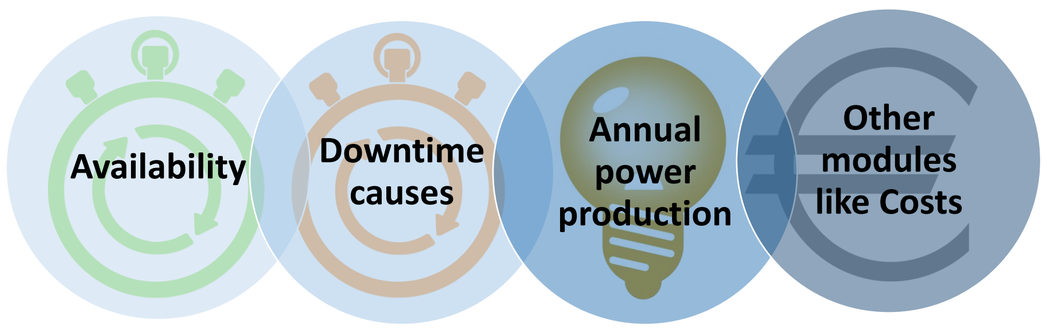
OpenO&M: Optimising availability of floating wind turbines for increased safety

Background

- **3,500+** Offshore wind turbines in Northern Europe
- **Operation and Maintenance data available**
- **OPEX challenge** in offshore wind farms' total costs
- **Many causes of downtime** including failures, weather conditions, unavailability of vessels, technicians or spare parts, logistic and repair times.
- **Effective tool is required** to understand and predict these downtimes : **O3M**

Aims and Objectives

- Deliver an **Open Source Numerical tool for O&M** with the following outputs :

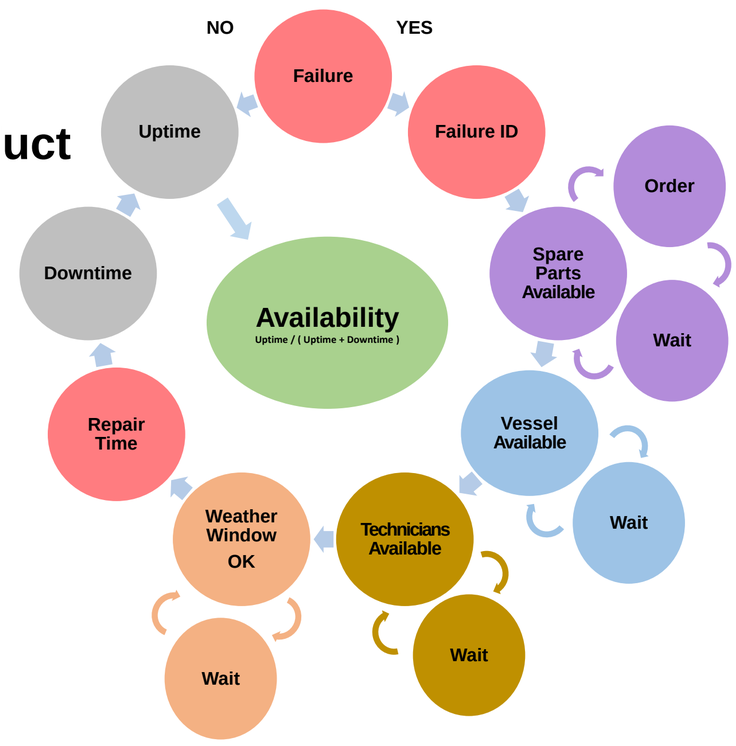


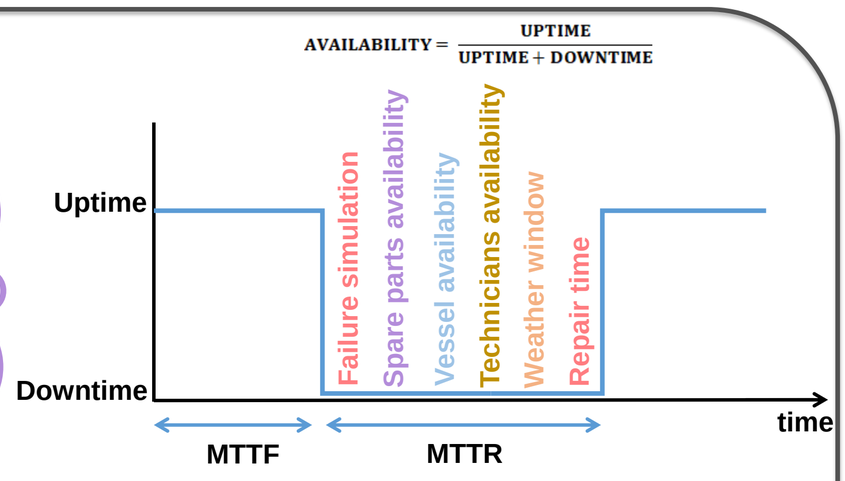
Methodology

Assumptions:
- Maintenance gives **like-new product**
- Vessels are **provided with crew**
- Technician's shift is **12 hours**

Planned maintenance:
- **Input** by user
- **Spare parts available**

Unplanned maintenance:
- Follow the process diagram

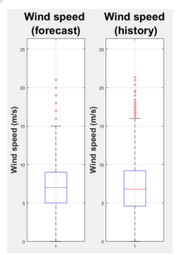


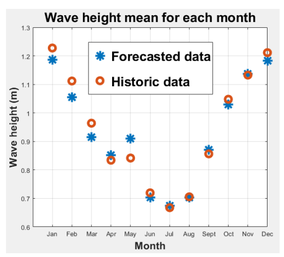


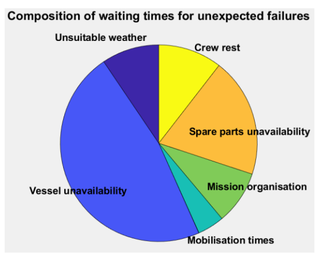
Simulations:
- Weather forecast modelling
- Failure modelling

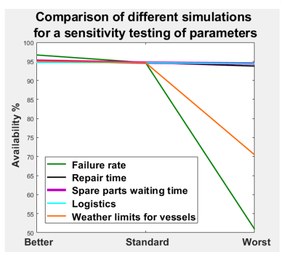
Inputs:
- Spare parts
- Vessels
- Technicians

Verification









- Wind and waves modelled with **Markov chain** at **high fidelity** and failures modelled with **e^x distribution.**
- Different causes of downtime simulated for **time-waste identification**
- **App sensitive** to variations (+/- 20 %) of its parameters

O3M App

- **OpEx** destined tool
- **Availability** information
- **Power production** information
- **Maintenance strategy** information
- **1800+** lines of **Matlab code**
- Excel **user-friendly** interface
- **Open source**, 1 month-**new** and **evolving**
- **Rapid** simulation
- **Confident** verification

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