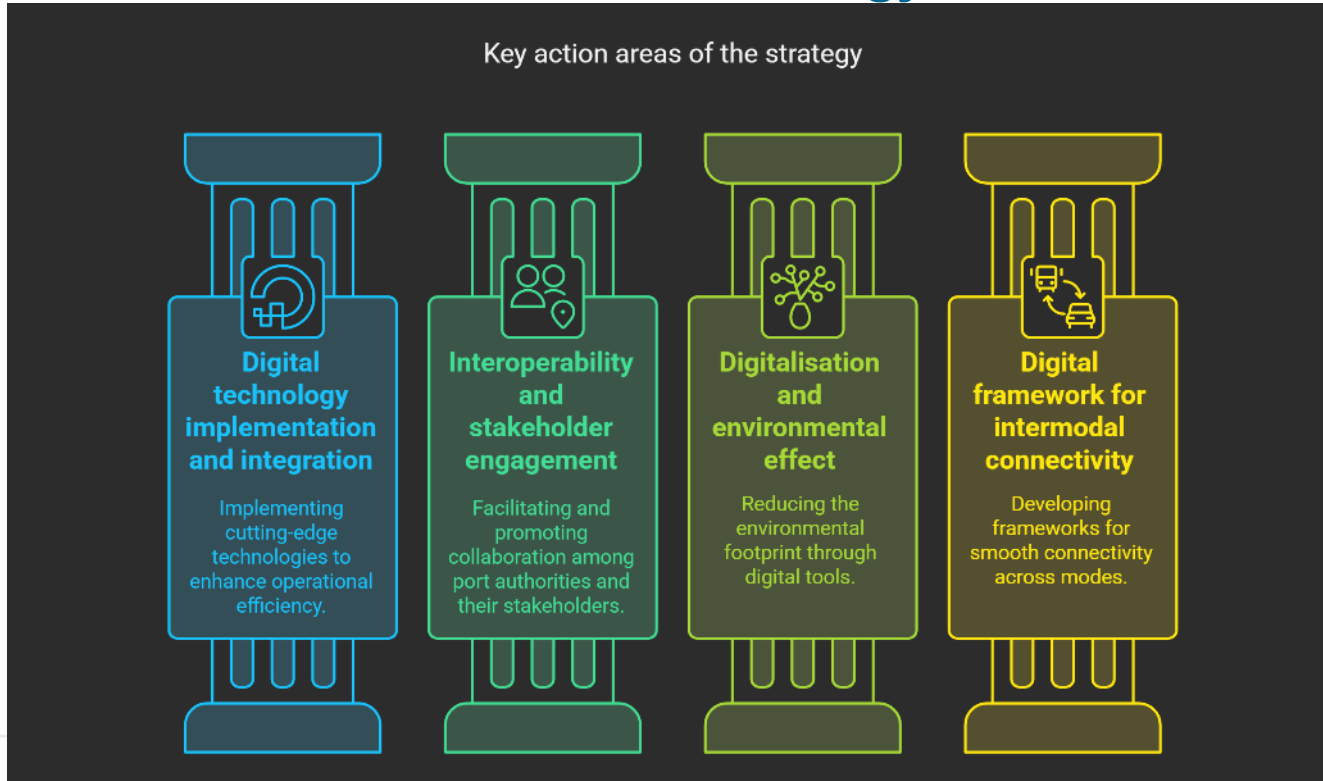
# Framework for vision achievement – Strategy



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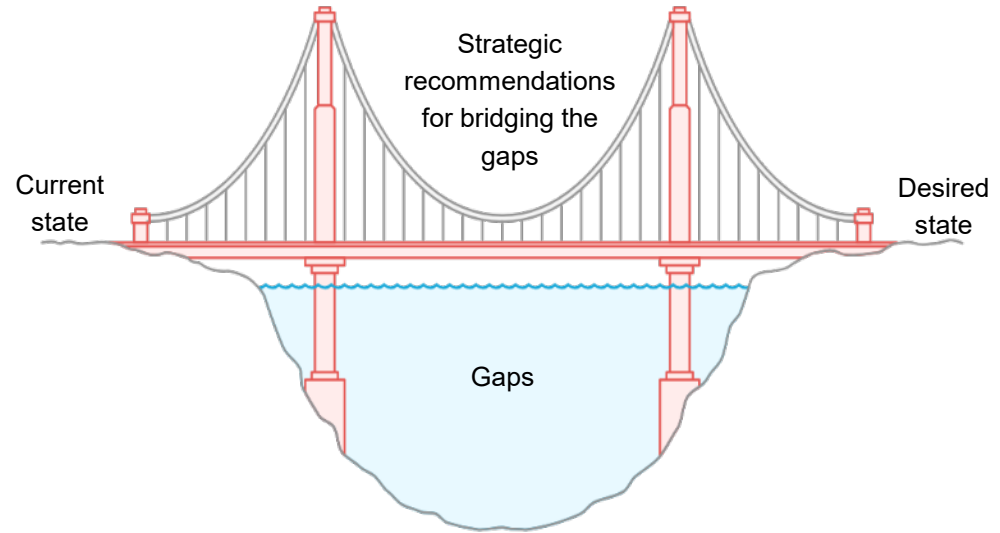
# Framework for vision achievement – Strategy



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## Framework for vision achievement – Strategy

- Current state defined for each key action area, on the basis of survey, interviews with ports, expert knowledge and desk research.
- Desired state based on digitalisation plans, available technologies and good practices.
- Identified gaps between the current and desired state
- Strategic recommendations and description for each measure intended for gap bridging in all four key action areas



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# Framework for vision achievement – Roadmap

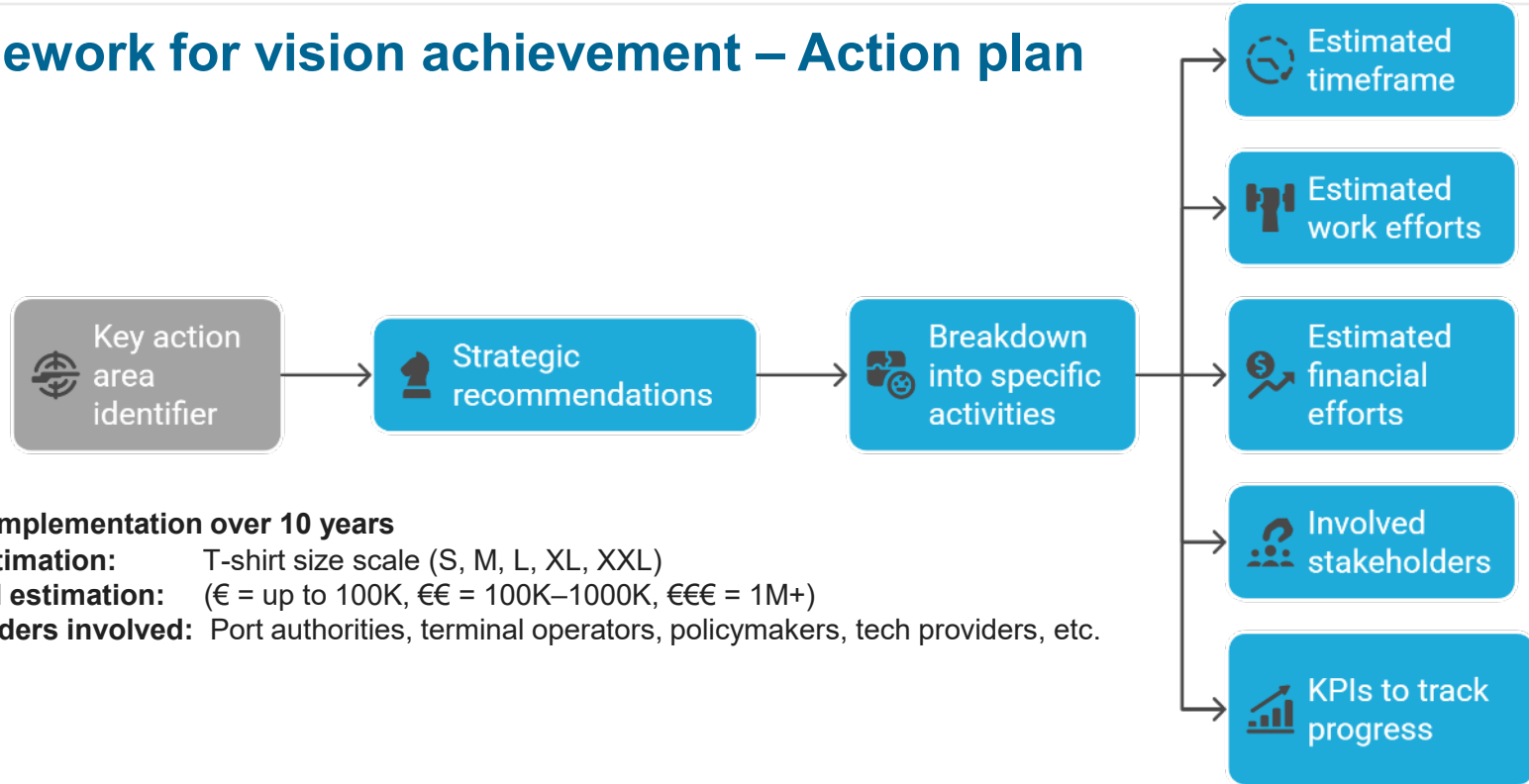
- Build a sound and common foundation
- Secure reachable victories
- Build networks for the future
- Support sectoral greening
- Final integration in the supply chain & innovative operations



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# Framework for vision achievement – Action plan



- **Phased implementation over 10 years**
- **Effort estimation:** T-shirt size scale (S, M, L, XL, XXL)
- **Financial estimation:** (€ = up to 100K, €€ = 100K–1000K, €€€ = 1M+)
- **Stakeholders involved:** Port authorities, terminal operators, policymakers, tech providers, etc.

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## Digital Maturity Self-assessment Tool (DMAT)

- The toolbox is used to assist ports to **self-assess the level of digital maturity**
- Port benchmarking against other ports in digital transformation, and identifies areas for improvement and track their progress over time.
- DMAT provide measures on:
  - **Technology adoption and integration**, which examines the extent to which digital tools and systems are applied and interconnected in the domain of port operations.
  - **Interoperability and collaboration**, where the tool assesses the ability of port's systems to share data and collaborate effectively with both internal and external stakeholders.
  - **Operational efficiency**, where the tool evaluates improvements that are achieved through digitalisation, real-time monitoring, and optimisation of resource allocation.
  - **Innovation and new business models applied**, evaluating the degree of application of innovative services in inland ports and their participation in wider digital ecosystems.
- Basic key performance indicator of the digital readiness/maturity of inland ports is defined as the **Digital Performance Index (DPI)**, which is designed to quantify the level of digital maturity of ports.

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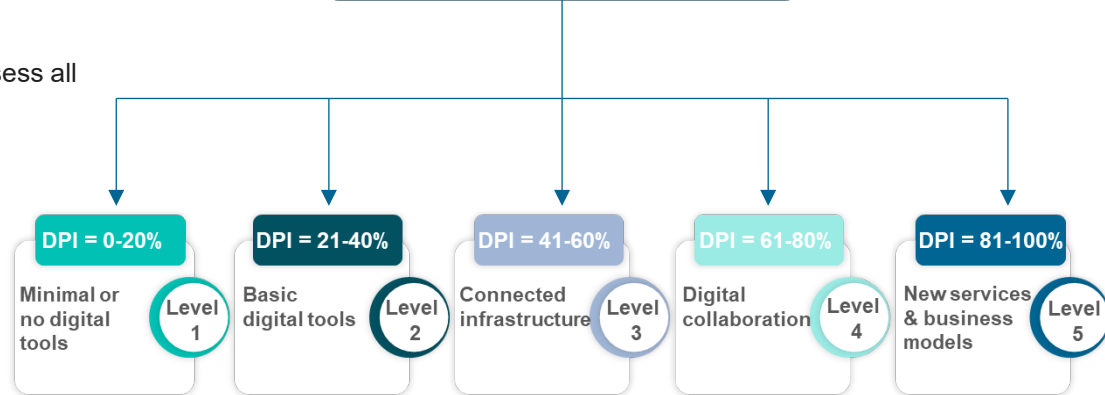
# Digital Maturity Self-assessment Tool (DMAT) – How does it work?

- General approach: “*Keep it as simple as possible*” – Port of Venlo (NL)
- DMAT (Web version and Excel version) measures the level of implementation of different digital technologies, systems, tools and practices across five levels of digital maturity
- Each level contains five assessment “dimensions” typical for that level.
- Using the scale from 0 (zero) to 4 (four), ports need to assess all dimensions in all five levels.

Scoring	Description
0	Non-existent or very minimal.
1	Basic or initial efforts.
2	Moderate or partially implemented.
3	Advanced or nearly complete.
4	Fully implemented and optimised.

**DPI Score**

$$DPI = \frac{\sum_{i=1}^n \text{Level}_n \text{ score obtained}}{\sum_{i=1}^n \text{Maximum score for Level}_n} \times 100\%$$

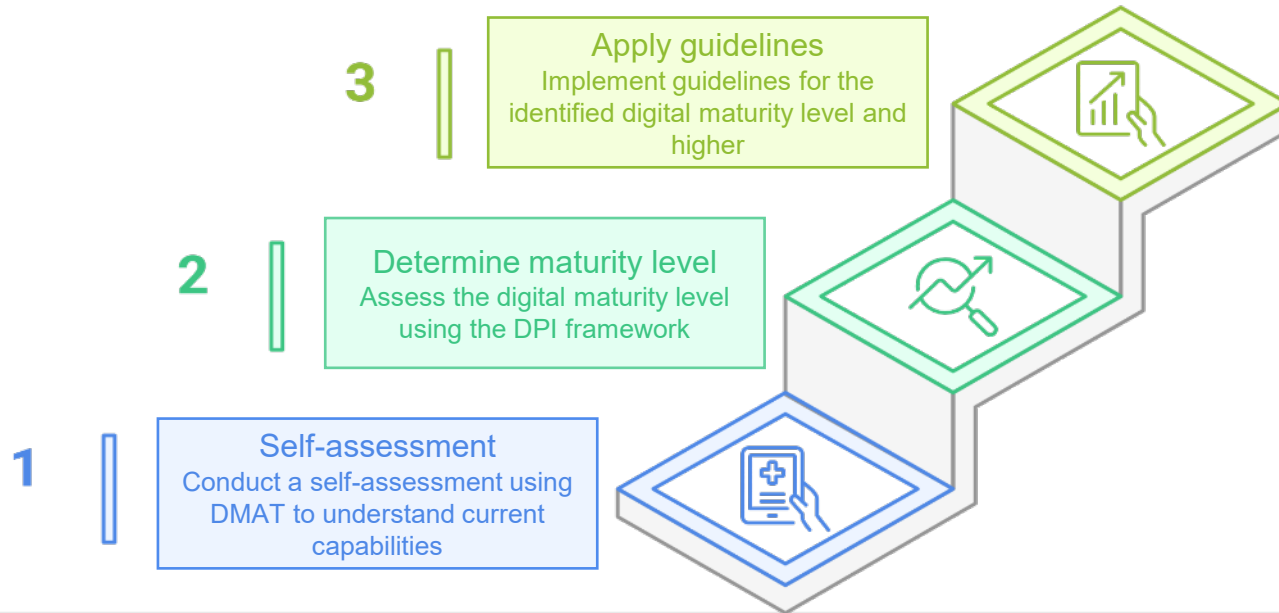


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# Digitalisation guidelines

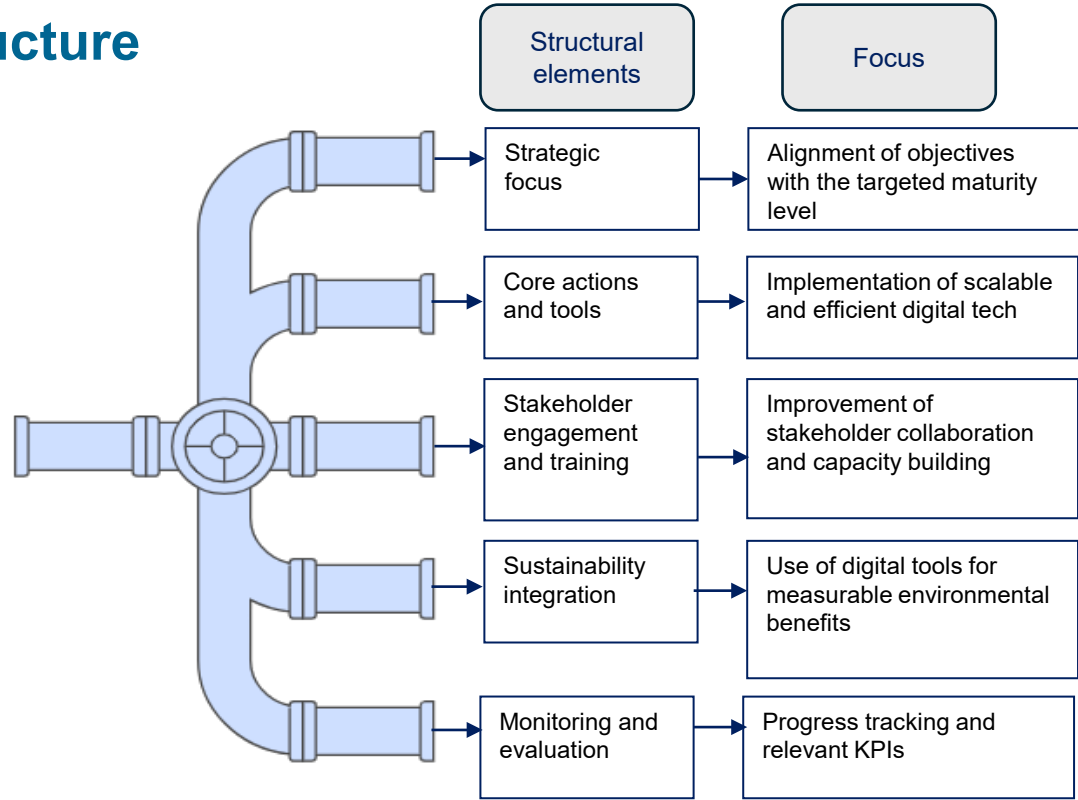
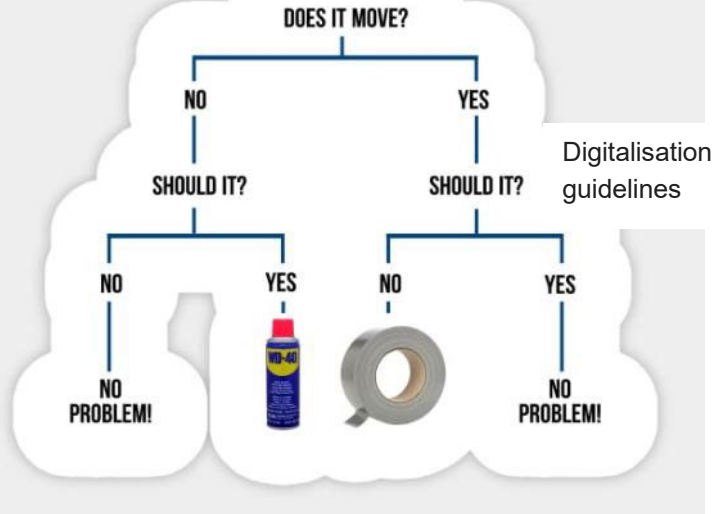
## How to use the Digitalisation Guidelines



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# Digitalisation guidelines structure

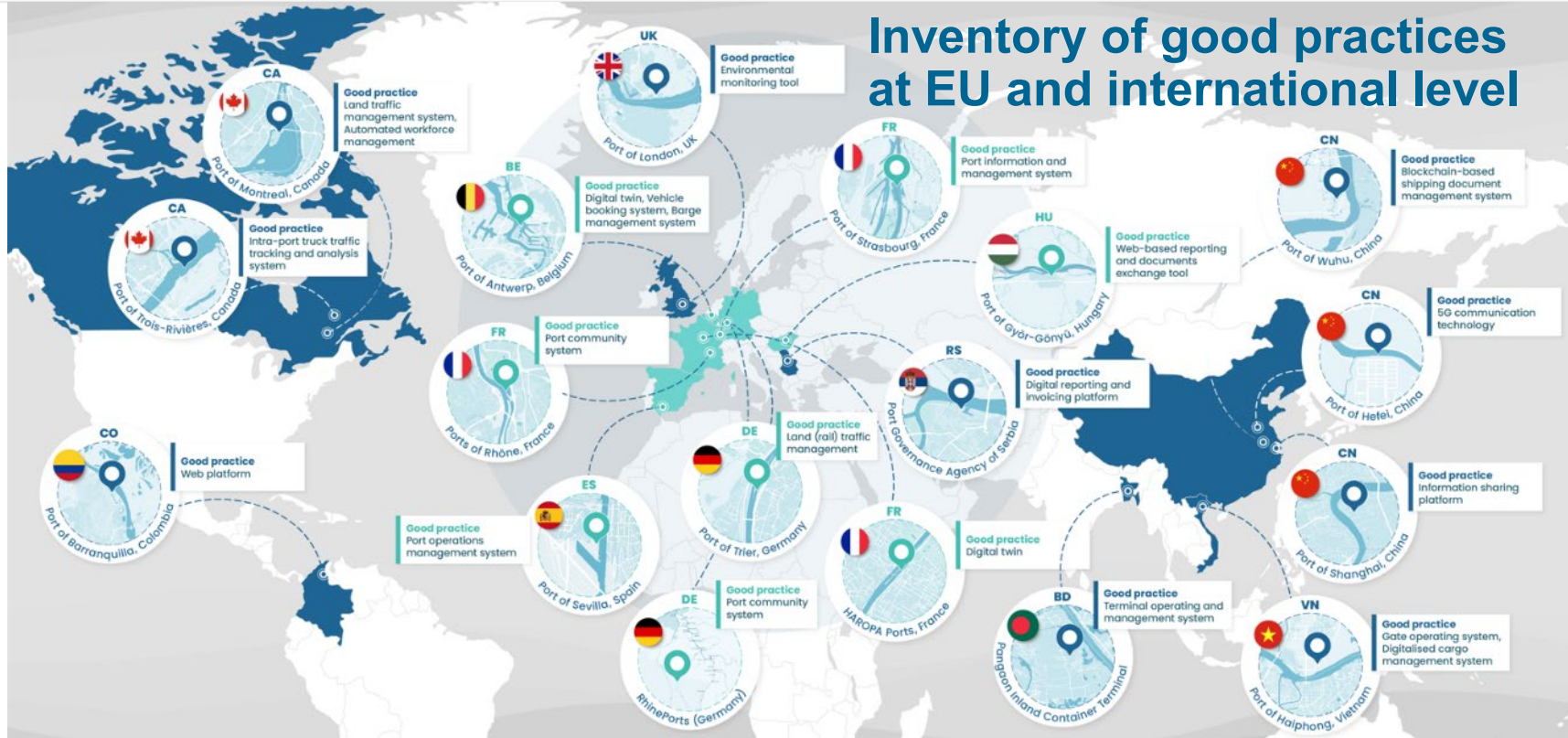
## ENGINEERING FLOWCHART



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# Inventory of good practices at EU and international level



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# Thank you!

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