

Digital Twin for autonomous vehicles: a prototype application for NATO maritime Exercise

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Digital Twins 4 Aerospace



Introduction



66

NATO is reinforcing its maritime posture and is taking concrete steps to improve the Alliance's overall maritime situational awareness, deter and defend against all threats in the maritime domain, uphold freedom of navigation, secure maritime routes and protect its main lines of communication.

NATO HQ

77



What is it all about?

Aim of collaboration with IT-Navy

Is DT applicable for the underwater domain?

Is it useful for the nations?

- Propose uses for DT in underwater autonomy
- Investigate an architecture that addresses scenarios



Environment characteristics

- Limited communication
- No GPS
- No light



- Explored
- Unexplored





02. Methods



1/25/2023 | PAGE 8



Collaboration

ITAN

- CSSN Centro Supporto e
 Sperimentazione Navale
- Meetings: recurring weekly
- Aim: Definition and Validation of the scenarios

REPMUS MCM Syndicate

- CMRE MCM PM
- Meetings: recurring weekly/daily
- Aim: Req.s elicitation and user







03. **Results**





Scenario 1: Clarify Operational Picture

lack of communication during underwater operations leaves the operator of a MUS fleet blind for significant portion of the mission duration







04. Discussion



MCM - use M&S DT to clarify the common operational picture during the exercises

- Visualize real assets in a 3D realistic environment
- Augment real assets with simulated assets executing a parallel mission (ghosting) to highlight discrepancies between realistic operational conditions and initial planning conditions
- Augment real assets with simulated sensors to simulate detection performances













05. Conclusion



Conclusion

- There is a strong interest in the operational community
- It is doable to develop a DT for UW scenarios
- It brings added value
- Working prototype deployed
- TEVV
- 2023 ACT tasked to progress