

# Finland as One of the World's leading Test Beds

IALA Marine Aids to Navigation in the Autonomous Worlds May 24 2021

Senior Ministerial Adviser Anne Miettinen Twitter  
@AnneMiettinen1  
Data Department, Automation Unit



# Test bed elements

- Enabling regulation and guidelines
- World's first open autonomous maritime ecosystem (<https://www.oneseaecosystem.net/>)
- RAAS Rethinking Autonomy and Safety Research Ecosystem <https://autonomous.fi/>
- Tests and pilots
- Infrastructure, technology and operating models
- Government Resolution on development of Transport Automation draft [Transport automation benefits all of society - draft resolution sent out for comments - Ministry of Transport and Communications \(lvm.fi\)](#)

## First Autonomous Ship demonstrations in Finland in 2018

<https://new.abb.com/news/detail/11632/abb-enables-groundbreaking-trial-of-remotely-operated-passenger-ferry>  
<https://www.rolls-royce.com/media/press-releases/2018/03-12-2018-rr-and-finferries-demonstrate-worlds-first-fully-autonomous-ferry.aspx>

### ABB enables groundbreaking trial of remotely operated passenger ferry

Group press release | Zurich, Switzerland | 2018-12-04

Ice-class passenger ferry Suomenlinna II was remotely piloted through test area near Helsinki harbor, proving that human oversight of vessels from anywhere is achievable with today's technologies



### Rolls-Royce and Finferries demonstrate world's first Fully Autonomous Ferry

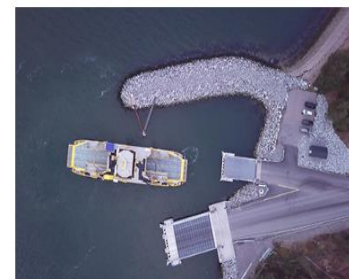
More about: [Press release >](#) [Marine >](#) [Ship Intelligence >](#) [United Kingdom >](#)

03 December 2018

Rolls-Royce and Finnish state-owned ferry operator Finferries have today successfully demonstrated the world's first fully autonomous ferry in the archipelago south of the city of Turku, Finland.

The car ferry *Falco* used a combination of Rolls-Royce Ship Intelligence technologies to successfully navigate autonomously during its voyage between Parainen and Nauvo. The return journey was conducted under remote control.

During the demonstration, the *Falco*, with 80 invited VIP guests aboard, conducted the voyage under fully autonomous control. The vessel detected objects utilising sensor fusion and artificial intelligence and conducted collision avoidance. It also demonstrated automatic berthing with a recently developed autonomous navigation system. All this was achieved without any



# National legislation enabling tests and pilots

## Bill on ships' crews and the safety management of ships (Amendment 976/2018)

- The manning of ships can be reduced
- Tests are possible in separately defined areas or routes.
- A permit issued by the Finnish Transport and Communications Agency for no more than 2 years
- As safe as in conventional traffic

## Remote pilotage in Pilotage Act (Amendment 51/2019)

- pilot can perform his tasks outside the ship
- A permit issued by the Finnish Transport and Communications Agency for no more than 5 years
- Finn-pilot to perform remote pilotage in public fairways defined as compulsory pilotage areas in Finnish waters and in the part of the Saimaa Canal leased by Finland

**DIMECC's co-creation ecosystem  
One Sea seeks global partners to join  
the leading co-creation ecosystem.**

**Join us!**

[www.oneseaecosystem.net](http://www.oneseaecosystem.net)

**Päivi Haikkola**  
Senior Ecosystem Lead  
[paivi.haikkola@dimecc.com](mailto:paivi.haikkola@dimecc.com)

**Jukka Merenluoto**  
Senior Ecosystem Lead  
[Jukka.merenluoto@dimecc.com](mailto:Jukka.merenluoto@dimecc.com)

[www.dimecc.com](http://www.dimecc.com)



KONGSBERG



Suomen Varustamot  
Rederierna i Finland  
Finnish Shipowners' Association



Suomen Satamaliitto  
Finnish Port Association



# Sea4Value: first OneSea Ecosystem project and future Port-to-Port experiment

- a transformative program <https://www.dimecc.com/dimecc-services/s4v/>

that aims for wide societal influence by providing concrete research-based recommendations on regulation, business, data usage & sharing and for standardization. In particular, the program targets on following demonstrations and experiments

1. Smart fairway navigation experiments <https://www.dimecc.com/the-archipelagos-sensor-test-station-collects-information-for-the-smart-fairway/>. ePilotage working environment (on shore) and remote pilotage experiments
2. Smarter optimizing efficiency in ports <https://www.oneseaecosystem.net/the-ports-of-turku-and-helsinki-get-faster-safer-and-greener/>
3. Port-to-port future experiment will aim at
  - Experimenting digital maritime corridor between two selected ports
  - Increasing the level of autonomy and automation across maritime supply chain
  - Taking steps towards autonomous maritime transport including smart ports, smart fairways and smart vessels

# Intelligent Sea: Integrated Digital Services for Efficient and Safe Maritime automation

- EU CEF financed project by Arctia, the Port of Stockholm and the Port of Naantali,
- Contact [Nina.Savijoki@Arctia.fi](mailto:Nina.Savijoki@Arctia.fi)
- The project aimed to improve the safety and efficiency of maritime fairways through digitalization. In the project, floating as well as land-based aids to navigation are equipped with devices for remote monitoring and control as well as environmental sensors. The fairway data produced by the aids to navigation will be integrated with other fairway and port data by combining several, currently separate, data and control systems into a single digital service cloud. In addition, the project will pilot marine high-speed broadband networks and monitoring of sulphur emissions from maritime transport by utilising aids to navigation, and alternative energy sources for them.
- Developing and piloting the InSea platform, which will integrate the currently separate control systems, port and fairway related data and the data coming from the navigational aids into a single digital service cloud. This will increase the safety of navigation as well as the efficiency of operations.
- Piloting a high-speed broadband network to operate in the fairway and port area, using floating platforms (i.e. network buoys) which will contribute to the connectivity and information flow between vessels, ports and other parties.
- Piloting alternative renewable energy sources for the smart buoys as well as compliance monitoring of SOX emissions from ships on fairways by employing smart floating navigational buoys.

<https://www.arctia.fi/en/arctia-ltd./intelligent-sea-project.html>

# Research and simulations

- **RAAS** is an interdisciplinary ecosystem for autonomous systems research and development incl. autonomous maritime systems coord. by VTT.
- **VTT ship handling simulator** can be used both for technical and human factors verification and validation (V&V) of the safety of ships' autonomous collision avoidance systems. **Contact:** Hannu Karvonen (Ecosystem Lead, VTT) [hannu.karvonen@vtt.fi](mailto:hannu.karvonen@vtt.fi), +358 40 021 6396
- A smart joint-use **Intelligent Shipping Technology test Laboratory (ISTLAB)** equipped with features for simulation of remote pilotage merges and consolidates the navigation simulator of Satakunta University of Applied Sciences, the Finnish Transport and Communications Agency's bathymetric model of the Rauma deep-water fairway, Finnish Transport Infrastructure Agency's smart buoy and sea current monitoring, the Finnish Geospatial Research Institute's navigation system research and the Finnish Meteorological Institute's survey of wave, sea level and ice conditions. **Contact:** Janne Lahtinen Senior Lecturer, Master Mariner, SAMK  
+358 44 710 3805, [janne.lahtinen\[at\]samk.fi](mailto:janne.lahtinen[at]samk.fi)



# Government Resolution on promotion of automation draft

- **Vision:** Safer, more efficient and more sustainable transport automation
  - Safety and sustainability by efficiency emphasized
  - Autonomy particularly in exceptional cases in low-traffic time and simple route. Connectivity needed particularly in complicated areas and dense traffic areas – eg. With remote control/pilotage, intelligent traffic control and intelligent fairway infrastructure
  - Trustworthy and adequate communications essential and certain degree of autonomy needed by limitations of reduced bandwidth and radio disturbances
  - Cyber security highlighted
- **Objectives:**
  - The human-centric objective of transport automation means that people's needs and abilities as well as human rights must be taken into account in development work and implementation.
  - Trust by transparency – authorities and independent third parties can evaluate safety
  - Increased efficiency of exchange of data and communications networks
  - Top-down, goal-based, technology neutral regulatory framework

# Government resolution on promotion of transport automation –draft actions

## Data, digital and physical infrastructure:

Intelligent fairway concept:

Interoperable interfaces, increasing availability of dynamic, quality data

Governance model and infrastructure

Enlarging sharing of authority data

Incentives for responsible data sharing

Uptake of intelligent safety devices

Double shift: digitalisation and automation development and uptake of automation solutions: international, national and EU financing

Cost effectiveness by joint use of sensors and simulators

Intelligent traffic control,

Enlarging sharing of authority data

Ports: cooperation, infrastructure and exchange of data

## Regulatory and AI ethics framework (international, EU and national)

Definitions, roles and responsibilities, data, digital infrastructure and data exchange requirements, uptake of new technologies, transparency, validation, verification, certification and oversight, competence

**Trials and pilots:** industry-led in neighbouring areas and internationally, ecosystems, remote pilotage, ports

ecosystems, remote pilotage, ports, adoption of guidelines

## Impact assessment

Framework on impacts of progressing automation and adoption of indicators needed

## Competence and skills development

**Financing:** Twelve-year transport system: pilots, intelligent fairway, infrastructure, digital data exchange

# Intelligent fairways and intelligent traffic control/vessel traffic services

- Intelligent fairways -concept in big picture includes
  - Producing, sharing and use of digital data, governance model and services, digital infrastructure (communications) and physical infrastructure (eg. intelligent safety devices) support pilots and progressing automation
  - includes open sea, fairway and ports
  - technologies (eg. sensors, sensor fusion and AI, also ship sensors and technology)
  - connects all the fairway and port stakeholders together. Also connection to multimodal transport corridors and logistics chains
  - eMSW project (Additional services based on open-data traffic information and maritime logistics data taken also into consideration automation needs)
- Intelligent traffic control and vessel traffic services
  - Digital, real-time maritime situational picture comprising data collected from different sources
  - Open data sharing
  - Fintraffic as a trusted third party to offer platform to intermediate data and supports ecosystem
  - Fintraffic VTS eFairway project (services for remote control and pilotage, Maritime Connectivity Platform MCP)



# Thank you!

lvm.fi  @lvmfi  
@AnneMiettinen1

**LVM** MINISTRY OF TRANSPORT  
AND COMMUNICATIONS