

Digital Twins for Vessel Life Cycle Service (DigiTwinship)

To develop digital twins of maritime systems and operations, which is an open virtual simulator as the next generation of marine industrial infrastructure not only for overall system design, allowing configuration of systems and verification of operational performance, but also more focusing to provide early warning, life cycle service support, and system behavior prediction (Figure 1).

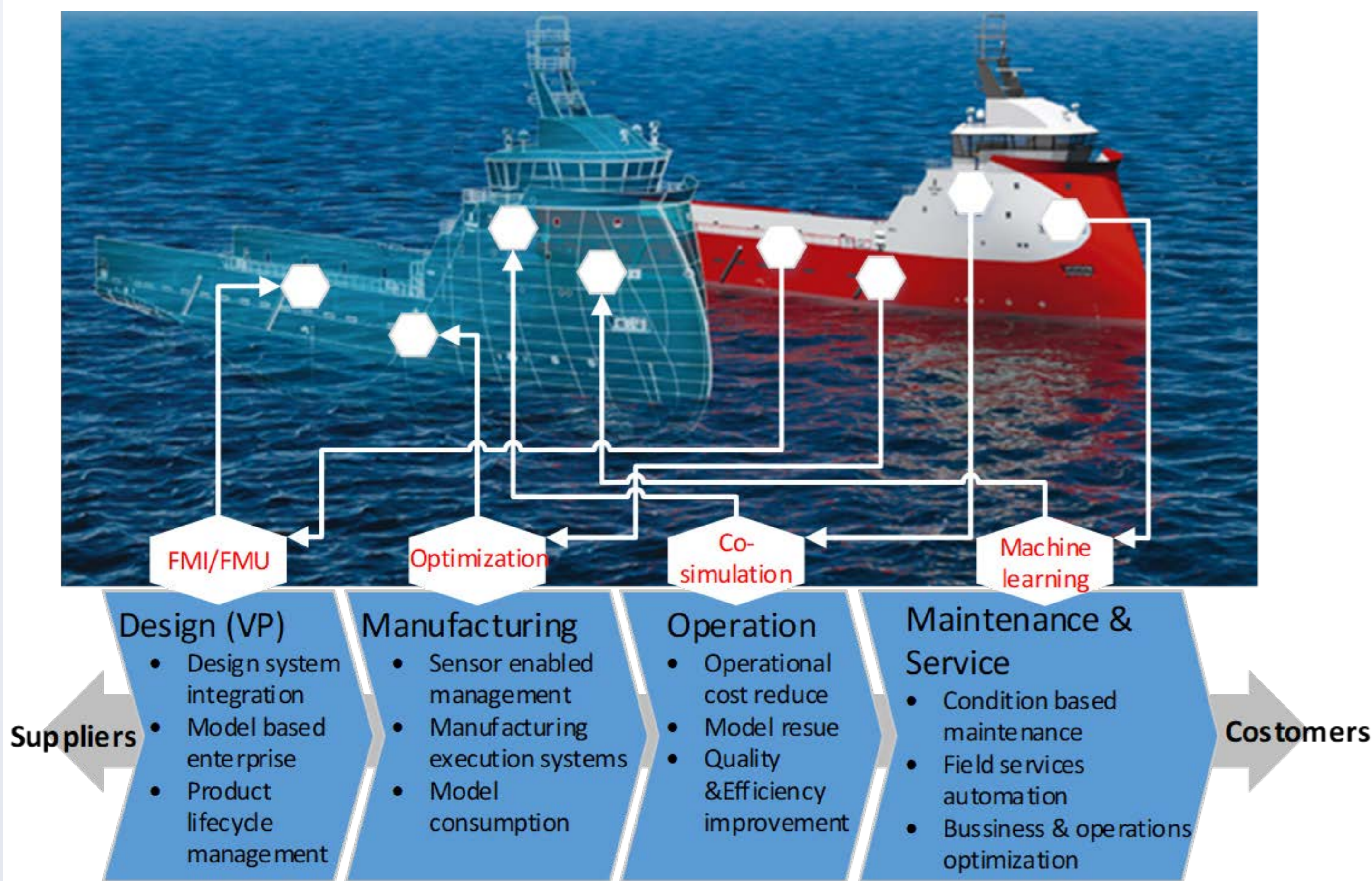


Figure 1. The development of digital twins system for marine industry

- Develop an open digital twins platform for marine design, operation, and maintenance

- Co-simulation mechanism for maritime digital twins platform
- Data infrastructure and analytics
- Define and develop sub-domain models for co-simulation and digital twins
- Benchmarking and analysis

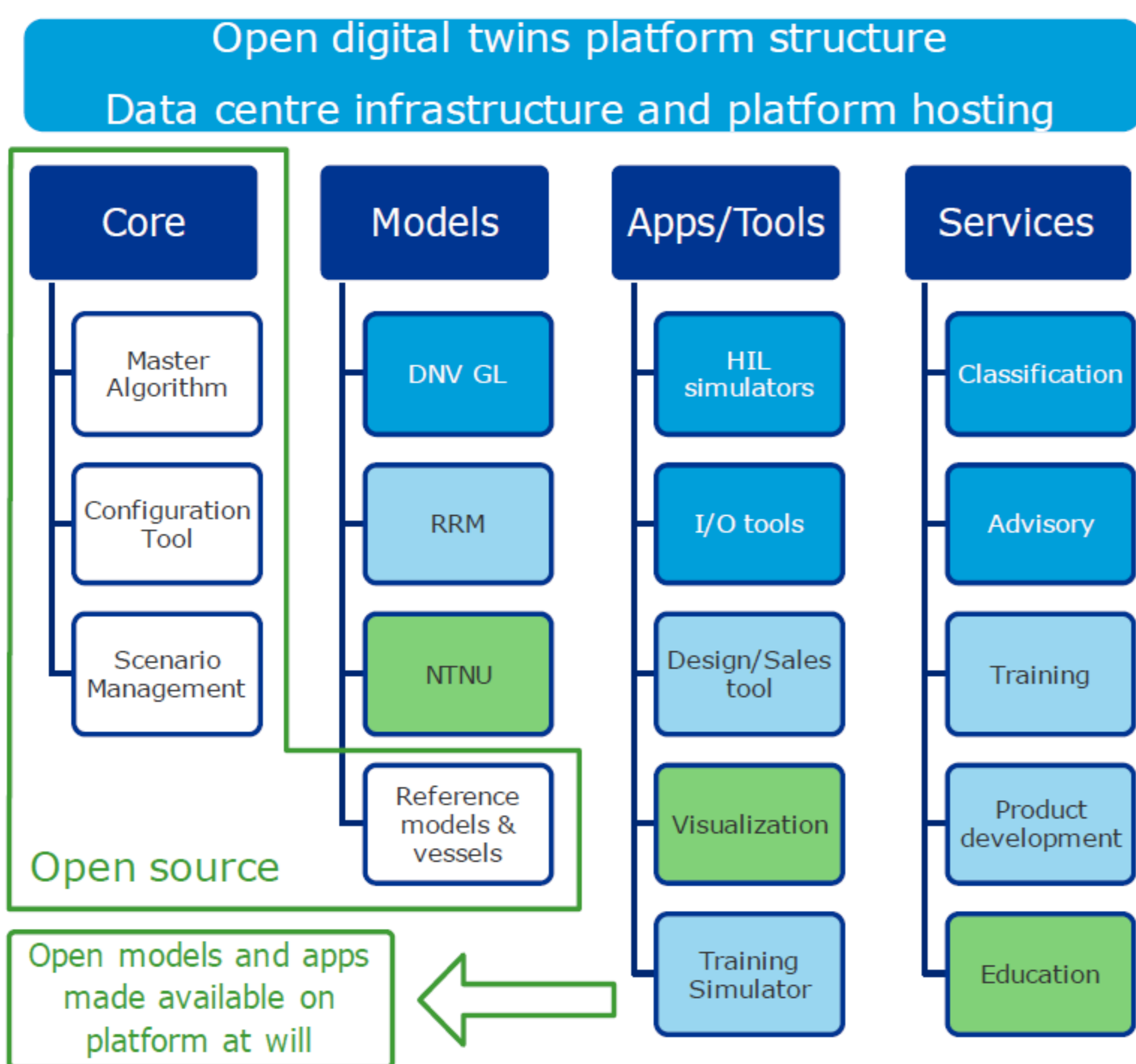


Figure 2. Open Software Framework and system architecture

- Development tools for early warning, prediction, and optimization based on digital twins for maritime industry

- Approximation-based model approach for sensitivity analysis
- Develop data-driven adaptive observer for ship component predictive maintenance
- Develop customizable optimization tools for operational efficiency on vessels
- Implementation of auto-control for certain full autonomy operations

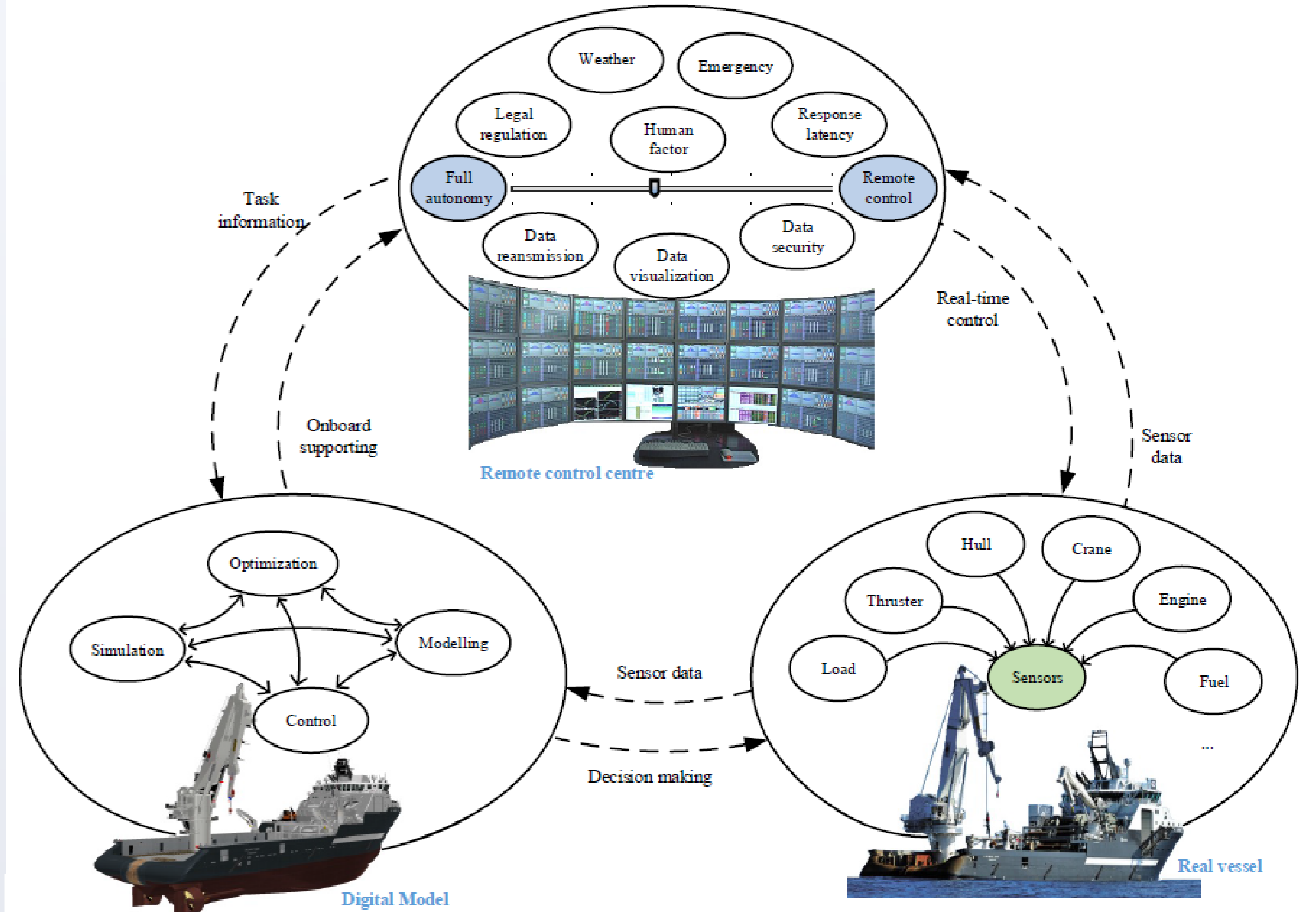


Figure 3. Onboard support system for ship maintenance and prediction

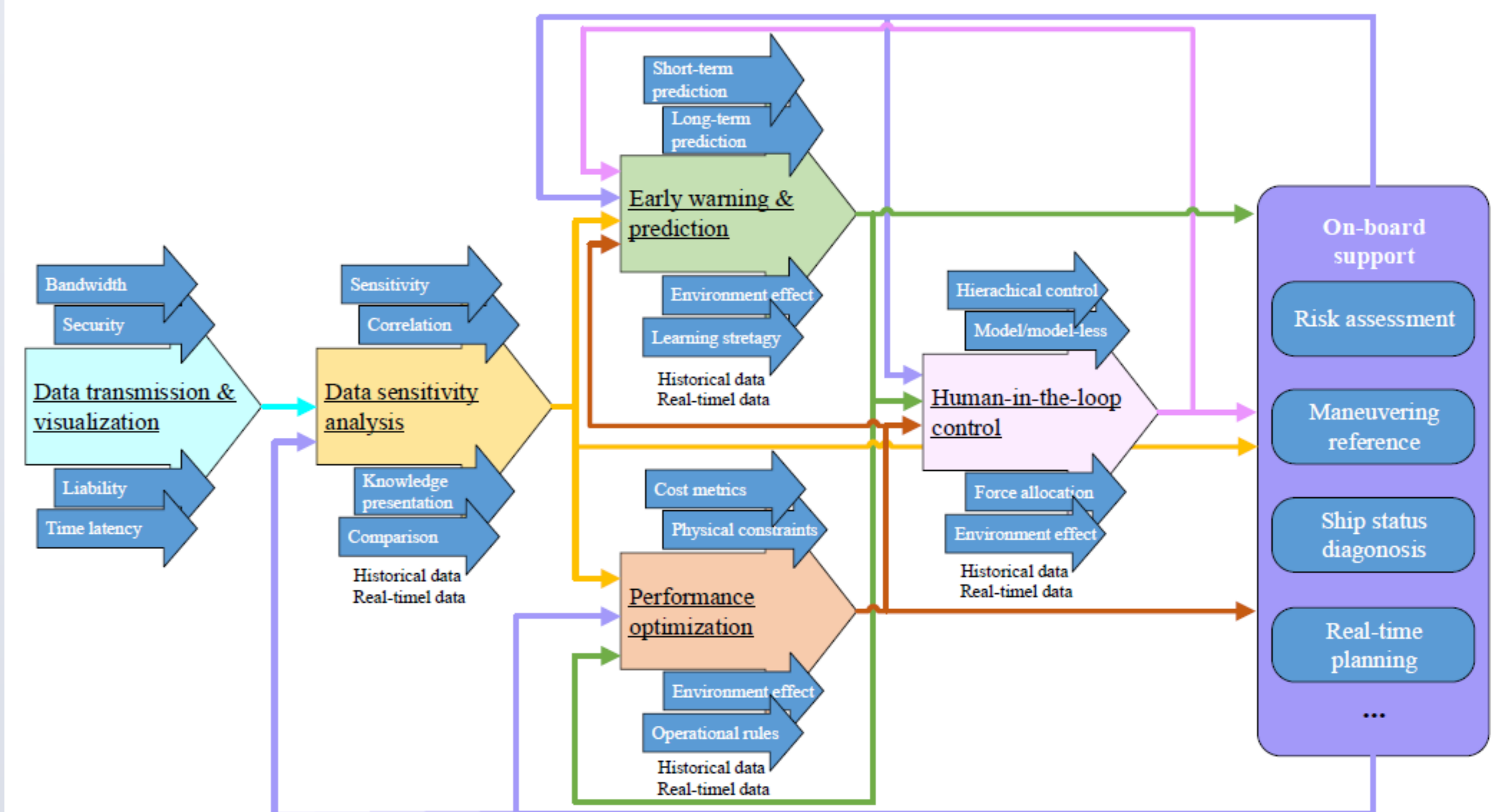


Figure 4. Hybrid model-based and data-driven approach

- Demonstrators - Subsystem and operational verification process

All demos will be made at Offshore Simulation Centre dome and "Remote control lab" at NMK II (Figure 5)



Figure 5. Demonstrators - Subsystem and operational verification process

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