FFI Norwegian Defence Research Establishment

R&D support to Royal Norwegian Navy programs

Håkon S. Andersen
Director of Research, Naval warfare systems and Autonomous systems

Combined Naval Event, May 24th 2023, Farnborough

Foto: AdobeStock

Norwegian maritime boundaries and strategic context

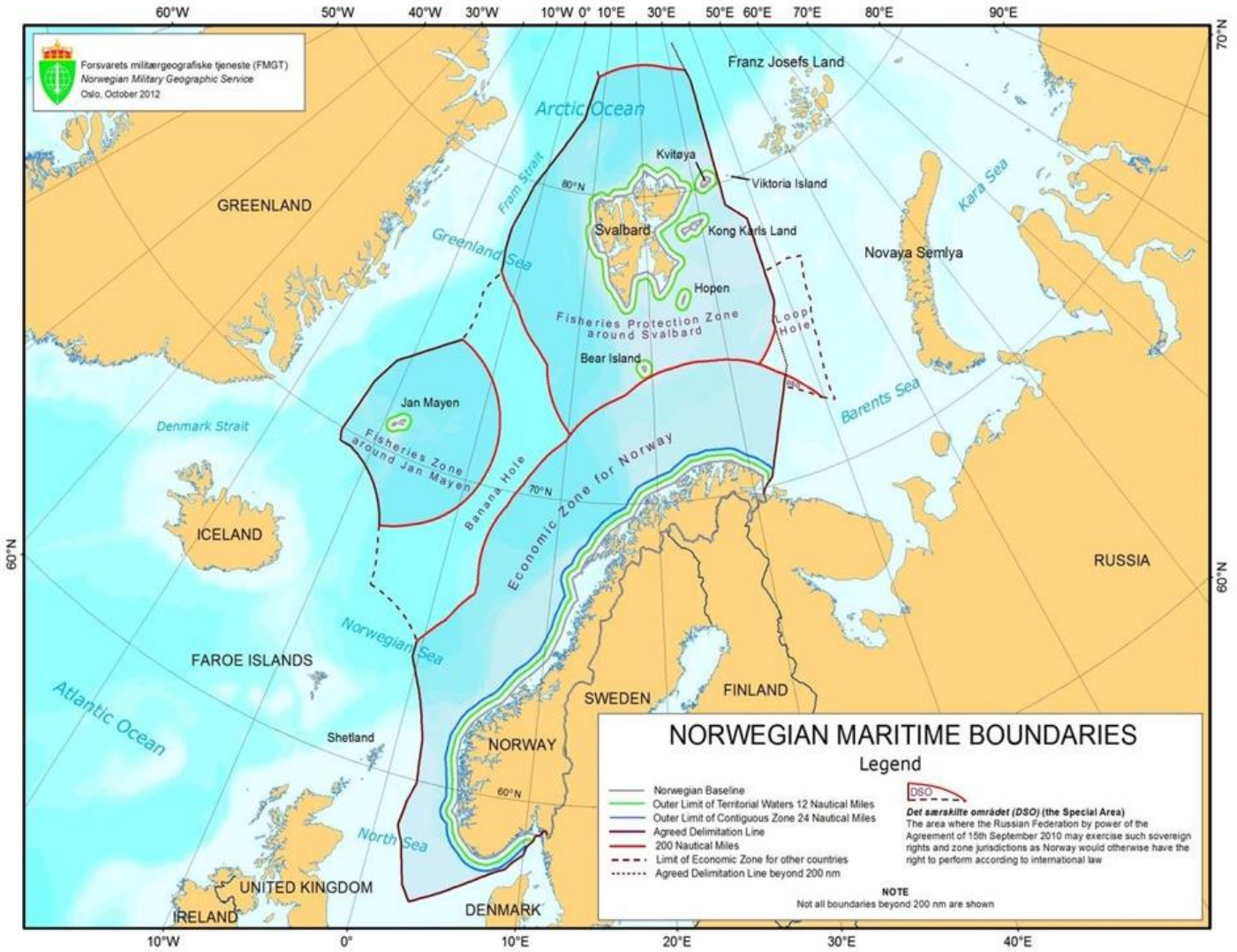

Image: FMGT

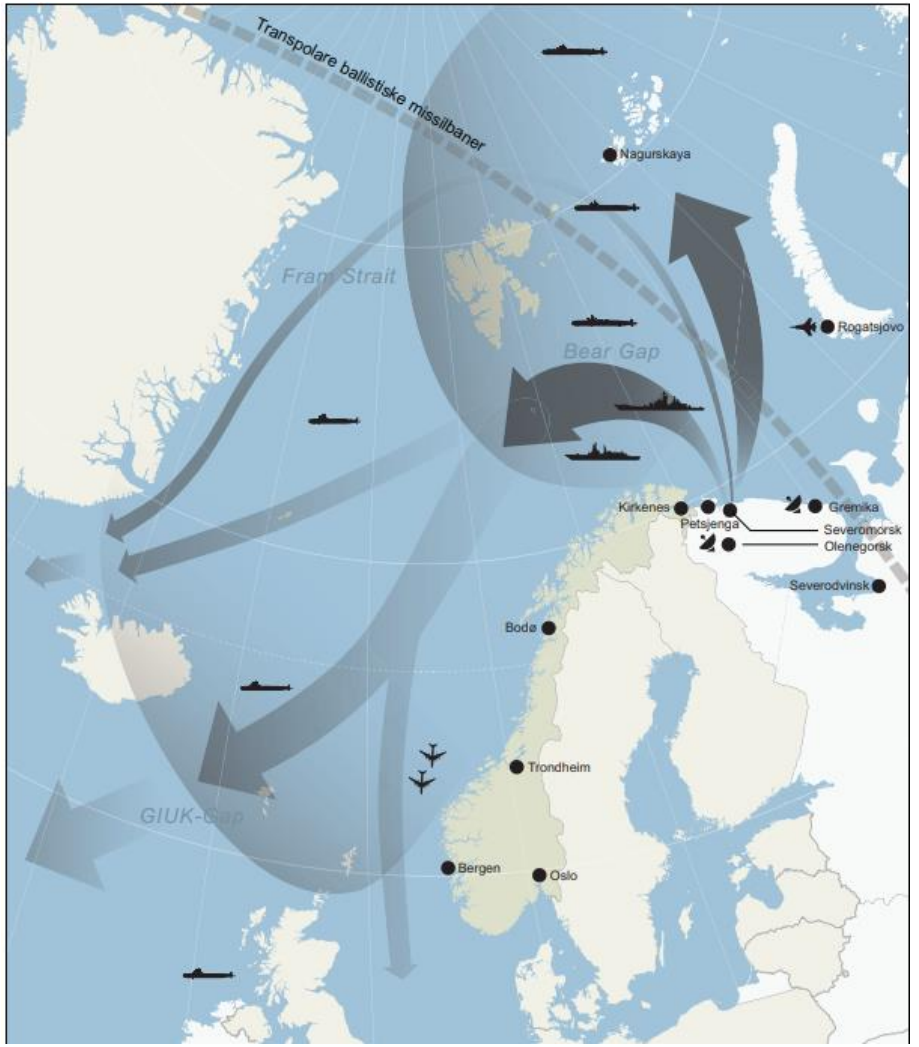

Illustration: 2021 Defence commission / Map: Norwegian polar institute

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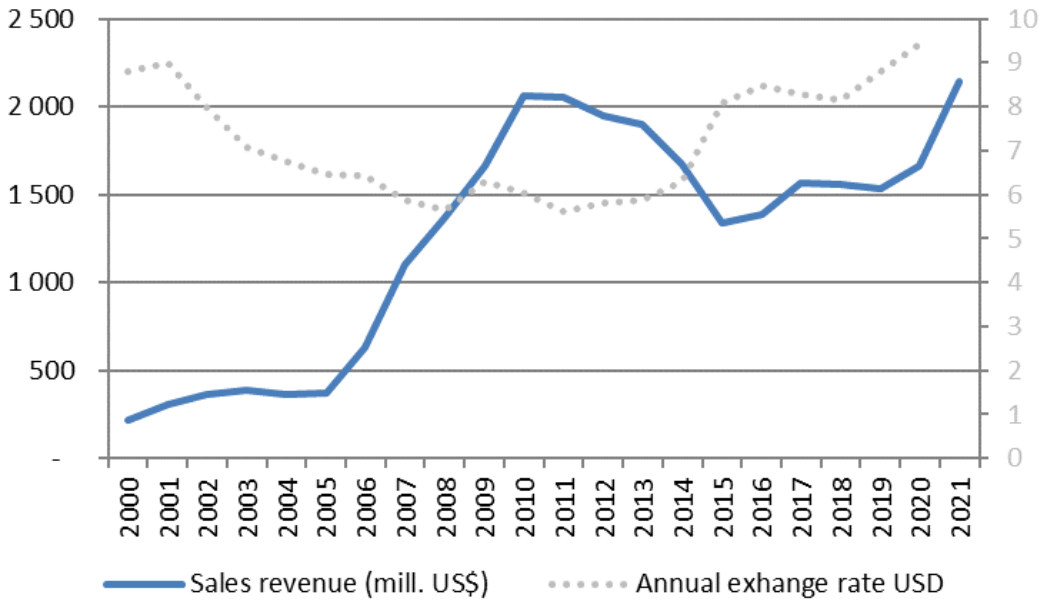
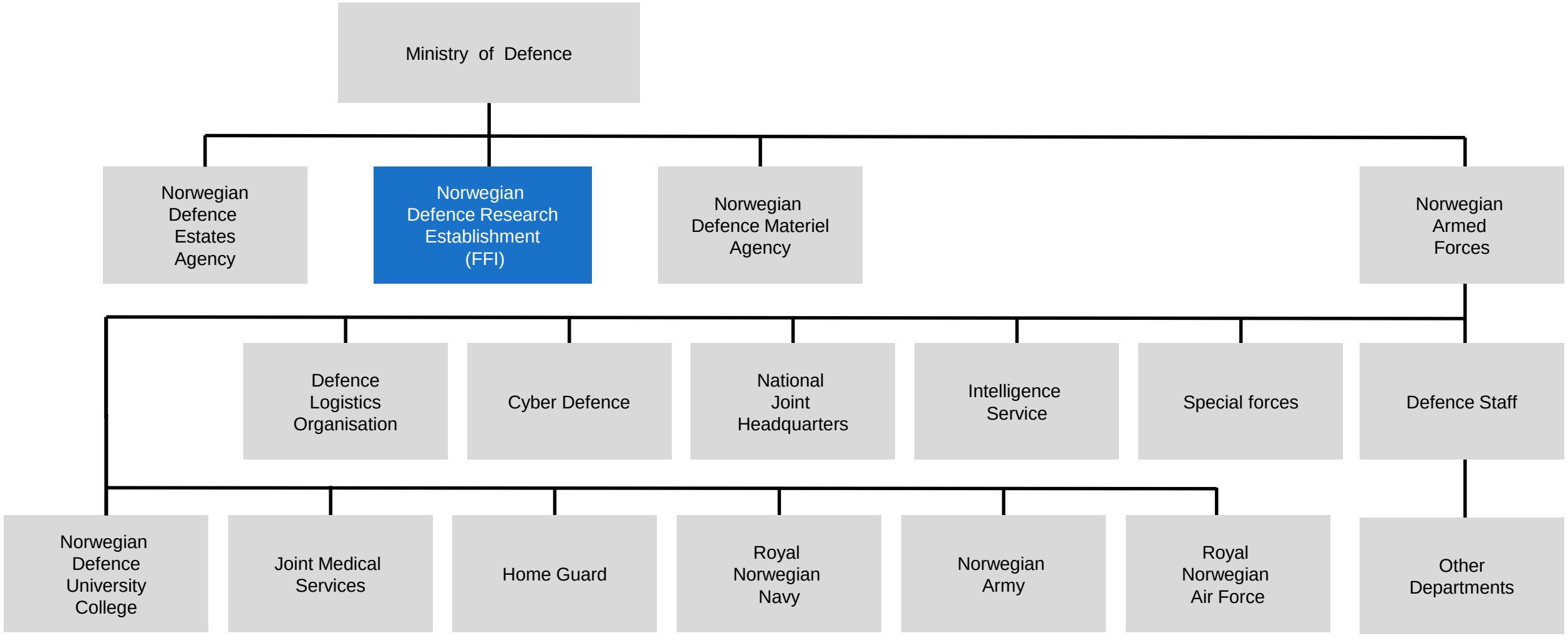
Norwegian defence industry

Sales revenue (mill. USD)

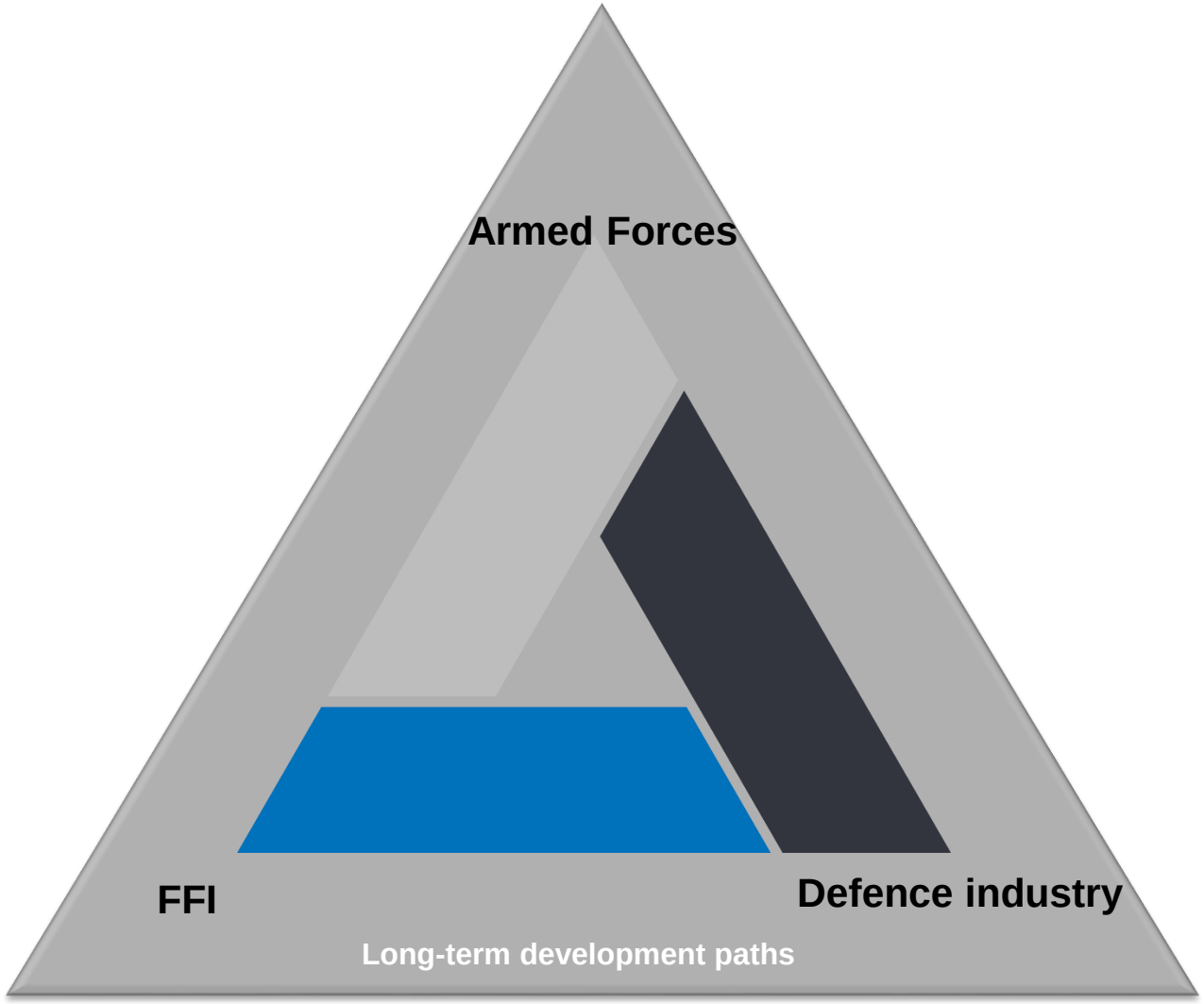


KDA, Nammo, Thales Norway, KAMS (2012 ->) and NFM Group (2009 ->)

FFI in the Norwegian defence sector



FFI in the «defence triangle model»



Hugin

Penguin

Submarine technology

PD 100, Black Hornet

TRL – The “valley of death” in technology development

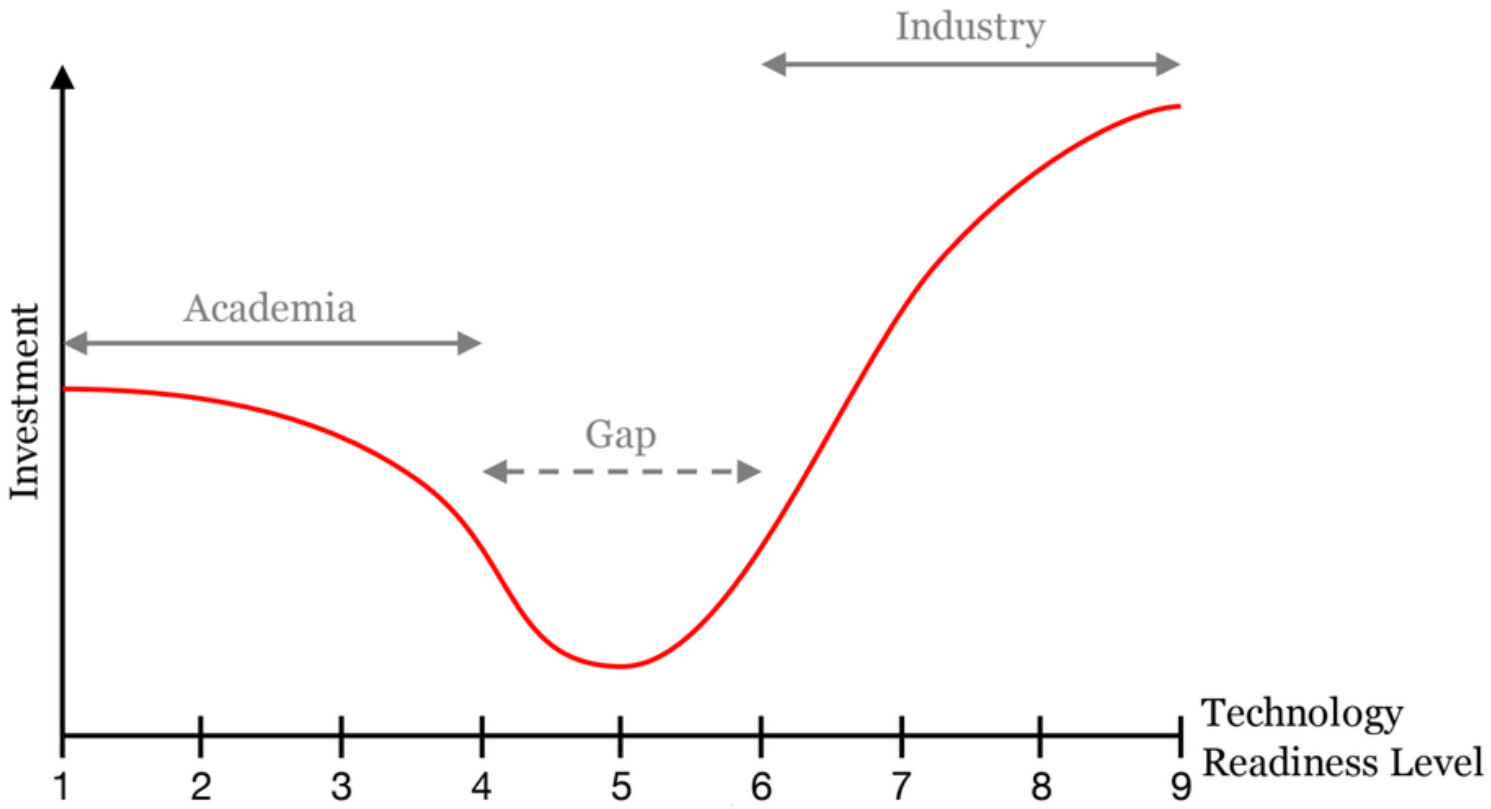


Illustration: https://www.tu.no

Research programs at FFI vs. the “valley of death”

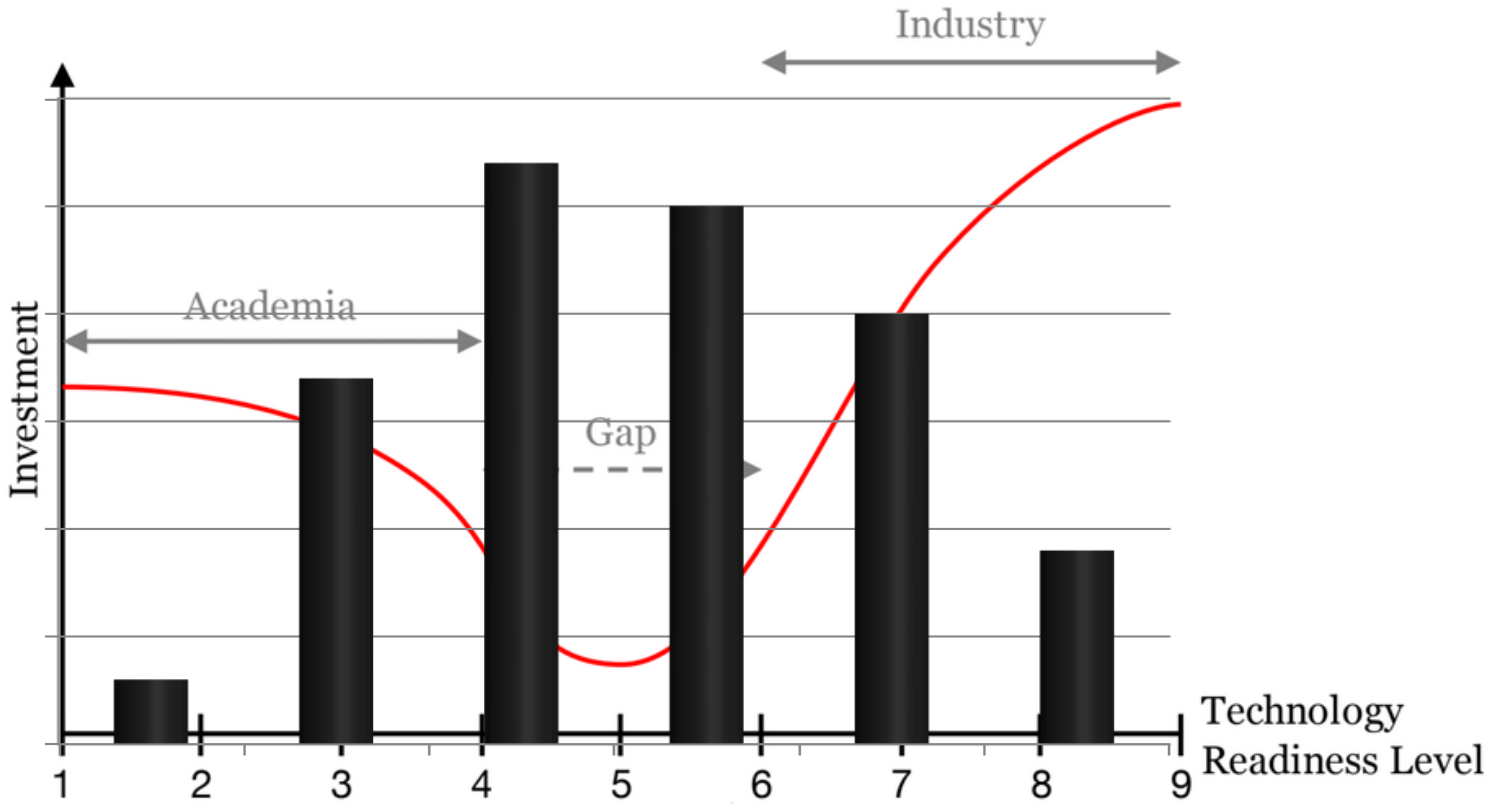


Illustration: https://www.tu.no

Maritime domain capability development – some ongoing platform related research activities

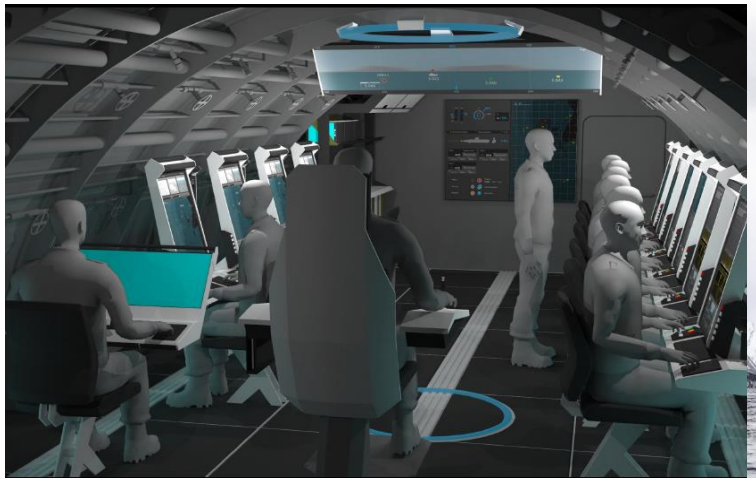
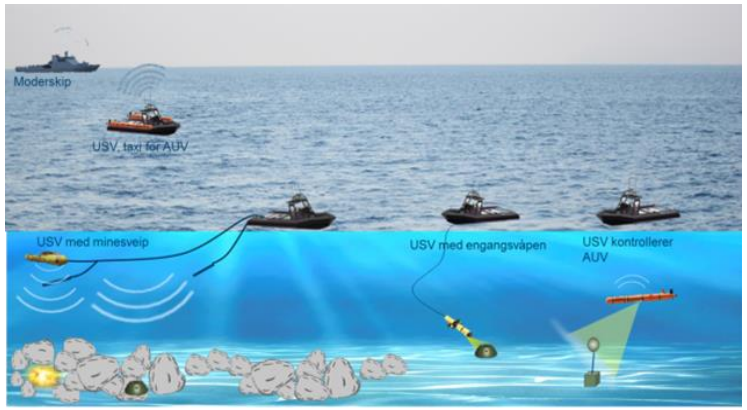
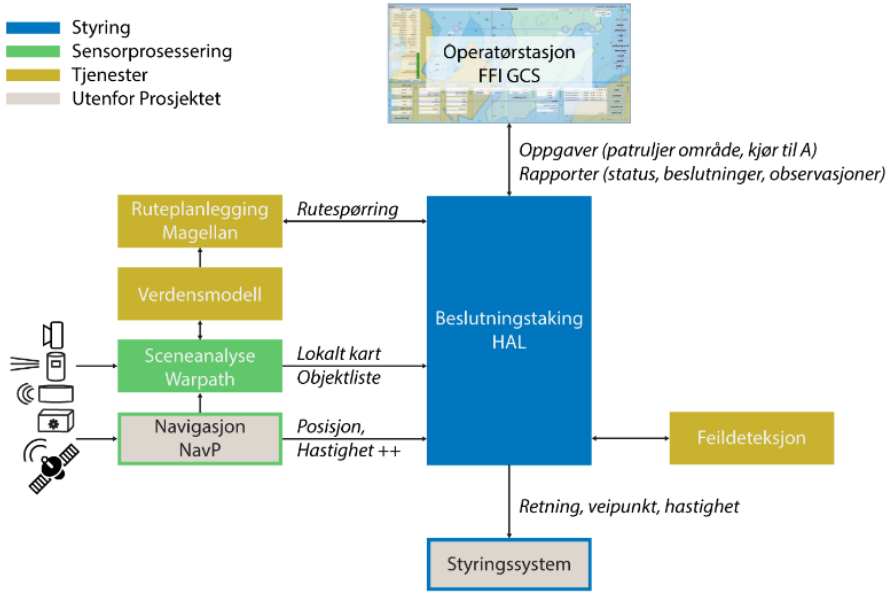


Photo: Bjørn Volle / Forsvaret

Photo: Boeing





Picture: Kongsberg Discovery

Example: Future Norwegian NMCM Capability

- P6359 is the Navy Procurement Program

- 2017 – 2020: Conceptual phase
- 2020 – 2022: Definition phase
- 2023 – 2028: Project phase (IOC: 2026, FOC: 2028)

Annual MCM Development Trials

3-week test periods

- Autonomy for MCM
- MCM operations
- Navy participation

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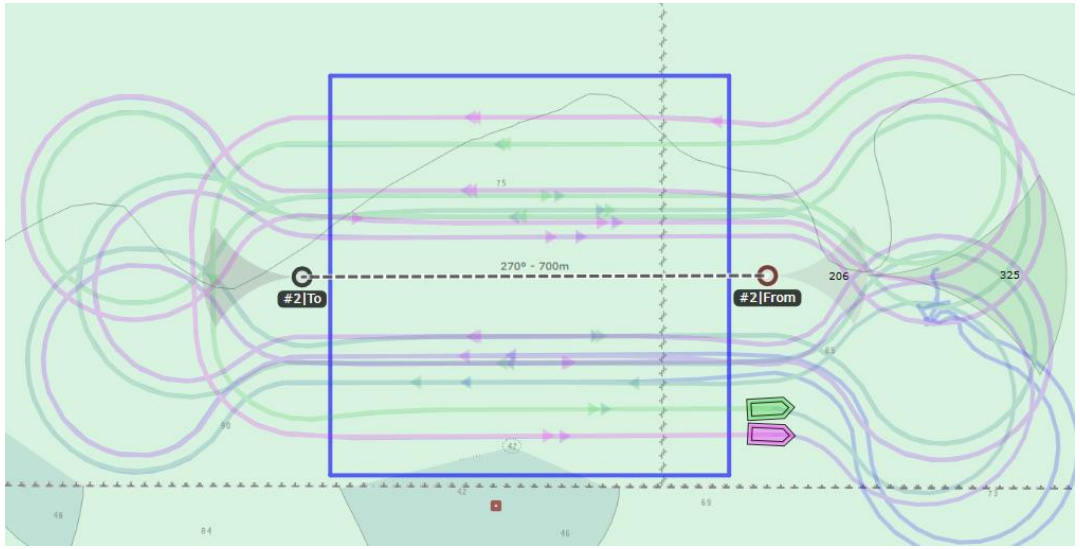
FFI USV Autonomy – Key Research Areas 2023

- Sweep operations with 2 USVs in formation
- Route planning with 2 USVs in formation
- Situational Awareness for collision avoidance
- Collision avoidance (iaw selected COLREGS)
- Navigation and positioning accuracy
- Simulator for USV autonomy
- L&R of AUV from USV



FFI AUV Autonomy – Key Research Areas 2023

Photo: Kongsberg Discovery

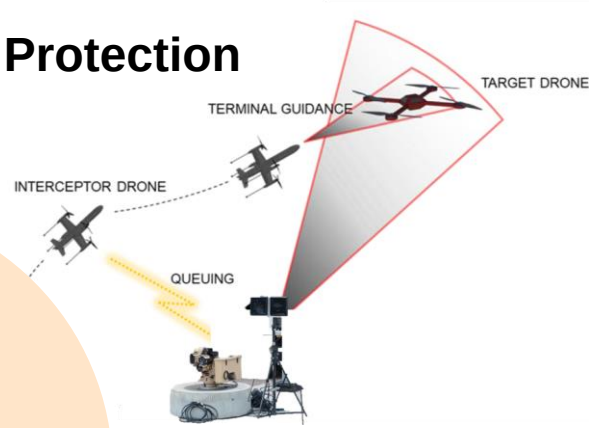
Focus on In-mission processing:

- Terrain Navigation
- HISAS Processing
- INSITE Software (Continuous performance evaluation)
- Adaptive Track Planning
- Change Detection
- Automatic Target Recognition (Algorithms based on deep learning and AI)
- Camera Image Quality Control
- Identification

Autonomy at FFI - main focus

Intelligence

Protection

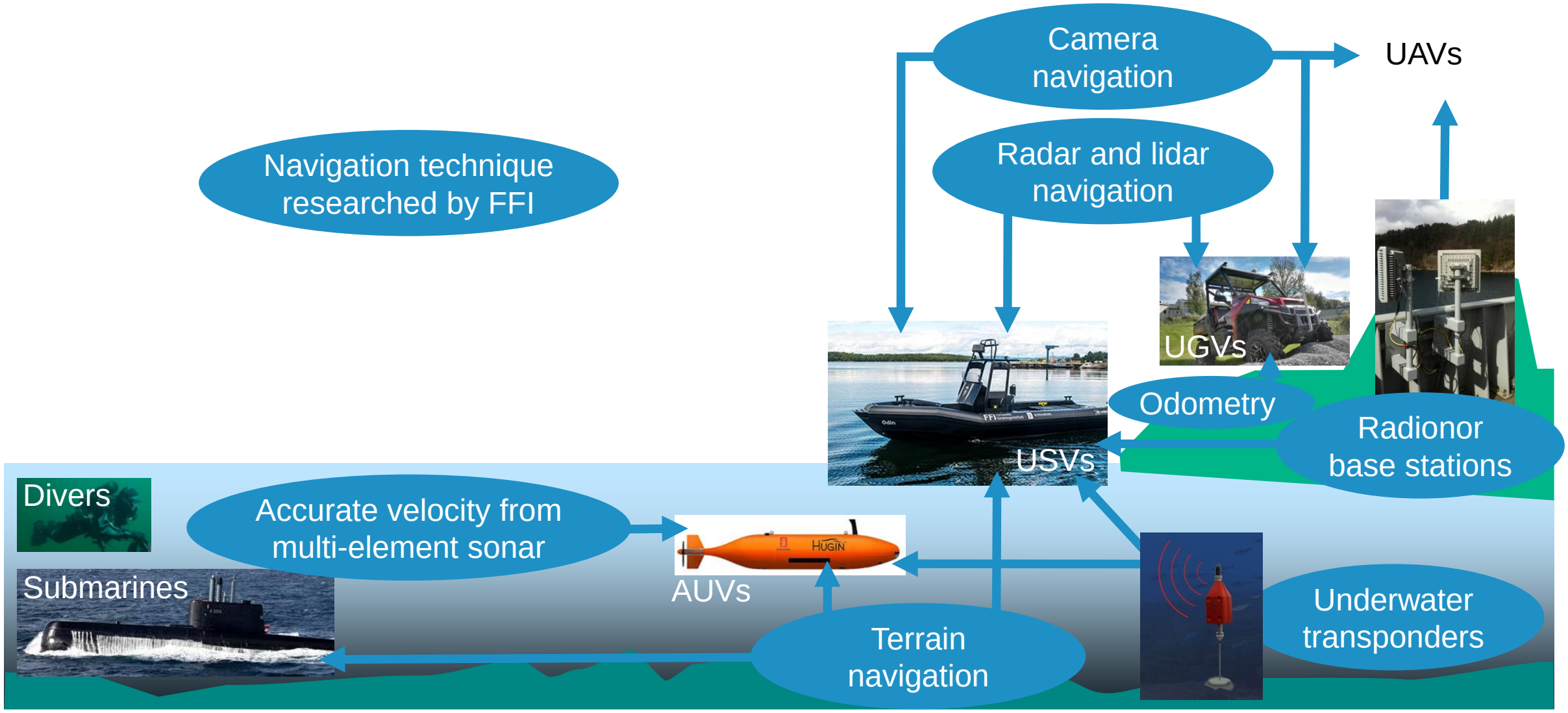


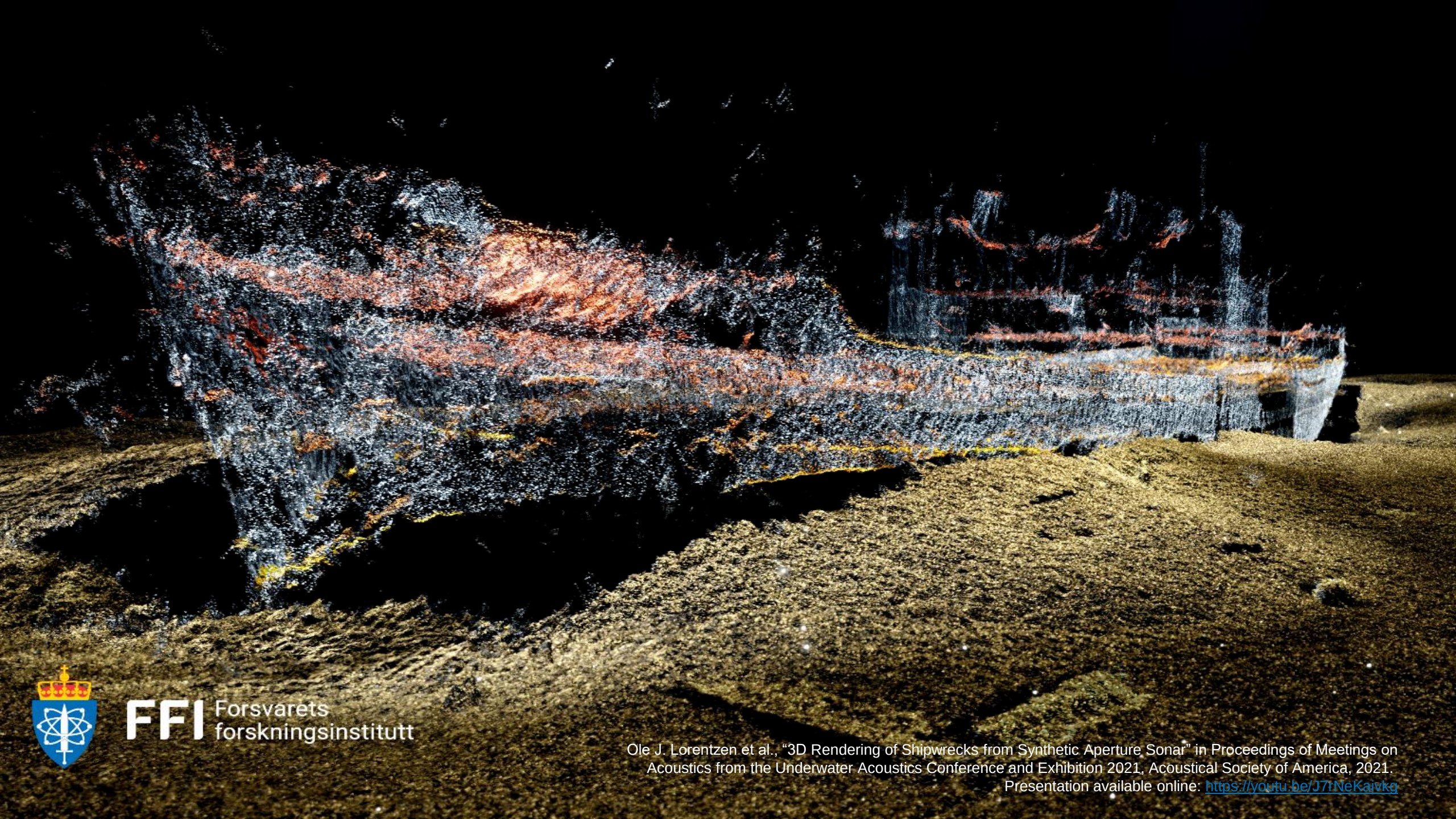
Coordination

Sustainment

Fires

Navigation in GNSS Denied Environments





FFI Forsvarets forskningsinstitutt

Ole J. Lorentzen et al., “3D Rendering of Shipwrecks from Synthetic Aperture Sonar” in Proceedings of Meetings on Acoustics from the Underwater Acoustics Conference and Exhibition 2021, Acoustical Society of America, 2021.
Presentation available online: https://youtu.be/J7rNeKajvkg