

Co-innovation project

Virtual Sea Trial

Ensuring that a single shortened sea trial is sufficient to pass all future ship commissions

Goals: One sea trial; Reducing costs, risks and emissions of shipbuilding and commissioning; lower the risk of implementing innovations.

Coordinator: Novia University of Applied Sciences, **Mikael Mangård**

Ecosystem: Meyer NEcOLEAP Veturi



About myself

- Jari Böling
- Lecturer in automation
- New automation program at University of Turku
- Under Mechanical and Materials Engineering

- Used to work at Åbo Akademi, still working part time with projects.

Virtual testing = testing in a simulated environment, **model-based design**

- Tests are done prior to building of the system
- Design of the automation can be done beforehand
- Finding design problems prior to building is extremely valuable
- Such problems can be related to automation systems

Background case: New more complex design of a power plant

- Power plant existed only on drawings
- Constructed a dynamic simulation model of the system
- Tested if the automation system works
- Biggest single success:
 - Realized that one pump is on the wrong pipe
 - Complex piping due to efficiency maximization
 - No-one realized it based on steady-state considerations
 - The system would not have worked
 - The plan was changed before the construction of the plant
 - It worked as predicted by the simulations

Virtual Sea Trial

- **Plan: Future sea trials** will consist of both virtual and physical elements.
- **Virtual commissioning** will start as early as possible in the ship-building project, years earlier than current sea trials start.
- **Left-shift testing** lowers the risk of implementing new technologies and saves time and manpower from trials.
- A **unified, distributed, multivendor test environment** for the whole shipbuilding ecosystem brings transparency to the commissioning process.

Work Packages

WP1 Virtual Commissioning Interfaces

- Digital asset management (DAM)
- AI-enhanced interfaces
 - Extracting information from drawings automatically
 - Doing that manually takes a lot of time
- Human-machine interfaces (HMI)
- Commissioning monitoring system

Work Packages

WP2 Test-driven Design and Commissioning

- System architecture and specifications
 - Testing of communication and interaction between different systems
- Test generation and creation
- In-the-loop testing
 - We do not want to model everything ourselves
 - Co-simulation of multi-vendor models, using FMI
- The model lifecycle
 - We want to use the models in the future
 - Which means we want to update it as well



Work Packages

WP3 Benefits realization

- Hybrid project model & business processes
- Impact assessment
- Business models and roadmap for benefits realization
- Roadmap to virtualization