

Motivation

- **Operations & Maintenance (O&M) costs** represent a sizeable chunk of expenditure for an offshore wind farm, amounting to ~ **30%** [1].
- Research into more efficient **Operational Decision Making** in both industry and academia is working to bring this cost down.
- Many different factors contribute to the decision making process, represented by the **disparate data-streams** coming from offshore wind farms.
- Analysis of the interplay between these data-streams is often hindered by the lack of quality of the data in question [2], & by the difficulty in **relating these different datasets**.
- **This PhD** will work on analysing a high quality & highly accessible database provided by an operational wind farm.

Aims & Objectives

- Investigate the **interplay between the factors** that contribute to turbine under-performance & failure rates. These include (e.g.):
 - **Seasonality**
 - **Accessibility**
 - Water depth
 - Wave height
 - Distance from O&M base
 - **Maintenance Actions**
 - Regularity of work
 - Duration of Work
 - Type of Work
 - **Staff**
 - Number per job
 - Experience
 - Qualification
 - **Turbine Positions**
 - Exposure to higher/lower av. wind speed?
- Initial focus on **operational factors** since:
 - Operational dataset is of higher quality than is generally available for analysis.
 - Fewer studies focused on this area than other datasets.

Operational Wind Data Ecosystem

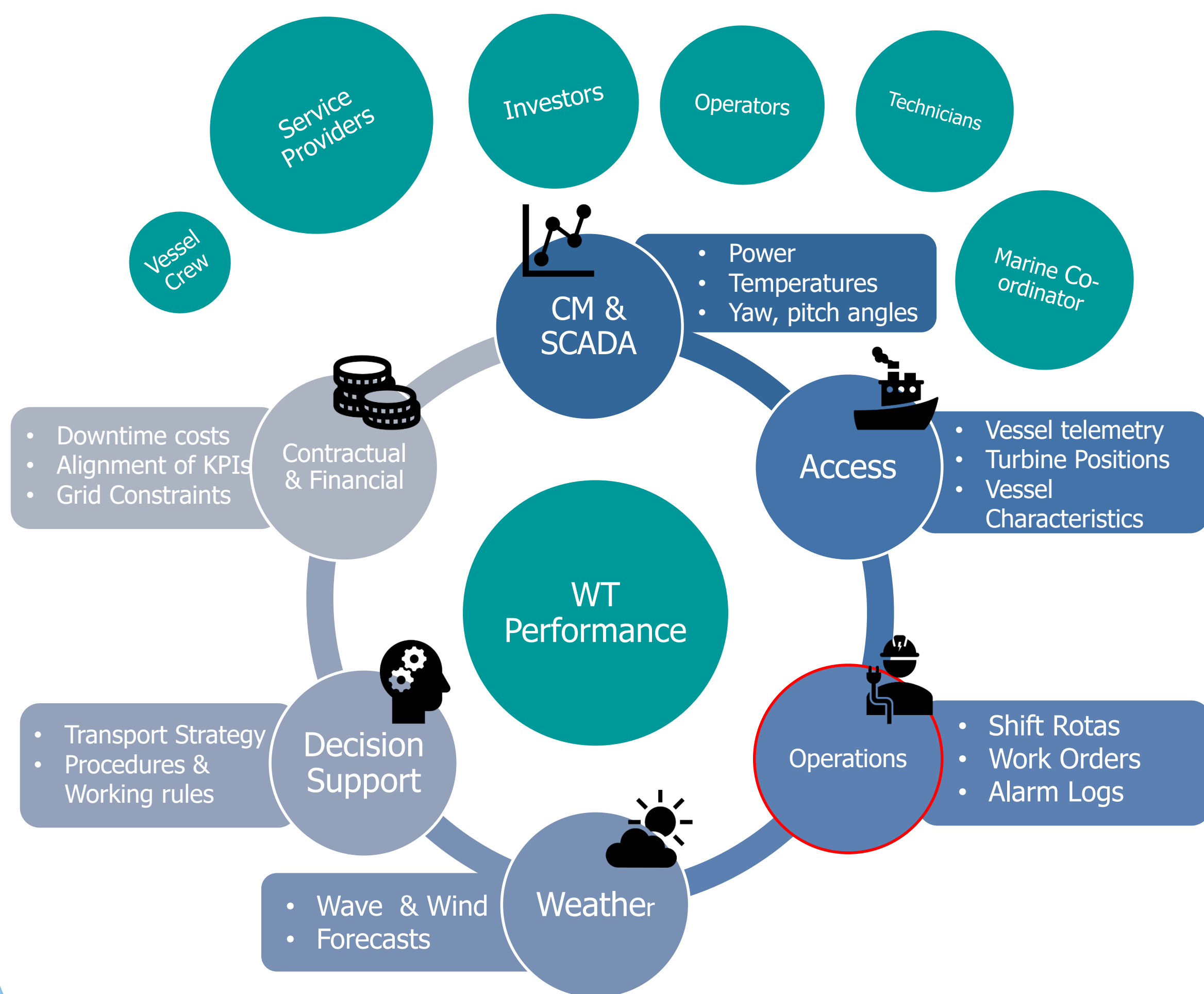


Fig.1: Summary of data-streams & key parties involved in operational decision making.

Early-Stage Work Packages

Intervention vs. Accessibility vs. Performance

- Calculating simple metrics to explore how turbine performance within the wind farm relates to accessibility (distance from O&M base, water depth) and type of intervention.

Faults After Servicing

- Investigating common fault occurrences after conducting annual services and other works

Effectiveness of Shift Patterns

- Investigating the efficacy of introducing night shifts for technicians in increasing turbine availability/accessibility.

Review of Wind Data Ecosystem

- Review 'Offshore Wind Data Ecosystem' - i.e. review of the various factors which effect operational decision making at an offshore wind farm and the data associated with those factors.

References

- [1] Seyr, H. and Muskulus, M. (2019). Decision Support Models for Operations and Maintenance for Offshore Wind Farms: A Review. *Applied Sciences*, 9(2), p.278.
- [2] Reder, M., Gonzalez, E. and Melero, J. (2016). Wind Turbine Failures - Tackling current Problems in Failure Data Analysis. *Journal of Physics: Conference Series*, 753, p.072027.)

