MOVING TOWARDS A GLOBAL NETWORK OF PORTS

Port of Rotterdam

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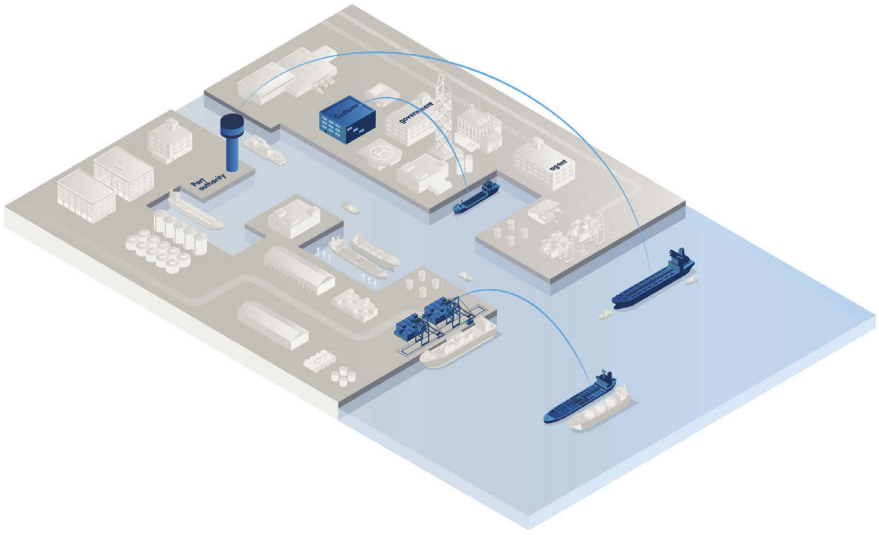
Digitization is a significant contemporary trend, and all ports and maritime companies are aware of the need for change. The question is: how and where to start? This paper outlines a model for digital maturity that shows how we, as ports, need to develop and exchange data in order to keep up with the developments taking place around us. We strongly believe in a step-by-step approach that keeps the process manageable and encourages the port community to get on board; within our Digital Maturity Model, four 'maturity levels' have been defined.

LEVEL 1: DIGITIZATION OF INDIVIDUAL PARTIES

Many different parties operate at a port, including the port authority, nautical service providers and terminals, and by digitizing their processes all of these players can work more efficiently. Every organization does this for itself and largely keeps the development of such processes under their own control. In order to achieve this digital

Level 1



goal, port companies implement what is known as a Port Management System (PMS), which supports the administrative and financial processing of calls and facilitates the digitization of the departure and arrival of ships, dock planning and cargo handling.

Another option could be to combine data science with – as an example – Automatic Identification System (AIS) technology on board ships. This, as well as the use of sensors within a port, can result in more efficient asset management. The Port of Rotterdam itself achieves savings of 5-10% in dredging costs by bundling the routes sailed with information on silt deposits in the port basins.

Automating the individual parties in the port enables data collection, which can be used to make the port run more cost-effectively, more safely and more sustainably. The implementation of the PMS in Rotterdam has shortened the turnaround time for ships by 30 minutes and, assuming a vessel costs €10,000 ($11,200 USD) per hour, this means around €150 million ($167.9 million) in annual savings [1].

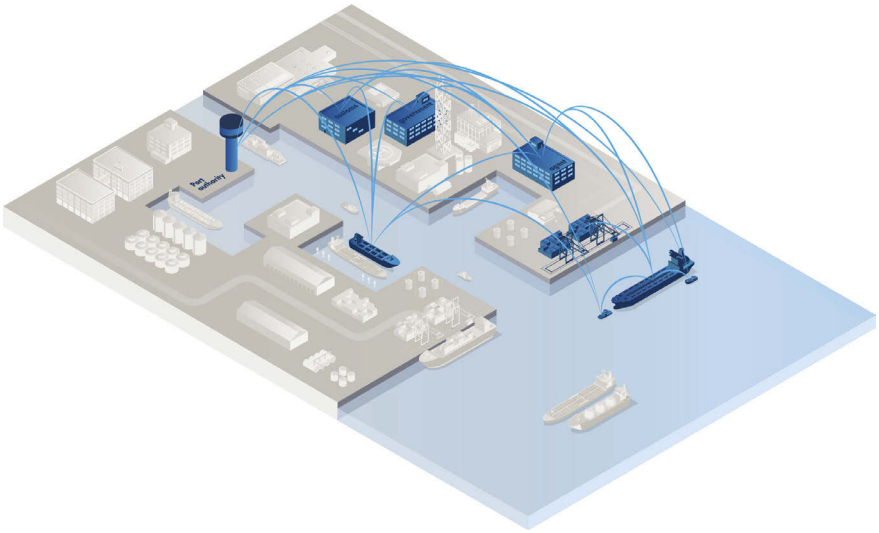
LEVEL 2: INTEGRATED SYSTEMS IN A PORT COMMUNITY

The digitization of individual processes heralds the digital exchange of information within the port community. Given that the number of players in a port can grow rapidly it is best to link all individual systems to one central platform, enabling the port to operate as a single entity. For this reason, systems in the Port of Rotterdam have been developed using the principles of security by design. Due to the fact that human activity also determines the level of data security, cyber security and cyber resilience need to be properly aligned to one another.

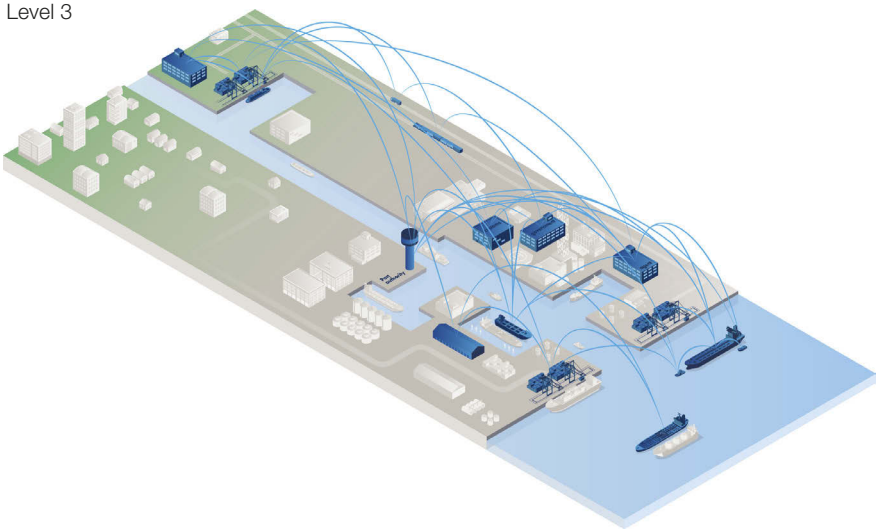
A Port Community System (PCS) forms a neutral, reliable basis for the digital exchange of information within the port community. This applies both to business-to-government (B2G) communication and to communication between companies (B2B). Data ownership and control of who may use which data needs to be arranged in such a way that it is always clear who data belongs to and who it may be shared with. This may not get in the way of exchanging new data. A port authority can play a neutral part in this and so offer added value to the port community.

While a PCS has traditionally focused on administrative data, the exchange of event data is now becoming increasingly important. People can use it to better predict how the logistics process will evolve. The exchange of event data and adding "brain" function makes a PCS more valuable. The annual added value of the PCA PortBase in the Port of Rotterdam amounted to €245 million [2], and savings include €30 million by reducing the number of phone calls, €100 million by reducing email traffic, and €10 million by reducing the volume of road freight mileage.

Level 2



Level 3



LEVEL 3: LOGISTICS CHAIN INTEGRATED WITH HINTERLAND

At this level, hinterland players are also involved in the digital communications taking place within the port community. Information from the PCS about ETA/ATA and ETD/ATD are shared with inland terminals, empty depots, carriers and other stakeholders. Consequently, parties in the hinterland have a real-time insight into cargo and ship visits, which makes better planning possible. Shippers are better able to guide their cargo over the available transport modes and transhipment hubs, as they can select the most efficient route for their cargo and have insight into the expected transit time. If they wish, they can contact carriers and/or transhipment hubs in the logistics chain. With tracking and tracing, all logistics chain players have insight into the status and location of cargo batches.

For ports and their hinterland, the digital sharing of information yields competitive advantages: shorter transit times, reliable hinterland transport and lower costs. For potential clients, this can be what prompts them to consider a port shift. In addition, ports and hinterland players can get to know each other's needs, as well as those of their clients, which reinforces their joint clout. However, digital communications with the hinterland chain will only run smoothly if clear standards and definitions related to the contractual agreements between chain parties are set.

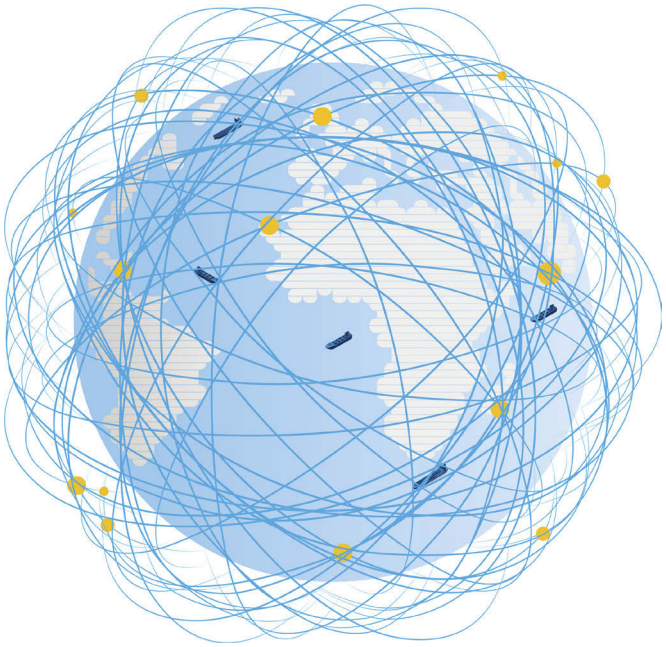
LEVEL 4: CONNECTED PORTS IN THE LOGISTICS CHAIN

At this level, an integrated door-to-door digital logistics chain is created on a global scale, making optimum use of different transport modes and creating benefits for all players along the logistics chain. Shippers and shipping companies are able to plan with greater accuracy and follow their cargo/ships in real time. Warehouses can maintain their stocks with small margins. Ports and terminals can forecast the ETAs and ETDs of ships more and more accurately and use their dock space and resources more effectively. This is not a luxury, given that currently around 30% of sea-going vessels still arrive more than 24 hours late [3].

The environment also benefits. The fulfilment of contract agreements by bulk carriers often leads to unnecessary emissions and high costs because the ships arrive at the port at the time arranged only to find themselves anchored outside the port because they are not yet allowed in. The fulfilment of contract arrangements on the basis of real-time information offers the opportunity of sailing more slowly, and therefore greener. Ships reach the port just in time and at the moment there is space available.

The linking of technologies, such as artificial intelligence, IoT and AIS, means everyone can access the information they need about sea-going vessels: location, cargo, crew data, port calls, and speed. A new era is dawning in shipping; one in which the entire logistics process will become transparent and predictable. We are convinced that this will result in a considerable improvement in global port calls, with several international shipping companies anticipating a potential saving of between €25 and €150 billion euros across the maritime industry [4]. In addition to this, studies have shown that emissions in international shipping could fall by 35% due to Just-in-Time (JIT) shipping [5].

Level 4



CONCLUSION

Working towards this - the highest level of digital maturity - is a challenge for everyone involved. For example, ports will have to enter into talks about sharing information with their rivals. In addition, global standards will have to be developed in order to make it possible to follow the logistics process from manufacture to the finished product on the shelf.

Based on the digital maturity model, ports can grow step by step into 'Smart Ports'. Although innovative technology plays a key role, it is not an objective in and of itself: the focus is on sharing data. The level at which this happens will have an impact on the digital maturity of a port, and on the associated benefits. We are happy to share our knowledge and experience in this area with all parties, as only together will we be able to work towards JIT operations and facilitate a seamless flow of cargo.

REVIEW POR IN THE AIS PORTAL

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ABOUT THE AUTHOR

Jan Gardeitchik originally studied Chemistry and Information Technology and he joined the Port of Rotterdam authority 35 years ago as a safety & environmental specialist. Within the Port authority he worked on various positions and was a senior manager for more than 20 years, leading both operational and staff departments. He was also trained as Incident Commander and has a broad experience in dealing with port emergencies.

He followed" leadership and executive development" programs at the Erasmus University and became head of the Policy and Innovation department of the Harbour Master Division.

He worked on the introduction of clean fuels for shipping, like LNG, Port Call Optimization programs and Cyber security resilience.

After working for some time in the Middle East he now is Business Development Manager Digital at Port of Rotterdam International. The digital product portfolio, bearing the name PortForward, is growing steadily. Port of Rotterdam develops digital tools and solutions not only for the Port of Rotterdam community but also offers them to other ports in the world.

ABOUT THE ORGANIZATION

The Port of Rotterdam is Europe's largest sea port. The port owes its leading position to outstanding accessibility for sea-going vessels, its intermodal connections and the 180,000 people working in and for Rotterdam's port and industrial area, a place where unlimited ambitions can become reality.

ENQUIRIES

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