NOVIA
UNIVERSITY OF APPLIED SCIENCES
Sea4Value
Future Fairway
Navigation
2020 - 2022
Value creation via smart and autonomous maritime transport
Joint development between industry, research and authorities

Industrial Partners
- awake.ai
- BRIGHTHOUSE INTELLIGENCE
- PORT OF HELSINKI
- RAUMAN SATAMA PORT OF RAUMA
- MEYER TURKU
- FINNPILOT
- ESL Shipping
- Haltian
- NESTE

Research Partners
- Aalto University
- NOVIA UNIVERSITY OF APPLIED SCIENCES
- Tampere University
- UNIVERSITY OF TURKU
- JYVÄSKYLÄN YLIOPESTO UNIVERSITY OF JYVÄSKYLÄ

Public and authority Partners
- Suomen Verustamo
- REDERIerna | Finland
- Finnish Shipowners' Association
- PORT OF TURKU FINLAND
- FINNISH METEOROLOGICAL INSTITUTE
- TRAFICOM
- VÄYLÄ
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Vision

- Future Fairway Navigation program creates a model for safe, sustainable and customer-centric next level fairway navigation and decision-making environment that benefits existing fleets and lays the foundation for future autonomous vessels.

Facts

- ONE SEA ecosystem program
- Business Finland funded R&D program
- Budget 6 M€
- Duration 2/2020 - 6/2022
- Program management
- DIMECC Ltd, Seppo Tikkanen
Vision of the smart fairway services and concept for remote pilotage
# Sea4Value Future Fairway Navigation

## 1. Vision of the smart fairway services and concept for remote pilotage

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<th>Vision of the smart fairway service</th>
<th>Safety and risk management strategy (FSA)</th>
<th>Assessment of remote piloting procedures</th>
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<td>Legal analysis</td>
<td>System level cyber security risks assessment for maritime solutions</td>
<td>Human factor effects in sociotechnical environment</td>
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## 2. Remote pilotage technical experimentation environment

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<th>Realtime communications</th>
<th>System architecture</th>
<th>Scenario simulations</th>
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<td>Connectivity solution</td>
<td>APIs/Interfaces to existing data sources (VTS and open)</td>
<td>Workstation for remote pilotage</td>
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<tr>
<td>Concept of sensor environment (HW &amp; SW)</td>
<td>Vessel data gathering system (or interface to already existing one)</td>
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<td>Digital twin of ship and fairway</td>
<td>Ship path prediction</td>
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## 3. Roadmap and recommendations for future development and actions

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<th>Roadmap and recommendations</th>
<th>International application &amp; potential</th>
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Novia University

- Novia's role mainly participates in the research and development of remote pilotage operating model and technologies.
- Remote pilot simulations at Aboa Mare / Novia university in Turku, Finland
- https://www.youtube.com/watch?v=vuW1AvhsjXg&t=461s

Simulator exercises
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First sensor station installed in June 2020

Remote pilotage center concept, December 2021

Spring 2022: Remote pilotage concept demonstration at Kokkola fairway in Bay of Bothnia
You can choose to place them on either the left or the right side.
ePilotage working environment and remote pilotage experiments
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Examples of required enables

- New roles for old players – new players
- Definition, standards and cooperation
- eFairway and Intelligent Fairway concepts
- Data and access to API’s
- Training and competence requirements
- Permissive legislation
- Connectivity (ship-to-shore, shore-to-ship)
- Present and future Aids to Navigation
- REMOTE PILOTAGE
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Remote pilotage needs?

- Information needs of a remote pilot or the captain of remotely piloted vessel?
  - What information must be transferred from the vessel and to the vessel?
  - What information is provided by the *intelligent* fairway?
- Competence?
  - What skills/training are required from the remote pilot?
  - What skills/training are required from the captain/bridge team?
- Standardized communication for remote pilotage?

Framework for remote pilotage

- Compulsory training requirements for the remote pilot and for the captain receiving remote pilotage
  - Standard operation procedures
  - Use of technology and its limitations
  - Verbal communication and data exchange
- Defining and selecting suitable fairways
- Technology requirements
  - Remote pilotage workstation
  - Data from the vessel
  - “Intelligent fairway”
  - Connectivity
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WP 2 Business transformation
Key outcomes
• Ecosystem analysis
• Smart Fairway Service vision
• New business model drafts for the partners
• Analysis report on legal challenges
• Experts’ evaluation of the Fairways service concept's international potential

WP 3 Technical transformation
Key outcomes
• Reliable communication infrastructure and connectivity solutions for real-time remote pilotage.
• Design and implementation of sensor solutions (hardware, data integration and computing power) to enable Remotely Operated Pilotage Services
• Information sharing for improved situational awareness
• Development of HIDS and NIDS solutions for each sensor subsystem and common solution to follow overall the Remote Pilotage Services cyber security status
• Ecosystem-level open APIs that benefit all partners and externals
• Common interoperable, communication and distributed compute platforms
WP4  Operational transformation

Key Outcomes

- Increased acceptability and desirability of the work processes
- Guidelines for safe, reliable, desirable, and ethical design of work processes and tools
- Seminars and co-creation workshops with external stakeholder groups
- Training tools and work processes for implementing new AI technologies.
PRELIMINARY RESULTS FROM THE S4VF PROJECT

- Information and control systems at ROC
  - The current bridge systems mainly transferred to the remote operations centers
  - User interfaces of the existing system not optimized for humans

- Replacement of the sensory perception
  - Importance of sensory perception?
  - AR technology & other new ways to improve Situational Awareness.

- Importance in learning to operate in a new environment.
  - Working environment is changing and humans need to be adapted to that.
  - Technology should support human performance (user centric design) hence research is needed to ensure that this happens.
Zusammenfassung

Sea4Value – Fairway-Projekt produziert intelligentes Fairway-Service-Konzept und demonstriert Fernlotsenfahrt

- Weitere Entwicklungen und Investitionen werden erforderlich sein, um die Ergebnisse zu konkretisieren und zu integrieren