Autonomous and remotely operated ships
Tekna – Havneteknisk gruppe og Marinteknisk Selskap
Fremtidens skip og fortøyningssystemer

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Agenda

1. What is it?
2. How it may look like
3. Current projects
4. The class perspective
5. Is it legal?
“Autonomous Ships” – what does it encompass?

Level of Autonomy

- Traditional Ship
- Operator’s assistance
- Partly or periodically unattended
- Unmanned, fully autonomous
- Unmanned, Remote/Autonomous

Level of unmanned operation

Unmanned, pure remote control
How it may look like

A scenario from the AAWA project
Operation scenario
Connectivity
Remote supervisory control
Remote supervisory control
Monitoring autonomous operation
Autonomous evade
Autonomous evade
Autonomous re-plan
Autonomous re-plan
Autonomous – requiring remote assistance
Autonomous – requiring remote assistance
Monitoring autonomous operation
Operation will vary depending on the ship
Projects
The SIMAROS project
Safe Implementation of Autonomous and Remote Operation of Ships

- **Unmanned offshore vessel**
  - Technology development
  - Development of risk assessment tools and standards
  - Ambition: Enable national regulations and class to allow for commercial unmanned operation
  - Building planned 2018

- **Partners:**
The AAWA project
Advanced Autonomous Waterborne Applications

- **Areas of focus:**
  - Technology
  - Safety and security
  - Societal & legal acceptance
  - Economy and business models

- **DNV GL focus:**
  - Class requirements and assurance of safety and performance

- **Partners:**
  - Rolls-Royce
  - DNV GL
  - Deltamarin
  - TUMA
  - Inmarsat
  - Turun yliopisto
  - University of Turku
  - Åbo Akademi
  - Aalto University
  - Tampere University of Technology
  - VTT
The Autosea project

- **Areas of focus:**
  - Sensor fusion
  - Collision avoidance
  - System architecture

- **DNV GL focus:**
  - Competence on core technologies

- **Partners:**
External project: Autonomous ferry Trondheim

- **Project scope:**
  - Worlds first autonomous passenger- and bicycle ferry
  - Crossing the channel in Trondheim
  - Driven by student projects

Aluminum hull 5 meter long
External project: Yara Birkeland

120 TEU container ship
- Short sea transport (>30 nm)
- Electric propulsion
- Launched 2018
- Unmanned 2019

Key facts (to date)
- LOA: 80m
- Beam: 15m
- Draught: 5m
- Service speed: 6 knots
- Max speed: 10 knots
The class perspective: How to ensure safe implementations?
Areas where DNV GL will have requirements

- Sensor capabilities
Areas where DNV GL will have requirements

- Sensor capabilities
- **Decision algorithms**

From the ReVolt Movie - [https://youtu.be/rhYaNHx5D00](https://youtu.be/rhYaNHx5D00)
Areas where DNV GL will have requirements

- Sensor capabilities
- Decision algorithms
- **Ship-shore communication**
Areas where DNV GL will have requirements

- Sensor capabilities
- Decision algorithms
- Ship-shore communication
- **Machinery design & maintenance**
Areas where DNV GL will have requirements

- Sensor capabilities
- Decision algorithms
- Ship-shore communication
- Machinery design & maintenance
- On-shore control centre
Areas where DNV GL will have requirements

- Sensor capabilities
- Decision algorithms
- Ship-shore communication
- Machinery design & maintenance
- On-shore control centre
- Cyber security
Is it legal?

- **Short answer:** No

- **IMO Conventions:** STCW, SOLAS, COLREGS, MARPOL, ...
  - Written for manned operation
  - References to operator/captain/officer
  - Topic on the agenda at IMO (MSC98/20/2 and MSC98/20/13)
  - Process will take time

- **Flag-states can, however:**
  - Provide exemptions within national waters
  - Make bi-lateral agreements with other states
Thank you for your attention!

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