MARITIME

Autonomous Ships

Development and status

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1 – Digital transformation
2 – Disruption of business models
3 – Remote & Autonomous operations
4 – Notable projects
5 – Conclusions

1 - What is digital transformation and why we talk about it

- Digital Transformation is about the set of opportunities enabled by:
  - Computers……. NASA vs iPhone
  - Connectivity…….. Evolution of mobile phone
  - Sensors…….. 20 sensors in your pocket
  - Software…….. Big Data among others

Vs

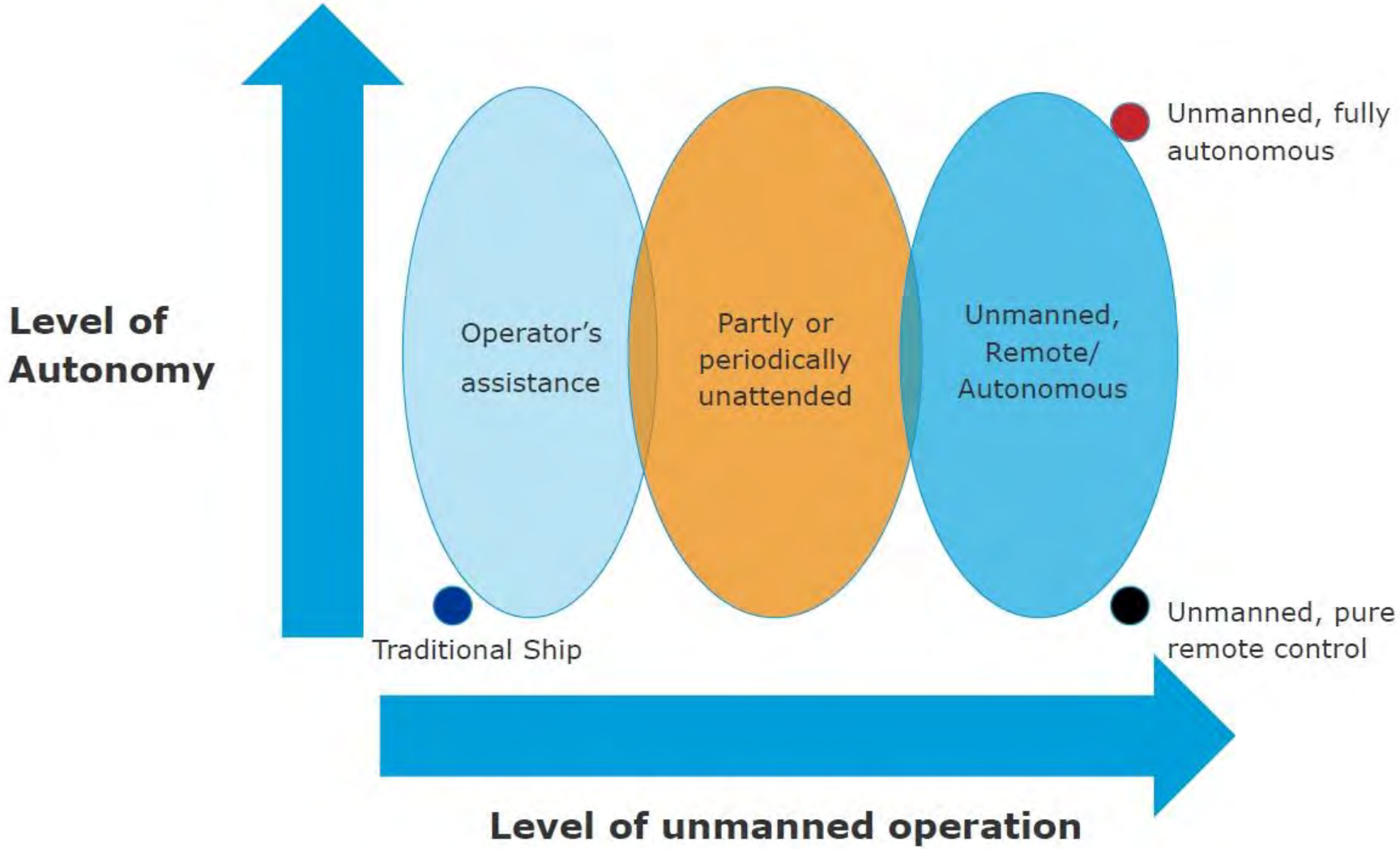
Spotify

2 - Disruption of business models

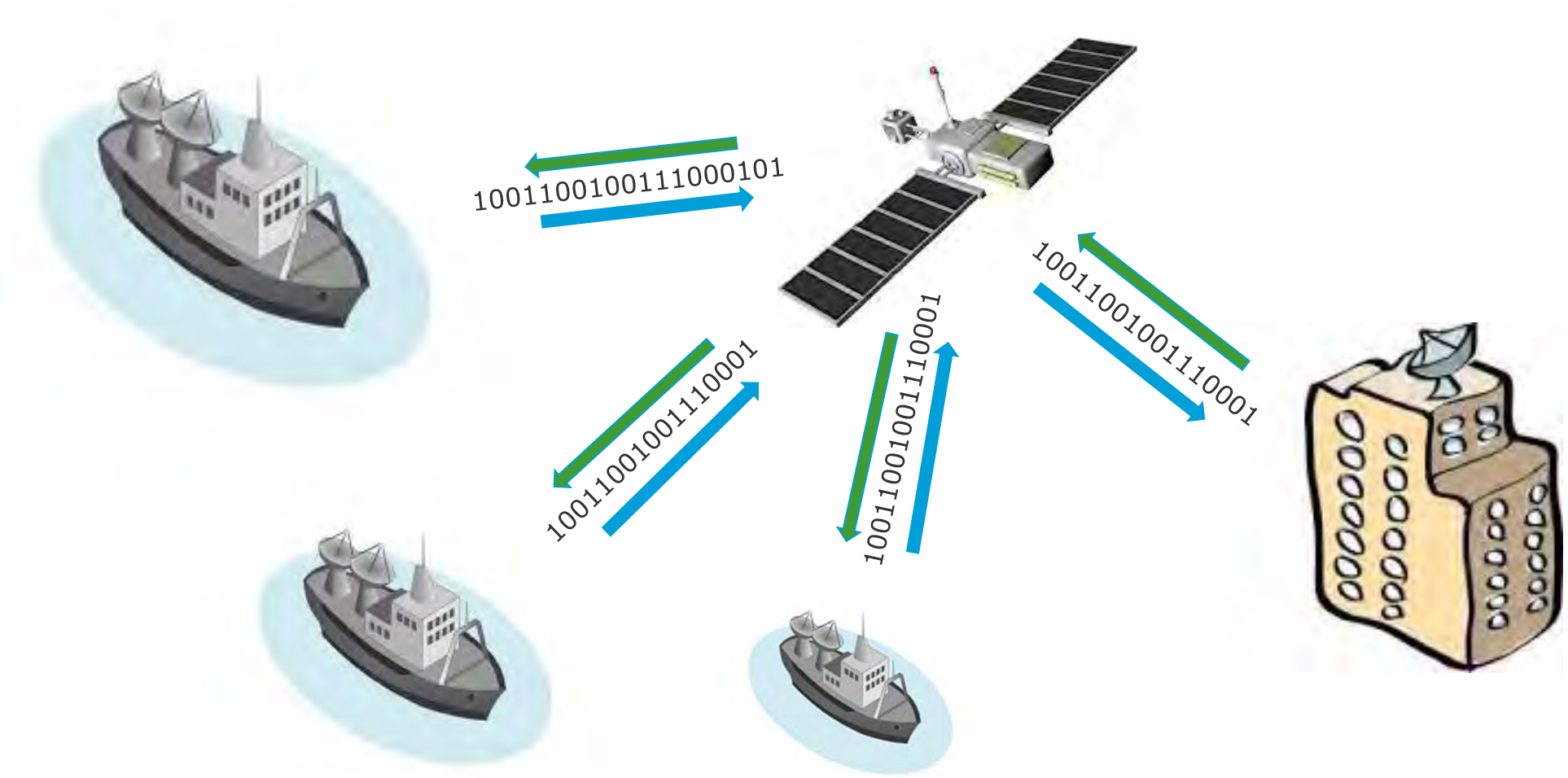
Wärtsilä and Carnival Corporation sign 12-year maintenance deal

- 120 TEU, delivered in 2020
- Replaces 40.000 truck trips annually
- All remote control functions tested in until 2022.
- From 2022 fully autonomous electric operation

3 – Remote & Autonomous operations

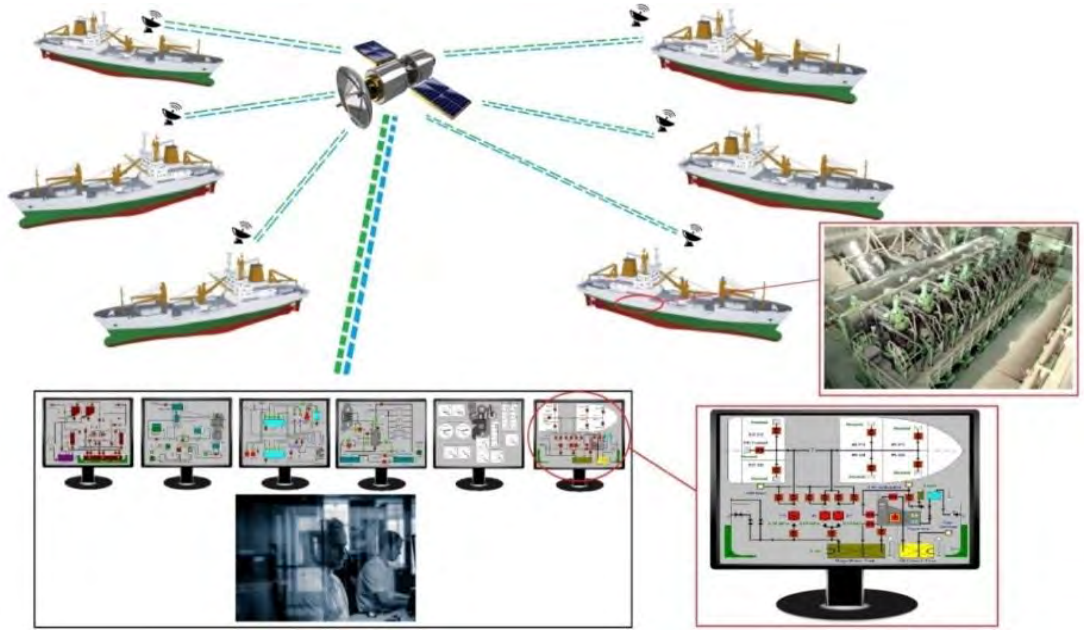


3 – **Remote control -** Connectivity



3 - Remote operations

The ROMAS project (On Shore ECR)



3 - Autonomous operations

4 - Notable projects

4 - Notable projects

CCS CHINA CLASSIFICATION SOCIETY

UCSDA

Unmanned Cargo Ship Development Alliance

This Chinese project is lead by the Chinese Classification Society CCS.

Rolls-Royce, Wärtsilä and ABS (American Bureau of Shipping) have been mentioned as external project partners.

Project announcement

NYK

Demonstration Project to Remotely Operate a Ship

NYK, together with its research-arm MTI (and other Japanese companies) has announced plans to demonstrate **remote operations of a container ship** in Pacific trade.

https://www.monohakobi.com/en/company/news/news_20180810/

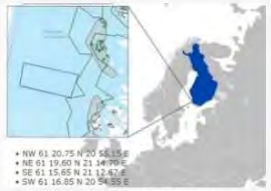
DNV·GL

4 - Notable projects

One Sea

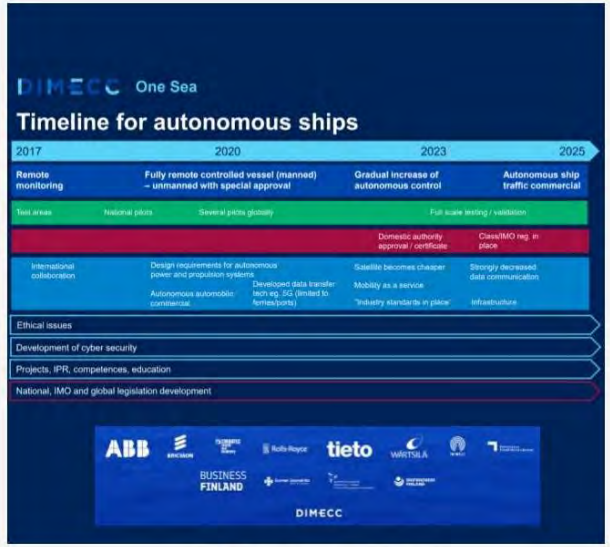
Autonomous Maritime Ecosystem

One Sea is a Finnish Ecosystem (project), which aims at providing a solid ground for research, testing and collaboration reg. autonomous ships.



One Sea features an open test area "**Jaakonmeri**"

Similar test areas are found also in Norway and China



https://www.oneseaecosystem.net/

MUNIN

Maritime Unmanned Navigation through Intelligence in Networks

MUNIN was essentially a feasibility study and test-bed development for an **Unmanned Cargo vessel**.

The project looked at technical, economical and legal feasibility.

http://www.unmanned-ship.org

MUNIN Vision © Fraunhofer CML

4 - Notable projects

AAWA *Advanced Autonomous Waterborne Applications Initiative*

The AAWA initiative looked at technology, safety, incentives (economics) and legal of autonomous vessels in general.

Project whitepaper

- **Areas of focus:**
  - Sensor fusion
  - Collision avoidance
  - System architecture
- **DNV GL focus:**
  - Competence on core technologies
- **Partners:** NTNU, DNV·GL, MARITIME ROBOTICS

SIMAROS

Safe Implementation of Autonomous and Remote Operation of Ships

The SIMAROS project is one of several Norwegian undertakings. SIMAROS looked mainly at safety aspects.

Other notable Norwegian projects are:

AUTOSEA (Sensor fusion and collision avoidance for autonomous surface vehicles)

ROMAS (Remote Operation of Machinery and Automation Systems)

The Norwegian research is quite focused around **NTNU AMOS** (Centre for autonomous marine operations and systems), **Kongsberg** and **DNVGL**

https://www.ntnu.edu/web/amos/research

“One small step for man..”

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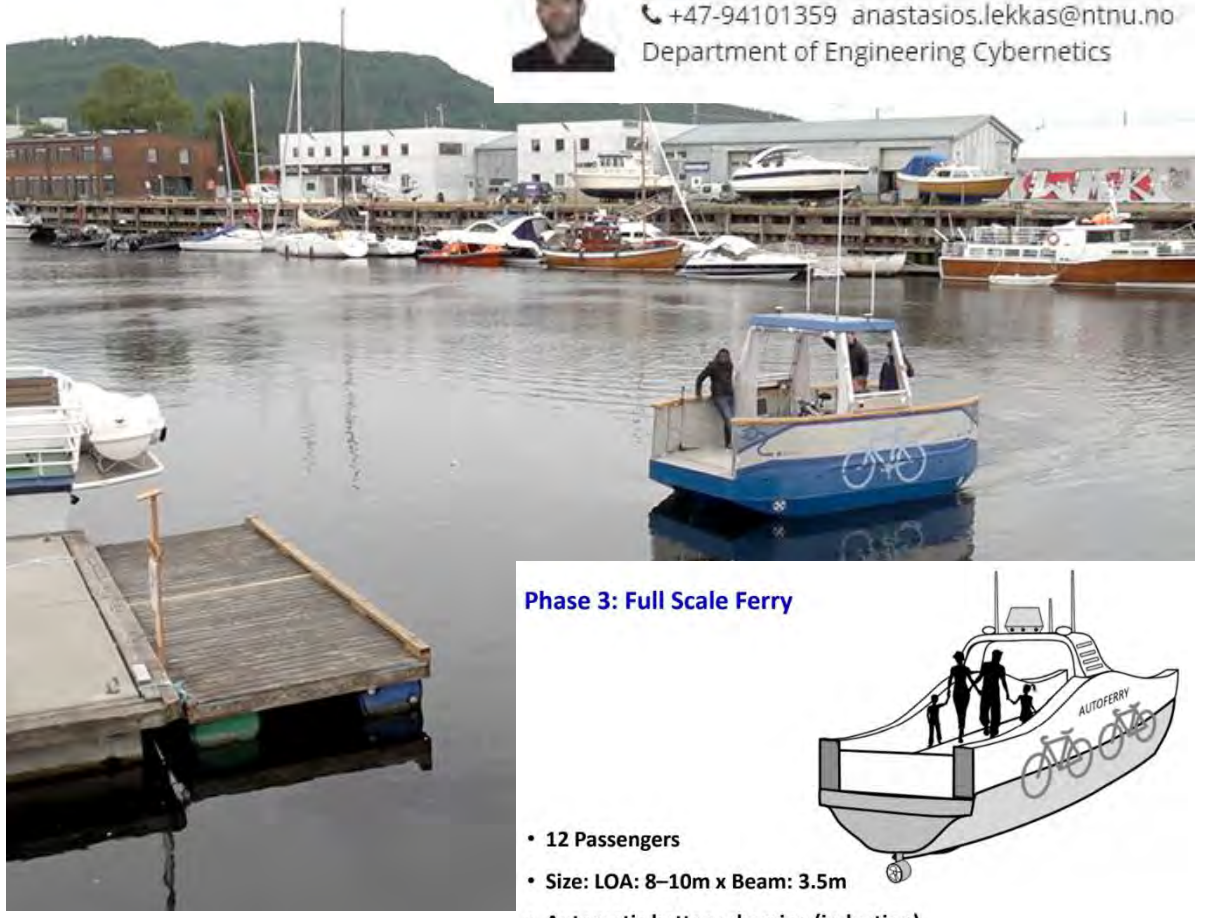
AUTOFERRY

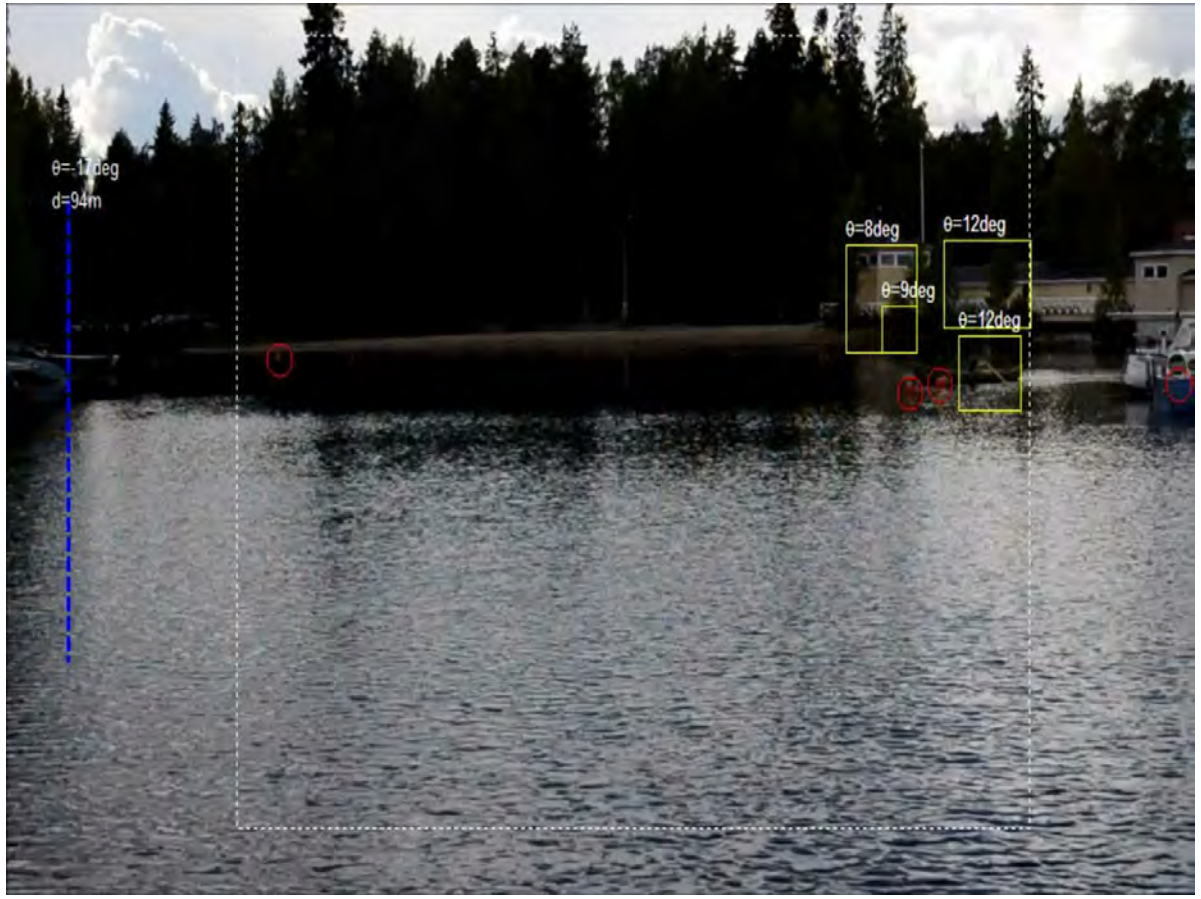
- The main goal of this project is to develop ground breaking new concepts and methods which will enable the development of autonomous passenger ferries for transport of people in urban water channels.
- On-demand ferry - push the button for the ferry to come
- Electrical propulsion, Automatic charging of batteries
- Navigation: High-precision system plus backup system & Anti-collision system



Phase 3: Full Scale Ferry

- **12 Passengers**
- **Size: LOA: 8–10m x Beam: 3.5m**
- **Automatic battery charging (induction)**
- **Propulsion: 4 x 4kW azimuth thrusters**
- **RTK GNSS-compass + Radar + Camera + LIDAR system**
- **AIS and 2-way wireless communication including video**

Conclusions



- Digital transformation (data, computers, sensors, connectivity) will drive change
- Disruption on how we do things
- Remote and autonomous operations and ships are not coming – they are here !
- We need to:
  - Accept
  - Embrace
  - Influence
- Start small, fail fast, fail small

Thank you !

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SAFER, SMARTER, GREENER