

SMART PORTS AND MARITIME LOGISTICS FROM FINLAND

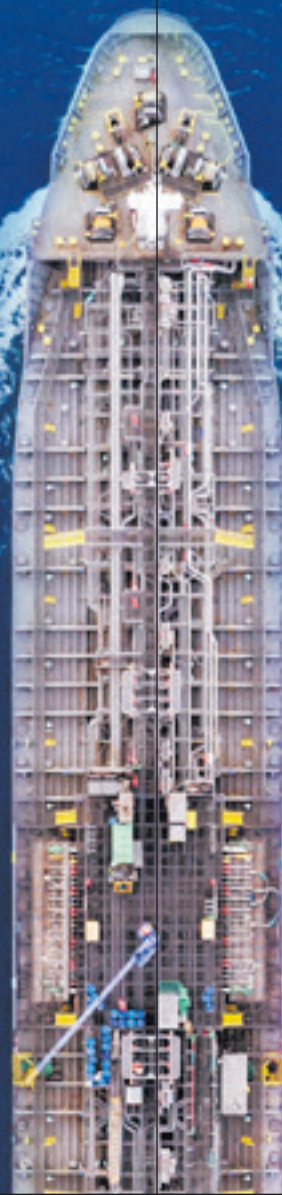
FINLAND IS A GLOBAL
FORERUNNER IN DIGITAL
INFRASTRUCTURE AND
INTELLIGENCE FOR PORTS

#FINLANDWORKS

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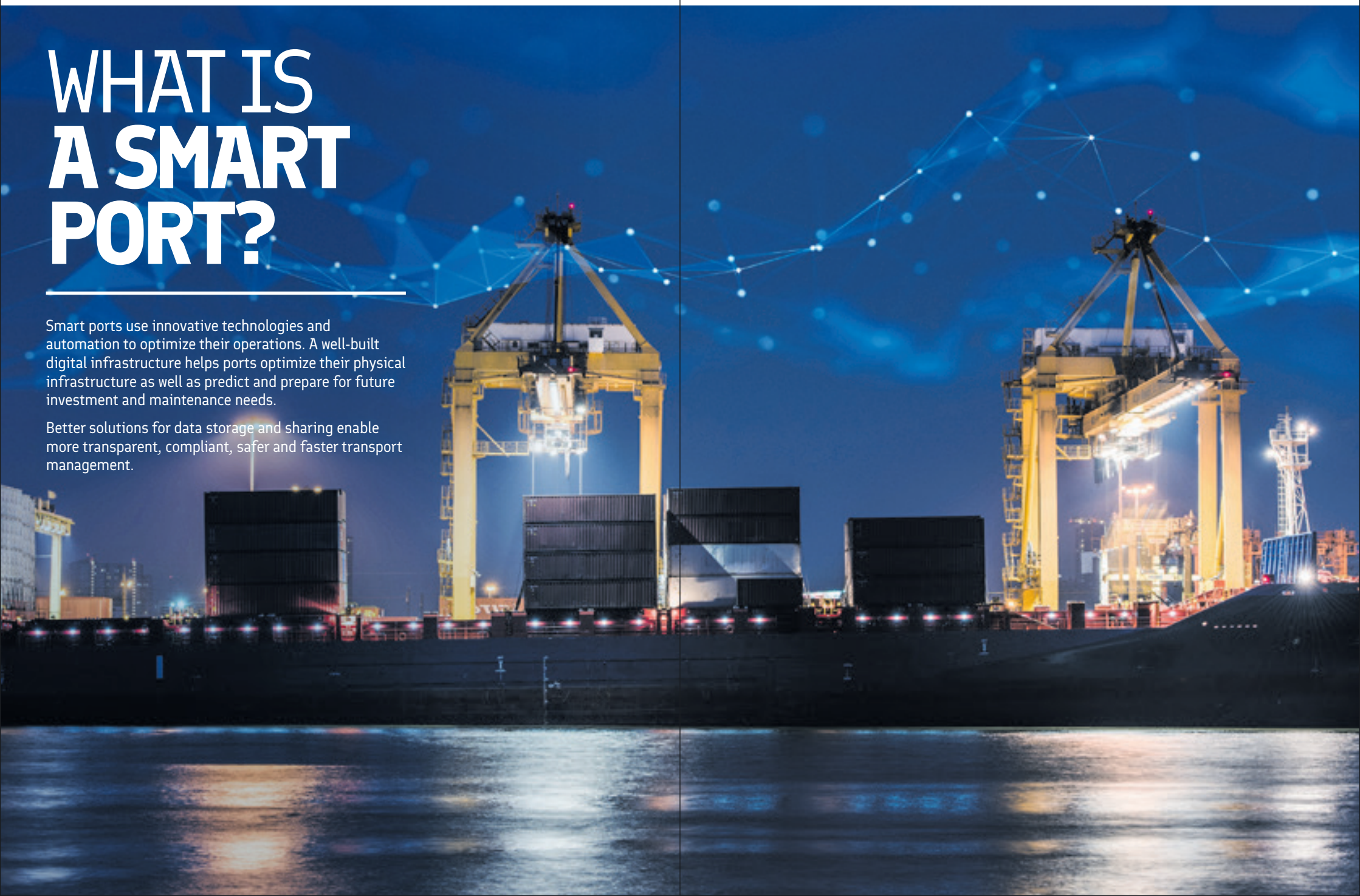
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WHAT IS A SMART PORT?

Smart ports use innovative technologies and automation to optimize their operations. A well-built digital infrastructure helps ports optimize their physical infrastructure as well as predict and prepare for future investment and maintenance needs.

Better solutions for data storage and sharing enable more transparent, compliant, safer and faster transport management.



IMPROVING PORT PERFORMANCE WITH INTELLIGENCE

As a leading country within the maritime and digital industries, Finland offers innovative solutions that lead to smarter ports. The Finnish Maritime Industries Cluster ranks high in applying digitalization, automation, autonomy and cloud-based technologies to port infrastructure and ecosystems, allowing them to unlock new value streams with information.

Finland is a global forerunner in developing digital solutions with competitive capabilities in artificial intelligence, sensing and wireless technology.



FINNISH MARITIME IN RANKINGS

#1

IN AUTONOMOUS
AND REMOTELY
CONTROLLED FERRIES
IN THE WORLD

FINNFERRIES 2018

#1

IN DIGITAL
COMPETITIVENESS
IN THE EU

DIGITAL ECONOMY AND SOCIETY
INDEX (DESI) 2019

#1

1ST TEST AREA FOR
THE AUTONOMOUS
MARITIME ECOSYSTEM

ONE SEA ECOSYSTEM

#1

1ST EVER TO USE
A 5G NETWORK
FOR PORT OPERATIONS

NOKIA

#1

THE WORLDS MOST
ECO-FRIENDLY
BULK CARRIERS

ESL SHIPPING

CONNECTED FOR SUCCESSFUL COLLABORATION

THIS BROCHURE HIGHLIGHTS THE WIDE ARRAY OF DIGITALIZATION, AUTOMATION AND ARTIFICIAL INTELLIGENCE SOLUTIONS WE OFFER TO MAKE PORTS SMARTER.

We also highlight two Finnish smart ports that have put these technologies into action. By offering cutting-edge technology, Finnish companies are showing the way to better integrate intelligent operations for the entire port ecosystem. They know how to combine and share essential sources of data with the myriad of maritime stakeholders, such as shipowners, terminal operators, regulation bodies, customs and many others.

We envision a world open to the opportunities of smarter maritime logistics and information hubs – the global ports of the future. Our vision is to enable every port to embrace digitalization and become the beacon of an intelligence hub.



LEADING RESEARCH AND INNOVATION IN FINLAND

ONE SEA

AUTONOMOUS MARITIME ECOSYSTEM



UNIVERSITY
OF TURKU

VTT

LEADING RESEARCH AND INNOVATION IN FINLAND

OPTIMIZING MARITIME LOGISTICS

ONE SEA

Autonomous maritime ecosystem

ONE SEA is an open alliance for global commercial organizations driving for an autonomous maritime system by 2025.

We are a leading industrial think tank and a platform for collaborators and competitors to address matters on technology, safety and security, operations, regulation, traffic control and ethics. The aim is to increase safety, sustainability and efficiency of maritime transport, including port operations.

We seek to harmonize the regulations and standards, interfaces and testing regime necessary to deliver a safe and commercially viable highly automated logistics system.

The system comprises physical infrastructure (ships, ports, freight and communication infrastructure), data infrastructure (cloud services, data interfaces and platforms),

as well as services enabling the interoperable travel and transport chains.

PROGRAMS TOWARD THE VISION

One Sea realizes its vision in working groups and research programs. An example of an ongoing program is Sea for Value – Fairway (S4VF), which aims for wide societal influence by providing concrete research-based recommendations on regulation, business, data usage and sharing and for standardization.

S4VF demonstrates the important milestones toward a smart and autonomous maritime transport system. These include smart fairway navigation, the ePilotage working environment on shore and remote pilotage experiments.



ABOUT ONE SEA

The One Sea ecosystem, established in 2016, gathers the global leaders in their industries to work together for an autonomous maritime system by 2025. Members include ABB, Awake.AI, Cargotec, Ericsson, Finnpilot Pilotage, Inmarsat, Kongsberg Maritime, MTI (Monohakobi Technology Institute – NYK Group's research subsidiary), NAPA, TietoEVRY, VTS Finland and Wartsila.

Other partners include Finnish Marine Industries, Finnish Port Association, Finnish Shipowners' Association, Shipbrokers Finland and The Royal Institution of Naval Architects (RINA).

One Sea is an open ecosystem that can be joined by anyone who intends to do business in autonomous shipping.

Financing is provided by participating companies and Business Finland. The One Sea ecosystem is hosted by DIMECC Ltd.

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LEADING RESEARCH AND INNOVATION IN FINLAND

RISKS, SAFETY AND SECURITY

AALTO UNIVERSITY carries out research on the analysis of risks, safety and security with a focus on the entire maritime ecosystem. The concepts of “smart shipping” and “smart port” have been our context of research in projects, such as AAWA, ÄLYVESI, Design for Value and Sea for Value – Fairway.

We develop new methods, frameworks and technologies for the management of risks, safety and security within the smart port concept. Our focus is on developing the foundations of an efficient strategy for the management of risks, safety and security that considers the needs of the socio-technical system and the demands of the regulatory framework.

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Aalto University
School of Engineering

MARITIME BUSINESS TRANSFORMATIONS

UNIVERSITY OF TURKU'S

Maritime @TSE studies economic and business transformations in the maritime sector. Our research builds on a long research tradition and collaboration with companies and other stakeholders.

Maritime@TSE is a platform that integrates several units and researchers engaged in maritime-related research at the School of Economics.

OUR AREAS OF EXPERTISE

1. Business renewal in the maritime sector, innovation management, business models, processes and organizational change
2. Efficient, safe, secure and sustainable maritime logistics services

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UNIVERSITY
OF TURKU

LEADING RESEARCH AND INNOVATION IN FINLAND

AUTOPORT FOR SMART LOGISTICS

**VTT TECHNICAL RESEARCH**

CENTRE OF FINLAND'S AUTOPORT co-innovation project consortium paves the way for operational excellence and new business concepts for autonomous logistics systems in ports. The consortium develops ecosystem-level approaches for logistics robot systems and works on stepwise automation and digitalization of ports and terminals for lifetime business.

EU H2020 COREALIS PROJECT

COREALIS stands for “Capacity with a positive environmental and societal footprint: ports in the future era.” This project proposes a strategic, innovative framework, supported by disruptive technologies and emerging 5G networks, for cargo ports to handle future capacity, traffic, efficiency and environmental challenges.

EU H2020 CYBER-MAR PROJECT

The Cyber-MAR project aims to develop cyber preparedness actions for a holistic approach and to raise awareness in the maritime logistics supply chain. The Cyber-MAR ultimate goal has two main directions – establishing a cyber ecosystem to prepare for cyberattacks in the maritime environment and estimating the impact of a cyberattack from a financial perspective.

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PHYSICAL AND VIRTUAL PORT INFRASTRUCTURE AND OPERATION

Aker Arctic
The Ice Technology Partner

awake.ai

SILO_{AI}

Reaktor

UNIKIE

VTT
SenseWay

KEMPPI

Maker_{3D}



PHYSICAL AND VIRTUAL PORT INFRASTRUCTURE AND OPERATION

ICE MANAGEMENT IN PORTS

Aker Arctic
The Ice Technology Partner

AKER ARCTIC investigates possible challenges and measures them at an early stage of the project, which allows the development of cost-effective, optimal, safe and efficient solutions for your port.

Standard solutions do not support ice management in port areas. Wintertime poses challenges for harbors due to cold temperature, brash ice growth, ice collar formation in wharves and icing of structures and equipment.

Ice drift produces intensive loads on structures and vessels. Ice accumulation inside port areas causes difficulties for vessel maneuvering and harbor operations. Ice blocks pushed against berth by an approaching vessel cause problems when position accuracy is essential for loading and unloading. Brash ice growth increases navigation time and cost.

CUTTING-EDGE ICE MANAGEMENT SOLUTIONS

Aker Arctic's 50 years of experience solving the challenges of ice and winter enable us to provide cutting-edge solutions and engineering for port planning and improvement projects.

- **Design and simulation of port layouts.** The location and layout of a terminal influence the structure and onshore equipment, and should be especially considered in cold areas. With our solution, the port layout can be verified, and fleet operation in the port area can be studied with a simulator.

- **Technical solutions** developed through our unique ice model testing basin prevent port facility icing and ice damage and keep ice loads from developing.



- **Ice management methods** as a normal requirement developed through our unique ice model testing basin prevent port facility icing and ice damage and keep ice loads from developing. Our ice protection barriers work effectively against drifted ice. In addition, we provide thermal energy and warm water circulation solutions for the protection of harbors from brash ice.

- **Numerical simulation** of ship logistics and operation in the port area. Our simulation solutions enable the optimization of ship routes, define which kind of ships can be used and specify the technical and environmental limitations.

REFERENCES

Aker Arctic has provided analysis, design and technical engineering services for the majority of the winter port projects in the arctic and freezing regions.

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PHYSICAL AND VIRTUAL PORT INFRASTRUCTURE AND OPERATION

FUTURE-PROOF COLLABORATION PLATFORM



AWAKE.AI is the growth engine for smart ports and shipping. Awake's platform for collaboration and optimization enables better operational planning for all logistics chain actors in real time.

The platform is built with future-proof and extendable architecture, which adapts to new emerging standards. The platform allows its users to focus on implementing their strategies on sustainable maritime logistics already today.

Awake.AI offers its Smart Port as a Service™ application and professional services for smart ports and shipping.

SMART PORT AS SERVICE™

Smart Port as a Service™ (SPaaS) is an integral component of the open and collaborative Awake platform. SPaaS is a web and mobile application offering a real-time overview and collaboration solution for all maritime actors. It improves situational awareness and enables smarter operational optimization, considerably benefiting the industry and society at large.

It includes features such as:

- All-around mapping
- Dynamic fleets
- Berth planning
- Task and resource planning
- Multimodal communication
- Accurate predictions

With more accurate predictions, all actors during the port call will save time and resources and are able to greatly increase their operational efficiency.

PROFESSIONAL SERVICES

Awake.AI's experts have experience developing intelligent shipping solutions and can help you to become an early adopter and industry leader in digitizing and automating your maritime logistics operations.

Awake.AI's team supports you all the way from conceptualization to design, implementation and optimization. Our services portfolio also contains industry-specific solutions, such as simulations, digital twins and optimization services for smart ports and shipping.



ABOUT AWAKE.AI

Awake.AI is a growth engine for smart ports and shipping. Awake.AI's mission is to lead the transition to sustainable and intelligent maritime logistics, where cumulatively 10% of the global CO2 emissions from shipping will be reduced by 2030 with the help of the ecosystem partners.

The platform, the first of its kind, is built from the ground up to accommodate seamless collaboration within the entire maritime logistics chain by sharing situational awareness and providing AI-supported predictions for future planning.

The APIs and applications built on top of the platform are available for customers and third parties using the subscription business model.

REFERENCES

Port of Rotterdam
Port Oulu
Port of Hanko
Port of Rauma

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PHYSICAL AND VIRTUAL PORT INFRASTRUCTURE AND OPERATION

ARTIFICIAL INTELLIGENCE FOR PORT OPERATIONS

SILO_{AI}

SILO AI is the largest private AI lab in the Nordics. We provide quick ramp-up in machine learning, computer vision and NLP, with an option to extend in-house teams or create complete teams for specific R&D needs.

We serve clients in several industries on four continents with a team of 80+ AI experts of which 40+ have PhDs in fields such as computer science, neural networks and physics.

Silo AI has a strong foothold in the maritime, automotive, manufacturing, heavy machinery and logistics industries.

EXPERTISE AND CONSULTATION

We have the AI expertise to extend your in-house teams or work as complete teams. We can provide quick ramp-up in machine learning, computer vision and NLP.

CUSTOMIZABLE SOLUTIONS

Our customized teams can adapt to changing customer needs during the development life cycle. We understand, decide and predict outcomes in highly complex systems and situations. Options to leverage either Silo AI's or the client's development environment are available.

COMPETITIVE ADVANTAGES

Close collaboration with Finland's AI accelerator

- Port and terminal automation
- Port design, build, maintenance and modernization
- Port operations and infrastructure management
- Logistics chains in port, hinterland and smart fairway
 - Situational awareness
 - Autonomy



REFERENCES

Awake.AI – intelligent port automation to help the company further increase port efficiency using artificial intelligence

Finnair – situational awareness of air traffic for the operations control center of the Finnish national airline Finnair

Posti – AI-driven logistics predictions for the Finnish national postal service

Groke Technologies – AI-driven awareness system for a maritime solutions provider and integrator

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PHYSICAL AND VIRTUAL PORT INFRASTRUCTURE AND OPERATION

A PARTNER FOR THE NETWORKED FUTURE

Reaktor

REAKTOR creates products and services and helps you navigate the complex landscape of modern business. Our teams work closely with our clients, combining human, cultural and technological understanding with creative thinking and practical skills.

We structure, design and build, iterate, implement and reinvent, delivering value faster than most consider realistic.

TRANSFORMING ORGANIZATIONS INTO DIGITAL CHAMPIONS

The potential of the digital era does not lie in technology, but in new adaptive business models, in the ability to break from siloed and closed value chains into the world of endless partnerships, synergies and cumulative value creation.

Transforming organizations from structured and predictable institutions into service organizations and

agile digital champions is not only risky, it's a fight against the biggest possible silo culture.

PORTS IN THE NETWORKED ECONOMY

The networked economy offers unprecedented opportunities for businesses and improves the lives of billions worldwide.

This emerging type of economic environment arises from the digitization of fast-growing, multilayered, highly interactive, real-time connections among people, devices and businesses.

Reaktor's consulting services can help bring the networked economy to port enterprises and their whole value chain at the port.

The port of the future is a unique location where the service layer, operational model and acquired capabilities can be scaled both locally and globally. It empowers companies to benefit from shared



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resources, have better utilization rates and create more unified and holistic services spanning outside company borders.

REFERENCES

Port operations

Kalmar – product prototype and concept video production

Cargotec – consulting services

Marine tech

Wärtsilä – consulting services

Passenger experience

Hurtigruten – creating a holistic digital experience for a state-of-the-art vessel

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PHYSICAL AND VIRTUAL PORT INFRASTRUCTURE AND OPERATION

SMARTER PORTS WITH ONE SOLUTION



UNIKIE Port Flow Optimization, POLO, is a ship and port ICT solution that enhances the efficiency of all port actors, including vessels, land operations, pilots and others. The new port call synchronization and optimization tool provides a scalable, cost-effective and robust solution for ports.

INTERCONNECTING ALL PARTICIPANTS

Unikie's solution is a synchronized real-time data-sharing ICT tool and warning system integrating all participants in the logistics chain.

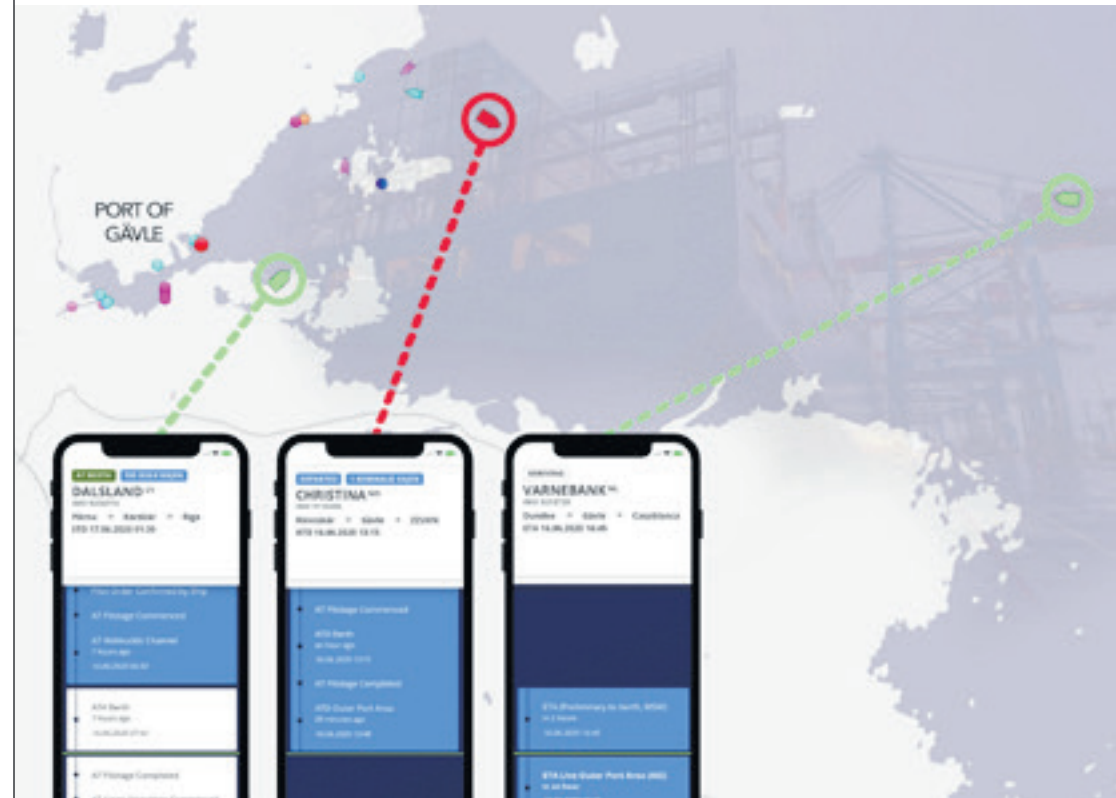
It is an open source, harmonized cutting-edge solution with minimal costs. Hinterland operations are also able to connect to the application. The solution can be leveraged in all types of ports regardless of their systems or operating procedures.

IMPROVED SITUATIONAL AWARENESS

Information exchange improves when port actors share their estimated and actual times of critical operational states – mainly ETA/ATA (estimated/actual time of arrival) and ETD/ATD (estimated/actual time of departure).

This increases situational awareness, improves just-in-time processes and minimizes waiting times. The application ensures well-coordinated, more efficient and environmentally friendly operations in smart ports. It increases flexibility in the case of unexpected events and improves the planning horizon.

The solution is available on a browser-based desktop or as a native mobile application for Android and iOS.



ABOUT UNIKIE

Unikie is a Finnish deep-tech development company focusing on high-profile embedded software for automotive, smart machinery, industry 4.0 and telecom with specialized solutions for each segment.

REFERENCES

POLO is in operation and development in cooperation with the Swedish Maritime Administration (SMA) at the Swedish Port of Gävle and the Finnish Port of Rauma. Contact Unikie for more on our user cases.

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PHYSICAL AND VIRTUAL PORT INFRASTRUCTURE AND OPERATION

TOWARD PORTS OF THE FUTURE



VTT SENSEWAY is an expert in autonomous operations and cloud technologies.

We have created a new way to enhance autonomy development. Multimodal Autonomy Framework (MAF) creates a base for autonomy or AI development on land, in the air and at sea by providing access to reusable components from sensors to software and from system architectures to AI models.

MAF makes autonomy and digitalization development cost efficient by maximizing project outcomes and minimizing risks. Developers can work more efficiently by choosing a verified toolchain, instructions and support for autonomy development.

If you do not have your own development team, we can offer work packages to help you in transforming your operations.

VTT SENSEWAY DIGITIZES THE FAIRWAYS

Data provided by existing and new sources should be digitalized to enable new services for various users of the fairway and the port.

Our Marine Tractor Beam (MTB) platform provides situational awareness as a service for vessels by digitalizing the real world. When the real world is digitalized, MTB can enable enhanced traffic monitoring and control for ports and other shore-based operators. MTB also enables totally new value chains in traditional business areas.

Gradual change by building on top of existing solutions is a cost-efficient way to bring new technologies into use. By using MTB, it is possible to develop various applications for different purposes both on land and at sea.

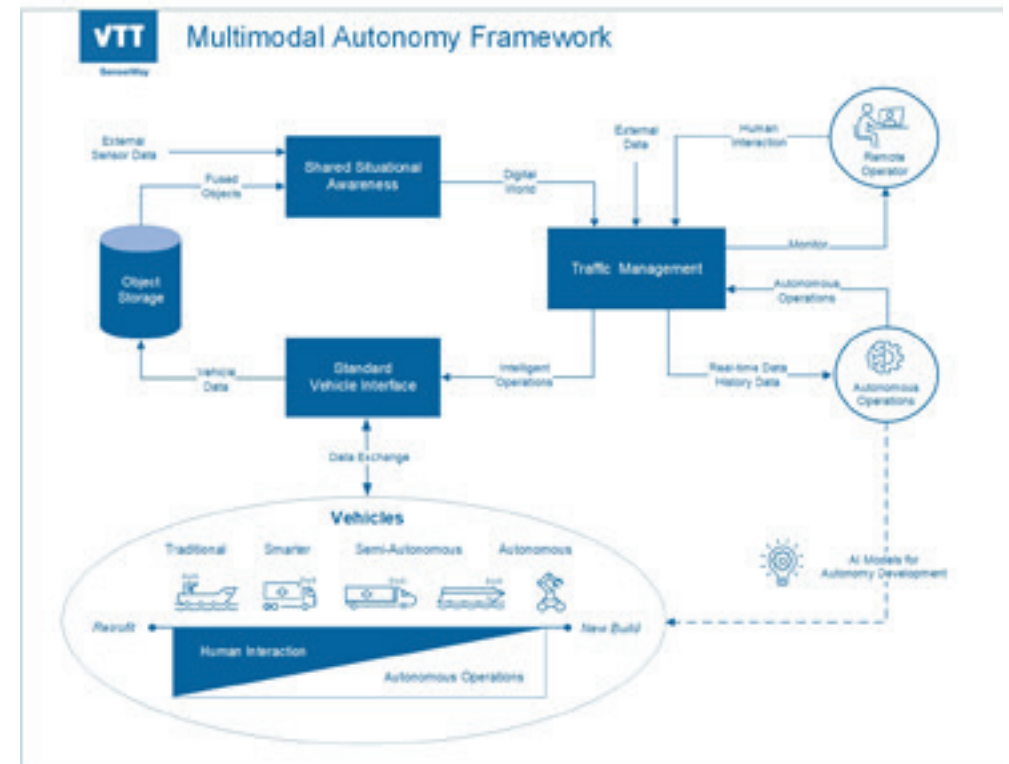
IS YOUR PORT READY FOR THE FUTURE?

Eventually, MTB can communicate with long-range deep-sea autonomous vessels and digitally escort them safely to port. MTB offers a way to gradually improve the digital infrastructure of ports and fairways to welcome the vessels of the future.

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PHYSICAL AND VIRTUAL PORT INFRASTRUCTURE AND OPERATION

INTELLIGENT WELDING SOLUTIONS



KEMPPPI offers intelligent welding equipment and welding management software for demanding industrial applications and ready-to-weld needs.

Designed for welders with an eye on quality and usability, Kemppi welding equipment keeps the technology on the inside – and simple, intuitive control and performance on the outside.

We offer a wide range of products for manual and automated welding, including welding torches and welder safety items. Our equipment can be connected to welding management software with a digital connectivity module.

X8 MIG WELDER WITH NATIVE CONNECTIVITY

Wireless remote controls ease the daily work, and FastMig's Arc Mobile Control app allows wireless setting of parameters and equipment monitoring via your smartphone or tablet device. The SuperSnake subfeeder guarantees reliable wire feed assist when welding over long distances.

Kemppi Wise products are smart application software solutions designed to make welding equipment perform optimally in challenging conditions. They provide excellent process techniques, while improving efficiency and quality.

WELDEYE FOR MANAGING WELDING PRODUCTION

WeldEye is a universal cloud-based solution for managing welding production. It fits any welding equipment and any size and type of organization that performs within standards like ISO, ASME and AWS.

WeldEye provides tools for managing welding procedures, welder and inspector qualifications, documentation, reporting and administration. Most importantly, you get 100% traceability of any weld you ever make.

WINNING BUSINESS WITH WELDING

Kemppi is the pioneering company within the welding industry. We develop solutions that help you win business. Headquartered in Lahti, Finland, Kemppi employs over 800 welding industry experts in 17 countries and has revenue of more than EUR 150 million. Our global partner network covers more than 60 countries.

REFERENCES

Nautic Africa – shipbuilding industry, Cape Town, South Africa

Meyer Turku – shipbuilding industry, Turku, Finland

Cammell Laird – shipbuilding industry, Birkenhead, United Kingdom

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PHYSICAL AND VIRTUAL PORT INFRASTRUCTURE AND OPERATION

3D PRINTING ALL YOU CAN IMAGINE

Maker3D

MAKER3D offers high-quality and flexible services for 3D printing, CAD modeling and 3D scanning. We can produce 3D printed parts from small batches all the way to large series. We also design parts and produce them from a wide range of industrial materials on demand.

ALL YOU CAN IMAGINE IS REAL

Digitalizing spare parts allows for new ways of designing them. From weight optimization to reducing the number of parts in an assembly, 3D printing can lead to fewer parts having to be procured. From reduced inventory and logistics costs to increased manufacturing agility, 3D printing provides endless advantages.

AROUND THE CORNER

Maker3D is a Helsinki-based 3D printing company. Our main business includes:

- 3D service bureau – design and industrial production
- Webshop for world-leading 3D printer brands
- Networking and partnerships
- R&D innovations

REFERENCES

VR FleetCare – spare parts manufacturing for trains

Outotec Research Center Pori – optimized plastic parts

The European Space Agency (ESA) – light, heat-resistant plastic parts for satellites

PROJECT PARTNERS

Ultimaker
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STAKEHOLDER CONNECTIVITY AND DATA MANAGEMENT

NOKIA

KNL
NETWORKS

GOODMILL
Always online |

DEAL
DEAL COMP OY

Basen

futurice

SCOPESENSOR 

STAKEHOLDER CONNECTIVITY AND DATA MANAGEMENT

CONNECTING EVERYTHING AT PORTS

NOKIA

NOKIA understands that bigger vessels and tighter supply chains are increasing the pressure on ports and terminals to operate at peak productivity and efficiency.

Shipping lines depend on promised productivity, while port operators need to deal with the dynamics of the maritime industry and aim to become even more cost effective.

Digital transformation enables port operators to meet this challenging paradigm. Wireless technologies play a key role in this. Today's Wi-Fi networks are not up to the task. It is time for industrial-grade private wireless powered by 3GPP mobile technologies, 4.9G/LTE today, and 5G tomorrow.

GLOBAL LEADER IN WIRELESS COMMUNICATIONS, ADVANCED ANALYTICS AND IOT

We have extensive experience in working with ports and terminals worldwide.

Our industrial-grade private wireless powered by our Nokia Digital Automation Cloud delivers resilient, secure connectivity for critical communications and operational applications on a dedicated network. Our coverage reaches every corner in the terminal.

A reliable, high-performance network provides a seamless connection between the terminal operating system (TOS) and drivers and equipment anywhere in the container yard, helping increase moves per hour. Real-time situational awareness and greater visibility help enhance safety across the terminal.

It is easy and cost effective to retrofit an LTE network today that's ready for 5G tomorrow.



REFERENCES

Nokia deployed 150+ private LTE and 5G networks worldwide of which dozens are in ports and port terminals. This includes customers in the following locations:

Port of Oulu, Finland
Port of Zeebrugge, Belgium
Port of Hamburg, Germany

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STAKEHOLDER CONNECTIVITY AND DATA MANAGEMENT

SMART AND SECURE CONNECTIONS



KNL NETWORKS' mission is to change what IoT connectivity means for the maritime industry. With our smart IoT solution, we provide both data collection and delivery. KNL's unique technology creates an independent and secure communications channel with global coverage that is entirely dedicated to the IoT data.

OPEN-PLATFORM SOLUTION

Our smart IoT solution ensures that the data is available on board and on shore in real time. The secure and reliable platform is open, which enables integrations to any third-party applications. This makes it possible to provide versatile solutions tailored to customer needs.

KNL's edge processing ensures that the most critical data is always transmitted first.

DATA COLLECTION AND DELIVERY

Our solutions comply with ISO standards that ensure standardized data collection and delivery. With us, you don't have to worry about additional integration costs or the need to rebuild your system architecture.

With our solution, your port operations are managed by data both onshore and onboard. We offer a solution that guarantees automatic and secure access to data, which can be fed into the application of your choice. In this way, the customer has full control of the data and its usage.

ABOUT KNL

KNL Networks provides simple, reliable and affordable connectivity through a dedicated network. We make maritime IoT connections smarter with military-grade security, the world's strongest HF mesh-network and easy installation.

KNL's connectivity is often used with our solution for collecting data from different sources on board the vessel. Signal amounts can range from a few hundred to thousands of signal sources.

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REFERENCES

In the year 2019 not a single customer data package was lost.

100+ vessels currently sail the globe with KNL's technology.

Customers include the Finnish Navy, the Finnish Defence Forces, Thomas Schulte Ship Management and Lindblad Expedition.



STAKEHOLDER CONNECTIVITY AND DATA MANAGEMENT

RELIABILITY FOR PORT CONNECTIONS



GOODMILL Ports present a unique industrial environment, with large indoor and outdoor spaces bordering between sea and land. With most of the assets in such a setting, maintaining reliable connectivity is especially difficult, since vehicles and personnel move around the area instead of being tied to a specific production line and building.

SEAMLESS NETWORK RELIABILITY

Goodmill's multichannel broadband routers seamlessly provide each of the port's logical networks all the combined coverage and availability of the individual physical networks. The connection from your cargo handling vehicle or a ship stays alive automatically even if one of the physical networks goes down.

Customers can combine both private and commercial 3G, 4G and 5G networks together with Wi-Fi and satellite communications. The vehicles with the installed routers can even act as Wi-Fi hotspots for workers in the area.

All of this provides better reliability and coverage with a more cost-efficient way than increased private network investments.

ABOUT GOODMILL SYSTEMS

Goodmill Systems was founded in 2005 to secure critical communications needs of public safety authorities such as police and fire departments. Thousands of our routers are providing broadband Internet across LTE, Wi-Fi and SAT-COM networks to moving vehicles and ships around the world..

REFERENCES

Our customer base includes several national police and defense organizations, among them navies and companies such as Thales and Receptum.

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STAKEHOLDER CONNECTIVITY AND DATA MANAGEMENT

AUTHORITY-APPROVED CONNECTIONS AT PORTS



DEAL COMP provides authority-approved, multichannel routers for motor vehicles (e1), marine (IEC 60945) and railway (EN 50155) transport and for use in work machines and autonomous vehicles.

Fast, secure and reliable connections are vital for intelligent and efficient port operations. We secure all means of good communications for port transportation, with uninterrupted connections.

Our multichannel router can also be connected to a vehicle's computer vision cameras, different sensors or the vehicle itself. Information collected through the router can be used for a port area digital twin and situation awareness.

SERVING ANY SYSTEM

Connections can be adjusted based on price, transfer capacity, location and available networks. Even if five simultaneous connections are used, such as satellite, WLAN, 3G, 4G and 5G, the system detects only one IP address. So, the router is capable of serving any system to which it is connected.

RELIABILITY, SECURITY, DURABILITY

Deal Comp has been a supplier of durable and powerful computers and routers for the harbor environment since 1992. All of our solutions are reliable and secure, and our products meet the most stringent industry requirements.

REFERENCES

Vehicles

Finnish rescue department – vehicle routers

UN, crisis management operations – rugged vehicle multichannel routers

Railway

VR train fleet – multichannel routers

Singapore metro – rail router

Work machines

Sandvik – work machine computers

Ponsse – special computer parts for forestry equipment

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STAKEHOLDER CONNECTIVITY AND DATA MANAGEMENT

MISSION-CRITICAL PLATFORM

Baseⁿ

BASEN takes complete responsibility for all critical IoT components without any reliance upon third-party cloud, software or even hosting providers with its full-stack platform.

We bring real-time processing, powerful analytics and enrichments to your massive data flows, such as those coming from sensors, RFID tags, drones, devices, equipment and much more.

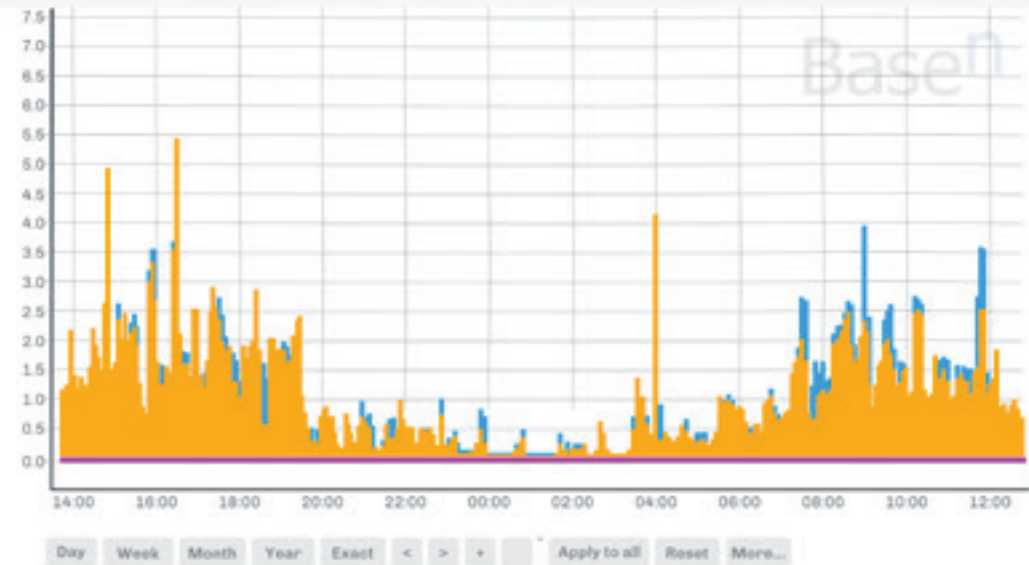
Smart Port ecosystem

- a port's next generation digital twin
- intelligent communication hinterlands & to the seas
- terminal access control and automation
- digital infrastructure management
- port data lake: all data from all devices, connections, and equipment
- workforce management and optimization
- smart grid management and control

Baseⁿ



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ENABLING GREEN SHIPPING ON A GLOBAL SCALE

We increase productivity, resource optimization and continuous operations using a platform-as-a-service framework and are ideally suited for the maritime industries' data lake requirements.

Additionally, BaseN provides the integration and connectivity of all legacy and contemporary hardware and software that is necessary for continuous and secure operations. We enable real-time, bi-directional data flows for the next generation of ships and components, facilitating the transformation from digital twins to spimes, the virtual counterparts of any physical thing.

REFERENCES

Norsepower Oy Ltd
Port of Tallinn
Trimble

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STAKEHOLDER CONNECTIVITY AND DATA MANAGEMENT

DIGITIZING MARITIME OPERATIONS

futurice

FUTURICE is an expert in digital services, from ship and port data analysis platforms to ecosystem portals and port automation. We are well-equipped to help maritime companies chart their way to digital business.

We have worked with shipping and shipbuilding firms, as well as companies in the port logistics and cargo handling business. We have built a wide selection of digital services and software, customer portals and platforms, and machine learning solutions to analyze ship and port data.

Additionally, we have helped maritime companies systematize the way they innovate.

Our work has helped shift the focus of these companies from traditional ways of working, hardware and equipment to modern, software-enabled business that embraces agility, speed, automation and autonomous teams.

GETTING RESULTS TOGETHER

Maritime companies can benefit from applying design thinking or methodologies like Lean Service Creation. As an expert in modern service development, Futurice can complement maritime companies with top-class expertise and insights from other industrial segments.

We have been able to quickly innovate, co-create and deliver new digital services and business models. These activities help maritime companies serve their customers better. They improve the efficiency of their operations, enabling them to move toward a more carbon-neutral and sustainable way of doing business.

Founded in Helsinki, Finland, in 2000, Futurice is an innovation and engineering agency with 600+ professionals across Europe.



Our network of offices in Berlin, Munich, Stuttgart, Helsinki, Tampere, Stockholm, Oslo and London enables us to work closely with various international maritime companies.

REFERENCES

Futurice has worked on strategic projects with many maritime clients. Our references are confidential. Please contact us for further details.

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STAKEHOLDER CONNECTIVITY AND DATA MANAGEMENT

BETTER COMMUNICATIONS FOR THE MARITIME INDUSTRY

SCOPESENSOR

SCOPESENSOR designs and provides resilient and secured communications with a number of high-tech solutions that support any customer-specific need in communications, logistics, transport, industrial and marine applications.

Communications in marine applications between ships and ports are important, just as they are between the hub and further logistics. Improved communications with broadband data create a safe work environment and provide the benefits of more detailed data for logistics management.

Secure and resilient communications help the entities working in the hub use up-to-date data and detailed information. They also enable new applications to be used for the benefit of all those involved in the daily work and business.

Secure broadband communications, combined with ScopeSensor

high-accuracy GNSS receivers, offer outstanding performance to locate equipment, vehicles, containers and materials in the hub in real time.

The secured broadband communication provides the channels to communicate even from sea to port, so harbor logistics can be well prepared and docking times shortened.

RESILIENT BROADBAND COMMUNICATIONS

Broadband communications can provide higher flexibility than cellular networks. A broadband network can use point-to-point communication simultaneously with point-to-multipoint communication.

Connectivity to IP networks are supported, and optional connectivity to WLAN is also provided.



RESILIENT AND SECURE

With our long design history and professional product development experience, we know what it takes to provide resilient and long-life system solutions that are reliable and give customers the support and capabilities they need.

REFERENCES

Logistics and vehicles

Bus terminal remote control network

Mobile trackers

Marine applications

Sensor network for marine IoT

GNSS receiver for high-accuracy marine applications

Secure networks

Wireless lock and remote control system for facility management

Wireless facility energy consumption measurement and automatic control system

Wireless broadband network for warehouse management

Our references are confidential. Please contact us for further details.

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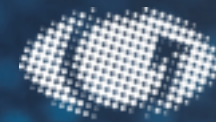
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AUTOMATED AND PRECISELY TRACKED CARGO AND PASSENGER FLOWS



hypercell



VISY
Expand your vision



BOX BOT
LOGISTICS SOLUTIONS

Connected
Inventions

AUTOMATED AND PRECISELY TRACKED CARGO AND PASSENGER FLOWS

SMARTER WAYS OF MOVING CARGO



CARGOTEC'S business area Kalmar provides smart, intelligent and sustainable solutions to ports, terminals, distribution centers and heavy industry. Our Hiab business area is the best-in-class in smart solutions for on-road load handling. Our MacGregor business area serves shipbuilders, owners and operators in the maritime and offshore segments.

INTEGRATED PORT AUTOMATION AND SYSTEMS

Kalmar's automation solutions support terminal and port operators in reducing operational costs and using fleet more efficiently.

Kalmar One, the first open automation system for container terminals, enables automated container handling operations regardless of vendor, equipment type, operation mode or level of terminal automation. Kalmar's OneTerminal provides an integrated automation solution that brings

together Kalmar and Navis software systems, equipment and services.

Kalmar's cargo handling equipment is largely available with electric power sources. An all-electric solution is not only good for the environment, but its total cost is significantly lower than that of a diesel-powered one.

INDUSTRY LEADER IN TERMINAL OPERATING SYSTEMS

Cargotec's Navis provides software and services to enable container terminals, carriers and intermodal rail operators to boost performance and streamline their operations. Navis's N4 is the global standard for terminal operating systems. Its Navis Smart cloud-based applications are easily deployed for enhanced functionality, such as optimization, business intelligence, collaboration and mobility.



Navis Carrier & Vessel Solutions offer ocean carriers, shipowners and technical managers ocean freight solutions that meet the needs for safe, efficient and environmentally friendly ocean transportation.

REFERENCES

TraPac port and logistics park,
USA – Kalmar automation

Port of Virginia, USA – hybrid shuttle carriers with Kalmar electric offering

Victoria International Container Terminal,
Australia – Kalmar OneTerminal

Port of Tanjung Pelepas (PTP),
Malaysia – Navis N4

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AUTOMATED AND PRECISELY TRACKED CARGO AND PASSENGER FLOWS

INTELLIGENT CONTAINER HANDLING

KONECRANES provides the most eco-efficient, productive and reliable container handling equipment to container terminals, backed by port service that keeps the equipment working safely at peak efficiency.

THE PATH TO PORT AUTOMATION

Konecranes' offering for container handling is the widest and deepest in the industry, and it includes the path to port automation. This enables container terminals to improve productivity and safety in manageable steps.

From smart features up to full automation, the path can include supervised operation and remote operation to smoothly introduce the power of automation. It applies to all container handling equipment brands.

Non-Konecranes container handling equipment can also be retrofitted to realize the desired degree of automation. Flexibility is the key.

POWERED BY ECOLIFTING

Powered by Ecolifting is Konecranes' vision to minimize the footprint and increase the handprint of equipment for container terminals.

From eco-optimizing diesel drives to hybridization and fully-electric fleets, Konecranes is on a mission to give its customers the ability to do more with less.

TRUCONNECT® AND DIGITALIZATION

Konecranes is at the forefront of digital technology applied to container handling.

TRUCONNECT® is our remote monitoring platform that provides real-time remote technical support for Konecranes container handling equipment, wherever it may be working in the world.

KONECRANES®



REFERENCES

Port of Virginia, Norfolk International Terminal (NIT), USA – 60 automated RMG cranes

Abu Dhabi Terminals, UAE – 54 automated RMG cranes

Terminal Peti Kemas Semarang (Pelindo III), Indonesia – 20 automated RTG cranes with remote operating stations

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AUTOMATED AND PRECISELY TRACKED CARGO AND PASSENGER FLOWS

SMART PASSENGER AND CARGO FLOW



HYPERCELL provides data on passengers' movement inside traffic terminals, their queue times and staying times in certain areas.

This information can be used for better optimization of the terminal services to gain significant cost savings and improve the customer experience.

CARGO AND LOGISTICS MANAGEMENT

Modern IoT technology provides opportunities that can greatly improve cargo and logistics area management, maintenance and security. Our IoT platform provides real-time insight on cargo, containers and vehicles moving on loading platforms.

The data our service provides can significantly improve the safety of workers and increase the efficiency of the loading platform and cargo management.

SITUATIONAL AWARENESS SOLUTIONS

Hypercell's IoT platform provides real-time data that can be used for deep insight into the port's dynamics, both in passenger terminals and loading platforms. The platform helps decision-making and vastly improves port logistics and services.

It is possible to create a real-time view of the desired area and use our technology to provide an anonymous visual image of passenger flow or focus on cargo logistics and safety at key areas.

REFERENCES

Passenger flow and management

Port of Helsinki and Port of Turku – detecting passenger flow, terminal flow and tourist's key interest areas in both cities



Helsinki Exhibition Center (Helsingin Messukeskus) – following a large number of visitors in a complex indoor environment

Cargo and logistics management

Rio Blanco, Chile – logistics chain quality management and collecting real-time data from plantation to storage, including authenticity control and monitoring cold storage temperature

Situational awareness solutions

LUX Helsinki art festival – following tens of thousands of people in a city environment

Tampere Stadium – providing a real-time image of queue times at each entry/exit point in the stadium

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AUTOMATED AND PRECISELY TRACKED CARGO AND PASSENGER FLOWS

SMARTER PORT OPERATIONS WITH AI



VISY'S artificial intelligence (AI) and vision technology solutions empower operators to automatically manage all cargo, personnel and asset movements in the yard and into or out of a terminal by road, rail or quay.

The Visy Access Gate Operating System (GOS) enhances all types of port and terminal operations. From traditional marine terminals to intermodal sites to complex facilities, Visy technology saves operators time and money.

PROVEN TECHNOLOGY

The single-platform GOS has been developed from the operator's point of view. Clever integration of commodity hardware and state-of-the-art AI algorithms make Visy products cost efficient, reliable and future-proof to operate.

When interfaced with a terminal operating system (TOS) or other third-party systems, operators experience levels of efficiency that were previously inconceivable.

All system software is made in-house by our engineers. Our R&D team is continuously investigating state-of-the-art, deep-learning technologies for improving existing products, such as optical character recognition (OCR) for license plates, containers and seals, and for disruptive products, such as automatic damage detection and camera-based area monitoring.

REACH YOUR BUSINESS GOALS

Visy systems will create and manage repeatable, scalable, sustainable processes for your operation. Whether the system is a spreader's OCR for yard cranes or a port-wide access control platform, the technology will create an environment for you to do consistent business.

Since 1994, Visy has been deploying cutting-edge solutions to help customers reduce operating expenses, optimize safety and security and increase throughput capacity.



REFERENCES

Qingdao New Qianwan Container Terminal, China – STS crane OCR

APM Terminal Gothenburg, Sweden – GOS with OCR

Mitteldeutschen Eisenbahn GmbH, Germany – rail OCR

Port of Tanger-Med, Morocco – port access control system

DCT Gdansk, Poland – GOS and rail OCR

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AUTOMATED AND PRECISELY TRACKED CARGO AND PASSENGER FLOWS

AUTOMATED LOAD PLANNING



BOXBOT Every day, thousands of cargo ships and trucks transport cargo around the world with about 40% of the space being empty. BOXBOT can be used as a decision support system in general cargo ship load planning.

Our algorithm optimizes bulkhead/tweendeck positions and space utilization of general cargo ships based on different parameters such as cargo properties, operational rules and ship loading and discharging ports.

Examples of cargo properties:

- Weight limits
- Temperature limits
- Humidity limits
- Durability and stackability

Examples of operational rules:

- Loading/unloading order
- Partial hold opening possibilities
- Crane positions and limitations
- Delivery schedules

You can reduce the environmental impact of shipping with BOXBOT by being more effective with your fleet.

AUTOMATED TRUCK LOAD PLANNING BY BOXBOT

BOXBOT optimizes cargo picking and packing in the right unloading order, which will work as the delivery order for the transport vehicle.

The priority can be, for example, the delivery order of the cargo items, so that the items in the front are delivered first.

Such an approach removes hassle and searching during delivery and creates a picking order for loading.

LOAD PLANNING EXAMPLE

- About 400 cargo items in a 32,000 DWT multi-purpose vessel
- Cargo optimization planning results made with BOXBOT in less than 10 minutes
- An experienced person's manual load planning for the same vessel with the same parameters takes up to four days
- BOXBOT planning is 900 times faster and loads more than 20% more cargo in the same vessel

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AUTOMATED AND PRECISELY TRACKED CARGO AND PASSENGER FLOWS

SMART FLEET AND ASSET TRACKING



CONNECTED INVENTIONS

Connected Ranger, an innovative fleet and asset tracker, is an industry-grade geolocation device for both indoor and outdoor usage. The device can be used to track assets or shipments, geo-fencing, warehouse inventory and equipment leasing.

The device scans surrounding Wi-Fi networks when it has detected motion and sends information using the Sigfox network. The data is then refined to correspond to the physical geolocation of the asset tracked.

Connected Ranger is easy to attach to any surface using screws or zip ties and has an ultra-long battery life at an affordable price.

The device works natively with the very advanced IoT platform FoxerIoT. This data platform is the simplest way to manage and analyze all of the data points that are important to logistics and tracking.

SIGFOX IOT TECHNOLOGY

Connected Ranger works with Sigfox, the world's leading service provider for the Internet of Things (IoT) that offers one global 0G network to connect the physical world with the digital universe and power industry transformation.

Sigfox ecosystems offer various solutions for ports, allowing them to improve efficiency, speed and quality while reducing the costs.

COVERING GLOBAL PORTS IN MORE THAN 75 COUNTRIES

Being part of global IoT ecosystem development, providing Sigfox IoT coverage, devices and applicable platform to more than 75 countries, Connected Inventions can deploy its IoT sensors and full services to the majority of ports worldwide.

Connected Inventions can help ports improve efficiency, speed and quality while reducing costs radically, leading to full digital transformation. Customers can benefit from the company's simple business model, one-contract global coverage, roaming-free devices and intelligent platforms.

CONNECTED INVENTIONS

Connected Inventions provides and develops low-cost, energy-efficient IoT solutions powered by global Sigfox 0G technology.

The FoxerIoT platform, custom IoT devices development, off-the-shelf products, IoT projects, ultra-low-cost global IoT connectivity – we have all the tools to make things come alive today.

REFERENCES

HELEN
Leanheat by Danfoss
Port of Tallinn
Tallink Maritime Transportation
Fortum

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GREEN PORT: ENERGY AND ENVIRONMENTAL SOLUTIONS



GREEN PORT: ENERGY AND ENVIRONMENTAL SOLUTIONS

CARBON-NEUTRAL AND OPTIMIZED ENERGY SOLUTIONS



HELEN the energy sector forerunner in carbon-neutral energy services and related solutions.

Our energy production has been awarded as the most efficient in the world. We offer solutions that enable energy transition and electrification of ports, as well as energy optimization in smart ports in the future.

Our pioneering technology for building smart ports includes solar panels, smart charging points and batteries.

ENERGY DEMAND IN SMART PORTS

Due to the shore power needed by ships, the energy demand of electrified ports will change significantly, resulting in substantial power fluctuations.

Balancing of power surges with electricity storage facilities is determined by the mooring time

and power demand of vessels. A more systematic, smart energy management system is needed to support the reliability and maintenance of electrified ports.

CLEAN ENERGY GENERATION

Our new solar power technologies, such as battery-operated electricity storage facilities, adjust the supply and demand of the electricity generated by Helen's solar power plants.

In connection with solar power plants and electricity storage facilities, our smart charging points can both charge an electric vehicle and be used as an electricity storage unit that balances the port's grid.

A data-based, digital control system improves energy efficiency in smart ports according to actual consumption.



HELEN IN BRIEF

Helen Ltd serves over 500,000 customers in Finland. In addition to heating, cooling and electricity, we offer solutions for regional and renewable energy, smart buildings and electric transport.

We are developing a smarter, carbon-neutral energy system that enables everyone to produce, use and save energy with respect for the environment. We aim to achieve 100% carbon neutrality in our energy production by 2035.

REFERENCES

Suvilahti district of smart energy systems – battery, V2G charging point and solar panels

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GREEN PORT: ENERGY AND ENVIRONMENTAL SOLUTIONS

INTELLIGENT LNG OPERATIONS

**VALMET AUTOMATION**

To effectively control the complex LNG terminal operations process, Valmet has innovated a software application: Valmet DNA Integrated Operations. It controls all of the main processes in the terminal: ship unloading, bunkering, storage management, truck loading, gas send-out and the evaporator units.

Behind this innovation are Valmet's extensive expertise in process automation and knowledge of the entire LNG supply chain. With the help of real-time measurement data and online connections, it is possible to gather all data in one place.

The entire LNG supply chain becomes much more accurate and efficient, because communications happen simultaneously between different parties.

With information accessibility, the transmission of LNG energy becomes faster and more streamlined. An LNG producer can oversee sales according to demand or price index.

The number of vessels and trucks can be precisely defined to meet delivery demand, and buyers can schedule investments at an ideal time.

LNG TERMINALS WITHIN EXTENDED REALITY

The Valmet Extended Reality platform incorporates mixed, virtual and interactive augmented reality experiences.

For LNG terminals, an open extended reality-based platform provides the ability to use a virtual environment to design terminal architecture in the form of virtual prototypes and digital twins.

One tool used to enable remote support and deliver information fast and precisely is PointR, an augmented reality-based solution integrated into Valmet Extended Reality. Using it, field engineers receive hands-on guidance from offsite support teams who see the operator's on-site view and enable remote assistance.



CASE: TORNIO MANGA LNG TERMINAL

At the start of 2019, Tornio Manga LNG Terminal started up its commercial operations using the Valmet DNA automation system to transport gas to companies outside the existing gas network.

REFERENCES

Gasum LNG, Scandinavia – LNG distribution
Gasum Traffic, Finland – bio-natural gas for traffic use
Logistics companies – Speed Logistics and others

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GREEN PORT: ENERGY AND ENVIRONMENTAL SOLUTIONS

RELIABLE, COST- AND ENERGY-EFFICIENT SOLUTIONS



PINJA has solutions for ports, shipowners and shipbuilders. With the help of our solutions, systems can be operated more efficiently, system life cycle is under control and subsystem data is made available for remote analysis.

We can serve as a full-line supplier or an integrator. Our offering also includes digital solutions to improve maritime transport profitability.

We work in very close cooperation with OEM operators.

SHORESIDE

We offer high- and low-voltage shore power applications for ports and vessels. Connection can be from manual to fully automated systems. Shore connection is also available with energy storage.

Our other shoreside solutions include remote service and support for vessels as well as remote fleet monitoring.

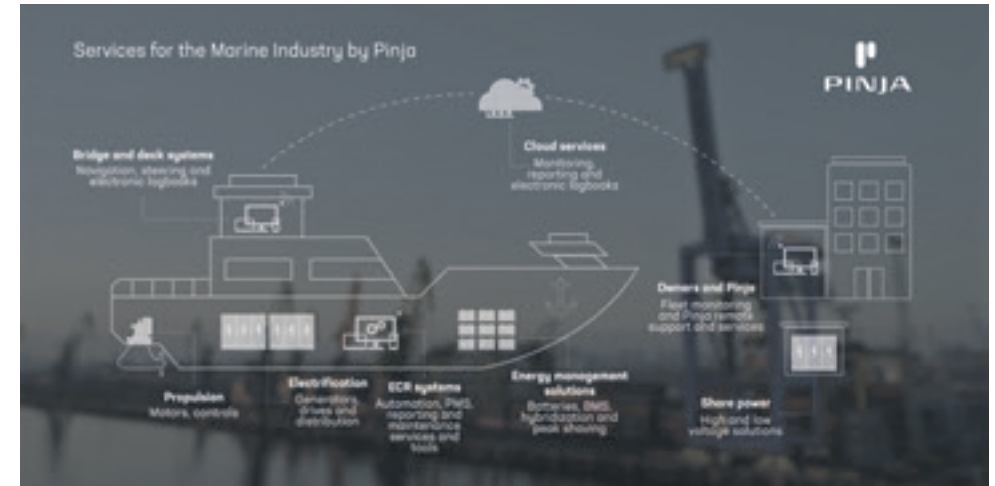
VESSELS

Our supply range for vessels includes electric propulsion, power distribution, shore connection and automation. We also develop low-emission diesel propulsion and energy saving and hybrid systems.

DEVELOPING THE FUTURE MARINE INDUSTRY

Pinja is part of INTENS and Team Arctic Finland. Pinja is your partner in digitalization and industrial innovation. We will be your guide in business development throughout the entire enterprise life cycle:

- From consulting to engineering
- From implementation to maintenance
- The development of completely novel digital business models



For the marine sector, we offer automation and electrification services. Our customers are industrial operators who want to utilize technological solutions and new business models quicker and more efficiently than their competitors.

REFERENCES

Vessels

Aranda – hybrid propulsion

Viking Supply Ships – electrical propulsion control system modernizations of icebreakers Atle, Ymer, Frej and Ale

Arctia – machinery alarm and electrical propulsion control system for icebreaker Urho

On shore

Wärtsilä – upgrade of the trial test process and loading automation, including bus protocol modifications

ABB Marine – bearing condition monitoring system

Neste – modernization project of the control system for test equipment

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GREEN PORT: ENERGY AND ENVIRONMENTAL SOLUTIONS

LOW-EMISSION HYBRID PROPULSION



WE TECH'S Hybrid Electric propulsion solution has introduced a battery-based Energy Storage System (ESS) and Zero-Emission Sailing Mode to Wasaline's M/S Aurora Botnia, which ensures zero emissions when arriving and leaving the port.

The Zero-Emission Sailing Mode utilizes battery banks for the vessel's propulsion and electrical power demand in the maneuvering mode. Thus, the voyage is peaceful and smooth as the noise, vibration and emissions of the vessel are dramatically minimized.

OPTIMAL OPERATION AND SAFETY CAPABILITIES

During the voyage, the ESS, which is connected to the common DC link of the main propulsion drives, provides power for peak shaving and back-up functionality. This ensures optimal operation capabilities for the vessel in the event of a fault and secures the vessel's entry to the harbor and exit back to the sea.

SHORE POWER CONNECTION

In the harbor, the vessel is connected to the shore electric power grid, which directly supplies the ESS's re-charging and keeps the vessel operational.

This eliminates the need for generators, and therefore minimizes the environmental footprint. Thanks to WE Drive, the vessel's power grid can be seamlessly matched to the harbor's shore supply in terms of voltage and frequency. In this way, an environmentally friendly harbor can be achieved.

EFFICIENCY, INNOVATION AND ENVIRONMENTAL RESPONSIBILITY

WE Tech is a leading energy efficiency solution provider with a global presence in the marine industry. Our reliable and market-proven solutions, suitable for new buildings and for retrofits, bring numerous benefits to the shipping industry worldwide.



REFERENCES

Ropax vessels

Wasaline
Stena AB

Gas carriers

Saga LNG Shipping
Korea Line Corporation
JP Morgan Asset Management
Knutsen OAS Shipping
Geogas Maritime S.A.S

Chemical, product, asphalt and bitumen tankers

Donsötank AB
Ektank AB
Stenersen AS

Transport Desgagnés Inc.
Tarbit Shipping AB
Terntank Rederi A/S

PCTC vessels

UECC
Wallenius Shipping

Bulk carriers

ESL Shipping Ltd
Vulica Shipping

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GREEN PORT: ENERGY AND ENVIRONMENTAL SOLUTIONS

SAFER PORTS THROUGH OBSERVATION

VAISALA

VAISALA provides reliable and accurate measurement of weather conditions, which is critical for approaching the port and berthing safely.

Backed by 80 years of expertise, Vaisala's flexible systems adapt to your needs and are proven in thousands of installations around the world and in outer space.

Understanding the factors affecting air quality at your port gives you the power to proactively mitigate pollution. Together, these measurements are part of a modern system supporting the safe and successful operation of complex port environments.

AIR QUALITY FOR SUSTAINABLE PORTS

Air quality is the #1 environmental priority for European ports. Many port operations generate emissions, but ports are often surrounded by busy roads and industrial areas. So it is essential to gain an understanding of various origins of polluted air to manage it.

An air quality monitoring network in the port zone provides real-time awareness of pollution levels, enabling port authorities to take action based on hard data to improve air quality in and around the port.

Air Quality Transmitter AQT400

Series: cost-effective sensor with near reference measurement performance to measure the most common gaseous pollutants (NO₂, SO₂, CO and O₃) as well as particulate matter (PM_{2.5} and PM₁₀).

Weather transmitter WXT530

Series: proven performance of the six most essential weather parameters in one product. Measures air pressure, temperature, humidity, rainfall and wind speed and direction.

Observation Network Manager

NM10: professional user interface for weather and air quality sensor network management. NM10 allows you to easily monitor and control sensors and get quick access to observation data. It enables you to create reports, alerts and APIs for interfacing third-party applications.



NOWCASTING WITH WIND LIDAR

The nowcast model of detailed weather observation delivers current and near-future weather conditions to port authorities. It helps to be prepared against imminent weather phenomena and can provide valuable input in designing safer and more cost-efficient dock structures. Real-time wind data will become critical when autonomous shipping becomes reality, as ports and ships can access the information simultaneously and take immediate action.

Vaisala offshore WindCube lidars: provide accurate wind measurement up to 200 m over 12 simultaneous heights and are ideal for floating lidar systems.

Windcube 400S Doppler lidar system: enhanced network detects the position, diameter, structure, direction and translational speed of downbursts.

Windcube Vertical Profiler: provides accurate, real-time 3D wind data

REFERENCES

Wind, Ports and Sea Project with University of Genoa

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EXAMPLES OF SMART PORTS IN FINLAND



**PORT OF
HANKO**

**|| PORT OF
HELSINKI ||**



EXAMPLES OF SMART PORTS IN FINLAND

A SMART AND AGILE PORT

THE PORT OF HANKO is the second largest liner shipping port for truck and trailer traffic in Finland and the fourth largest commercial port in the country. It is also Finland's car import center, and big volumes of Finnish forest industry products find their way through the port.

The port is leading the way in using digital solutions. We constantly challenge traditional practices and look for new development paths through digitalization and new technologies.

INFORMATION AT YOUR FINGERTIPS

Building a digital model of our physical port and connecting it to our document management system allow us nowadays to intuitively and quickly "map navigate" our way to the information we need – with only a few clicks.

SAFETY AND SECURITY THROUGH TECHNOLOGY

The Port of Hanko collaborates with local rescue authorities to find new ways to share critical information

where it is needed most.

Digital models with up-to-date information on critical emergency infrastructure, such as rescue equipment, fire hydrants, drainage systems, electrical centers and more, can be shared and brought directly to field rescue workers to considerably speed up decision-making.

By utilizing video analytics and machine learning in video surveillance systems, it is possible to filter out unusual events from ordinary ones, allowing security guards to stay focused and react only to real and relevant events.

TOWARD A DIGITAL TWIN

To stay competitive, we must be able to cope with an increasing amount of cargo traffic and vessel sizes. Since the physical boundaries dictate the space available, space usage needs to be optimized.

The Port of Hanko is investing in technology that focuses on improving and sharing situational awareness.



This includes new approaches for real-time tracking of cargo units, collecting and sharing of geospatial and other data and information with cost-efficient and flexible communication networks, mobile applications as well as a means of visualizing and utilizing the data within a digital twin environment.

To support development activities, the Port of Hanko will set up piloting areas for technology testing and demonstration purposes.

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EXAMPLES OF SMART PORTS IN FINLAND

THE WORLD'S MOST FUNCTIONAL PORT

|| PORT OF HELSINKI ||

THE PORT OF HELSINKI'S goal is to be a pioneer in sustainable port operations. We use new technologies, such as automooring and shore power, and are promoting the use of LNG in vessel traffic to achieve our goal.

Our objective is to make our operations 100% carbon neutral by 2035. We take responsibility for minimizing the harmful environmental impacts of port and maritime operations. The port has a certified operating system that fulfills the requirements of ISO 9001, ISO 14001 and ISO 45001 standards.

EFFICIENT PORT OPERATIONS

Our goal is to improve the port community's productivity and make more efficient use of assets. To achieve this, we plan to develop new digitalized services and use new technologies.

This includes improving the real-time data flow and enabling wider supply chain integration between the operators and smart port systems for more efficient vehicle traffic, better predictability of vessel traffic and more.

Our customers gain in time and cost savings when the port visit takes less time or is more predictable. The port community's gain is improved flexibility and effectiveness.

SEAMLESS PASSENGER EXPERIENCES

By utilizing new technologies, the passengers' travel experience can be improved, and travel time can be made shorter. To further improve passenger experience, we are adopting the 5G network in our terminals.

Helsinki is the busiest passenger port in Europe, and the Port of Helsinki creates a seamless framework for sea traffic to destinations such as Tallinn and Stockholm.



In 2019, a total of 12.2 million passengers travelled through the Port of Helsinki. The Port of Helsinki is also Finland's leading general port for foreign trade. In 2019, the Group's total cargo traffic was 14.4 million tons.

The main export commodities are products for the forest industry, machinery and equipment, whereas in imports, the most prominent product group is daily consumer goods. In 2019, the turnover of the Port of Helsinki was EUR 95,6 million.

REFERENCES

Eckerö Line
Finnlines Oyj
Finnsteve Oy Ab
Multi-Link Terminals Ltd Oy
Oy M. Rauanheimo Ab
Steveco Oy
Viking Line

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