

Syncing Reality and Simulation

Enabling continuous prediction for offshore wind park installations

15.09.2026 | Cadeler and MEVB Consulting | AnyLogic Conference 2026

CADELER

MEVB.

Modelle und Expertisen für ein verbessertes Business

Cadeler at a Glance



- A pure-play offshore wind transport and installation contractor, headquartered in Copenhagen
- Operates a fleet of purpose-built jack-up and foundation installation vessels (11 vessel)
- It transports and installs offshore foundations and wind turbines across Europe, Asia and North America
- 21.8 GW of capacity installed to date
- Hornsea 03 monopile campaign executed with the installation vessel Wind Ally and Wind Orca.

Hornsea 3 at a Glance

The world's largest single offshore wind farm — and Cadeler's first end-to-end foundation delivery

2.9 GW world's largest single offshore wind farm

3.3M UK homes supplied once the farm is complete

197 XXL monopiles transported and installed by Cadeler

120 km offshore off Norfolk, 696 km² project area

May 2026 first fully commissioned monopile installed

2027 planned commissioning of the wind farm



Cadeler's scope: transport and installation of all 197 monopile foundations

The Business Challenge



High variability of assumptions

A fast-evolving project needed a tool that absorbs parameter changes and returns results quickly



Logistics complexity

Interacting vessels, berths and SPMTs cannot be represented in Excel or classical scheduling tools



Environmental unpredictability

Monthly weather downtime materially shifts vessel availability and installation schedules



Opaque results

No reporting, no dashboards and no spatial representation of the operation



No verification path

No reliable way to test the quality of the scheduling tool's output

No existing tool covered these requirements.

Why AnyLogic

Simulation was the only viable approach — AnyLogic was selected because it offers:



Robust engine

Professional simulation core, proven in commercial projects



Multi-method

Discrete event for port and logistics, agent-based for vessels and monopiles



Variability by design

Native handling of weather downtime and variable transit times



Fast ramp-up

Strong documentation and an extensive example library



Explainable results

Built-in visualisation makes model behaviour clear to non-modellers



Team familiarity

Existing experience in the team from prior academic use

MEVB Consulting at a glance

MEVB Consulting GmbH is an independent consulting company based in Switzerland.



Specialises in **high-quality simulation models** and decision-support systems for public institutions and private companies



Services span system modelling, **strategy** and **innovation** leadership, and operational and **impact optimisation**



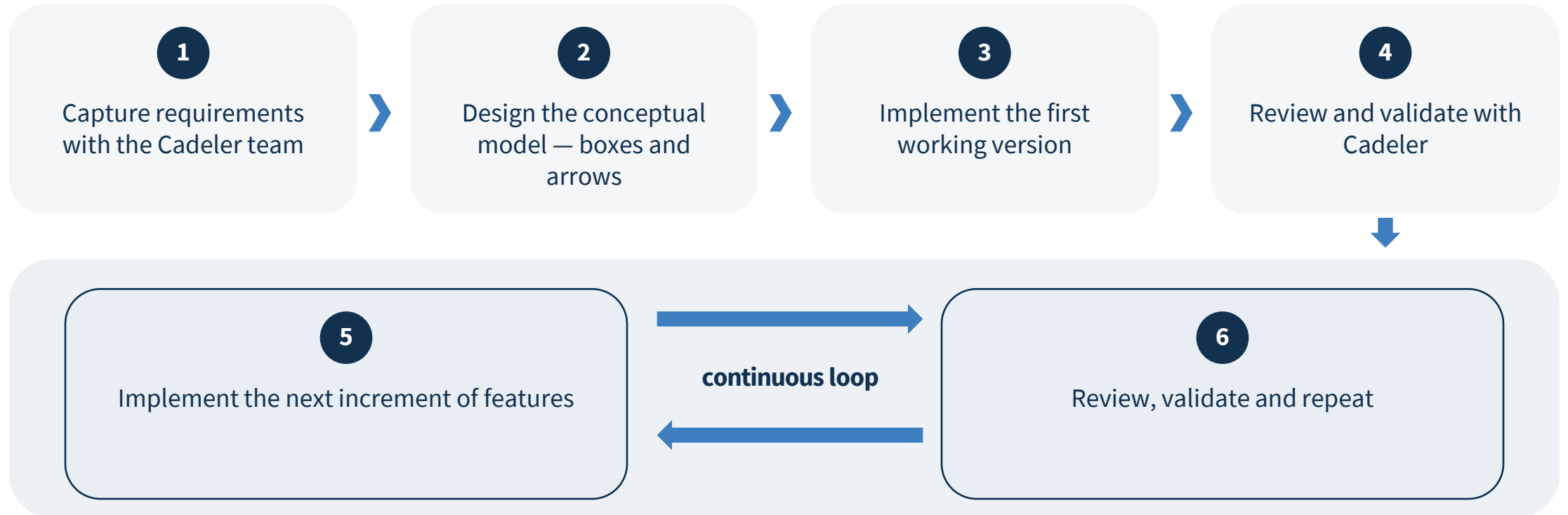
Serves **global clients** across Europe, the Middle East, United States and Asia



Consulting **Partner** of AnyLogic Europe

Modelling Process

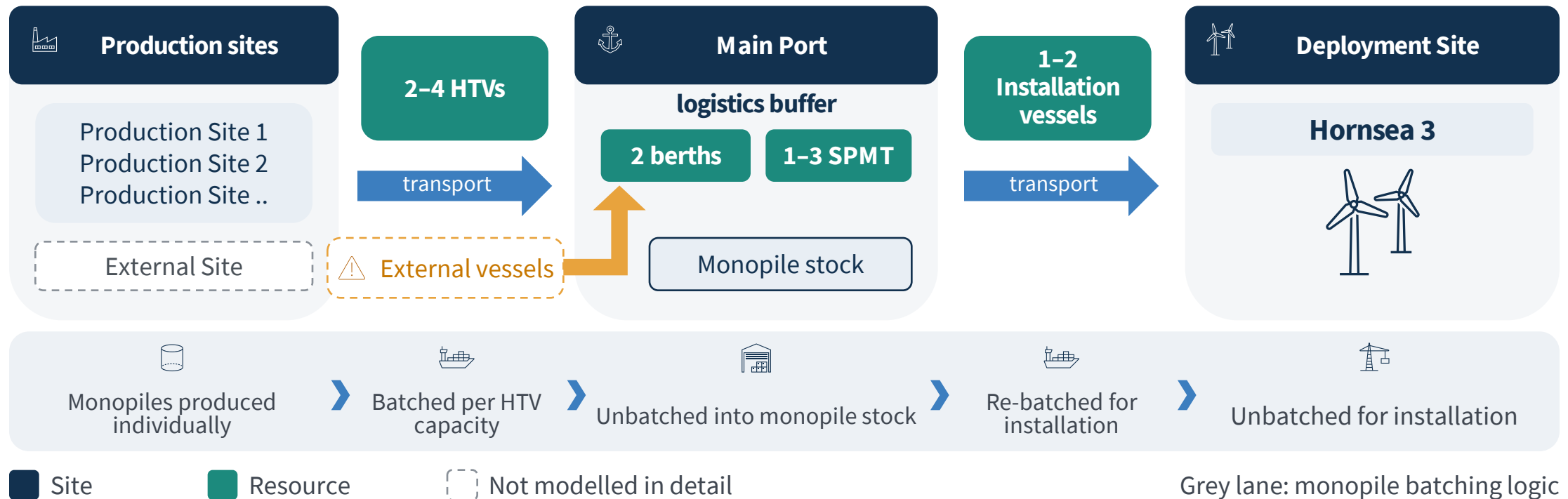
Incremental delivery — build, review, validate, repeat



Model Design

Simulation of monopile transport and installation processes

- Multiple production sites, with transport times derived from distance
- External sites and berth usage are not modelled in detail, but constrain main port capacity
- Resource availability varies over the course of the campaign
- Weather downtime regularly disrupts the transport chain through vessel unavailability



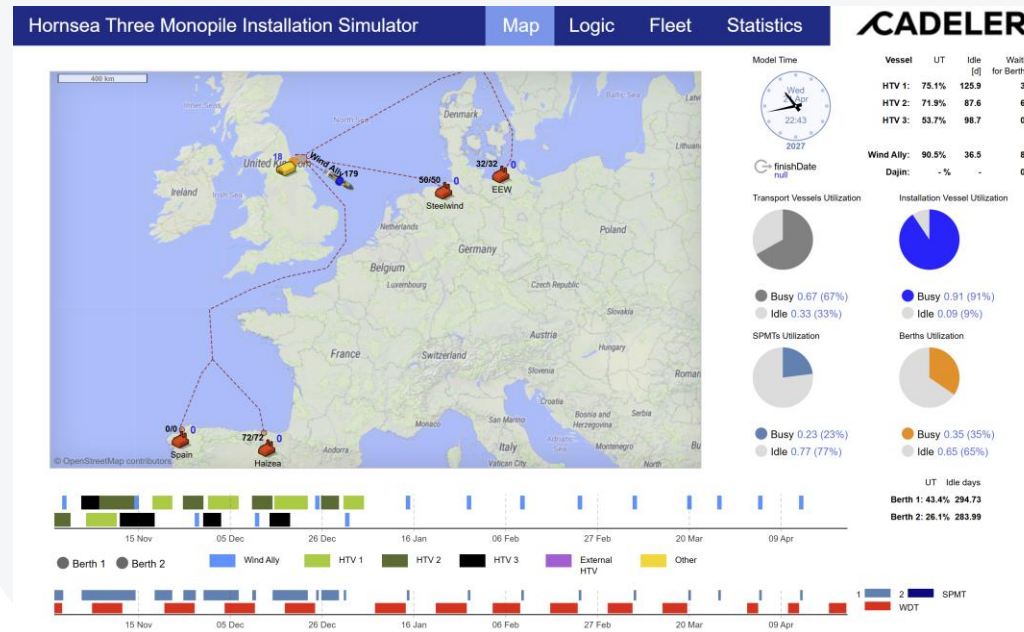
Workflow: Forecasting from Project Start

Input data (Excel)

[illegible]

Name	LoadOutIn Days	Transit Days	IsExternal	NeedsSPMT
Haizea	4	3	false	true
SteelWind	4	2	false	true
EEW	4	3	false	true
Dajin			true	true
SeaAH	0		true	false
Spain	4	3	false	true

Simulation model



Output logs (CSV)



	A	B	C	D	E	F	G	H
1	Line ID	Vessel name	Tripp number	Supplier	Arrival time at Teesworks	Load/Unstn Starts	Vessats in Qu-MP	Shp Back Ref.W.
2		0 HV1 1	0	Hazeta	-	-	0	0
3		1 HV1 1	1	Hazeta	19.11.2023 03:00	19.11.2023 03:00	0	0
4		2 HV1 1	2	Hazeta	12.12.2023 14:00	12.12.2023 14:00	0	3
5		3 HV1 1	3	Hazeta	02.01.2026 14:00	02.01.2026 14:00	0	4
6		4 HV1 1	4	Hazeta	23.01.2026 14:00	23.01.2026 14:00	0	9
7		5 HV1 1	5	Hazeta	27.02.2026 14:00	27.02.2026 14:00	0	20
8		6 HV1 1	6	Hazeta	18.03.2026 14:00	18.03.2026 14:00	0	31
9		7 Windy Aliv	0	Hazeta	05.11.2023 06:00	05.11.2023 06:00	0	34
10		8 Windy Aliv	1	Hazeta	02.04.2024 17:00	02.04.2024 17:00	0	35
11		9 Windy Aliv	1	1	13.04.2026 08:01	13.04.2026 16:01	0	32
12		10 Windy Aliv	1	1	17.04.2026 19:00	17.04.2026 19:00	0	35
13		11 Windy Aliv	2	2	24.04.2026 15:02	24.04.2026 15:02	0	36
14		12 Windy Aliv	3	3	04.05.2026 01:03	04.05.2026 03:03	0	36
15		13 HV1 1	1	Hazeta	26.04.2026 13:48	26.04.2026 13:48	0	38
16		14 HV1 1	1	Hazeta	11.05.2026 11:04	11.05.2026 11:04	0	31
17		15 HV1 1	10	EEW	11.05.2026 15:06	11.05.2026 15:06	0	31
18		16 HV1 2	0	Steelswind	-	-	0	0
19		17 HV1 1	5	-	23.05.2026 01:49	23.05.2026 03:49	0	29
20		18 HV1 2	1	Steelswind	24.05.2026 19:48	27.05.2026 21:49	0	24
21		19 HV1 1	11	Hazeta	23.05.2026 20:12	23.05.2026 21:49	0	24
22		20 HV1 2	2	Steelswind	05.06.2026 16:37	05.06.2026 16:37	0	37
23		21 HV1 1	1	Hazeta	19.06.2026 11:50	19.06.2026 11:50	0	31
24		22 HV1 1	12	EEW	07.06.2026 23:49	09.06.2026 16:37	0	31

Vessel log
Monopile log

Decision-relevant simulation

Project start = simulation start
05.11.2025



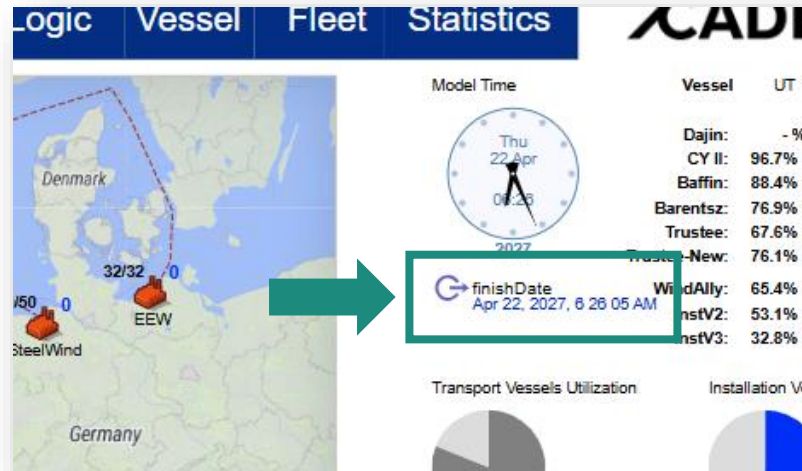
Surplus simulated horizon

Forecast installation end
13.05.2027

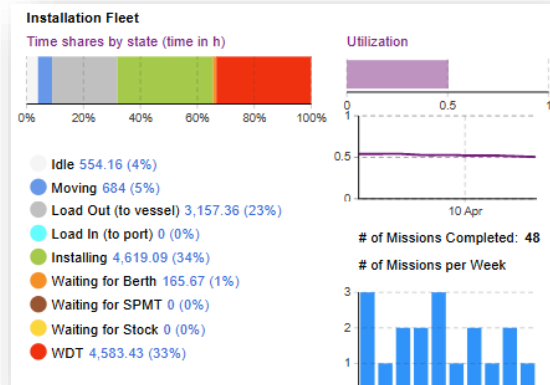
Simulation end date
31.12.2027



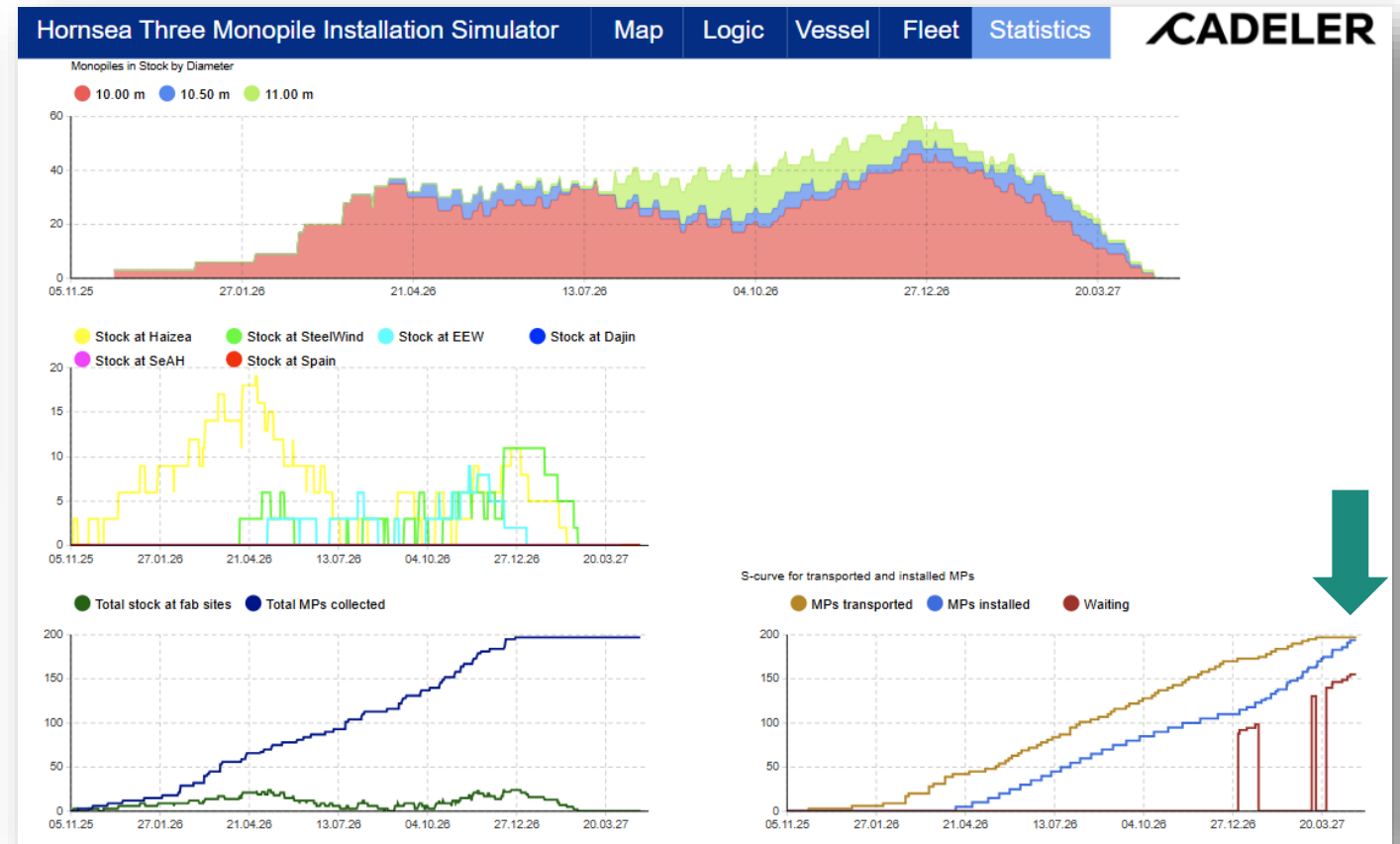
Results: Forecasting from Project Start



Forecasted end date for installations

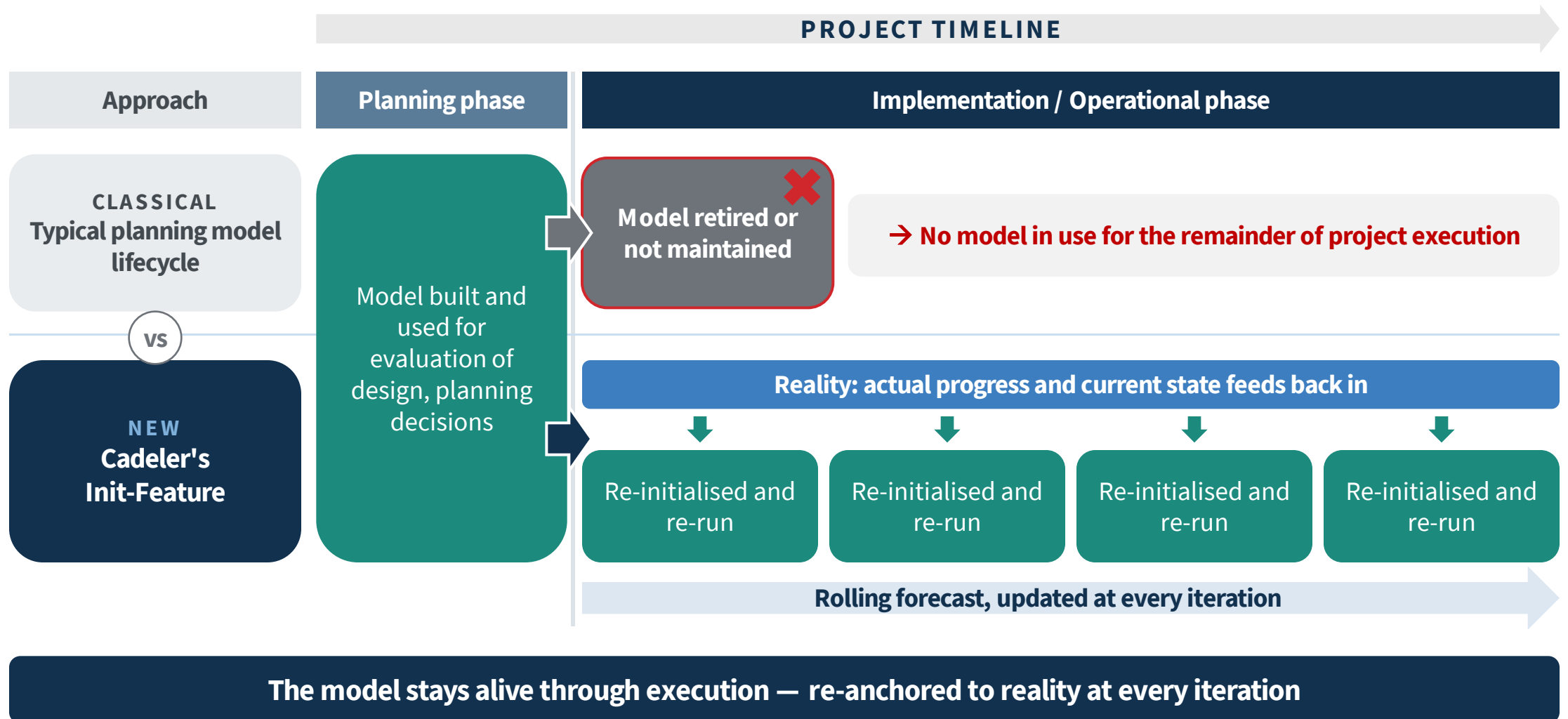


Resource utilization



Overall statistics

Syncing Simulation with Reality

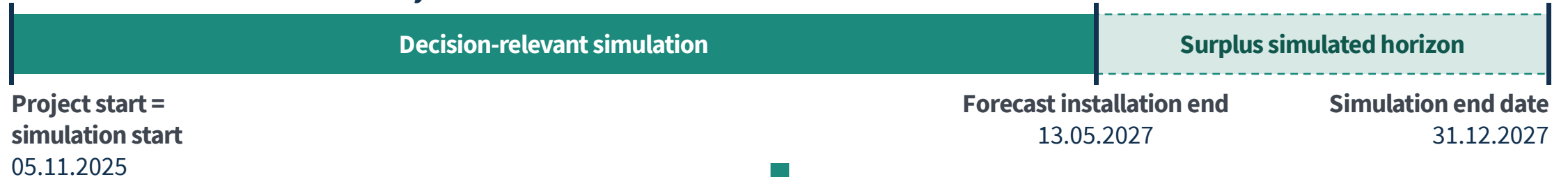


The Initialisation Feature

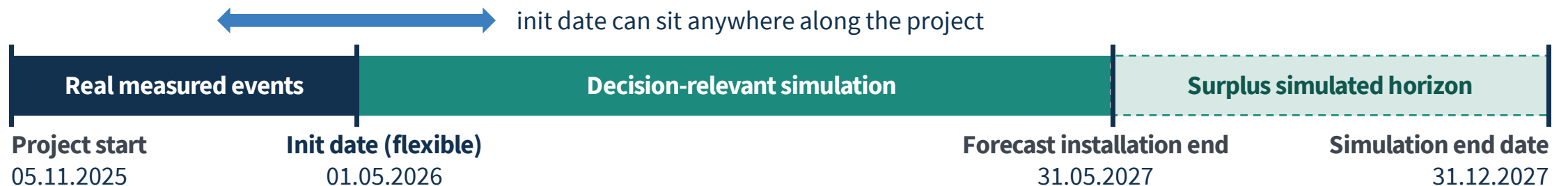
Idea: start the simulator in a mid-run state at any chosen point after project start, rather than always from day one

Objective: forecast the remaining campaign from the project's actual current position

Standard run — simulated from day one

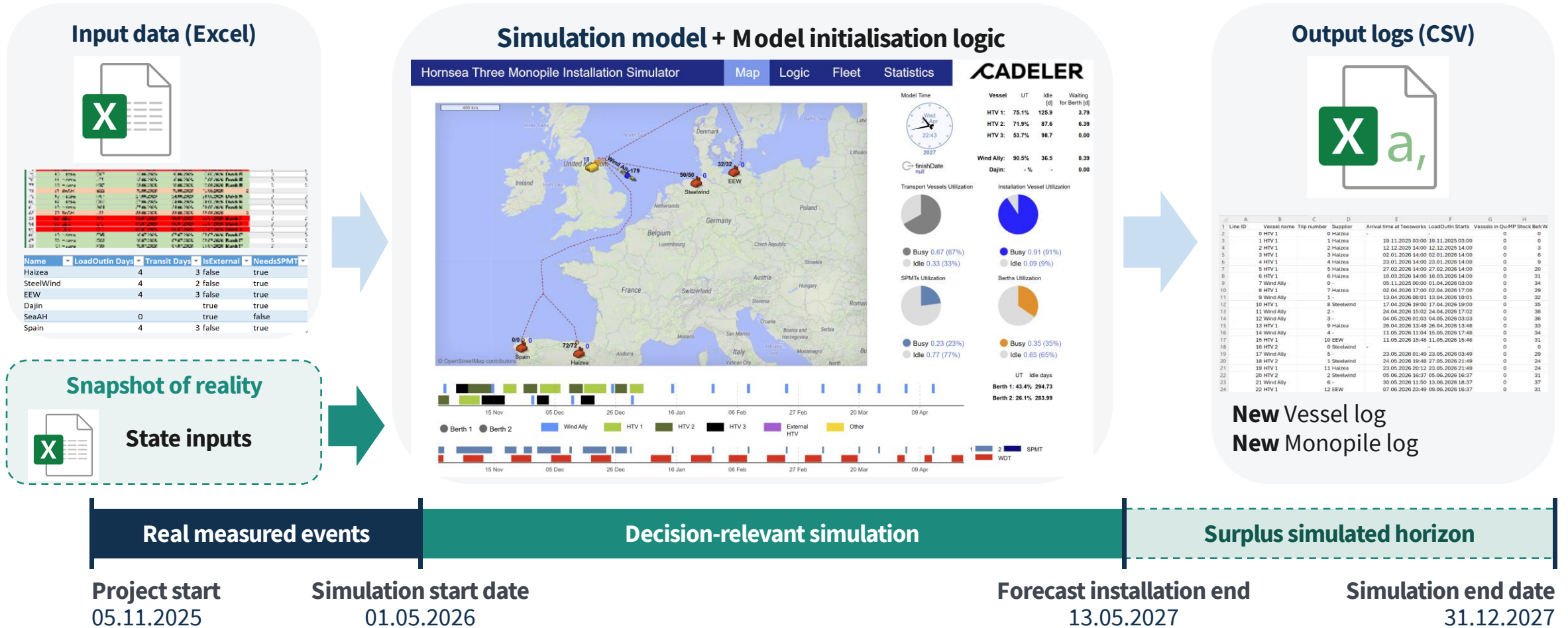


Initialised run — start from the project's actual position



Moving the init date swaps simulated history for real data — re-forecast, not re-simulated

Advanced Workflow: Rolling Forecast from Actual State



The Initialisation Setup Table

The setup table captures the full operational state

- Vessel states — in port, transiting, installing
- Remaining times for movements, loading and installation
- Locations of individual monopiles and monopile batches

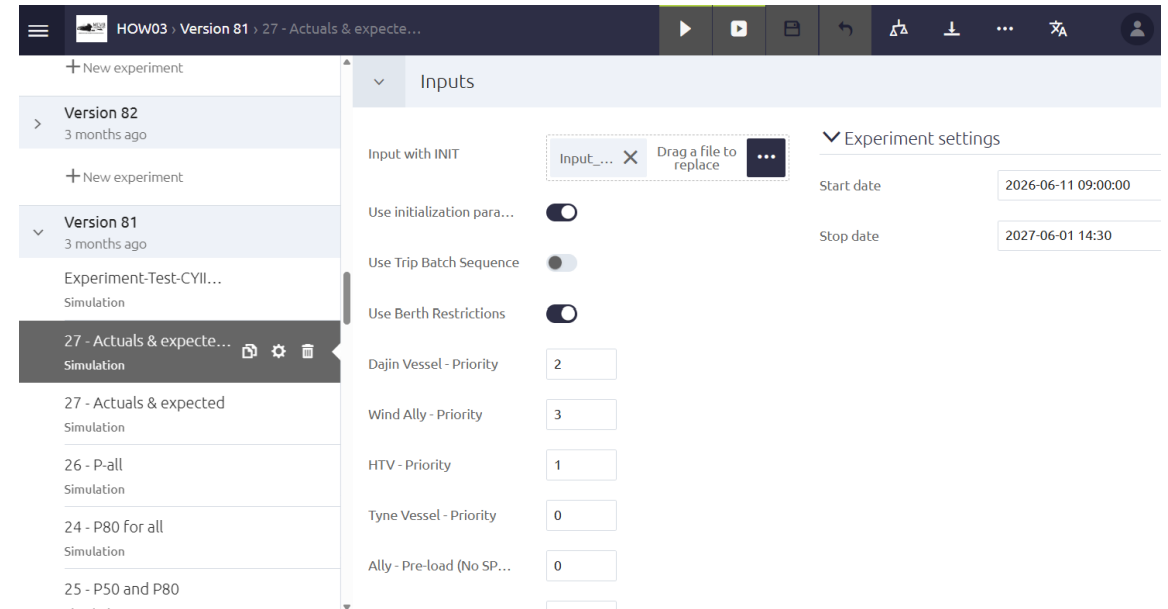
The challenge

- Each vessel agent must be inserted at the correct point in the process flow, with a valid and well-tuned configuration
- Inconsistent or contradictory input states must be detected and rejected

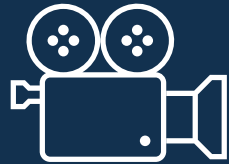
Name	Replication	Value list
Standalone Mode		Yes or EMPTY
List of Monopiles installed		
List of Monopiles in Teesworks		
List of Monopiles in stock at FabSite	Foreach FabSite	
HTV location	Foreach HTV	Haizea/SteelWind/EEW/Spain/Teesworks/Transit
HTV status	Foreach HTV	Loading, Unloading, TransitToFab, TransitToTW, WDTtoFab, WDTtoTW
HTV remaining time	Foreach HTV	value represents Days or Hours, depending on HTV status
HTV Monopile Ids	Foreach HTV	list of monopileIds
HTV seized SPMT	Foreach HTV	1,2,3 or EMPTY
HTV seized Berth	Foreach HTV	1,2 or EMPTY
HTV skip WDT	Foreach HTV	Skip or EMPTY
InstVessel status	Foreach InstVessel	Loading, Unloading, Installing, TransitToInst, TransitToTW, WDT
InstVessel remaining time	Foreach InstVessel	value represents Days or Hours, depending on InstVessel status
InstVessel Monopile Ids	Foreach InstVessel	list of monopileIds
InstVessel seized SPMT	Foreach InstVessel	1,2,3 or EMPTY
InstVessel seized Berth	Foreach InstVessel	1,2 or EMPTY
InstVessel skip WDT	Foreach InstVessel	Skip or EMPTY
ExtVessel status		TransitToBerth, Unloading
ExtVessel remaining time		measured in hours
ExtVessel monopile Ids		list of monopileIds
ExtVessel seized SPMT		1,2,3 or EMPTY
ExtVessel seized Berth		1,2 or EMPTY

Deployment on AnyLogic Cloud

- Hosted on MEVB's private cloud, with dedicated access for Cadeler
- Runs from any PC with an internet connection — no local installation required
- Parameters adjusted directly, or in full detail through a single Excel setup file
- Multiple scenarios run and compared side by side
- Results downloaded as Excel or CSV for offline analysis
- Model versions managed centrally



Live Model Walkthrough

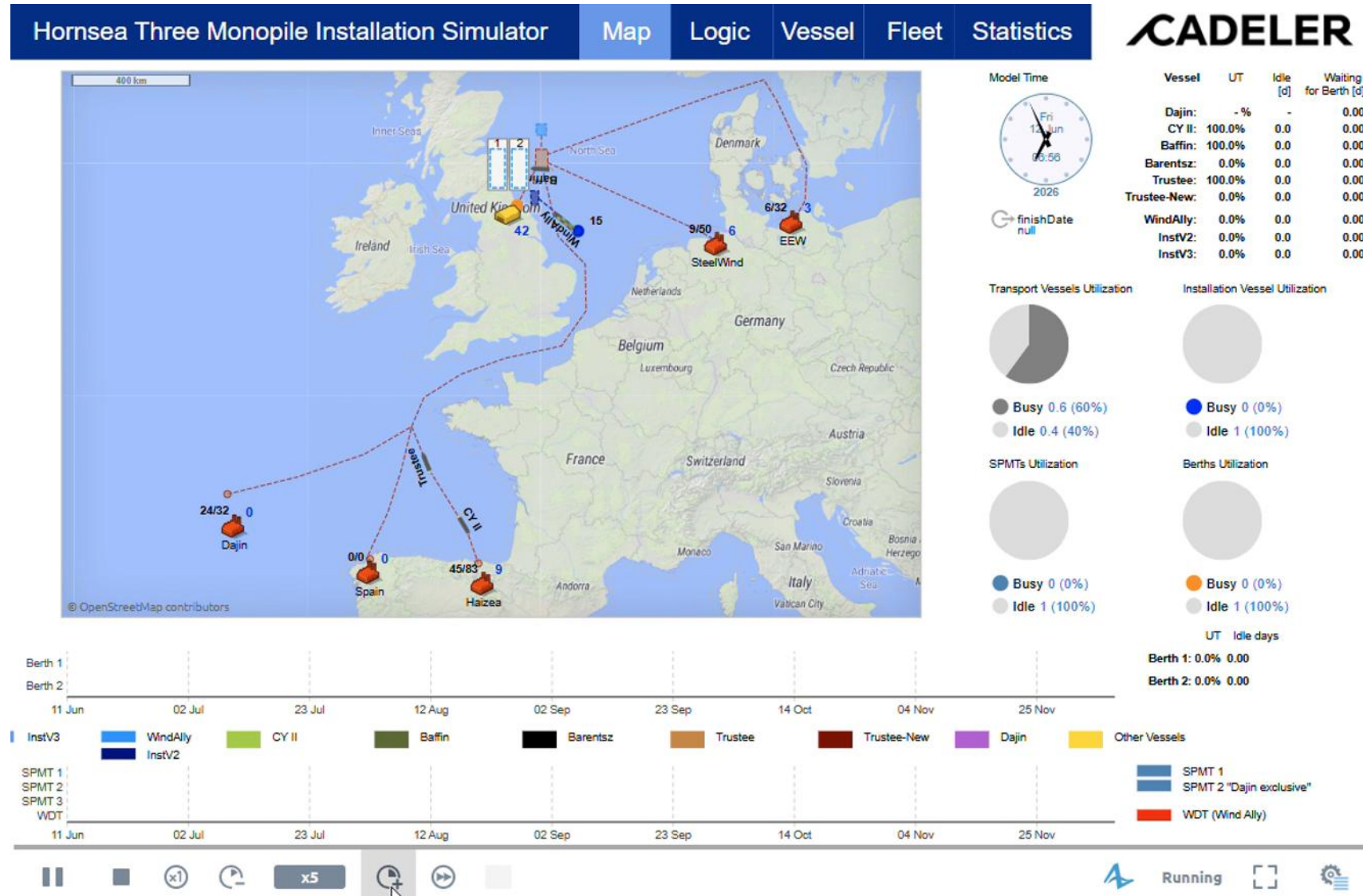


Video demo following

What to watch for

- 1 The port and offshore operation running end to end
- 2 Setting up and launching a mid-run initialised scenario
- 3 How weather downtime interrupts the transport chain
- 4 Reading the forecast output and finish of installation date

Live Model Walkthrough



Significance and Tangible Benefits

Tangible benefits

- A shift from static planning to rolling predictions, continuously sync'ed to reality
- Better resource utilisation through improved planning and scheduling
- Higher accuracy in short-term operational forecasting

Intangible benefits

- Greater operational agility and increased confidence in decision-making tools
- Clearer communication between internal teams and external stakeholders
- A model (and an investment) that remains useful throughout implementation, not only during planning

From static plans to a living model that keeps predicting through operation.