

Floating offshore wind technology: stepping into the consolidation phase

Seanergy Nantes, 27/06/2024

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www.sofresid-engineering.com



Contents

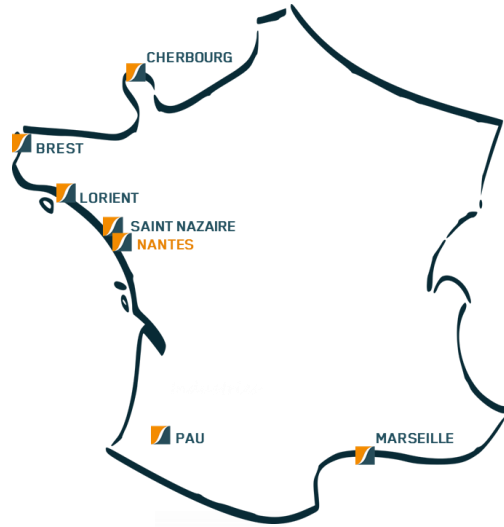
- Sofresid Engineering
- FOWT market status
- Consolidation drivers
- Conclusion

SOFRESID ENGINEERING – At a glance

100% subsidiary of EKIUUM since October 2023



Une société du groupe



325
Employees

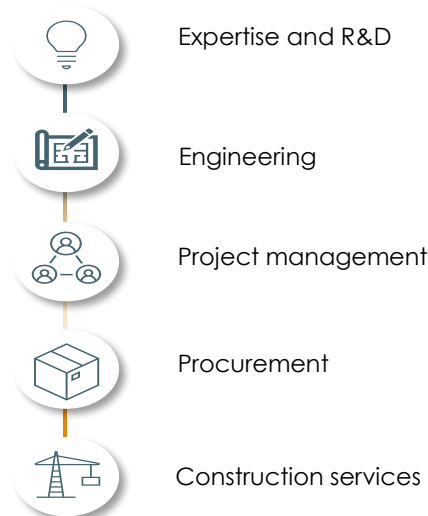


37 M€
Turn-Over



4
Business Lines

From conceptual to EPC



WIND

Experts in the floating wind and offshore markets, in the design of floating and fixed foundations, from design to completion.



GREEN

Dedicated to the development of green hydrogen, both on land and at sea, and to the development of low-carbon energies from biomass.



NAVAL

Our specialists in naval design and architecture support shipowners on their conventional projects as well as on decarbonization issues.



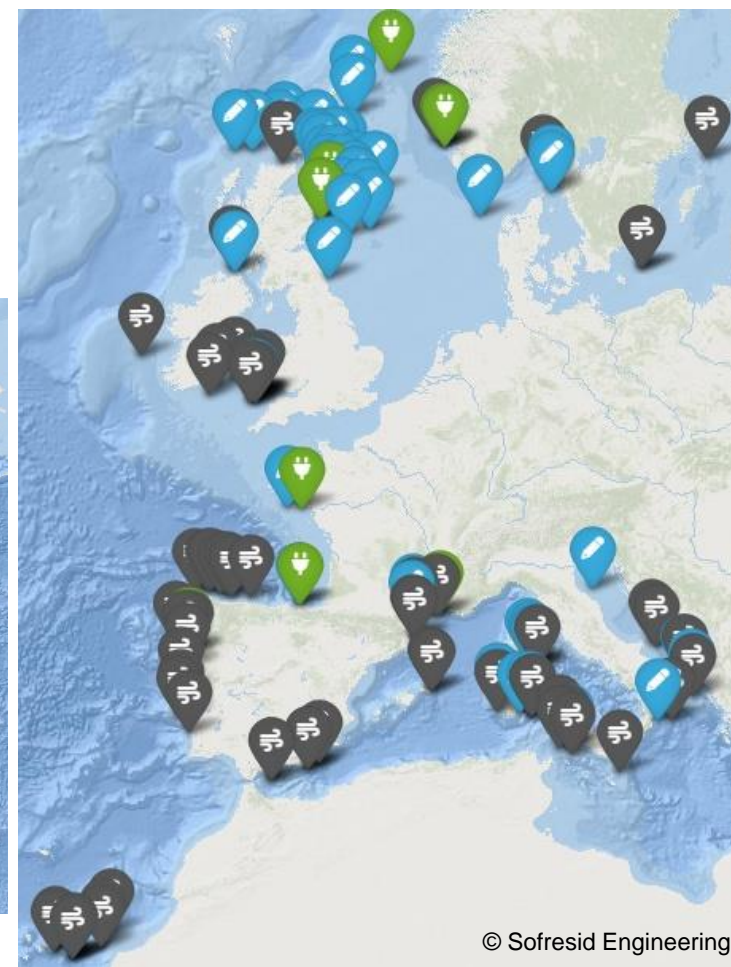
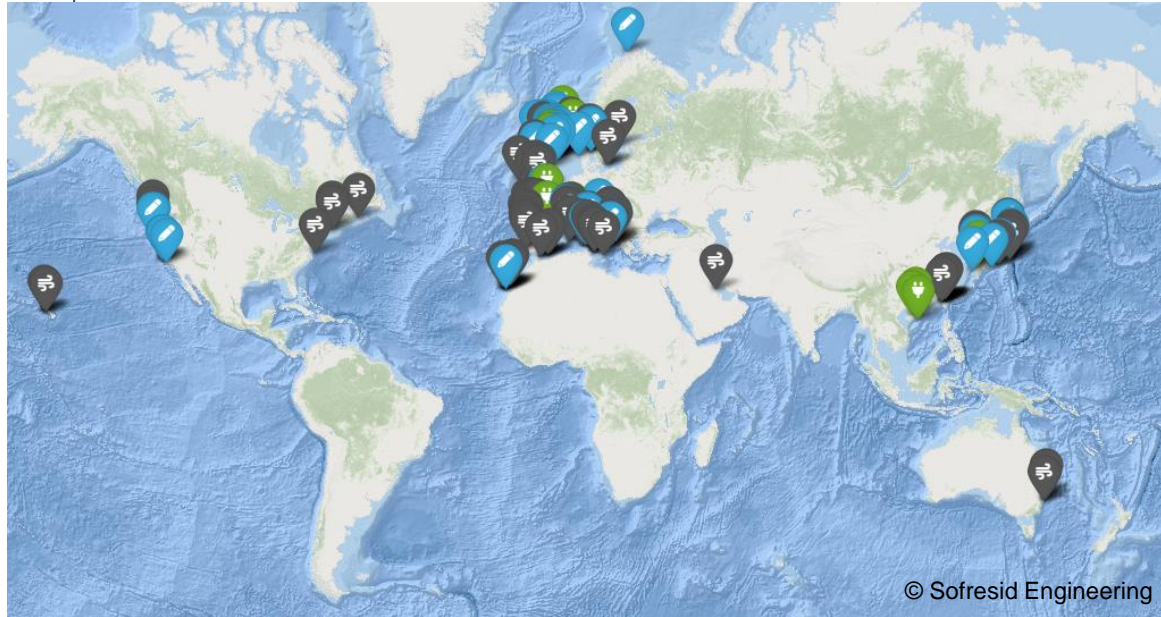
PLANT

Recognized as fluid process expert in the Energy and Industry sectors. Key player in the Energy Transition (CO₂, H₂ and e-Fuel...)



FOWT market status: projects

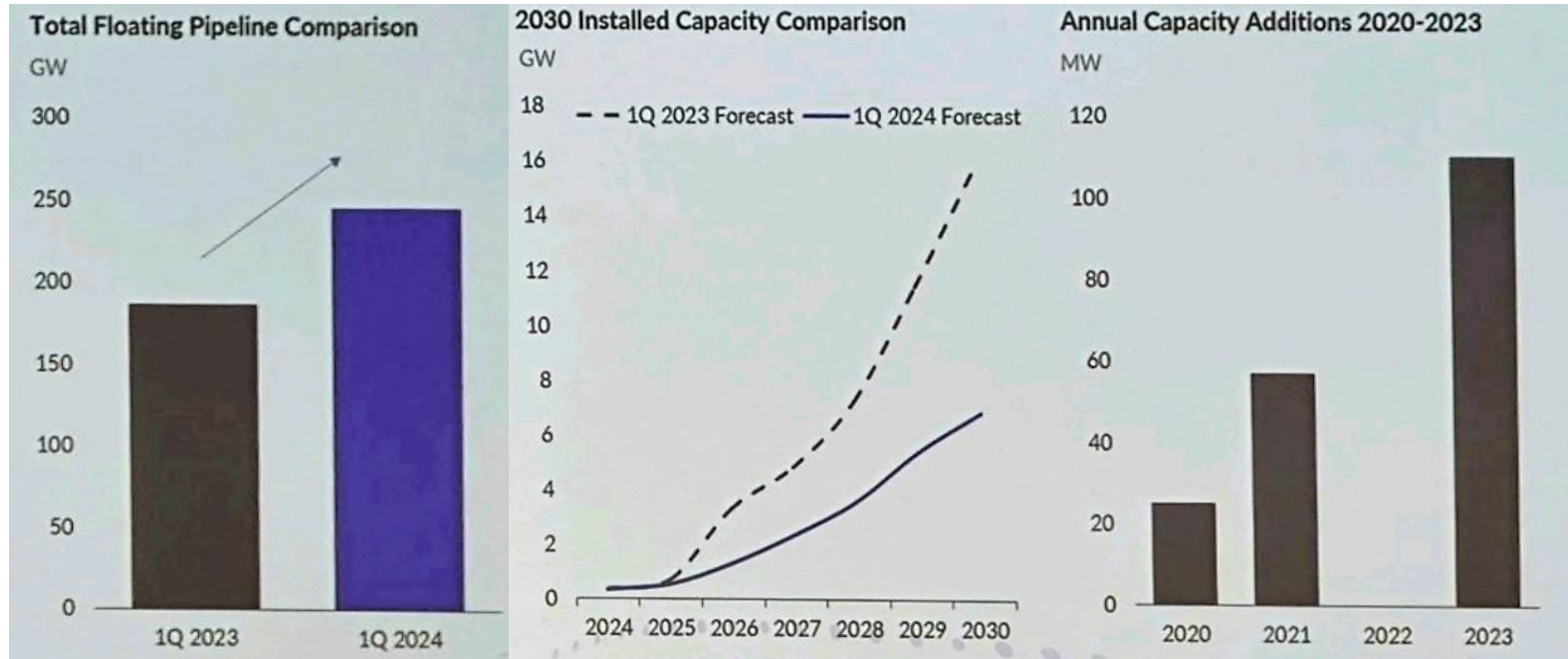
- Floating wind projects are rising in the World... and in Europe



- Prospect
- Design, Construction, Development
- Operational

FOWT market status: projects

- FOWT market marked a halt in 2022/2023. Short-term capacity revised down, following a “Reality check”
- But the market remains promising, keeps on progressing with expanding project pipeline



From: Westwood Global Energy Group, 4th Annual Floating Wind Europe

FOWT market status: products

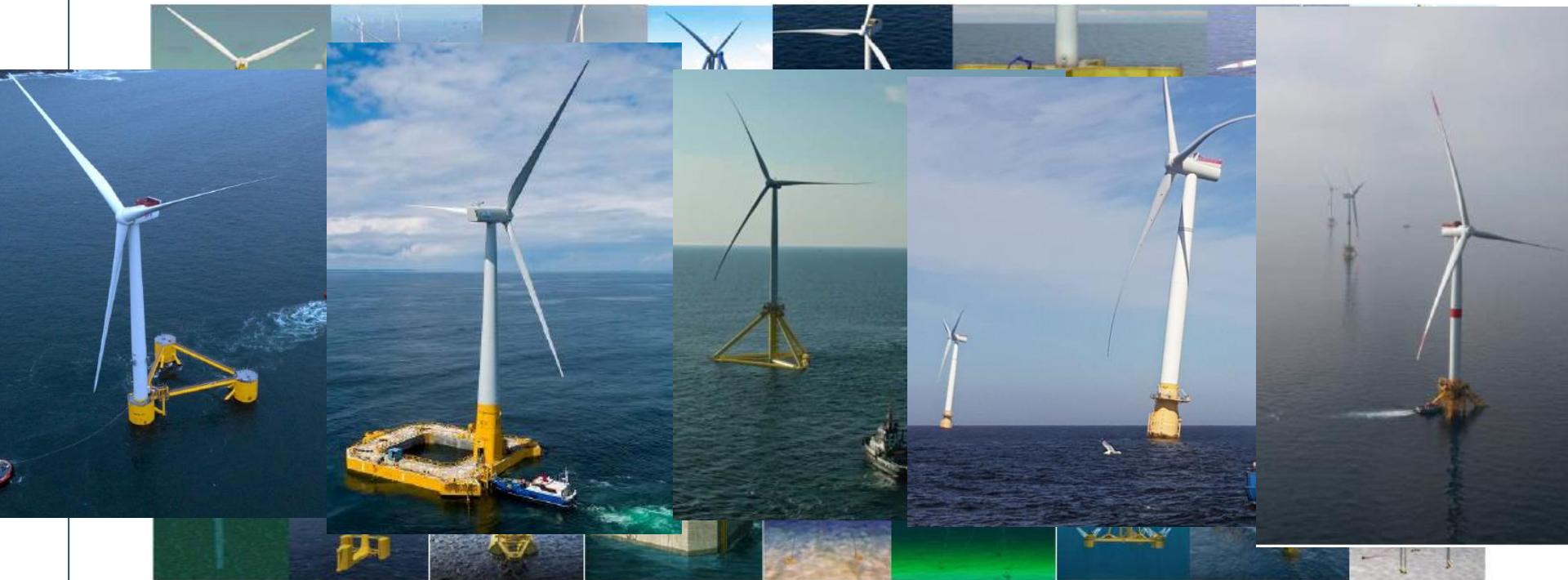
- Today, a market with (over?) abundant offer of products



From: "Le marché géotechnique des éoliennes flottantes". CFMS - ANCRAGES DES ÉOLIENNES FLOTTANTES.
<https://www.cfms-sols.org/sites/default/files/jst-20240314/02-fugro-borel-pdf-20240403111310.pdf>

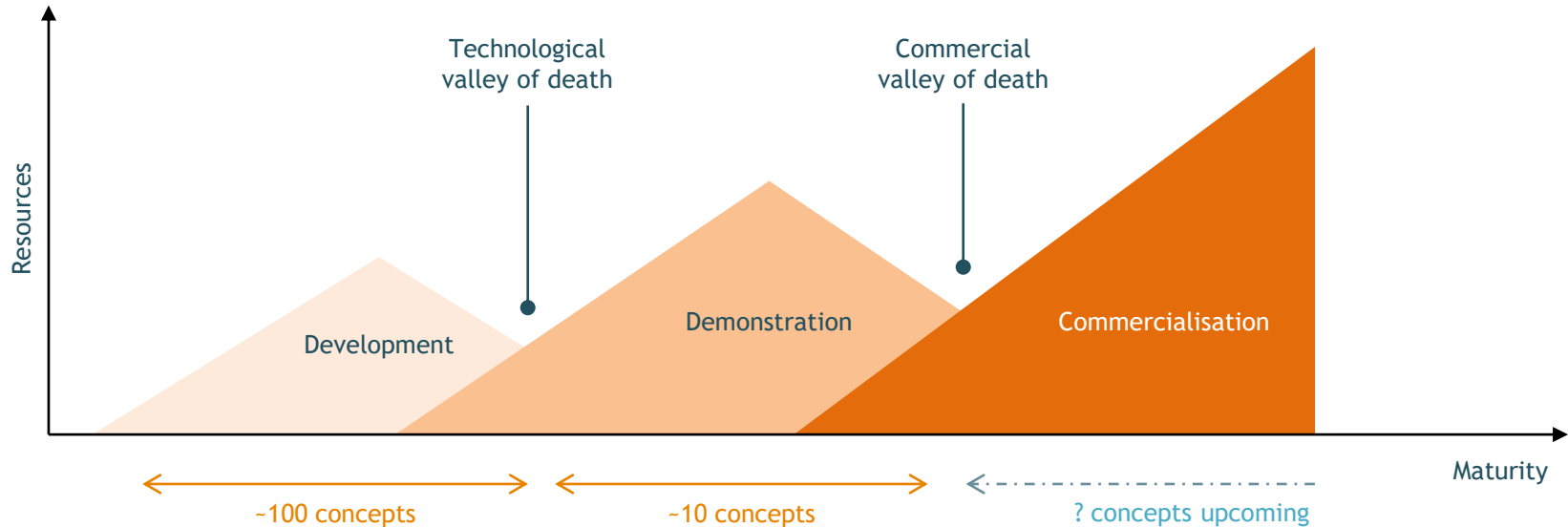
FOWT market status: products

- Despite a difficult conjuncture, the market is moving forwards facing reality



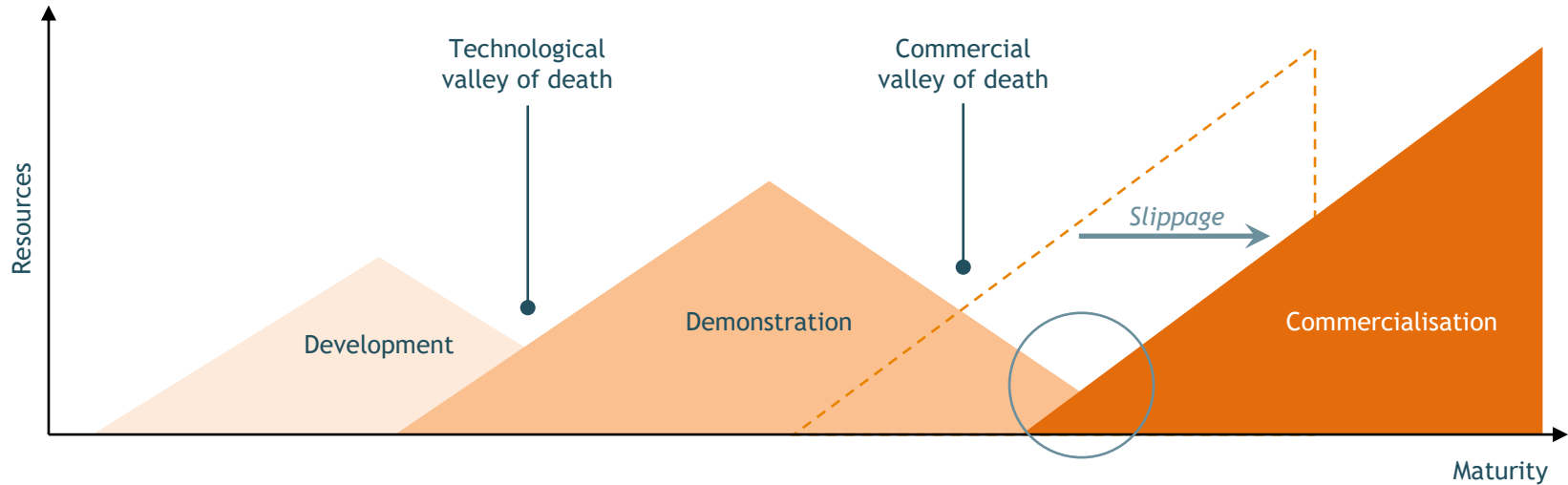
FOWT market status: products

- A few technologies toward the end of demonstration... but no 15+ MW demo
- All must confront the commercial valley of death (first crossings likely around 2030)



FOWT market status: products

- “Reality check” causing a commercial project slippage
- Consequence: deeper valley

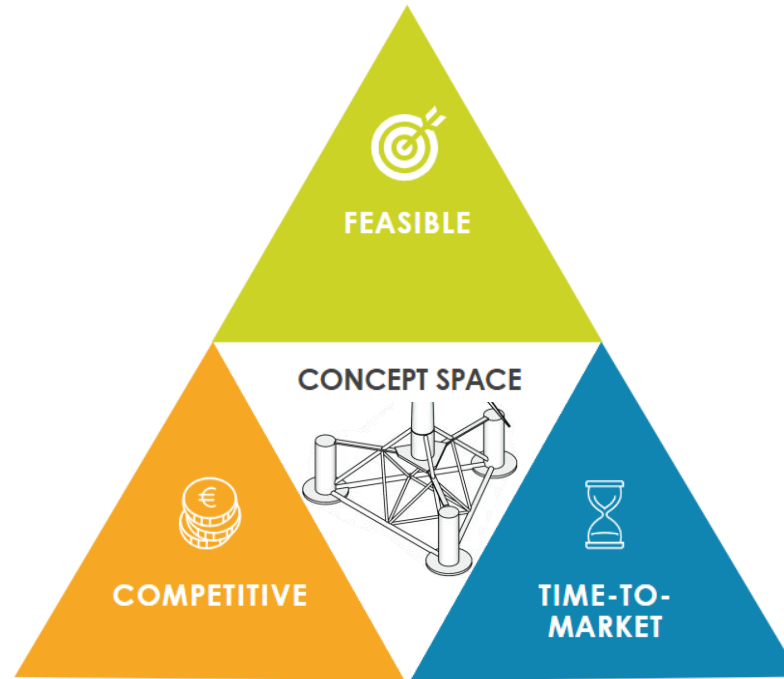


FOWT market status: products

- A consolidation is also necessary for asset investments, volume, bankability, insurability...
- Best-in-class “Design and Engineering” must assist in this consolidation, for product evaluation and maturity improvement

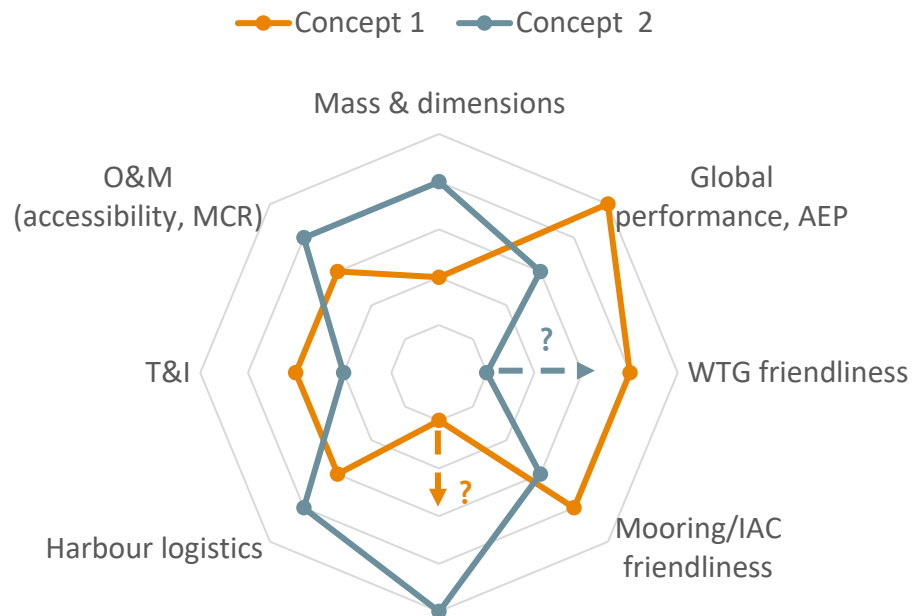


Consolidation drivers: floater concept selection



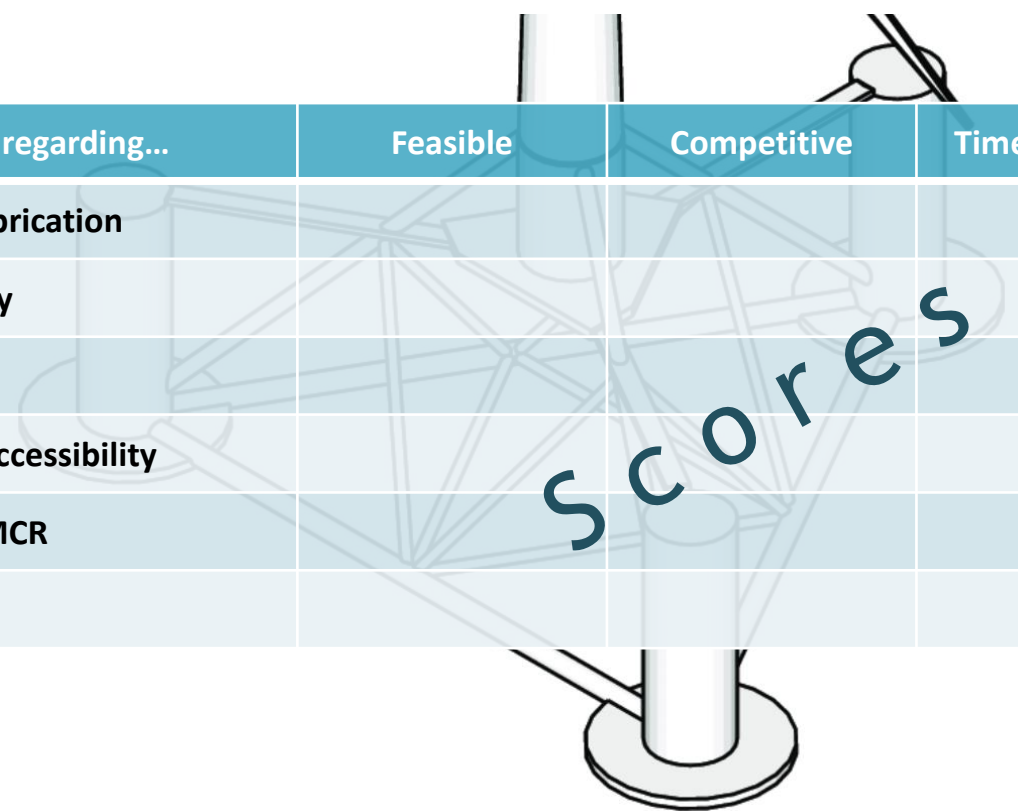
Technology selection trilemma

Consolidation drivers: floater concept selection



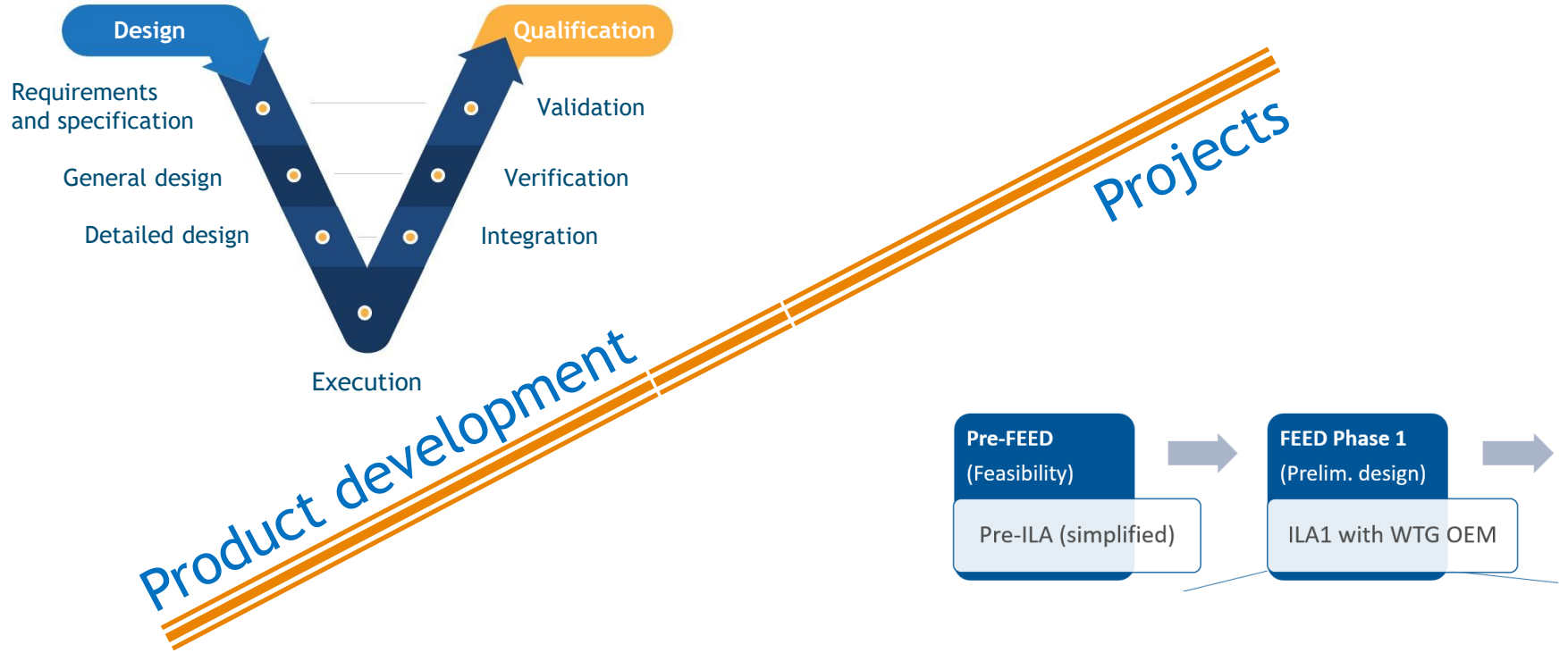
Holistic view

Consolidation drivers: floater concept selection

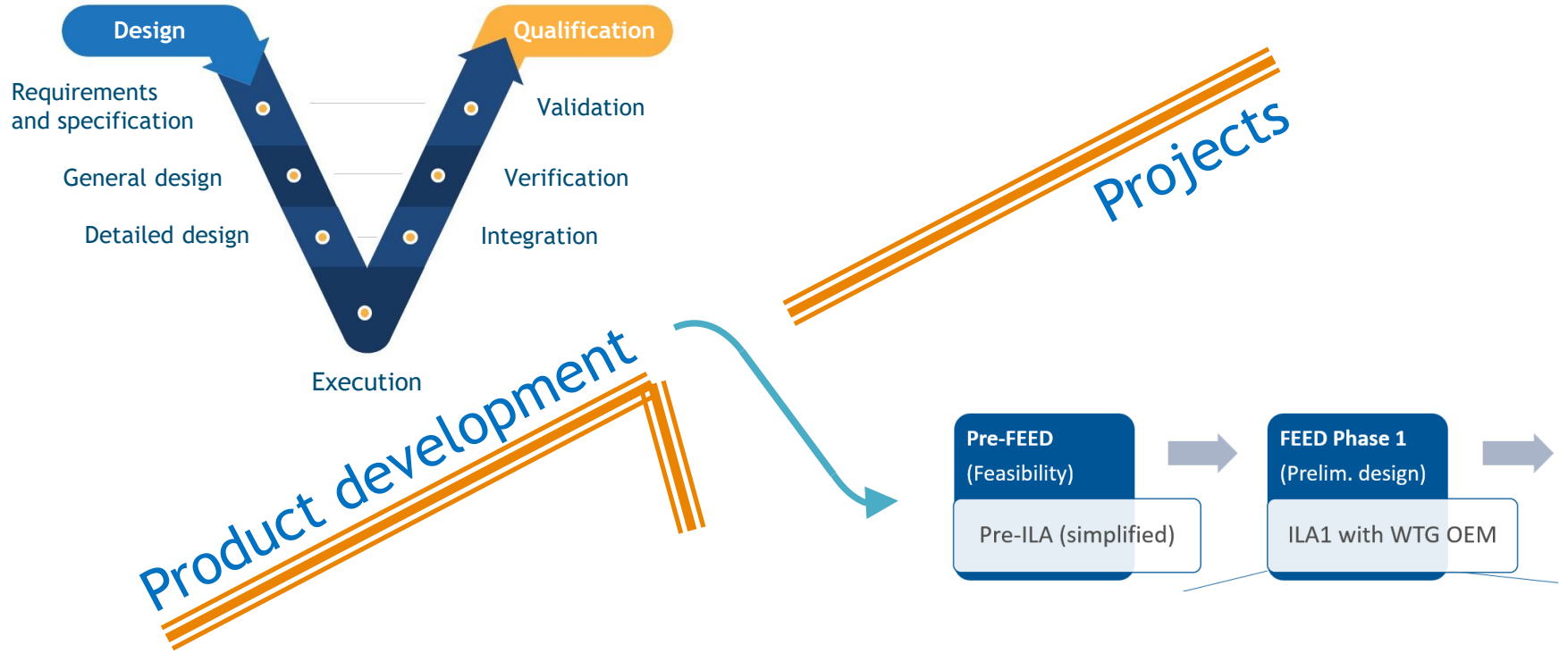


Solution regarding...	Feasible	Competitive	Time-to-market
Serial fabrication			
Assembly			
T&I			
O&M - accessibility			
O&M - MCR			
...			

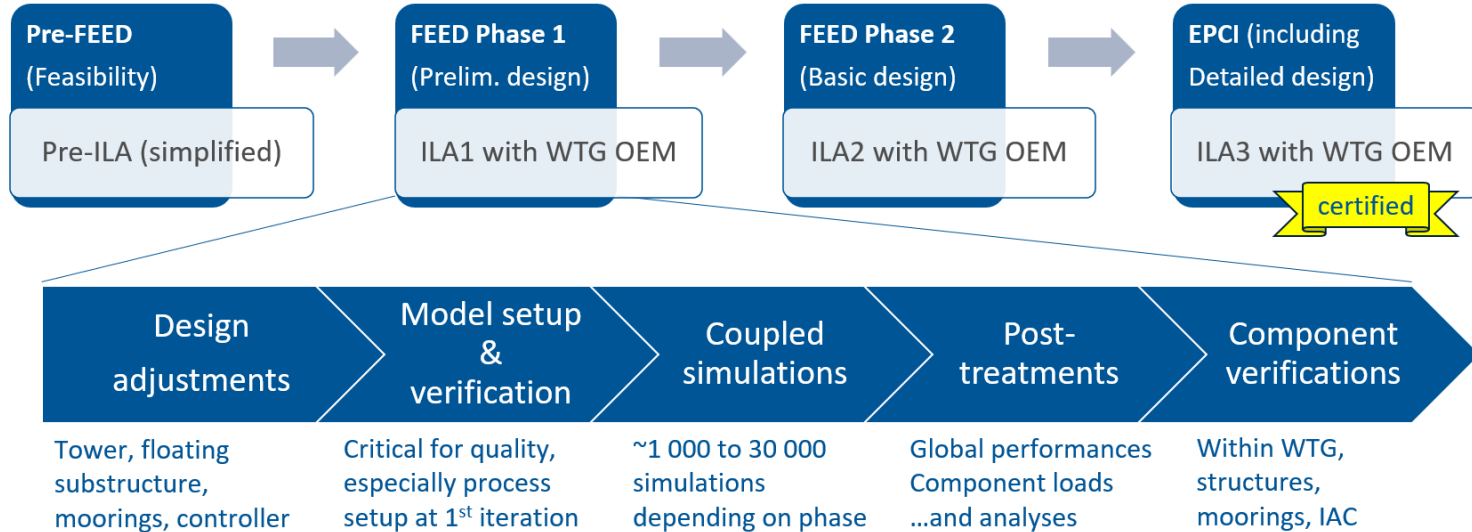
Consolidation drivers: product vs project



Consolidation drivers: product vs project



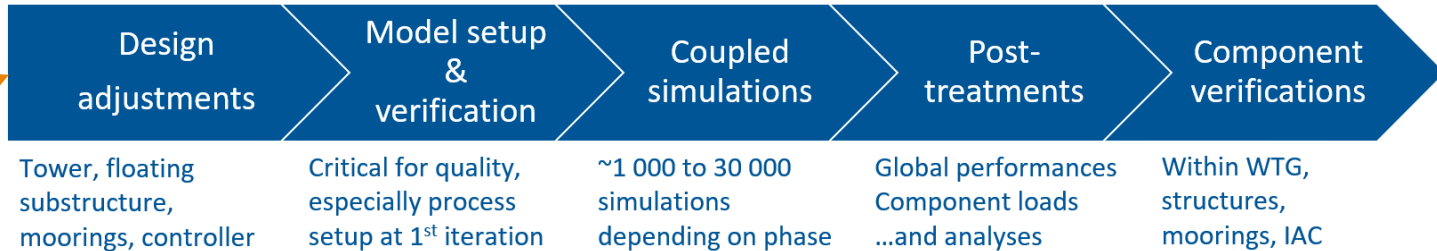
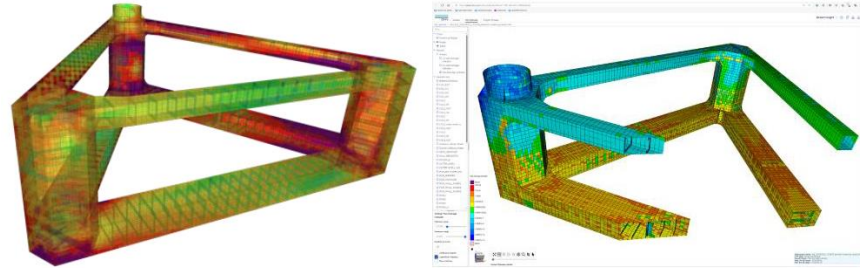
Consolidation drivers: engineering good practices



→ Need for **Standardized Processes** relying on **Qualified Methods and Tools**

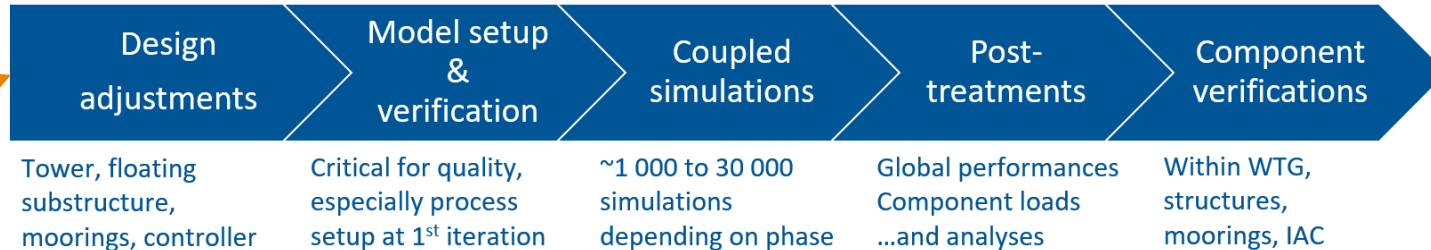
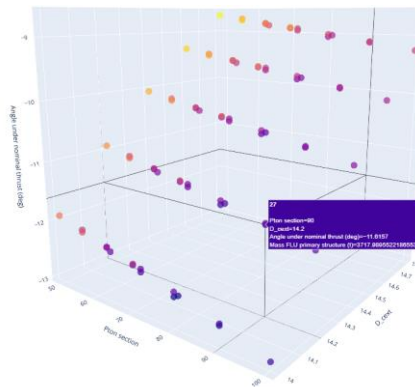
From: “Co-engineering with a wind turbine OEM: a floating substructure designer’s view”. In Proc. WindEurope 2024.

Consolidation drivers: engineering good practices



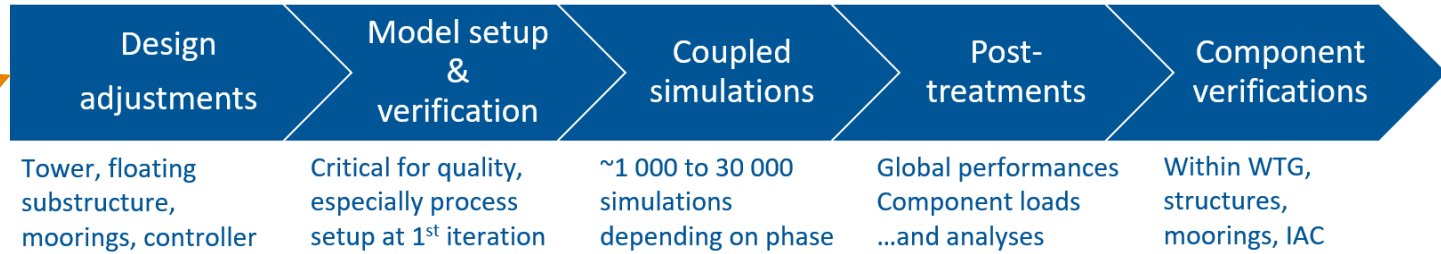
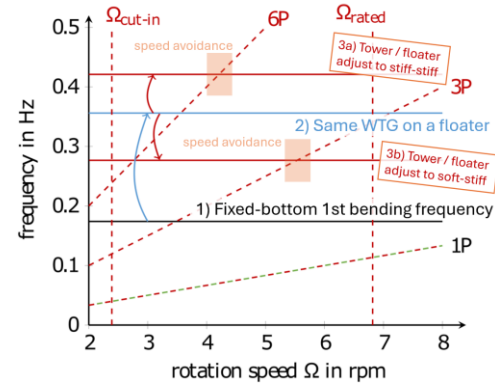
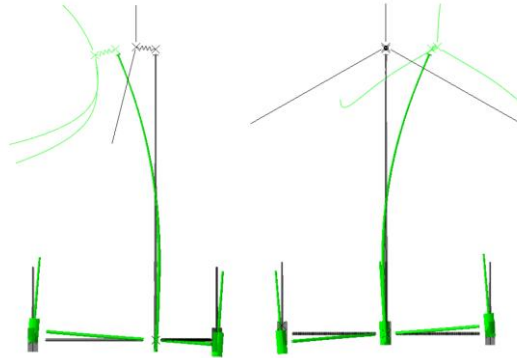
- 1) Come in with a developed structural fatigue vision from product development for an enlightened design

Consolidation drivers: engineering good practices



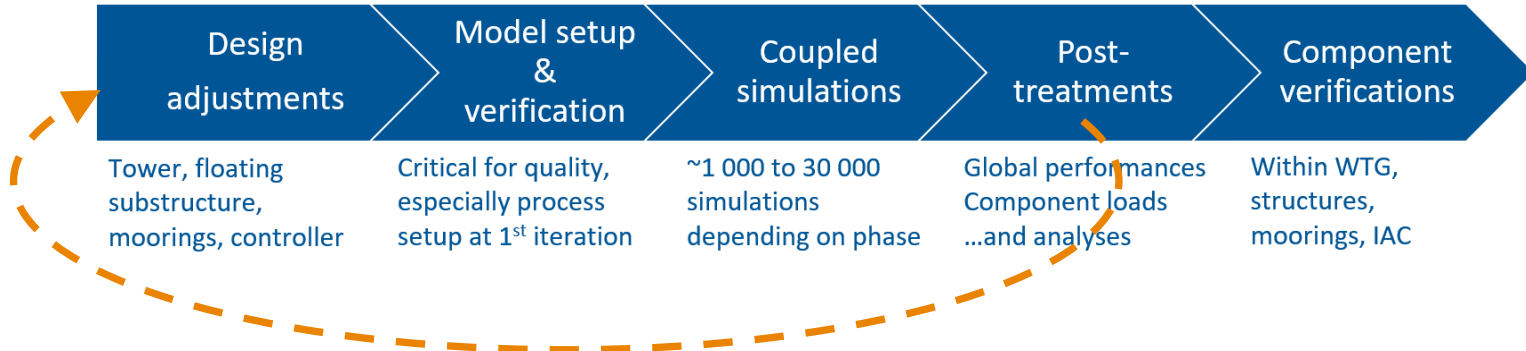
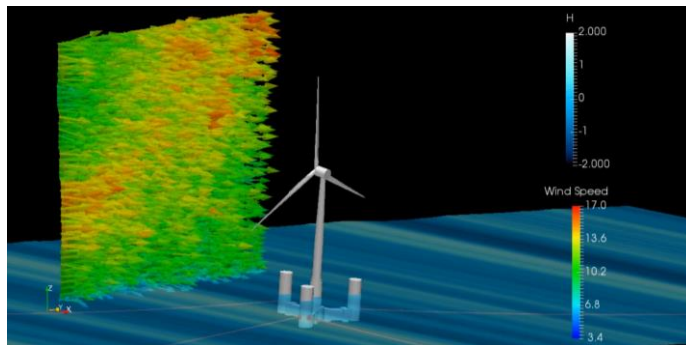
- 1) Come in with a developed structural fatigue vision from product development for an enlightened design
- 2) Seek the **optimal global sizing parameters** for the project (i.e. not just a floater that works)

Consolidation drivers: engineering good practices



- 1) Come in with a developed structural fatigue vision from product development for an enlightened design
- 2) Seek the optimal global sizing parameters for the project (i.e. not just a floater that works)
- 3) Run **3P/Campbell** analysis ASAP => flexible frequencies highly influential on design

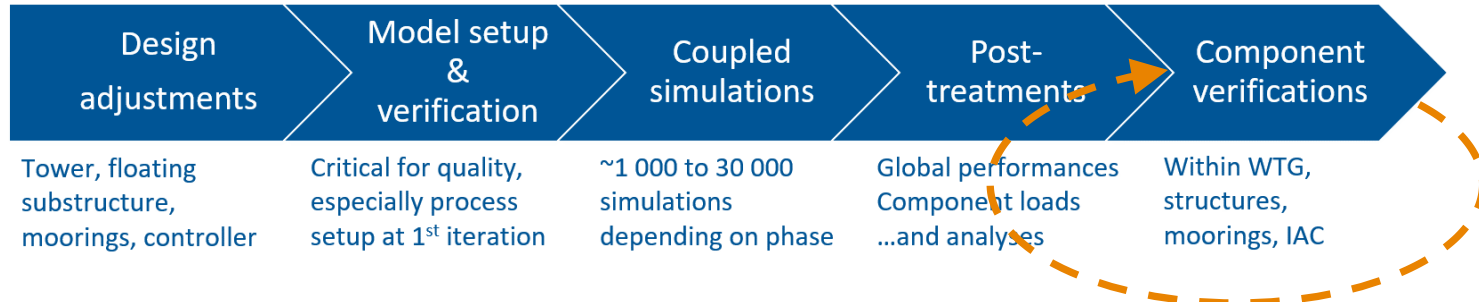
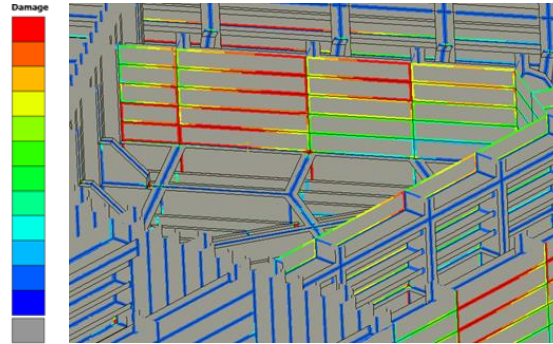
Consolidation drivers: engineering good practices



Global FOWT optimization enablers:

- 1) Quick global performance iteration capacity
- 2) Closed-loop design based on global performances & loads from coupled simulations

Consolidation drivers: engineering good practices



Local structural optimization enablers:

- 1) Quick structural arrangement iteration capacity
- 2) Closed-loop component design based on FLS & ULS in time domain

See: "Accurate FOWT fatigue assessment at all design stages". In Proc. WindEurope 2022.



Conclusion

Market

- Solid early pilot developments
- Awash with highly diverse technological offers
- Presently challenged by conjuncture + reality check, but the long-term pull persists
- A consolidation is necessary for the 1st Gen technologies to get commercial traction

Engineering design

- Concept development and selection must rely on holistic evaluations leveraging on experience and know-how
- Engineering requirements:
 - System engineering
 - Concepts qualified as products before deployment on commercial projects
 - Standardized process relying on qualified methods / tools, in consciousness of the relevant design drivers

→ For a successful technology consolidation: ensure the above conditions are satisfied in your own technical process, or by the summoned engineering center / designer

Thank you for your attention

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