Digital intelligent operational network using hybrid sensors and simulations approach for FOWT monitoring – Webinar

Results from DIONYSOS project

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PARTNERSHIP:

Welcome words

Romain Ribault, **France Energies Marines**

Adrien Hirvoas, **France Energies Marines**

César Aguilera Esquivel, **SERCEL**

Jérôme de Lauzon, **Bureau Veritas**

Manuel Fernandez Perez, **SAITEC**

« Q&R » to ask questions that will be addressed during Q&A session

1. Introduction & context

Romain Ribault, FRANCE ENERGIES MARINES

DIONYSOS project objectives [2021-2024]

[Digital Intelligent Operational Network using hYbrid SensOrs / Simulations approach]

OBJECTIVE

To develop and test a fatigue monitoring system for floater and mooring lines of a floating wind turbine

LEADER

FRANCE ENERGIES MARINES

DURATION

36 months

LAUNCH

December **2021**

PARTNERS & FUNDING

Université Gustave Eiffel, INNOSEA AqualisBraemar LOC Group, Sercel, EOLFI, IMT Atlantique Bretagne-Pays de la Loire École Mines-Télécom, ifp Energies nouvelles, Bureau Veritas, SAIPEM

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A Digital Twin (DT) paradigm

Tower accelerations
Floater motions

Limited acquisition system

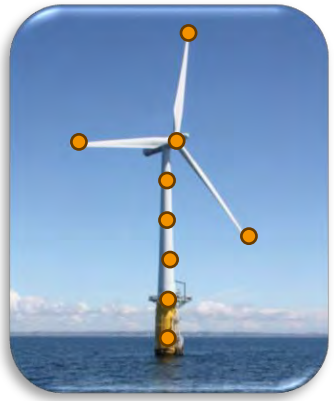
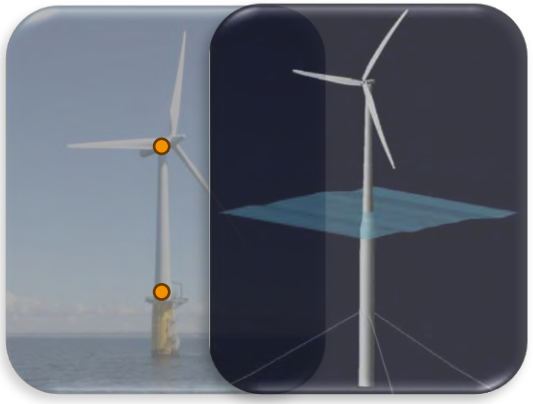
Numerical model

- Virtual sensoring
- Anomaly detection
- Fatigue estimation
- …

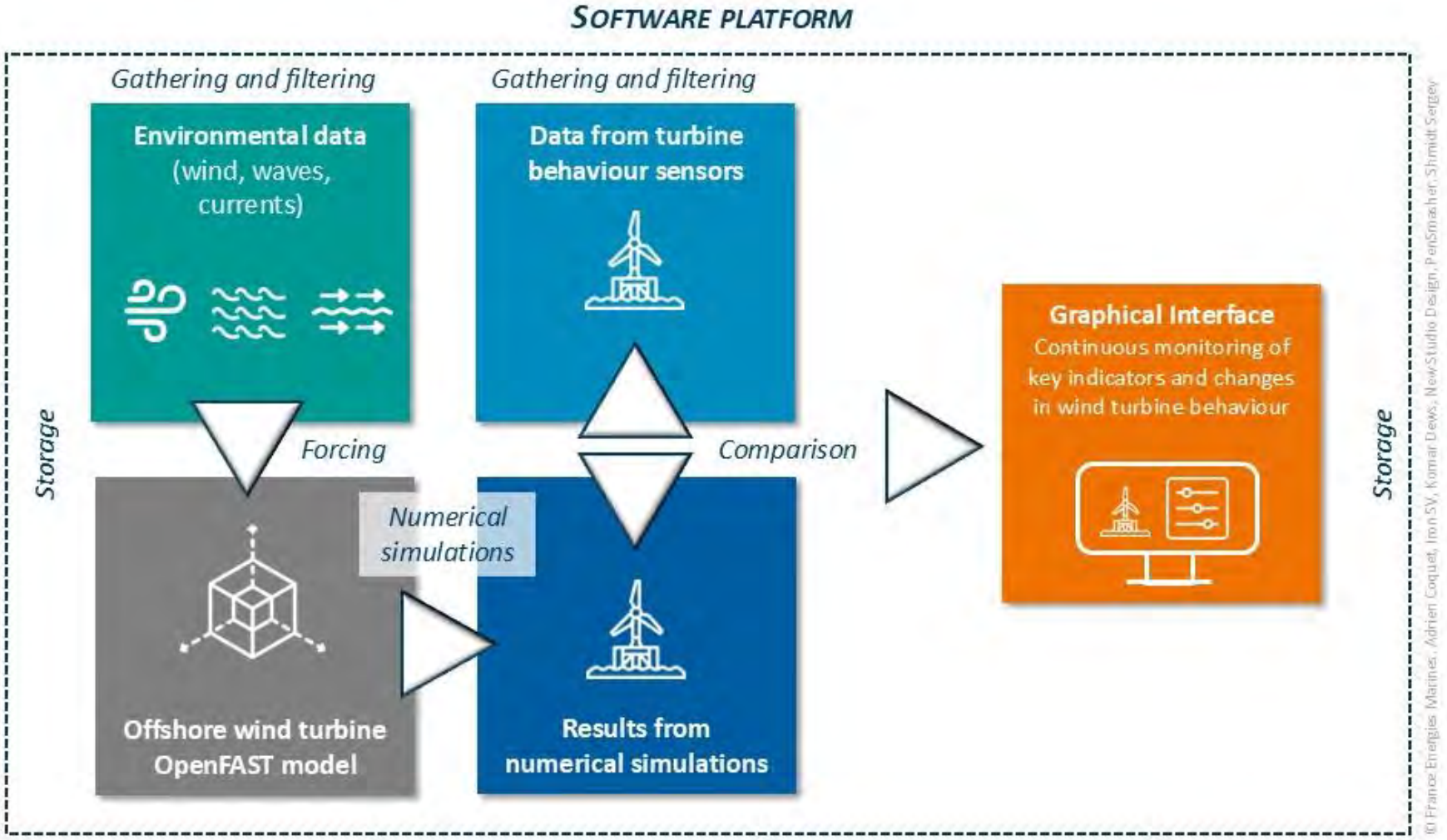
THE GOAL OF A DIGITAL TWIN

- Improve **availability**
- **Reduce** operational expenditure **(OPEX)**
- **Improve** future designs
- Anticipate **life extension**
- **Estimation** of the **residual lifetime** with regards to real loads

A Digital Twin (DT) paradigm

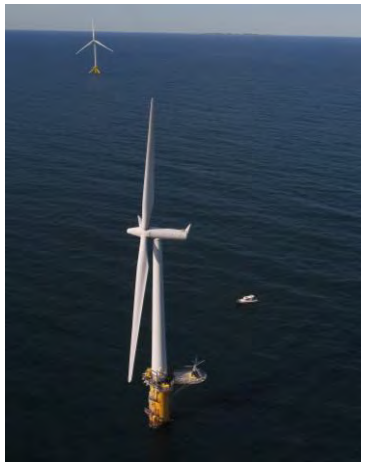
	Sensor monitoring	Numerical monitoring	DT monitoring
			
Installation & maintenance costs	€ € €	€	€ €
Accuracy	◎ ◎ ◎	◎	◎ ◎
Reliability	👎	👍	👍

DIONYSOS software platform



Two application cases for DIONYSOS

Zefyros



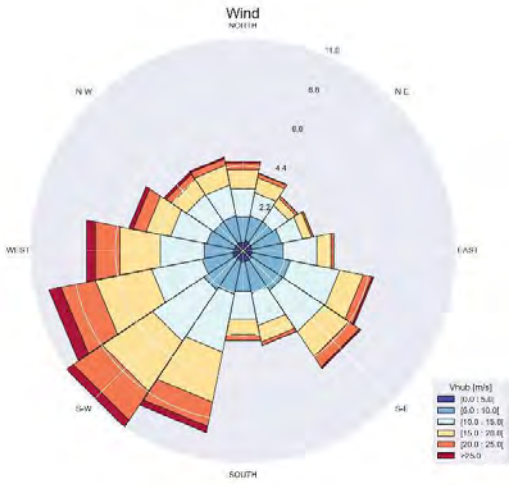
- Wind turbine generator: 2.3 MW
- Location: Met center, Norway
- Hull draft: 100 meters
- Water depth: 200 meters
- Structure: steel with ballast
- Mooring system: Chain catenary and clump weights
- Deployed 2009

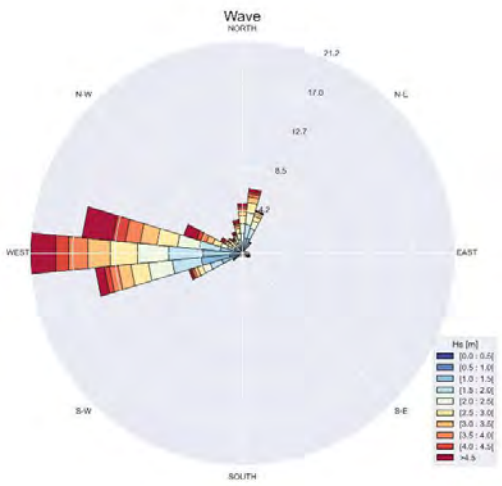
DemoSATH

- Wind turbine generator: 2MW turbine
- Location: BIMEP, Spain
- Water depth: 85m
- Structure: Concrete twin – hull barge
- Mooring system: Hybrid mooring lines(chain and fibers)
- Deployed 2023

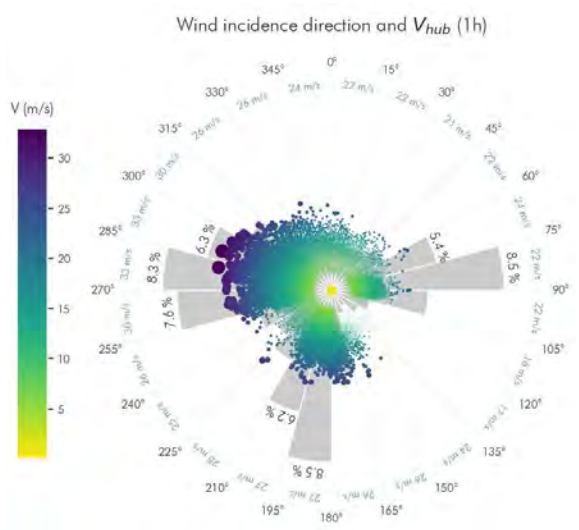
Environmental conditions at test sites

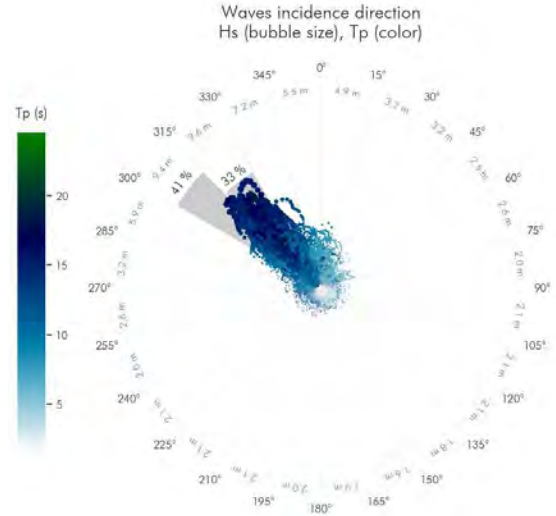
Met center





BiMEP





Agenda

- 1. Welcome word, context, and agenda – Romain Ribault, *France Energies Marines* — *10’*
- 2. An investigation of the Zefyros FOWT system based on in-situ and simulated data — *45’*
  - Effects of floater flexibility on the dynamic response of the wind turbine Zefyros – César Aguilera Esquivel, *SERCEL*
  - Coupled eigen-frequency analysis of floating wind turbines – Jérôme de Lauzon, *Bureau veritas*
  - Machine learning approaches for floating offshore wind turbine – Adrien Hirvoas, *France Energies Marines*
- 3. Application of the digital Intelligent operational network architecture to the SATH Technology — *35’*
  - SATH Technology philosophy based on DemoSATH case study – Manuel Fernández Pérez, *SAITEC*
  - High-level description and model measure comparisons of digital twin technology – Romain Ribault, *France Energies Marines*
- 4. Interactive Q&A session — *15’*
- 5. Conclusion and wrap up – Romain Ribault, *France Energies Marines* — *5’*