



Reliable O&M decision tools and strategies for high LCoE reduction on offshore wind

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Introduction

The CAPital EXpenditure (CAPEX) in support structures and the OPerational EXpenditure (OPEX) during an offshore wind project represent circa 42% of the Levelised Cost of Electricity (LCoE). Up to now, the strike price development has had a clearly marked decreasing trend: from more than 140 €/MWh in projects with construction underway to less than 60 €/MWh in projects to be built from 2025 onwards) and will be soon approaching an asymptotical stage. The industry needs to uncover new areas for optimisation to overcome this obstacle.

Planning for the end at the beginning during the design of offshore WT foundations is expected to be a game-changer for the offshore wind industry, particularly as larger WTs (> 10MW) and XL monopiles (>7.0m diameter) are conceived by developers.

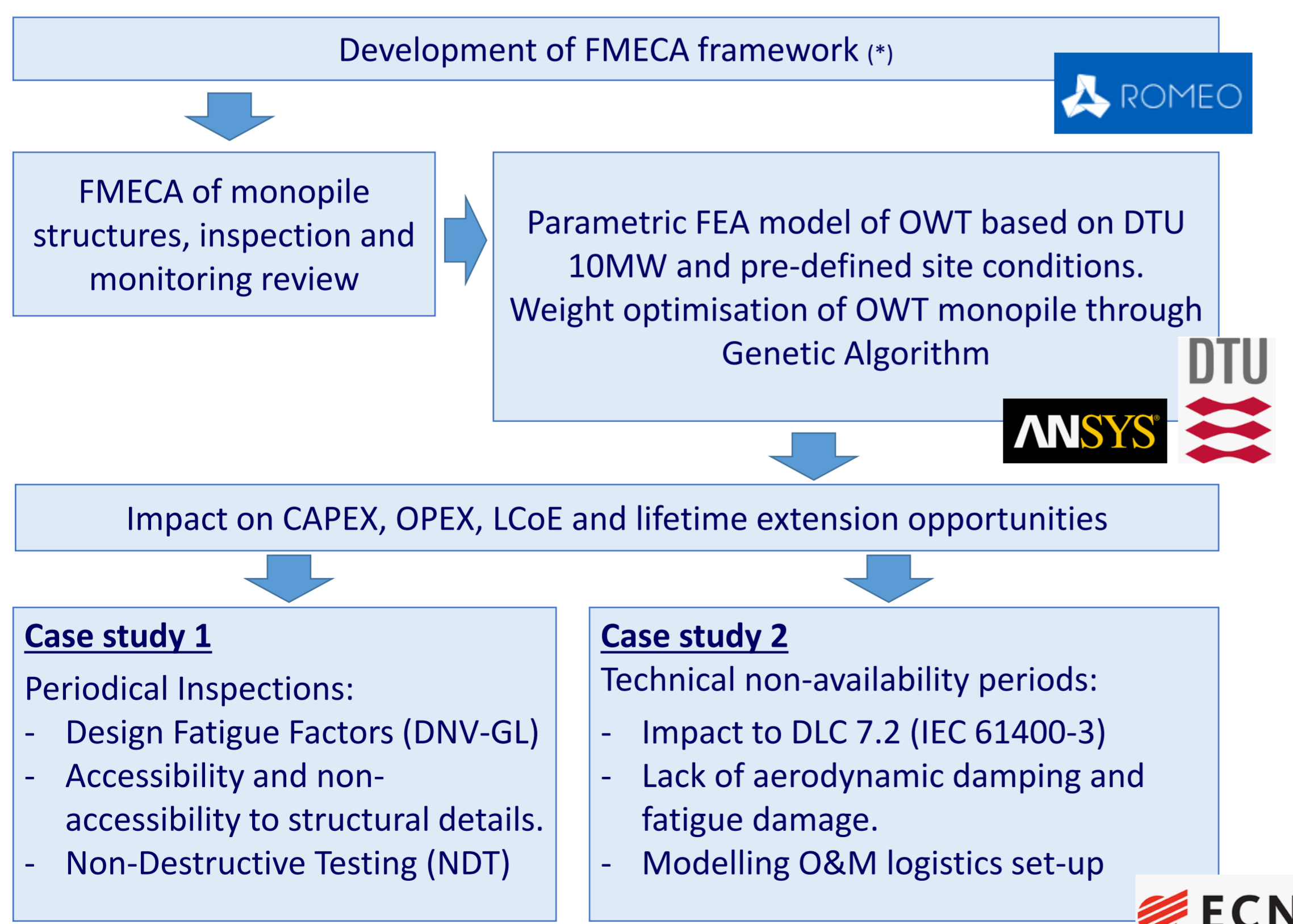


Aims and objectives

The aim of this research is to develop a holistic approach towards the design of new offshore wind turbine foundations by presenting a balanced decision making process accounting for CAPEX, OPEX and risk exposure, with a view on lifetime extension opportunities and LCoE reduction. This project particularises on:

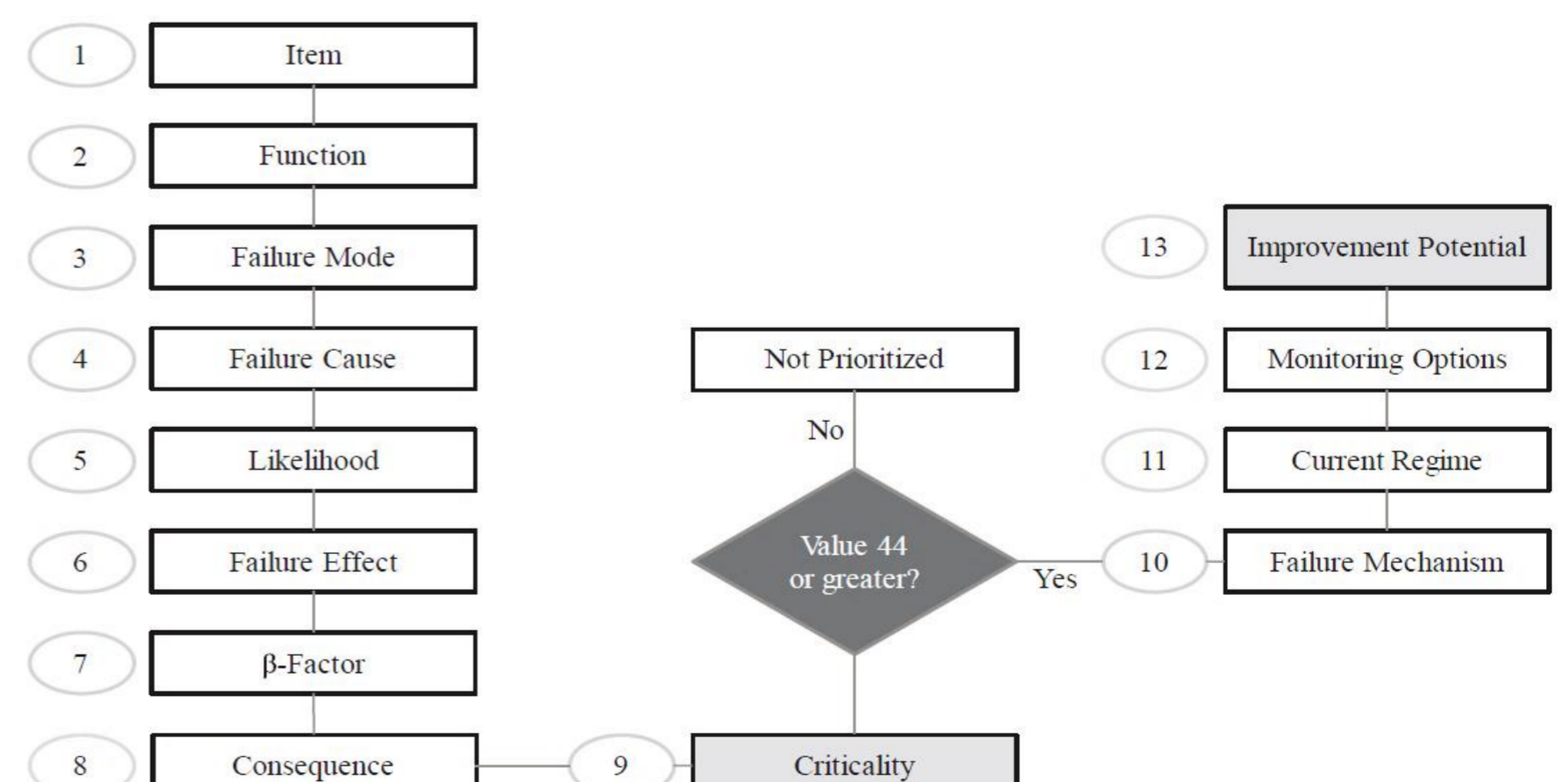
- In-depth review of monopile foundation failure modes, current inspection and monitoring practices and the opportunities for optimising OPEX and maximise revenue through early investment in monitoring.
- Technical feasibility and economical impact of introducing periodical inspections during the O&M phase as part of the foundations design.
- Impact on the structural integrity and response following periods of technical non-availability during O&M as a result of the chosen logistics strategy and site performance.

Methodology and future work



Application of FMECA framework

A total of 109 failure modes related to OWT foundation structures were assessed and 33 failure modes were prioritised based on their criticality level. Out of these, 26 were found to have improvement potential in comparison to the current O&M State-of-Art as a result of considering monitoring techniques in the design.



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