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MOSWOZ design simulation scenarios

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Introduction

The traffic situation on the Dutch part of the North Sea is changing and will change even more in the future due to the construction of new wind farms and other renewable energy and/or shared use. These changing circumstances require new insights into the safety of shipping. To this end, Rijkswaterstaat has established the Offshore Wind Energy and Shipping Safety Program around offshore wind farms (MOSWOZ). As part of this program, Rijkswaterstaat is conducting research into the effect of offshore wind farms on maritime safety. An important component in this, is the behaviour of ship's crews navigating the ships.

One of the main questions is: what influence does the proximity of wind turbines/farms have on the orientation, behaviour (possibly culturally influenced) and decision making of ship crews? The assignment falls within the Collisions theme. It concerns the investigation of situational awareness, decision making of the ship's crew when sailing in the vicinity of wind farm areas, and the role of culture (intercultural communication) in these processes.

In order to answer this question, information should be gathered. Simulation scenarios have been designed for this purpose. This document describes those scenarios in such a way that a simulator centre should be able to execute these simulations, provided that they comply with the requirements set. The execution of the scenarios will have to take place in such a way that information can be collected to answer the (main) questions from the various [MOSWOZ themes](#).

The purpose of the scenarios is to simulate new potential situations at the Dutch part of the North Sea and to collect information for further research. Each scenario enables data collection and should provide answer to the various research questions.

The descriptions of the scenarios contain hardware requirements for the execution and all other information for building and executing the scenarios as designed. Besides, the descriptions provide directions for potential channels to collect data.

Glossary

CCTV:	Closed Circuit Television used for debriefing and evaluation purposes.
Decision making:	The process of taking decisions by identifying a decision, gathering information, and assessing alternative resolutions.
ECDIS:	Electronic Chart Display Information System.
ERTV:	Emergency Response Towing Vessel.
Evaluator/observer:	Person(s) who observes participants, during the simulation and conducts evaluation after completion, to gather information in line with the pre-determined research questions for each scenario.
Events:	Particular moments in simulation runs initiated by simulator operator, evaluator or delegates. Events are used to describe the simulation run in a sequential order.
FMB:	Full Mission Bridge
HKZ:	Wind energy area Hollandse Kust Zuid
HKN:	Wind energy area Hollandse Kust Noord
HKW:	Wind energy area Hollandse Kust West
Initial conditions:	A part which describes the starting conditions for each simulation run.
MOSWOZ:	Monitorings- en Onderzoeksprogramma Scheepvaart veiligheid Wind op Zee. (Shipping Safety around offshore windfarms Monitoring and Research Program).
NUC:	Not Under Command.
OS:	Own Ship, this is used in the SIMRUNs and defines the ship which is loaded on the simulator and is actively navigated by the nautical crew.
Rijkswaterstaat:	Rijkswaterstaat is the executive agency of the Ministry of Infrastructure and Water Management, dedicated to promote safety, mobility and the quality of life in the Netherlands.
SIMRUN:	Simulation Exercise where particular situations are combined in one simulation run. The SIMRUN describes the scenario for development, execution and evaluation purposes.

SIMOPS:	Simulator operator. The person behind the operator/instructor station. This person monitors traffic, roleplay other ships VHF communication and manipulates Hydro/Meteo conditions in line with the simulation script.
Situational awareness:	Situational awareness is the ability to perceive, understand, and effectively respond to one's situation. It involves comprehending a given circumstance, gathering relevant information, analysing it, and making informed decisions to successfully address any potential risks, hazards, or events that might occur.
TGT:	Target, this is used in the SIMRUNs and defines ships in the scenario other than the own ship.
Thinking out loud:	Is used in the maritime industry to increase team-situational awareness. Person(s) will vocalize their thoughts to make their cognitive processes more visible. In this setting it is used as an evaluation technique, so to provide observable information for the observer(s).
Transit Passages:	Passages through a wind farm intended to be used by ships <46 meter.
TSS:	Traffic separation scheme.
VTMON:	Vessel Traffic Monitoring. The process (or methodology) of monitoring ship movements in and around wind farms.

1 Study design

1.1. Introduction

A great deal of research has already been done into the behaviour and decision making of ships' crews. In most cases, this information has been collected from incident investigations. As a result, we know which behaviour may contribute to safer sailing in challenging conditions. We also know from research that in challenging circumstances, maintaining situational awareness by the crew is a challenge. Reduced situational awareness increases the risk of unwanted decisions and incidents.

What we don't know is whether the situation in 2030 in the Dutch part of the North Sea, with the construction of new wind farm areas and increasing traffic, will make the situation more challenging for ship's crews. What is also uncertain is whether these new circumstances may lead to reduced situational awareness. Although this may be assumed, no information is available on this matter to date.

Ideally, you want to investigate this by first understanding the current situation and then comparing that information with collected information about the new situation. However, there is no information about situational awareness in the current situation and it is also extremely expensive and complex to carry out such a study. One possibility is to simulate the future situation, make observations and question a crew about it. Observations and responses are collected to questions that have not been researched before. This allows us to gain insight into whether there may be a problem or experience that we want to get to know better. We refer to this as an exploratory study.

1.2. Qualitative exploratory research

By means of qualitative exploratory research, Rijkswaterstaat wants to generate an impression of how ship crews may react in the future situation (2030) when sailing through or near wind farms. The research is intended to gain new insights and fill knowledge gaps. The core of the research focuses on the behaviour of seafarers in relation to the wind farms realized in 2030 in combination with the intensified traffic density.

1.3. Research questions

The MOSWOZ theme leaders of Rijkswaterstaat have jointly drawn up research questions. These research questions are linked to one of the nine MOSWOZ themes. These research questions were then merged in one or more simulation runs. The simulation run is seen as the stage to answer the research question(s).

1.4. Applied research methods

During the study, information can be collected through e.g. observations during the simulation runs by a team of behavioural specialists (cognitive psychologists/ergonomist). To obtain answers to the research questions, the best possible evaluation methods should be applied. These methods will have to be selected by the contractor.

1.5. Participants

In order to gather reliable information, it is important to pay attention to the group of participants that will participate in the simulation runs. Rijkswaterstaat is looking for a group of participants that meet certain criteria. When selecting the participants at least the following criteria should be considered:

- Competent and working experience appropriate to his/her position (rank).
- Less experienced with sailing in and around wind farms in the North sea.
- Nationality of the bridge team corresponding to the most common nationalities on board seagoing vessels.
- Bridge team consisting of diverse cultural backgrounds in which English is not the mother tongue.
- Bridge team of one shipping company so that the same set of shipboard procedures can be used.
- Bridge team is familiar with the type of ship, manoeuvring characteristics and navigation equipment used.

1.6. Limitations and reliability

The reliability of an exploratory study is influenced by, among other things, subjectivity, limited structure and bias. The smaller the sample, the more impact of this influence. However, exploratory research is one of the first steps to explore and generate new ideas, hypotheses or research questions. It is important to understand the limitations and context of exploratory studies when interpreting the results.

Due to the broad field of research, large number of variables, high degree of complexity and limited time, the research results will not be directly applicable to practice. It is also not clear whether the results can be generalised to other individuals, teams or professions with slightly different characteristics than those who participated in the study. However, the simulator study is intended to uncover critical aspects that should be the focus of follow-up research.

2 Structure of the descriptions

The main question to which the simulation runs contribute is: *what influence does the proximity of wind turbines/farms have on the orientation, behaviour (culture) and decision making of ship crews?* To address this question, various situations can be simulated. The situations to be simulated were selected based on a literature review of shipping incidents and crew behaviour.

At the same time, behavioural characteristics of a VTMON operator can be taken into account in different situations. For that reason, in addition to ship crews including ERTV crew, VTMon operators are also involved in the scenarios.

Based on the MOSWOZ themes, Rijkswaterstaat has selected a number of scenarios based on the questions. In these scenarios, the participating crews (including VTMon operator and ERTV crew) will face realistic situations. These situations allow for collecting information regarding the crews choices, behaviour and actions. Where possible, culture-related information is also gathered.

The scenarios have been categorized into so-called 'simulation runs'. A total of eight simulation runs have been designed in which a combination of different scenarios take place.

This report is divided into four parts:

1. The simulation runs.
2. Information for building the simulation runs.
3. Information for the execution of the simulation runs.
4. Gathering information with the simulation runs.

All simulation runs take place in the Dutch part of the North Sea (see 9, Appendix 3).

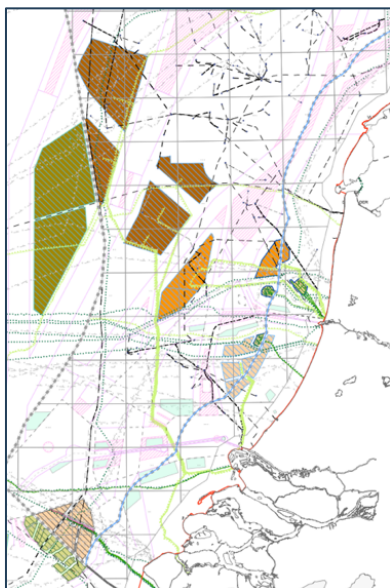


Figure 1: Overview map of the working area, see also Appendix 3

3 Simulation runs

This chapter describes the simulation runs in which the scenarios are part of.

3.1. De simulation runs

A total of eight simulation runs have been designed in which a combination of one or more of the scenarios selected by Rijkswaterstaat occurs. Each simulation run performed will therefore provide information for multiple research questions associated with each scenario.

The following simulation runs are designed:

1. SIMRUN 1 BASIS.
2. SIMRUN 2 ARRIVAL IJMUIDEN.
3. SIMRUN 3 COLLISION-NUC.
4. SIMRUN 4 VTMON SUMMER.
5. SIMRUN 5 VTMON AUTUMN.
6. SIMRUN 6 LOSS TOW.
7. SIMRUN 7 PASSAGES.
8. SIMRUN 8 SENSORS.

The simulation runs are described in detail in the separate [appendix 1 'Description and SIMRUNS 1 to 8'](#).

4 General information for building simulations

This chapter describes the general information to prepare for the development of the scenarios and the necessary simulators. All simulation runs will take place in the Dutch part of the North Sea as realised in 2030. The wind farms, the expected traffic density in 2030, buoys, cables and traffic lanes need to be programmed. The longest simulation runs last for six consecutive hours. As a guide, a checklist is attached in **Fout! Verwijzingsbron niet gevonden..**

4.1. Technical specifications simulators

4.1.1. Capacity simulators

The nature and scope of the scenarios will demand a lot from the calculation capacity of a simulator. The large number of ships together with the 'full model' ships and challenging meteorological / hydro conditions require a large amount of simulation capacity. The designers of the scenarios do not know whether this research has been done in this way before. The common (and required) classification for full mission simulators is a DNV Class A certification. This classification tests scenarios with 100 ships and 20 routes. The simulations for this study require much more than DNV Class A requirements.

The described simulations have been built and executed on a simulator set-up of a specific supplier. At this test set-up, the so-called 'exercise load' turned out to be so high that the simulator had insufficient capacity to work properly and correctly. In order to guarantee operational reliability during the simulations, an appropriate capacity is required. The specific configuration depends on the type and settings of the simulators.

4.1.2. Equipment and facilities simulators

Because this research must simulate reality as closely as possible, it is important that a crew must be able to keep watch comfortably on the full mission bridge. The simulation runs take several hours (up to a maximum of six hours) and depending on which bridge team configuration the captain will choose, it must be possible for a bridge team or an individual to work. This requires comfortable (cockpit) seats for the officers on watch and lookout. Just like on a real ship, there must be an opportunity to consume or prepare coffee/tea and refreshments.

4.1.3. Simulation development application

All simulation runs require development application software which is both suitable for a (minimum) DNV Class A simulator or similar and for building and playing a simulation run in which approximately 350 to 500 ships can sail simultaneously in a certain sailing area. These ships must be able to sail according to set routes. We recommend that ships should also be able to start with a delay in order to achieve a realistic supply of traffic from ports, for example. Six-hour simulation runs require a constant real-world flow of traffic in the designated area. The software must be able to play (pre-recorded) VHF radio traffic during the simulation.

4.1.4. Simulators required for the runs with ship crews

For ship's crews to participate in the simulation runs, a full mission bridge simulator is required. The minimum requirement is a DNV Class A certification or similar qualification. These simulators do not need to be linked to an engine room simulator. The ability to control the anchor chain from the simulator operator is an

advantage. For the simulation run with a tug, it is an advantage if the tow wire can be operated from the bridge unit.

4.1.5. Simulators Needed for ERTV Crew Runs

For the simulation runs in which the ERTV ship has an active role, a full mission simulator with at least DNV Class A certification or similar is required. It is an advantage if this simulator is a realistic offshore or sea tug simulator.

4.1.6. Simulators Needed for VTMON Operator Runs

For the simulation runs in which a VTMON operator participates, a set-up is required that approximates a Vessel Traffic Monitoring station/desk (Similar to a VTS desk). This set-up must be in a separate space from the full mission bridges. The screens of this simulator must display an ECDIS chart (or similar). In addition, display of AIS image and radar overlay must be available for the entire 'area to be monitored'. This station does not require ship control, but it does require means of communication such as VHF transmission and listening. The future VTMON desk is most likely to be equipped with three to four screens. It is preferable to approach such a set-up as closely as possible for the simulations.

A link between the Vessel Traffic Management System and the ships in the simulations is an additional advantage.

4.1.7. Playback option

The simulator should be able to save simulation runs and play them back. All information from instruments, sound and CCTV must be stored from the bridges, VTMon station and the instructor station.

4.1.8. ECDIS

In the full mission simulator for the ship's crew, it is an advantage if a duplication of the ECDIS is available. The ECDIS should have the possibility to upload an ECDIS chart provided by Rijkswaterstaat for use in the simulations. If a new chart of 2030 is not available at the time the contractor starts building the simulations, it should be possible to make adjustments according to newer versions of ECDIS charts to make the wind farm areas visible to the navigator. Official ECDIS requirements of the ship to be sailed on the simulator, should be met as a minimum.

4.1.9. Availability CCTV, camera surveillance

For observation and evaluation purposes, CCTV in the simulator and in particular aimed at the participants is a requirement. In addition to CCTV, recording of the sound is also required. Both must be recorded and playable for the duration of the simulation run and in a later stage to be used for research purposes. It is even highly desirable that a live connection/viewing option can be made with researchers at another (possibly foreign) location who want to watch a part of the simulation run.

4.2. Required information for the sailing area

4.2.1. Wind Farm Areas

In the working area of the simulation runs, the wind farm areas should be built corresponding to the year 2030. The coordinates of the contours of the farms can be retrieved from Rijkswaterstaat. For the installation of wind turbines in the wind farms, the location per wind turbine may be filled out approximately. The number of wind turbines per wind farm must be in accordance with the information provided by Rijkswaterstaat. Depending on the simulator manufacturer, you may choose to

include the wind turbines in the area or to place them as a 'target' later. This choice will have an impact in particular on the required capacity of the simulator. At the moment there is a viewer available from which the coordinates of the wind farms can be extracted via this link: [Coordinates windfarms](#)

4.2.2. *Shipping traffic*

The density of shipping traffic can be approximated from ships present on an average busy day plus 10%. This is the expectation of 2030. Traffic density data can be retrieved from Rijkswaterstaat. The type of shipping traffic can be replicated from this data. Consider fishing vessels, small work traffic in and around wind energy areas, Deep Water route traffic, anchor handlers and the variation in different sizes and types of merchant ships. Appendix 2 provides a snapshot of 27.11.2023 (15:00). This snapshot can be used to develop the traffic situation in the simulator. Expectations are that this day plus 10% will give a number of about 385 ships in the simulated areas. In simulations where pleasure yachts are involved, a moment should be selected when many pleasure yachts are on the water. In order to maintain a traffic flow throughout the scenario, it is recommended to make use of delays in take-off times for ships from ports or from outside the simulation area.

Detailed information for shipping traffic per simulation run is shown in the descriptions of the simulation runs in the separate appendices. A distinction is made between traffic that is given an active role in a simulation run and traffic that serves to decorate and add realism to the simulation run.

4.2.3. *Buoys, passages and waterways*

The waterways and passages for small vessels in the working area and the TSS will not change compared to now. For shipping traffic, in order to follow the correct routes in the simulation, it is necessary to include all routes in the simulation area. As far as buoys are concerned, there may be changes. At the moment, the possible changes are currently unknown. Rijkswaterstaat will notify the contractor of the future changes as soon as more information is available.

4.2.4. *ECDIS-chart*

For a navigator in the simulations, a correct ECDIS chart is important. An ECDIS vector chart must include the wind farm areas and related information that will be on the chart in 2030.

4.3. **Ships and objects required for the scenarios**

4.3.1. *Ships*

A realistic range of diversity of ships in the simulations must be available in order to function as shipping traffic in the simulations. These ships can be developed simplified with the aim of serving as so-called target ships. At a minimum, the following ship types are required:

- Fishing ships.
- Sailing yachts.
- Work vessels to transport personnel to and from wind energy areas (Crew Transfer Vessels).
- Containerships.
- Tankers.
- General cargo ships.
- Deep-draft ships.
- Passenger ships.

- RoRo ships.

For ships playing an active role in the various scenarios, ships are needed that are developed as realistically as possible and equipped with a mathematical model, which accounts for motion, drift and steering angles according to forces induced by current, wind or waves. The ships which meet at least those characteristics are:

- ERTV-ship (specifications like active ERTV¹).
- Oceangoing tug (can be same as ERTV model).
- Large merchant ship (Indication 150m – 300m).
- Small merchant ship (Indication 80 – 100m).
- Car carrier (or similar wind surface).
- Object to be towed (car carrier, can be same as above).
- Sailing yacht 10 – 15 m.

The ships mentioned above must be able to be operated on a full mission simulator. The ships that play an active role in the simulation with anchoring must be able to drop anchor and bring it home again by means of communication with a simulator operator.

4.3.2. *Objects*

Wind turbines should be equipped with prescribed IALA guideline G-1162 '[The marking of offshore wind farms](#)' lighting. Preferably with rotating wind turbine blades.

The simulation run with a tow requires a connection between a tug and an object to be towed. This connection must be able to be disconnected by the simulator operator.

4.4. **Hydro meteo conditions**

The necessary weather and current/ tidal data are indicated for each scenario. Unless specifically stated otherwise, an actual tidal pattern of the sailing area is required for the simulation run. Because the research aims to collect information under challenging conditions, spring tides are required in simulation runs. For the crew, it is necessary that they are provided with the tidal data that is also programmed in the simulation runs. To do this, the programmer may choose a different date than the one mentioned in the simulation run. For different simulation runs, it is necessary that weather phenomena can be adjusted during the simulation run. This can be done either pre-programmed or manually. For this reason, the following elements are a technical requirement for the simulator:

- Wind.
- Waves.
- Swell.
- Fog.
- Current.
- Tidal current.
- Difference in day and night with visible navigation lights of shipping, buoys and wind farms.

¹ <https://kustwacht.nl/eenheden/multtraship-commander/>

5 Execution of simulation runs

This chapter describes key features of the eight simulation runs. Subsequently, these characteristics are described for each simulation run. This allows a global picture to be formed for building and executing the runs. For the actual development and execution of the runs, detailed simulation run descriptions are available for each run. See Appendix 1: Description and SIMRUNS 1 t/m 8. The sequence of simulation runs 1 to 8 is up to the research institute itself, provided that SIMRUN 1 is performed first.

- SIMRUN 1 BASIS
- SIMRUN 2 ARRIVAL IJMUIDEN
- SIMRUN 3 COLLISION-NUC
- SIMRUN 4 VTMON SUMMER
- SIMRUN 5 VTMON AUTUMN
- SIMRUN 6 LOSS TOW
- SIMRUN 7 PASSAGES
- SIMRUN 8 SENSORS

5.1. Familiarisation of participants

Prior to the simulation runs, the participating ship's crews must be familiarised with the bridges and equipment. This should be done in such a way that unfamiliarity with, or uncertainty about, equipment does not play a role in the simulation runs. We expect that a short familiarisation will not suffice. If necessary, instruction and practice of skills will be required for e.g. the Radar, ARPA and ECDIS. The crew is only ready when they indicate that they are ready and understand their task and how to work with the apparatus.

5.2. Duration and timings of the simulation runs

There are simulation runs from a few hours to a maximum of six hours, excluding briefing, debriefing, and any necessary voyage planning. Depending on the simulation run, the participants differ. In some simulation runs, multiple participants can have a role. Each simulation run also requires a different configuration of simulators.

The times at which the simulation runs should be performed differ per simulation run and are given approximately. For some simulations, execution at night is preferable. For each simulation run, a preference is specified when it should be executed. All simulation runs take place in the designated work area. See Appendix 3: .

SIMRUN	TITLE	TIME
SIMRUN 1	BASIS	2 runs of +/- 4 hrs
SIMRUN 2	ARRIVAL IJMUIDEN	1 run of +/- 3 hrs
SIMRUN 3	COLLISION-NUC	1 run of +/- 6 hrs
SIMRUN 4	VTMON SUMMER	1 run of +/- 6 hrs
SIMRUN 5	VTMON AUTUMN	1 run of +/- 6 hrs
SIMRUN 6	LOSS TOW	1 run of +/- 3 hrs
SIMRUN 7	PASSAGES	4 runs of +/- 1 hr
SIMRUN 8	SENSORS	1 runs of +/- 4 hrs

Total netto SIM time		+/- 40 hrs
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Tabel 1: Approximate running hours for each simrun and total expected sim time

5.3. Minimum simulators required

To perform all simulation runs, a minimum of 3 DNV Class A² (or similar) full mission simulators are required that can run in the same simulation run at the same time, be able to see each other and communicate with each other. In addition, a VTMON setup is required for the simulation runs with VTMON operators. This must also be part of the same simulation run.

For the simulation runs with ship crews, they must sail in a full mission simulator. If the VTMON operator is involved, the VTMON setup is required at the same time. Both the simulators and the VTMON set-up must be equipped with a CCTV capability.

The simulation run 'Passages' is best performed with a number (at least five) of part-task navigation simulators with a window view.

SIMRUN	TITLE	SIMULATOR
SIMRUN 1	BASIS	1 FMB (+CCTV)
SIMRUN 2	ARRIVAL IJMUIDEN	1 FMB + 1 VTMON SIM (+CCTV)
SIMRUN 3	COLLISION-NUC	2 x FMB + 1 VTMON SIM (+CCTV)
SIMRUN 4	VTMON SUMMER	1 FMB + 1 VTMON SIM (+CCTV)
SIMRUN 5	VTMON AUTUMN	1 FMB + 1 VTMON SIM (+CCTV)
SIMRUN 6	LOSS TOW	2 x tugsim + 1 FMB + 1 VTMON (+CCTV)
SIMRUN 7	PASSAGES	5 x Parttask bridge wit outside view
SIMRUN 8	SENSORS	1 FMB (+CCTV)

Tabel 2: Minimum simulators needed for each simrun

For an example of minimum requirements for a VTMON setup, see 5.1.6 Simulators Needed for VTMON Operator Runs.

5.4. Vessels required for the simulators

In addition to the so-called target ships (TGT), one or more own ships (OS) are used for each scenario, which are 'loaded' onto the bridge simulator. For these ships, it is important that the mathematical models are modelled in such a way that realistic sailing characteristics can be expected.

The table below shows which ships should be used for each scenario.

SIMRUN	TITLE	OWN SHIPS
SIMRUN 1	BASIS	1x Cargo ship approximate 150 - 250mtr
SIMRUN 2	ARRIVAL IJMUIDEN	1x Car carrier or other ship with large wind surface
SIMRUN 3	COLLISION-NUC	1 x Cargo ship approximate 150 - 250mtr

² In accordance with DNV-ST-0033 (August 2023)

		1x ERTV (Similar to Multraship Commander ³)
SIMRUN 4	VTMON SUMMER	1x ERTV (Similar to Multraship Commander)
SIMRUN 5	VTMON AUTUMN	1x ERTV (Similar to Multraship Commander)
SIMRUN 6	LOSS TOW	2 x Oceangoing tug (90 T BP) 1x ERTV (Similar to Multraship Commander) 1x Car carrier or other ship with large wind surface
SIMRUN 7	PASSAGES	1 x Sailing yacht (+/- 30 feet)
SIMRUN 8	SENSORS	1x Cargo ship approximate 150 - 250mtr

Tabel 3: Own ships needed for each simrun

5.5. Required ship crew or participants for the simulators

5.5.1. Hiring crew and other participants

It is explicitly intended that all the necessary participants in the simulation runs are organized and hired by the simulation centre that conducts the research. This includes travel, accommodation and all other costs.

5.5.2. Merchant ship crew

Rijkswaterstaat considers it of great importance to work with representative ship's crews. No crew may be selected that serves more often as crew for a simulation centre in any role (except for regular crew training).

The merchant ship must be manned with the average possible crew of a common composition in terms of nationality and cultural background. The language of instruction must be at least English. Based on an EMSA study on crew compositions, Filipino nationality is preferred and Ukrainian, Greek or Polish is the second option. No nationality or combination of nationalities is excluded, provided that the crew is representative of the average seagoing vessel. Combinations of different nationalities in a crew is strongly preferred.



Figure 2: Nationality of crew following EMSA research.

As far as practicable, it concerns a crew that is not optimally attuned to each other. There are shipping companies that train a lot with crews. In that case, they are more attuned to each other than average, and we want to prevent that in this study. The purpose of the composition is to have a crew that is professional, experienced, participates in the actual function of the scenario and can be expected

³ <https://kustwacht.nl/eenheden/multraship-commander/>

to have experience with the type of ship, especially in terms of size and bridge position (rank). Experience in the Dutch part of the North Sea is preferably limited. It is preferable if the crew is from the same shipping company so that they can work with familiar and similar procedures and this can approach reality as much as possible.

There are simulation runs where the information has to be collected from a crew that is tired. To achieve this, appropriate measures are required to ensure that the crew is in that condition. For example, a crew being taken off a ship, or the simulation run at night.

The table below shows which ship must be provided with which crew per simulation run.

5.5.3. Crew ERTV ship and oceangoing tug

The crew must be a bridge crew of an ERTV ship or similar consisting of a captain and two bridge officers and a lookout/helmsman (sailor) who have experience in similar positions on the Dutch part of the North Sea. At the same time, SIMRUN 6 requires a tugboat crew that has experience with towing at sea by oceangoing tugs. This crew also consists of a captain with two bridge officers and a sailor as lookout/helmsman.

5.5.4. Crew VTMON-desk

The simulator centre has to hire two operators for this. Preferably, VTMON operators, as an alternative, two sea VTS operators can be proposed. Information on VTMON tasks and responsibilities can be found at: [Information about VTMON](#).

5.5.5. Sailing yacht skippers

SIMRUN 7 requires sailing yacht skippers, five people who have experience in the North Sea and five who are inexperienced in the North Sea.

5.5.6. Other participants

A licensed North Sea Pilot, or Deep Sea Pilot specialized in the North Sea, to be stand-by in case a crew requires one in SIMRUN 1,3 and 8. A salvage expert to provide expertise in the evaluation of SIMRUN 6.

SIMRUN	SIMULATOR	PARTICIPANT	CREW
SIMRUN 1 BASIS	1 FMB	Merchant vessel	• 2 x crew (Captain- 2nd off – 3rd off – Lookout/Helmsman) • Crew should work according to their standard company procedures. • 1 crew experienced with Northsea and sailing in vicinity of windparks. • 1 crew with no/minimal experience on Northsea or sailing in vicinity of windparks. • Both crews should be in tired state. Preferably this scenario should be executed after a shift on board. • Cultural background as requested.
SIMRUN 2 ARRIVAL IJMUIDEN	1 FMB	Merchant vessel	• 1 x crew (Captain – 2nd off – 3rd off – Lookout/Helmsman). • Crew should work according to their standard company procedures.

			• Crew with minimal experience on northsea and sailing in vicinity of windparks. • Crew should be preferably in tired/fatigue state. • Cultural background as requested.
	1 x VTMON-operator station	VTMON	• 2 VTMON operators.
	-	Shipping office	• Designated person from office shipping company to be standby on phone for advice and instructions during scenario.
SIMRUN 3 COLLISION -NUC	1 FMB	Merchant vessel	• 1 x crew (Captain – 2nd off – 3rd off - Lookout/Helmsman). • Crew should work according to their standard company procedures. • Crew with minimal experience on Northsea and sailing in vicinity of windparks. • Crew should be preferably in tired/fatigue state. • Cultural background as requested.
	1 x VTMON-operator station	VTMON	• 2 x VTMON operator.
	1 FMB	ERTV	• 1 x crew from ERTV
	-	Shipping office	• Designated person from office shipping company to be standby on phone for advice and instructions during scenario.
	-	Deep Sea pilot	• 1 x Deep Sea Pilot stand-by for when ordered by Captain, and assisting in evaluation
SIMRUN 4 VTMON SUMMER	2 x VTMON-operator station	VTMON	• 2 x VTMON operator
	1 FMB	ERTV	• 1 x crew from ERTV
SIMRUN 5 VTMON AUTUMN	2 x VTMON-operator station	VTMON	• 2 x VTMON operator
	1 FMB	ERTV	• 1 x crew from ERTV
SIMRUN 6 LOSS TOW	2 x Tug Simulator	Seagoing Tugboat	• 1 x Oceangoing tug captains • Medium experienced on Northsea
	1 FMB	ERTV	• 1 x crew from ERTV
	1 x VTMON-operator station	VTMON	• 1 VTMON operator
	-	Salvage expert	• 1 x salvage expert for evaluation
SIMRUN 7 PASSAGES	5 x parttask bridge simulator	Sailing yacht Experienced	• +/- 5 Sailing yacht skippers • Experienced on crossing Northsea • Experienced with sailing in vicinity of windparks
	5 x parttask bridge simulator	Sailing yacht inexperienced	• +/- 5 Sailing yacht skippers • Inexperienced on crossing Northsea • Inexperienced with sailing in vicinity of windparks

SIMRUN 8 SENSORS	1 FMB	Merchant vessel	• 1 x crew (Captain- 2nd off – 3rd off – Lookout/Helmsman) • Crew should work according to their standard company procedures. • Crew with no/minimal experience on Northsea or sailing in vicinity of windparks. • Crew should be in tired state. Preferably this scenario should be executed after a shift on board. • Cultural background as requested.
		Deep Sea Pilot	• Deep sea Pilot stand-by in case required by Captain and assisting in evaluation

Tabel 4: Participants needed for each SIMRUN

5.6. Preparation by crew

Once the crew has been properly familiarised with the equipment in the simulator, as indicated in **Fout! Verwijzingsbron niet gevonden.**, the simulation runs for the study can start.

To prepare for the voyage, the crew must have sufficient common resources and time available. In this preparation, the captain must also determine the composition of the crew as he normally determines it. This may be dictated by the circumstances or may depend on the start time if the captain adheres to his usual watch schedules and bridge team layout. Crews are required in the simulation runs, but how the captain composes his or her bridge team is up to the captain alone. In practice, therefore, there may be (a part of the) crew not participating in the simulation run or only partially for the duration of his or her watch in the scenario. The same goes for the lookout or helmsman. The Officer of the Watch determines when he/she is deployed.

In the simulations where a North Sea pilot is available, it is also up to the captain whether he or she is deployed. The captain will have to ask for this, as is the case in daily practice.

Events in the simulation runs allow an officer or captain to call for help from other available crew members, but it is important that this is not directed or manipulated by the simulator operators or investigators.

5.7. Roles in the simulation runs

In addition to the predetermined events in the SIMRUN descriptions, the simulator operator will act in various roles from the instructor station. It is impossible to determine in advance where, with whom and when this interaction will take place. However, it is important that the simulator operator has sufficient nautical knowledge to be able to take on the roles listed below:

- Engine room.
- VTS-station / Pilot station.
- Bosun.
- Coastguard.
- Search and Rescue.
- Other shipping traffic.

6 Gather information with simulation runs

This chapter describes the minimum way in which information relevant to the research questions should be collected. Where the information collected concerns digital information, such as the recording of simulation images and sound recordings as well as CCTV, the retention period will be agreed upon in consultation with Rijkswaterstaat. The aim of the information collection is to be able to gain findings in the field of human behaviour, situation awareness and the relationship between this and the presence of wind farms.

6.1. Measurable aspects

Every simulation run has measurable aspects. The research questions for each simulation run are tailored to these measurable aspects. It is important that information is collected for each individual research question.

In any case, during the investigation, information will be collected by:

- Observations during the simulation runs by a team of behavioural specialists (such as cognitive psychologists/ergonomists) and a subject matter (nautical) expert.
- Written reflection on participant reports after the event.
- Interviewing between the behavioural specialists, participant and the content expert after the simulation runs (see also chapter 1 [Research design](#)).

Factual information collected with the simulator can also be used to answer the research questions.

6.2. CCTV

In each simulation run, every full mission bridge and VTMON desk must be recorded with CCTV (including audio) in order to be able to see behaviour and actions. The selected crew must agree with the image and sound recordings including for their storage for research purposes.

6.3. Simulator recordings

Each simulation run must be saved including ECDIS chart, Radar screen, ship controls for playback, outside view from the navigation bridge and sound recordings. The audio recordings of participants in the simulators and radio traffic of the participants must be recorded for playback.

7 Appendix 1: Description and SIMRUNS 1 t/m 8

SIMRUN 1 BASIC

GENERAL OUTLINE	
General objective	Gain insight into how the crew from ships react to the new situation in 2030. With wind farms in operation and maximum traffic movements, crossing shipping, recreational boats, and fishing vessels.
Overall description	This scenario will commence in voyage preparation phase. After the preparation, the crew will execute their planned voyage. The merchant ship sails from Europort to Helsinki in busy traffic according to situation in 2030. How does the crew react on the windfarms? Do the wind farms create an additional load on the crew or is this of no issue at all? Note: This scenario should be executed two times. One time with a crew with experience on the North Sea and one time without experience. Which differences are observed when both runs will be compared?
MOSWOZ theme	Monitoring: 1 and 2 Collisions: 18
Situation	In line with 2030 21 GW
Duration	Approx. 4 hours This scenario should preferably be executed in the evening (20.00 – 0000)
Research questions	1. How are the wind farms perceived by ship crews sailing here for the first time in the new situation? 2. What effect do the wind farms and increased traffic intensity have on ship crews' situational awareness? 3. Is there a point at which the crew loses SA and what actions will follow next? 4. What considerations are made in preparing the voyage at the new situation in 2030 by the ship's crew in relation to the wind farms? 5. Is consideration given to increased risk for sailing in the vicinity of wind farms? 6. How does the ship's crew experience the increased traffic intensity? 7. What considerations are made regarding weather in the proximity of wind farms?
Participants	Merchant vessel (General cargo) (OS1)
Location	Departure from pilot station Europort and navigating to Helsinki
Meteo	6 Bft SW later 7 Bft
SPECIFICATIONS CONTRIBUTING PARTIES	
Merchant vessel	○ 2 x (Captain, 2nd/ 3rd officer, look-out/Helmsman) ○ 1 run with navigators with experience in and around windfarms on North Sea. ○ 1 run with navigators without experience in and around windfarms on the North Sea.
EXTRA	
○ Participants uses 'thinking out loud' method so that the observers can properly observe the participants thought processes. ○ Nautical crew should be familiar with the type of vessel, and brand of the bridge instruments (ECDIS/RADAR) ○ VHF recordings should be played for distraction and to increase realism. ○ After departure, captain is standby in his/her cabin and responds to phone calls. ○ Captain decides the watch schedule in line with company procedures. ○ Both crews should be in tired state.	

SIMRUN 1 BASIC

OPERATOR FORM		
INITIAL CONDITIONS		
Local Time:	2000	
Date:	25 October 2030	
Current:	Spring – Ebb tide (max current going south)	
Wind:	SW 6 Bft	
Visibility:	Moderate / nighttime	
Vessel type:	General cargo (OS1)	
Loading condition:	OS1: loaded 8.5m	
Position:	N 52 02. 7 E 003 54. 9	
Heading:	000°	
Speed:	14 kts	
VHF CH:	-	
EVENTS		
Event No.	Party	Description
	OS1	Crew will prepare their passage plan from pilot station Europort to Helsinki in line with their company procedures.
	OBSERVER	Observe crew with the passage planning to see whether they mention the wind parks and if they make any considerations regarding them. When crew is planning the route via deepwater route, ask them for the reasons and note this down. Then direct them to use the route as demonstrated in the overview chart below.
	OS1	The Vessel is fully loaded with wind turbine parts and just departed from Europort. The pilot disembarked, and she is continuing her voyage northbound with destination Helsinki.
		After debarkation from the pilot, captain goes to his/her cabin for rest. 3 rd officer takes the watch together with a lookout until midnight. Captains standing orders should be discussed about when the captain should be called (as per company procedures).
01	T237	Ship leaving anchorage and crossing TSS South and Northbound traffic lanes and proceeds to East. Create CPA 0 with OS1 to observe actions from OS1. T237 to give away when actions OS1 are clear.
	OBSERVER	Observe actions from bridge team, are they aware of the collision course and what are their considerations and decisions?
02	T030	Ship in front of OS1 Suffers engine problems and slows down. To be initiated by simulator operator.
	OBSERVER	Observe actions from bridge team, do they notice the ship in front of them slowing down?
03	T184	Ship in passage wind park HKZ will exit from west transit passage and joins North bound traffic lane. This causes interaction with OS 1. (speed should be managed by simops to time the interaction)
	OBSERVER	

SIMRUN 1 BASIC

		Observe actions from bridge team, do they notice the ship coming from the passage of HKZ?
04	T258	Sailing yacht1 outside TSS west from HKZ is northbound and following a predefined route.
	OBSERVER	Observe actions from bridge team, do they keep a look out for the sailing yacht?
05	T259	Westbound sailing yacht is in passage HKZ and is closing in to the TSS and crossing in front of OS1.(speed should be managed by simops to time the interaction)
	OBSERVER	Observe actions from bridge team, do they keep a look out for the sailing yacht?
06	T183	Fishing vessel is fishing outside the TSS and distracts OS 1
	OBSERVER	Observe actions from bridge team, do they keep a look out for the fishing vessel?
07	T129	Ship is in TSS on the west and is NE bound, underway to Ijmuiden and will create interaction with OS1. (speed should be managed by simops to time the interaction)
	OBSERVER	Observe actions from bridge team, how soon do they observe this vessel might cause an issue?
08	METEO	Wind is veering from SW to W and increases to 7 Bft.
09	T042	Is leaving DW anchorage and will enter North bound traffic lane. and creates distraction for OS1. (The exact moment of heaving anchor should be managed by simops)
	OBSERVER	Observe actions from bridge team, do they monitor the movement of this ship?
10	T005	T005 is leaving from Ijmuiden crosses NE traffic lane and joins South bound traffic lane. OS1 will be the give way vessel. (speed and moment of departure should be managed by simops to time the interaction)
	OBSERVER	Observe actions from bridge team. how soon do they observe this vessel might cause an issue?
11	OS1	

SIMRUN 1 BASIC

		When OS 1 passes latitude 52°40'00N black-out will be initiated by simops when parallel of wind park HKN.
	OBSERVER	Observe actions from bridge team and how they will respond on the blackout and drifting towards the wind park HKN.

EVALUATOR FORM	
Observations during exercise	
Evaluator observes the participants on (in particular) the points below. Takes notes and records the time of important events so this can be shown afterwards in the video debriefing.	
OS 1 VOYAGEPLAN	What considerations are made in preparing the voyage at the new situation in 2030 by the ship's crew?
OS1 METEO	What considerations are made regarding weather in the proximity of wind farms?
OS1 VICINITY WF	Is consideration given to increased risk for sailing in the vicinity of wind farms?
OS1 EFFECT SA	What effect do the wind farms and increased traffic intensity have on ship crews' situational awareness?
OS1 LOSS OF SA	Is there a point at which the crew loses SA in relation to the changed situation?
OS1 INCREASE TRAFFIC	How does the ship's crew experience the increased traffic intensity?
Reflection after exercise	
After the exercise, have the participants write a reflection report. Encourage the participants to do this by providing them with human factors and the most important factors in line with the research questions. The participant individually selects the most important events and reflects on them with a reflection model.	
Reflection questions	
Situational awareness	Was there a time when your SA was low and at what time and why?
Decision making	- What are the most important considerations made in this scenario? - What information was used to make choices about this?
Communication	How did the communication go within your team and with external parties?
Instruments	What was your familiarity with instruments? Did this affect the exercise?
Meteo	Was the weather an influence, if so, why?

SIMRUN 1 BASIC

PARTICIPANT FORM

1. Make a voyage preparation from Europort pilot station to Helsinki. (until latitude 53°27'0"N)
2. The vessel is fully loaded with wind turbine parts and just departed from Europort. The pilot is disembarked, and you (3rd off.) are continuing your voyage northbound with destination Helsinki. You have an AB on the bridge performing look-out duties. Captain leaves the bridge after 15 minutes into the exercise. At 0000 LT you will handover your watch to the 2nd officer.

INITIAL CONDITIONS

Local Time:	2000
Date:	25 October 2030
Current:	Spring tide - low tide (south going current)
Wind:	SW 6 Bft.
Visibility:	Moderate / nighttime
Vessel type:	General cargo (OS1)
Loading condition:	OS1: loaded 8.5
Position:	N 52 02. 7 E 003 54. 9
Heading:	000°
Speed:	14 kts
VHF CH:	-

SIMRUN 1 BASIC

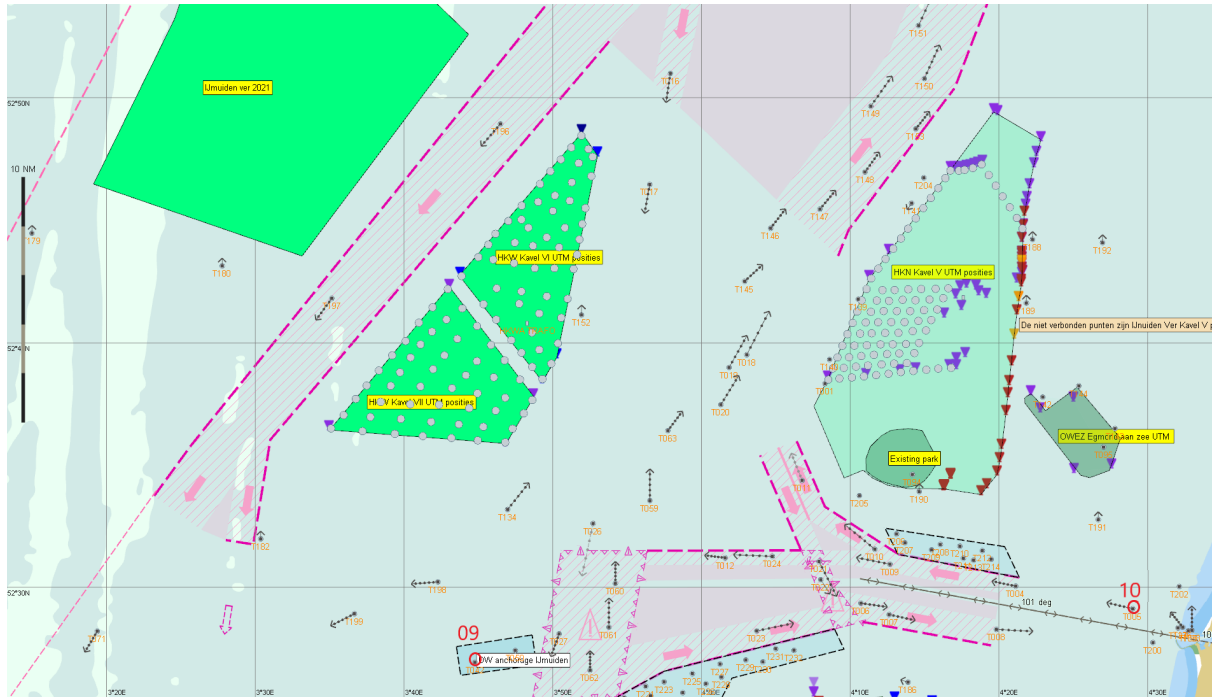


Figure 1 Instructor chart overview North

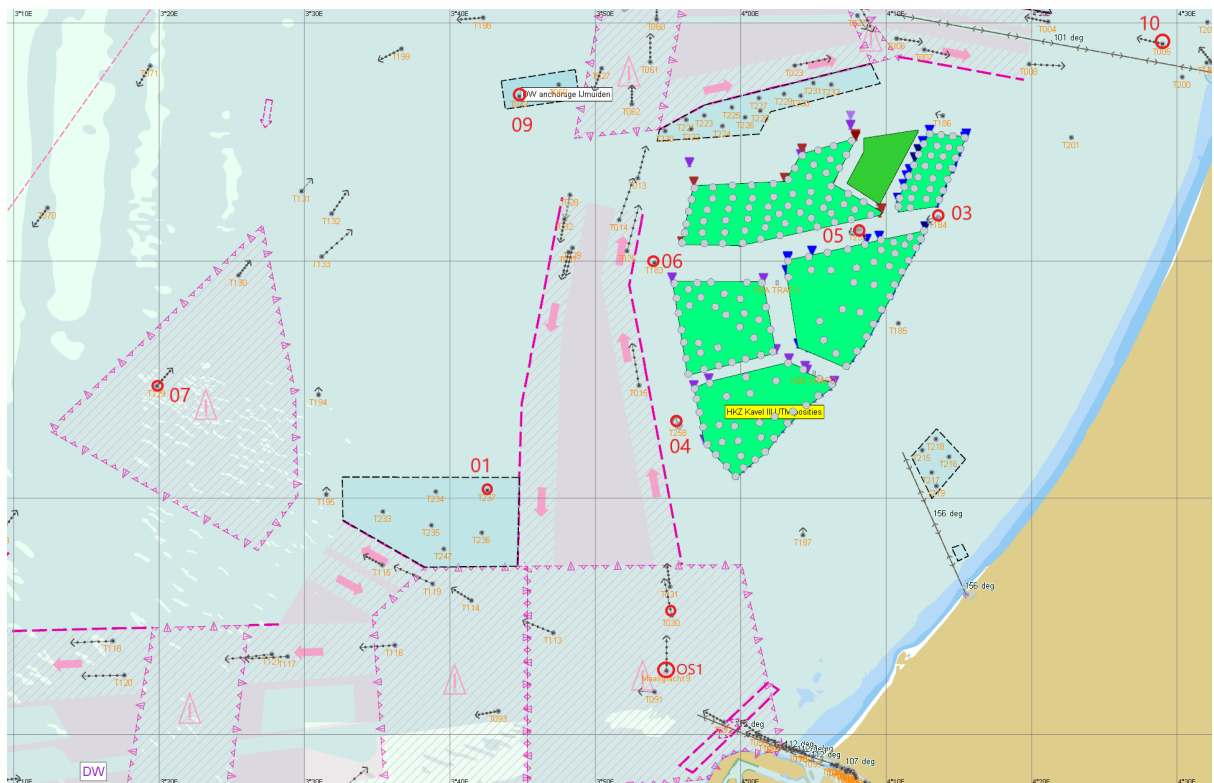


Figure 1 Instructor chart overview south

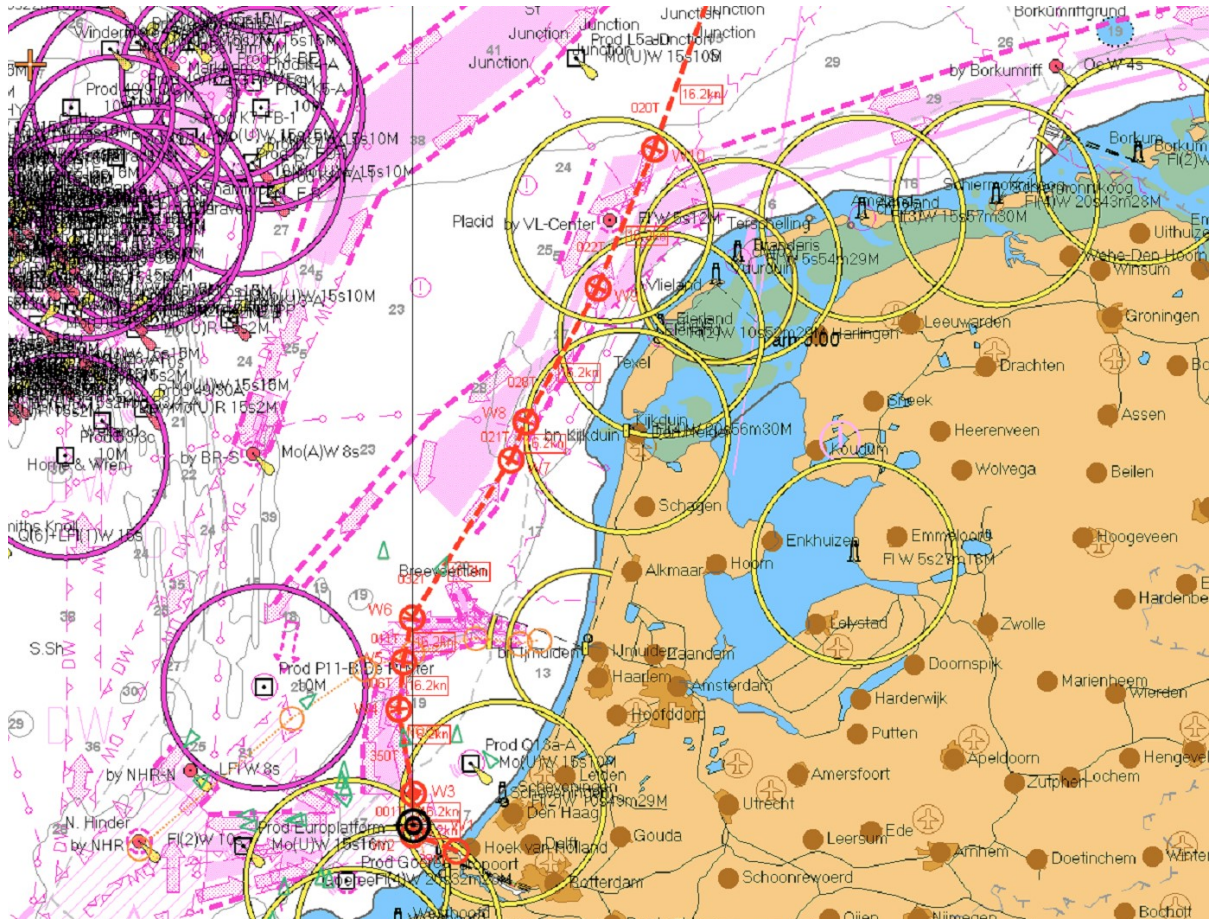


Figure 3 ECDIS overview

SIMRUN 2 DRAGGING ANCHOR / VTMON / ERTV

GENERAL OUTLINE	
General objective	Gain insight into considerations and decision making of ship's crew and VTMON when anchoring unexpectedly at regular anchorage near a wind farm in relation with damage to cables when anchor is dragging and ship drifts towards a wind farm.
Overall description	Before arrival IJmuiden, the merchant vessel (OS1) must unexpectedly anchor at a regular anchorage (number 7). The considerations and choices made by the ship's crew regarding the anchor position and weather conditions can be observed. After deterioration of the weather anchor starts dragging and vessel drifts towards wind farm. Let the crew of merchant vessel act on this and observe these actions. VTMON is taking part in this scenario and will be observed on her actions of early recognition of the dragging anchor. And on the follow-up actions taken.
MOSWOZ theme	Anchorage area's: 5, 6, 7 VTMON: 13 Hydro - meteo ERTV
Situation	○ Traffic situation as expected in 2030. ○ Area as specified in route map 2030 21 GW.
Duration	+/- 3 hr
Research questions	1. What considerations are made by OS1 to drop anchor in relation to pilot waiting times? 2. What considerations take place for a decision about anchor position? 3. What are the considerations from OS1 when weather deterioration is reported? 4. At what moment recognizes VTMON the dragging anchor? 5. Does OS1 report dragging anchor? 6. How is the communication between VTMON and OS1? 7. At what moment is ERTV deployed and what considerations are made? 8. What considerations take place on OS1 when dragging anchor over cables?
Participants	○ Merchant vessel (OS1). ○ VTMON operator (VTM1) + (VTM2). ○ ERTV (ERTV1). ○ Deep Sea Pilot (stand-by)
Location	○ 2 Hours before pilot station Ijmuiden.
Meteo	○ 5 Bft W at start scenario. ○ 9 -10 Bft NNW later in scenario.

SIMRUN 2 DRAGGING ANCHOR / VTMON / ERTV

SPECIFICATIONS CONTRIBUTING PARTIES	
OS1	○ Bridge occupation as per procedures of shipping company. Captain, 2nd/ 3rd officer, look-out/Helmsman available. ○ Is familiar with RADAR/ECDIS type used. ○ Is familiar with sailing characteristics of vessel. ○ Engine Room Standby as per procedures of shipping company (role played by SIMOPS) ○ Office from shipping company stand-by for support (this role will be played by simulator operator)
VTMON	○ Is familiar with the used monitoring systems. ○ Has vessel traffic monitoring system available with full coverage of the area. ○ VHF available. ○ Must be in separate room so he/she does not know which ship is OS1 to avoid focus on this vessel.
ERTV	○ Is stand-by on location to be determined in line with operating procedures and own decision.
Deep Sea Pilot	○ Deep Sea pilot is stand-by. When crew requires Deep Sea Pilot this can be used. Otherwise observes and will comment after scenario on which moment Deep Sea Pilot could have been a benefit.
EXTRA	
○ All participants use the 'thinking out loud' method so that the observers can properly observe the candidates' cognitive processes. ○ VHF communications playback used for distractions (recordings of reality). ○ Bridge team is familiar with used type of ECDIS/RADAR/ Autopilot. ○ Bridge team is using own procedures from their company. ○ VTS role is played by simulator operator. ○ Engine room Role is played by simulator operator. ○ Captain decides the watch schedule in line with company procedures.	

SIMRUN 2 DRAGGING ANCHOR / VTMON / ERTV

OPERATOR FORM

Before arrival IJmuiden, the merchant vessel (OS1) must unexpectedly anchor at a regular anchorage (number 7). The considerations and choices made by the ship's crew regarding the anchor position and weather conditions can be observed.

After deterioration of the weather anchor starts dragging and vessel drifts towards wind farm. Let the crew of merchant vessel act on this and observe these actions.

VTMON is taking part in this scenario and will be observed on her actions of early recognition of the dragging anchor. And on the follow-up actions taken.

INITIAL CONDITIONS

Local Time	0400
Date	25 October 2030
Current:	Spring – Ebb tide (max current going south)
Wind:	5 Bft NW
Visibility:	Moderate
Vessel type:	Car Carrier or vessel with high wind-surface (OS1)
Loading condition:	OS1: Ballast (draft 7,93 m)
Position	52° 19. 01 N 003° 29. 9E
Heading	056°
Speed	17 kts
VHF CH	VHF 61 IJmuiden port control VHF 07 IJmuiden approach

EVENTS

Event No.	Party	Description
	OS 1	Will make a voyage plan for the last part of the voyage, per company procedures. This will be done until the pilot station.
	Observer	Will the bridge team consider possible back-up anchor positions?
01	SIMOPS	Once participants are ready, start simulation.
	OS 1	Underway to IJmuiden pilot with ETA 06.00 LT.
	VTMON1	Start watch behind desk.
	ERTV	Stand-by on pre-determined position.
	OS 1	OS1 should report to IJmuiden Approach on CH 07 (1 hr prior arrival) (Pilot station) Buoy IJM C.
02	IJmuiden port control CH 61	When OS1 is west of platform P12-SW report that pilot boat has technical problems, and this will take some time. Advise to slack off and wait for further instructions.
	Observer	What reaction does the VHF report from the pilot station trigger in the candidates? What considerations take place and what decision is made?
03	IJmuiden port	

SIMRUN 2 DRAGGING ANCHOR / VTMON / ERTV

	control CH 61	Report from Ijmuiden Port Control: Due to delay caused by technical issues with pilot boat, advise to OS 1 to drop anchor in 52° 31. 4 N 004° 14. 5 E and wait for further instructions.
	Observer	Observe what actions are taken on the bridge (OS1). Will the bridge team anchor or will they make another choice?
04	OS 1	Should go to the advised anchor position. When OS1 is considering other options make notes and try to force them to proceed to the provided anchorage position.
	Observer	Is the distance from the wind farm discussed by OS1?
05	IJmuiden port control CH 61	Report from Ijmuiden Port Control that the delay will take some time due to waiting time. The first option to get a pilot will be at 1300 LT. (they can shut down engines and wait for further instructions)
06	CG	OS successfully anchored and engines are off? coastguard gives meteo warning on Navtex. ZCZC PE36 NETHERLANDS COASTGUARD NAVIGATIONAL WARNING NO 24222324 0400 UTC OCT WEATHER FORECAST THAMES SOUTHEASTERLY VARIABLE 5 BECOMING 8 IN EXTREME NORTH STRONG GALE 10 TEMPORARILY AT FIRST DRIZZLE LATER SLEET OCCASIONALLY WINTRY SHOWERS MODERATE LATER BAD TO VERY BAD TEMPERATURES BETWEEN TWELVE AND FIFTEEN NNNN
	VTMON2	VTMON 2 takes over watch from VTMON 1, once OS1 is at anchor. It is intended that VTMON does not realize which ship is engaged in the simulator to prevent focus on this. VTMON 1 must therefore be instructed on this not to share this information with VTMON 2 about this point.
07	METEO	20 min after anchoring wind shift to NW and increases to 9 - 10 Bft with waves of 3m.
	Observer	Are meteorological influences in relation to the nearest windfarm discussed?
08	OS 1	After 15 minutes dragging anchor starts (breaking anchor chain in simulator).
	Observer	How soon is the dragging anchor noticed by crew OS1?
	Observer	What are the first actions of the crew from OS1 after dragging anchor?
	Observer	How soon is the dragging anchor noticed by VTMON2?
	Observer	Are the cables and pipes on the seabed being discussed?

SIMRUN 2 DRAGGING ANCHOR / VTMON / ERTV

	Observer	Does OS1 inform the VTS/surrounding vessels of their situation?
09	ECR	When Engine Control Room is called for starting engines. Make report that they have difficulties in starting. Problems with starting air.
	OS 1	Drift toward wind farm HKZ drift space relative to first turbine is +/- 2 hr with a drift speed of 1.5 kts.
	Observer	Will there be VHF traffic between OS and VTMON? How will this take place?
	Observer	Will the ERTV be deployed by VTMON and what are the considerations?
10	SIMOPS	When the observers have enough information in line with the research questions, SIMRUN can be stopped.

SIMRUN 2 DRAGGING ANCHOR / VTMON / ERTV

EVALUATOR FORM	
1. Observations during exercise	
Evaluator observes the participants on (in particular) the points below. Takes notes and records the time of important events so this can be shown afterwards in the video debriefing.	
OS1	Will the bridge team consider alternative/emergency anchor positions and pipe/powerlines on the seabed in the voyage planning?
OS1	What will the bridge team consider after hearing the pilot is not available? Will they consider anchorage in relation to pilot waiting time?
OS1	Does the bridge team discuss the distance to the nearest wind farm?
OS1	Are the meteorological conditions discussed in relation to dragging anchor to wind farm?
OS 1	How soon is the dragging anchor noticed by crew OS1?
OS1	What are the first actions of the crew from OS1 after dragging anchor?
VTMON2	How soon is the dragging anchor noticed by VTMON2?
OS1	Are the cables and pipes on the seabed being discussed?
OS1	Does OS1 inform the VTS/surrounding vessels of their situation?
VTMON2/OS1	Will there be VHF traffic between OS1 and VTMON2? How will this take place?
VTMON2	Will the ERTV be deployed and what are the considerations by VTMON?
2. Reflection after exercise	
After the exercise, have the participants write a reflection report. Encourage the participants to do this by providing them with cards with human factors and the most important factors in line with the research questions. The participant individually selects the most important 5 events and reflects on them with a reflection model e.g. STARR	
3. Reflection cards	
Situational awareness	Was there a time when your SA was low and at what time and why?
Decision making	- What are the most important considerations made in this scenario? - What information was used to make choices about this?
Fatigue	On a scale of 1 to 10, how tired were you?
Communication	How did the communication go within your team and with external parties?
Instruments	What was your familiarity with instruments? Did this affect the exercise?
Meteo	Was the weather an influence, if so, why?
4. Debriefing	
After the exercise and reflection, the observations from the observants are discussed. Video debriefing can be used to bring the situation back to those particular situations for any further elaboration.	

SIMRUN 2 DRAGGING ANCHOR / VTMON / ERTV

PARTICIPANT FORM

You are on your way from Antwerp to IJmuiden. It is 0400 LT, and the 2nd mate has just taken over the watch from the 1st mate and is on the bridge together with a look-out. The pilot at IJmuiden has been ordered at 0600 LT. According to 'Captain's standing orders' the captain must be called 1 hour before arrival pilot station (buoy IJM C). Engine room needs 1 hour notice for standby engines.

INITIAL CONDITIONS

Local Time	0400
Date	25 October 2030
Current:	Spring – Ebb tide (max current going south)
Wind:	5 Bft NW
Visibility:	Moderate
Vessel type:	Car Carrier
Loading condition:	OS1: Ballast (draft 7,93 m)
Position	52° 19. 01 N 003° 29. 9E
Heading	056°
Speed	17 kts
VHF CH	VHF 61 IJmuiden port control VHF 07 IJmuiden approach

SIMRUN 2 DRAGGING ANCHOR / VTMON / ERTV

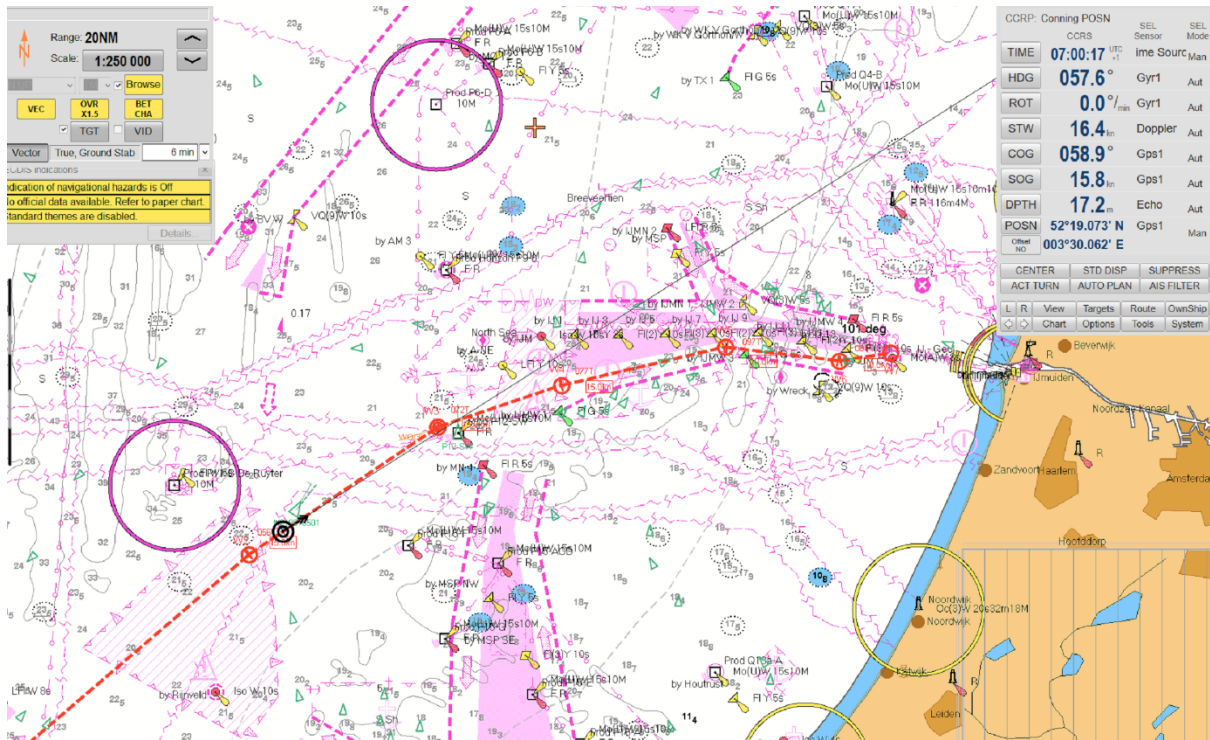


Figure 1 ECDIS overview



Figure 2 Instructor Overview

SIMRUN 3 NUC / SAR / VTMON / ERTV

GENERAL OUTLINE	
General objective	Gain insight into considerations and decision making of ship's crew and VTMON in case of incident and becoming 'NUC' aboard a ship in the vicinity of wind farm.
Overall description	While underway from Hamburg to Antwerp, merchant vessel collides with a container ship north of HKW lot VI. OS1 Is hit from port side aft off ER. ER makes water and causes blackout and 10° list. The vessel drifts toward wind farm HKW. The crew will possibly make considerations to anchor. Due to weather conditions, it is not possible to locate personnel at the forward mooring deck and drop anchors. Ship drifts into wind farm.
MOSWOZ theme	Anchorage area's: 5 VTMON: 13 Crisis organization: 3 ERTV: 9
Situation	According to routemap 2030 21 GW
Duration	+/- 6 hr.
Research questions	1. What considerations and decision making takes place among ship's crew in case of NUC in proximity to wind farm? 2. What considerations take place for anchoring (position)? 3. Are positions of cables and pipelines considered by ship's crew? 4. Is the NUC vessel noticed by VTM1 and how quickly? 5. How is the communication between VTM1, OS1 and ERTV? 6. How quickly is ERTV deployed and what considerations and decisions are made by the VTM1? 7. Will VTMON consult supervisor about up-scaling? 8. Is coastguard/VTMON notified by crew OS1, how quickly and what considerations played a role? 9. What resources are considered by ship's crew or VTMON for support? 10. What considerations and decisions are made by ERTV and ship's crew in establishing towing connection between ERTV and OS1? 11. How familiar is the crew of OS1 with the ERTV, how do they respond on it?
Participants	○ Merchant vessel (OS1) ○ VTMON operator (VTM + VTM2) ○ ERTV (ERTV1) ○ Deep Sea Pilot (stand-by)
Location	Enroute from Hamburg to Antwerp. Passage in southwesterly direction north of HKW.
Meteo	6 Bft NW at start of scenario, later in scenario increase to 7 - 8 Bft.

SIMRUN 3 NUC / SAR / VTMON / ERTV

SPECIFICATIONS CONTRIBUTING PARTIES	
OS1	○ Bridge manning as per company standards (Captain, 2nd off, 3rd off and lookout/helmsman available). ○ Is familiar with used RADAR/ECDIS type. ○ Is familiar with sailing characteristics of vessel. ○ Engine room on standby as company procedures dictate.
VTMON 1 + 2	○ Is familiar with used monitoring systems (Maritime Control or similar, Vessel Traffic Monitoring Systems). ○ VHF available. ○ In the middle of the run a handover will be done between the two VTMON operators.
ERTV	○ ERTV standby in port Den Helder until 5 Bft. Above 5 Bft. Standby outside in position determined by coastguard.
DEAPSEA PILOT	○ Is stand-by when crew requests Deep Sea Pilot. Otherwise observes behind the scenes, pays attention to where added value can be found for the use of a Deepsea pilot.
EXTRA	
○ Bridge team uses 'thinking out loud' method so that the observers can properly observe the candidates' cognitive processes. ○ Bridge team is familiar with bridge instruments especially ECDIS/RADAR/ Autopilot. ○ Bridge team uses own procedures as known to them. ○ VHF communication recordings will be played in the background to increase realism. ○ The recordings and outcome of this scenario can be used as input for a tabletop with the Dutch Coastguard and Salvage experts to provide answers to the questions from MOSWOZ scenario 3 and 9. ○ The Simulator operator plays the role of the coastguard in the SIMRUN. ○ Emergency team from shipping company standby on phone for advice to the ship's crew (optional) ○ Captain decides the watch schedule in line with company procedures.	

SIMRUN 3 NUC / SAR / VTMON / ERTV

OPERATOR FORM

While underway from Hamburg to Antwerp, merchant vessel collides with a container ship north of HKW lot VI. OS1 Is hit from port side aft off ER. ER makes water and causes blackout and 10° list. The vessel drifts toward wind farm HKW. The crew will possibly make considerations to anchor. Due to weather conditions, it is not possible to locate personnel at the forward mooring deck and drop anchors. Ship drifts into wind farm.

INITIAL CONDITIONS

Local Time:	0330
Date:	25 October 2030
Current:	Spring – Ebb tide (max current going south)
Wind:	7 Bft NW
Visibility:	Moderate to poor
Vessel type:	General cargo (OS1)
Loading condition:	OS1: loaded 8.5
Position:	N 52° 56. 8 E 003° 59.7
Heading:	224°
Speed:	13 kts
VHF CH:	

EVENTS

Event No.	Party	Description
	OS1	Ship's crew will make voyage plan as per company standards from initial position to 4 hours ahead.
	OS 1	En route to Antwerp in southwest direction 1st mate on bridge together with look-out.
	VTMON1	Will prepare the workstation and develops situational awareness.
01	SIMOPS	Start SIMRUN when candidates are present and ready to start.
	OS 1	0350 2nd mate comes on the bridge for watch handover. Watch handover takes place per procedures of shipping company.
	Observer	Is there any discussion of the wind farms during the watch handover? If so, what is discussed?
02	IJM 23	IJM 23 (fishing vessel) creates distraction by fishing in separation zone. Maneuver fishing boat so that crew's focus is on this.
03	KMSS Uni Assure 6	Will cross south westbound traffic lane of TSS. Is required to give way but does alter course. Maneuver vessel so, that eventually CPA becomes 0.
	Observer	Observe what actions are taken on the bridge and what aspects are considered in regards to CPA with KMSS Uni Assure

SIMRUN 3 NUC / SAR / VTMON / ERTV

04	KMSS Uni Assure 6	Once KMSS Uni Assure 6 is called on VHF KMSS Uni Assure does not respond on Radio.
05	American Courage 1	American Courage 1 has a course that creeps in. This is positioned so that OS1 has fewer opportunities to alter course to starboard.
	Observer	Does the bridge crew realize that they are being slowly cut off by American Courage 1? What considerations are involved and what actions are taken?
06	Marine Liberty 1	Is behind OS1 and is there to prevent OS1 from slacking off too much
07	KMMS Uni Assure	Simulator operator to maneuver KMMS Uni Assure to collide with OS 1 portside aft at near engine room. Allow collision as close as possible to wind farm HKW lot VI.
	Observer	What are the initial considerations and actions of the bridge crew after the collision?
	Observer	At what point is an emergency call made by ship's crew?
08	Coastguard	Once emergency call is made from OS1 coastguard will have VHF communications with OS1. This role is played by simulator operator.
	Observer	At what point does VTMON realize that something is going on and it may pose a threat to the wind farm?
09	OS 1	Several bilge alarms are activated in engine room port side.
10	ECR (OS1)	Phone from engine room to bridge that a leak is reported in the engine room portside aft. The severity is under investigation.
11	KMMS Uni Assure 6	KMMS Uni Assure 6 reports damage to bow of own vessel. No water intake and no casualties. Asks what situation is aboard OS1. She will remain in position and maneuver the bow out of the wind.
12	OS1	Incoming water causes complete blackout. Simulator operator to take away the power, propulsion and bow thrusters. Bridge equipment remains on UPS. Few minutes later, the light will switch on by result of diesel generator online.
	Observer	How does the crew react to the blackout? What actions and considerations take place with respect to drifting toward the wind farm?
	Observer	At what point is the use of ERTV discussed by VTMON or ship's crew?
13	OS1	Simulator operator slowly increase list to 10°.

SIMRUN 3 NUC / SAR / VTMON / ERTV

	METEO	Wind from northern direction causes drift toward HKW wind farm
14	BOSUN (OS1)	When bridge team calls bosun to prepare anchor it is eventually reported back that this is not possible due to the combination of the weather and the spray coming in front of the anchor deck. Forward mooring station is not accessible.
	Observer	Does bridge team contact own shipping company for advice and support?
	Observer	What considerations does the bridge team make regarding anchor position? Is an anchor position discussed, and does it take into account cables and wind farm?
	Observer	Are external resources being discussed? Nearby working vessel, hotel ship, cruise ship, etc.?
	Observer	Will the bridge team proceed with abandonment? At what point is this option first discussed?
15	ERTV	Let the ERTV proceed to the distress location. When the ERTV is too far away, ERTV can be relocated by simulator operator. This should be communicated with ERTV crew and noted by the observers.
	Observer	Observes which interaction will take place between ERTV, VTMON and OS1. How will the situation develop and what considerations and decisions are made regarding connecting a towing line. When Emergency team from shipping office is standby which advice will they give to the crew and which considerations will they make for salvage?
16	SIMOPS	When observers have received sufficient information stop the SIMRUN and proceed to reflection/evaluation.

SIMRUN 3 NUC / SAR / VTMON / ERTV

EVALUATOR FORM	
1. Observations during exercise	
Evaluator observes the participants on (in particular) the points below. Takes notes and records the time of important events so this can be shown afterwards in the video debriefing.	
OS1	What considerations and decision making takes place among the vessel crew in case of Blackout or NUC near wind farm?
VTMON	Is the NUC vessel noticed by VTMON and at what moment?
VTMON	Will the VTMON operator consult supervisor for up-scaling?
OS1	What considerations take place for anchoring and at what position?
OS1	Are cables and pipes on the seabed discussed?
OS1	Is a report made to coastguard /VTMON, how quickly and what considerations played a role in this?
OS1	Are additional resources called in? If so, what resources are called in for support or coordination? (Working vessels, hotel ships, cruise ships etc.)
OS1& VTMON	Will there be VHF traffic between OS and VTMON? How will this proceed?
ERTV	Will the ERTV be deployed and what are the considerations here with the VTMON?
OS1 office shipping company	What considerations does the OS1 (shipowner's office) make for attaching ERTV or contracted salvage service?
2. Reflection after exercise	
After the exercise, have the participants write a reflection report. Encourage the participants to do this by providing them with cards with human factors and the most important factors in line with the research questions. The participant individually selects the most important 5 events and reflects on them with a reflection model e.g. STARR.	
3. Reflection cards	
Situational awareness	Was there a time when your SA was low and at what time and why?
Decision making	- What are the most important considerations made in this scenario? - What information was used to make choices about this?
Communication	How did the communication go within your team and with external parties?
Instruments	What was your familiarity with instruments? Did this affect the exercise?
Meteo	Was the weather an influence, if so, why?
4. Debriefing	
After the exercise and reflection, the observations from the observants are discussed. Video debriefing can be used to bring the situation back to those particular situations for any further elaboration.	

SIMRUN 3 NUC / SAR / VTMON / ERTV

PARTICIPANT FORM

You are on your way from Hamburg to Antwerp and are following the planned route. It is 0330 LT, and you are on the bridge together with a lookout. In half an hour your watch will be over, and the 2nd mate will take over your watch. As soon as the 2nd officer is on the bridge you hand over your watch according to the standard operating procedures within your company.

INITIAL CONDITIONS

Local Time:	0330
Date:	25 October 2030
Current:	Spring – Ebb tide (max current going south)
Wind:	7 Bft NW
Visibility:	Moderate to poor
Vessel type:	General cargo
Loading condition:	OS1: loaded 8.5
Position:	N 52° 56. 8 E 003° 59.7
Heading:	224°
Speed:	13 kts
VHF CH:	

SIMRUN 3 NUC / SAR / VTMON / ERTV

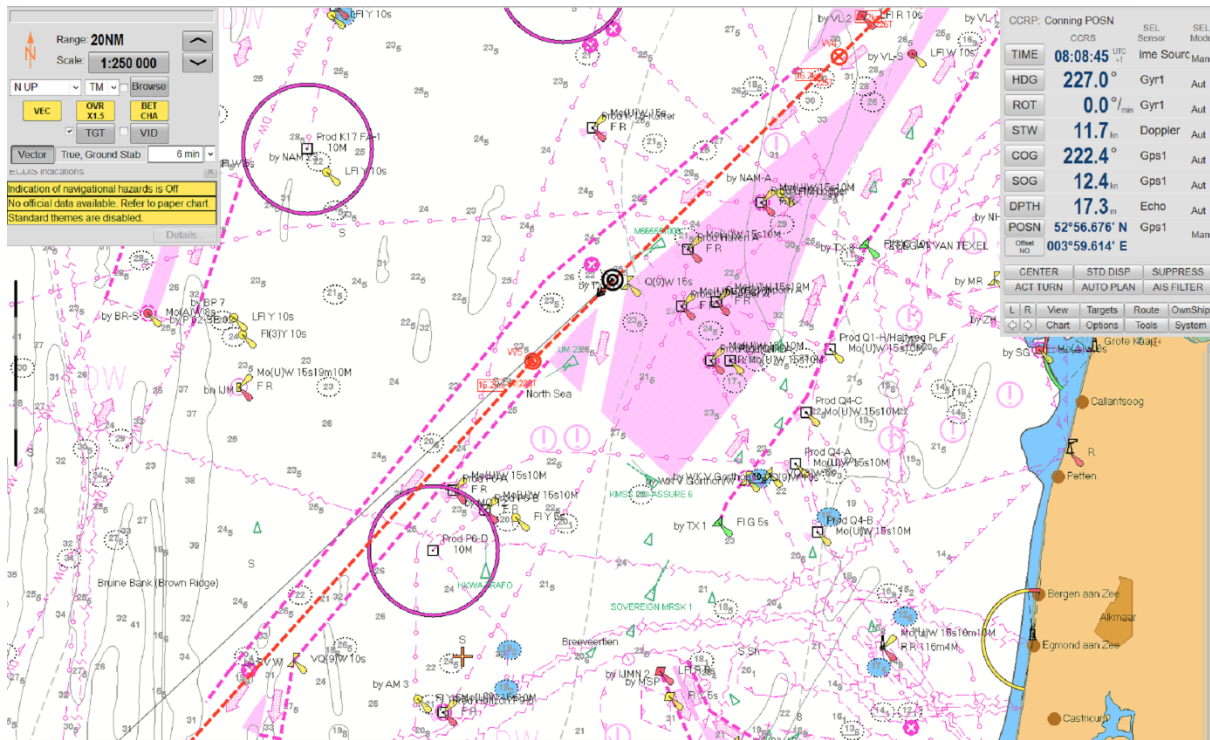


Figure 1 ECDIS overview



Figure 2 Instructor Overview

SIMRUN 4 VTMON SUMMER

GENERAL OUTLINE	
General objective	Gain insight on the deployment of the VTMON function. To what extent is the VTMON operator able to monitor the assigned area in a variety of situations with the available resources.
Overall description	In this SIMRUN the limits from the VTMON operator are explored. The VTMON operator will monitor the assigned area according to prevailing procedures and current systems. At various times, events are put into the scenario to assess whether this is perceived by the VTMON operator and how this information is processed. This SIMRUN is in summertime with recreational yachts and good weather.
MOSWOZ theme	VTMON: 14
Situation	In line with 2030 21 GW
Duration	+/- 6 hr
Research questions	1. To what extent is the VTMON operator able to monitor the assigned area? 2. What is the optimal distribution of work shifts to maintain concentration and avoid under/over stimulation? 3. Which size of area can the VTMON operator effectively monitor? 4. To what extent are anomalous situations recognized in a timely manner? 5. How is the cooperation between VTMON and ERTV? 6. In which situations is an ERTV deployed and what aspects play a role in decision making by VTMON to deploy it?
Participants	○ VTMON operator (VTM1 + VTM2) ○ ERTV
Location	VTMON operator is behind the desk of own station and monitors allocated area's the vessel traffic monitoring system or similar. ERTV is in position determined by crew ERTV.
Meteo	4 Bft NW
SPECIFICATIONS CONTRIBUTING PARTIES	
VTMON	○ Is familiar with used monitoring systems (Maritime Control or similar Vessel Traffic Monitoring System) ○ VHF available
ERTV	○ ERTV (Guardian) standby in port Den Helder until 5 Bft. Above 5 Bft. Standby outside in position determined by coastguard.
EXTRA	
○ Participants uses 'thinking out loud' method so that the observers can properly observe the candidates' thought processes. ○ VTMON has access to vessel traffic monitoring systems similar to their used work stations (maritime control) ○ VTMON has VHF available. ○ VHF communications playback (recordings of reality) ○ Role VTS is played by simulator operator.	

SIMRUN 4 VTMON SUMMER

OPERATOR FORM		
INITIAL CONDITIONS		
Local Time:	0330	
Date:	05 June 2030	
Current:	Spring tide, ebbing	
Wind:	4 Bft NW	
Visibility:	Good	
Vessel type:	-	
Loading condition:	-	
Position:	-	
Heading:	-	
Speed:	-	
VHF CH:	-	
EVENTS		
Event No.	Party	Description
01	SIMOPS	Once VTMON operator and ERTV crew is ready, scenario starts.
02	MY DAINEE	Motor yacht Dainee sails through wind park HKZ IV
	Observer	Will the VTMON operator notice this 21m yacht is sailing through the wind park? Is it noticed and what are the considerations and actions from the VTMON operator?
03	M/S FLORA 2	132 meter ship sails through passage HKZ Northwest Bound
	Observer	Will the VTMON operator notice this unusual situation? Is it noticed timely and what are the considerations and actions from the VTMON operator?
04	T141	Fishing vessel sails trough wind park HKN.
	Observer	Will the VTMON operator notice this unusual situation? Is it noticed timely and what are the considerations and actions from the VTMON operator?
05	T184	Sailing yacht is 100 meters away from transformation platform in HKZ
	Observer	Will the VTMON operator notice this unusual situation? Is it noticed timely and what are the considerations and actions from the VTMON operator?
06	T152	Shows on AIS that it is fishing in passage from HKW

SIMRUN 4 VTMON SUMMER

	Observer	Will the VTMON operator notice this unusual situation? Is it noticed timely and what are the considerations and actions from the VTMON operator?
07	VOLGA	Workship sails through passage HKW and suffers blackout
	Observer	Will the VTMON operator notice this unusual situation? Is it noticed timely and what are the considerations and actions from the VTMON operator?
08	VTMON1	Mismatch on GPS is activated. On chart from VTMON it will show a mismatch between radar targets and AIS symbols.
	Observer	Will the VTMON operator notice this unusual situation? Is it noticed timely and what are the considerations and actions from the VTMON operator?

SIMRUN 4 VTMON SUMMER

EVALUATOR FORM	
Observations during exercise	
Evaluator observes the participants on (in particular) the points below. Takes notes and records the time of important events so this can be shown afterwards in the video debriefing.	
VTMON	Will the VTMON operator recognize the unusual events timely?
VTMON	What are the actions from the VTMON operator after recognizing these unusual events?
VTMON	What is the level of workload? (Boredom vs. Overload)
VTMON	How does the VTMON operator experience the size of the Areal in combination with the traffic intensity which need to be monitored?
VTMON	Are the utilized resourced enough to monitor the areal?
VTMON	Which consideration takes place when weather deteriorates, and which actions will be taken by VTMON operator?
VTMON	Is there cooperation between VTMON and other parties? How is this cooperation going?
VTMON	What are the considerations for a VTMON operator to activate the ERTV?
Reflection after exercise	
After the exercise, have the participants write a reflection report. Encourage the participants to do this by providing them with cards with human factors and the most important factors in line with the research questions. The participant individually selects the most important 5 events and reflects on them with a reflection model (STARR)	
Reflection cards	
Situational awareness	Was there a time when your SA was low and at what time and why?
Decision making	- What are the most important considerations made in this scenario? - What information was used to make choices about this?
Communication	How did the communication go within your team and with external parties?
Instruments	What was your familiarity with instruments? Did this affect the exercise?
Meteo	Was the weather an influence, if so, why?

SIMRUN 4 VTMON SUMMER

PARTICIPANT FORM

You are performing your watch shift as usual. No additional information.

INITIAL CONDITIONS

Local Time:	0330
Date:	05 June 2030
Current:	Springtide, ebbing
Wind:	4 Bft NW
Visibility:	Good
Vessel type:	-
Loading condition:	-
Position:	-
Heading:	-
Speed:	-
VHF CH:	-

27/02/2024

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SIMRUN 5 VTMON AUTUMN

GENERAL OUTLINE	
General objective	Gain insight on the deployment of the VTMON function. To what extent is the VTMON operator able to monitor the assigned area in a variety of situations with the available resources.
Overall description	In this SIMRUN the limits from the VTMON operator are explored. The VTMON operator will monitor the assigned area according to prevailing procedures and current systems. At various times, events are put into the scenario to assess whether this is perceived by the VTMON operator and how this information is processed. This SIMRUN is in late Autumn without recreational yachts and severe weather.
RWS scenario's	VTMON: 14
Situation	In line with 2030 21 GW
Duration	+/- 6 hr
Research questions	1. To what extent is the VTMON operator able to monitor the assigned area? 2. What is the optimal distribution of monitoring schedule to maintain concentration and avoid under stimulation/over stimulation? 3. Which size of area can the VTMON operator effectively monitor? 4. To what extent are anomalous situations recognized in a timely manner? 5. What actions and considerations will the VTMON operator take when weather deteriorates? 6. How is the cooperation between VTMON and ERTV? 7. In which situations is an ERTV deployed and what aspects play a role in decision making by VTMON to deploy it?
Participants	- o VTMON operator (VTM1) + (VTM2) - o ERTV
Location	VTMON operator is behind the desk of own station and monitors allocated area's the vessel traffic monitoring system or similar.
Meteo	4 Bft NW later weather deterioration to 9 bft SW
SPECIFICATIONS CONTRIBUTING PARTIES	
VTMON	- o Is familiar with used monitoring systems (Maritime Control or similar Vessel Traffic Monitoring Systems) - o VHF available
ERTV	o ERTV Guardian standby in port Den Helder until 5 Bft. Above 5 Bft. Standby outside in position determined by coastguard.
EXTRA	
- o Participants uses 'thinking out loud' method so that the observers can properly observe the candidates' thought processes. - o VTMON has access to vessel traffic monitoring systems similar to their used work stations (maritime control) - o VTMON has VHF available. - o VHF communications playback (recordings of reality) - o Role VTS is played by simulator operator.	

SIMRUN 5 VTMON AUTUMN

OPERATOR FORM		
INITIAL CONDITIONS		
Local Time :	0330	
Date:	25 November 2030	
Current:	Springtide ebbing and later in scenario flooding	
Wind:	4 Bft NW	
Visibility:	Moderate to poor	
Vessel type:	-	
Loading condition:	-	
Position:	-	
Heading:	-	
Speed:	-	
VHF CH:	-	
ECIDS Route	-	
EVENTS		
Event No.	Party	Description
01	SIMOPS	Once VTMON operator and ERTV crew is ready, scenario starts.
	VTMON1	VTMON1 start watch and gains situational awareness
02	METEO	After 30 minutes weather deteriorates slowly to 8-9 bft
	Observer	How will the VTMON operator collect information about the weather and what actions and considerations will follow?
03	M/t IRINI 6	Start dragging anchor from IJmuiden Anchorage 7. And start drifting towards HKZ wind park.
	Observer	Will the VTMON operator notice the ship dragging anchor? Is it noticed timely and what are the considerations and actions from the VTMON operator?
04	HALAND SAGA 14	Start dragging anchor from IJmuiden Anchorage 7. And start drifting towards HKZ wind park.
	Observer	Will the VTMON operator notice the ship dragging anchor? Is it noticed timely and what are the considerations and actions from the VTMON operator?
05	AMERICAN COURAGE 1	In SW TSS lane NE of HKW will alter course to port and steers in direction of wind park HKW. Will remain on collision course with HKW until VTMON operator notices.
	Observer	Will the VTMON operator notice the ship has a steady heading towards the wind park? Is it noticed timely and what are the considerations and actions from the VTMON operator?
06	METEO	Wind is backing to West but remains on strength

SIMRUN 5 VTMON AUTUMN

	VTMON1	After 3 hours watch handover from VTMON 1 to VTMON 2
07	OCCL ST. PETERSBURG	Suffers black-out and start drifting with westerly winds towards HKN
	Observer	Will the VTMON operator notice this unusual situation? Is it noticed timely and what are the considerations and actions from the VTMON operator?
08	VOLGA	In Transit of passage from HKW NW bound. Suffers blackout and with Westerly winds start drifting towards TRAFO station.
	Observer	Will the VTMON operator notice this unusual situation? Is it noticed timely and what are the considerations and actions from the VTMON operator?
09	METEO	Wind is backing further to South and remains in strength. Tide is changing to high tide with currents going to North.
10	MAASGRACHT 6	With strong winds from the South, Maasgracht 6 starts dragging anchor start drifting towards HKN.
	Observer	Will the VTMON operator notice the ship dragging anchor? Is it noticed timely and what are the considerations and actions from the VTMON operator?
11	M/S FLORA 2	132 meter ship sails through passage HKZ North West Bound
	Observer	Will the VTMON operator notice this unusual situation? Is it noticed timely and what are the considerations and actions from the VTMON operator?
12	T003	A coaster will sail through Windpark Ijmuiden Ver North.
	Observer	Will the VTMON operator notice this unusual situation? Is it noticed timely and what are the considerations and actions from the VTMON operator?

SIMRUN 5 VTMON AUTUMN

EVALUATOR FORM	
Observations during exercise	
Evaluator observes the participants on (in particular) the points below. Takes notes and records the time of important events so this can be shown afterwards in the video debriefing.	
VTMON	Will the VTMON operator recognize the unusual events timely?
VTMON	What are the actions from the VTMON operator after recognizing these unusual events?
VTMON	What is the level of workload? (Boredom vs. Overload)
VTMON	How does the VTMON operator experience the size of the Areal in combination with the traffic intensity which need to be monitored?
VTMON	Are the utilized resourced enough to monitor the areal?
VTMON	Which consideration takes place when weather deteriorates and which actions will be taken by VTMON operator?
VTMON	Is there cooperation between VTMON and other parties? How is this cooperation going?
VTMON	What are the considerations for a VTMON operator to activate the ERTV?
Reflection after exercise	
After the exercise, have the participants write a reflection report. Encourage the participants to do this by providing them with cards with human factors and the most important factors in line with the research questions. The participant individually selects the most important 5 events and reflects on them with a reflection model (STARR)	
Reflection cards	
Situational awareness	Was there a time when your SA was low and at what time and why?
Decision making	- What are the most important considerations made in this scenario? - What information was used to make choices about this?
Communication	How did the communication go within your team and with external parties?
Instruments	What was your familiarity with instruments? Did this affect the exercise?
Meteo	Was the weather an influence, if so why?

SIMRUN 5 VTMON AUTUMN

PARTICIPANT FORM

You are performing your watch shift as usual. No additional information.

INITIAL CONDITIONS

Local Time :	0330
Date:	25 November 2030
Current:	Spring tide Ebbing
Wind:	4 Bft NW
Visibility:	Moderate to poor
Vessel type:	-
Loading condition:	-
Position:	-
Heading:	-
Speed:	-
VHF CH:	-
ECIDS Route	-

SIMRUN 5 VTMON AUTUMN

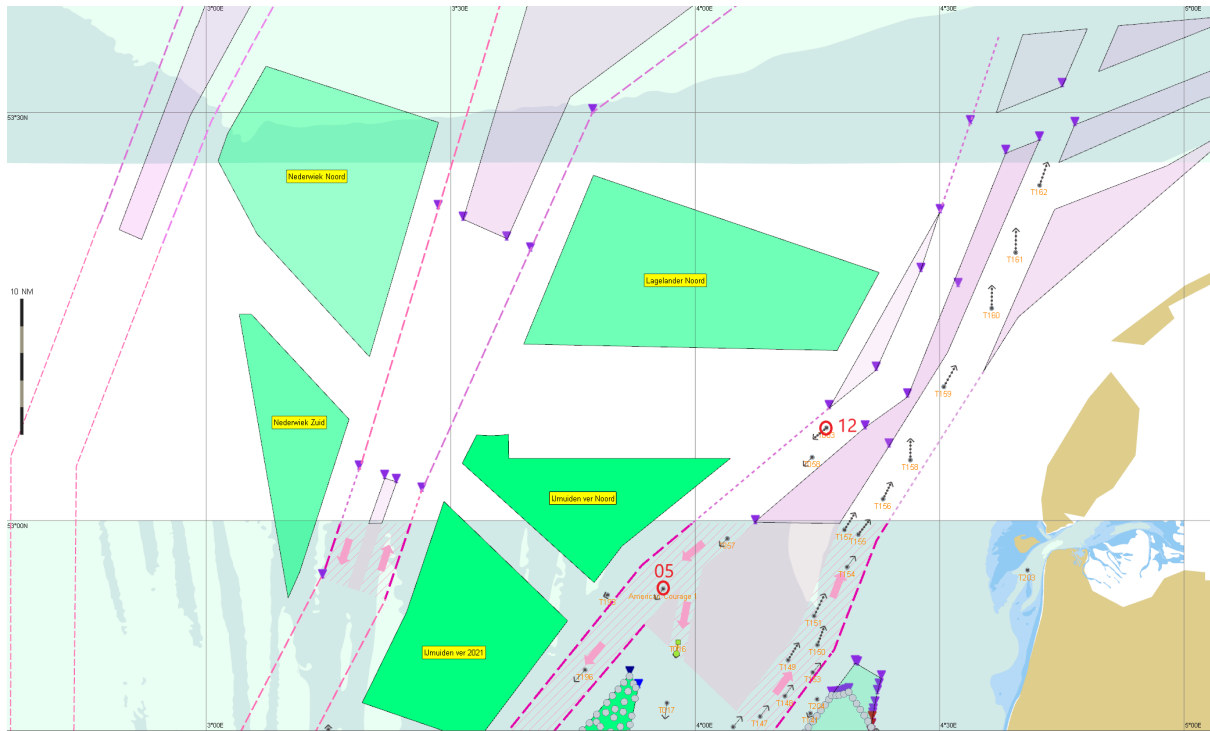


Figure 1 Instructor chart overview North



Figure 2 Instructor chart overview middle

27/02/2024

SIMRUN 6 LOSS OF UNMANNED TOW

GENERAL OUTLINE	
General objective	Gain insight in the considerations and decision making from the crew of a commercial tugboat, when it loses the towing connection at sea from an unmanned tow with high wind surface.
Overall description	While two tugs are towing an unmanned car carrier or vessel with a high wind surface, the tugboat loses the tow due to adverse weather. This tow drifts toward the wind farm and pose a hazard to the windfarm.
MOSWOZ theme	ERTV: 9
Situation	In line with 2030 21 GW
Duration	+/- 3 hr.
Research questions	1. What is the response/considerations/actions of the crew of the tugboat when it is losing the tow near a windfarm? 2. What is the response/considerations/actions from the VTMON and ERTV when losing an unmanned tow near a windfarm? 3. What are the possibilities to make a new towing connection with the drifting unmanned tow? 4. Once the unmanned tow drifts into the wind park, what are the consequences for salvage?
Participants	○ Nautical crew from commercial towing vessel ○ ERTV ○ VTMON ○ Salvage Expert (for evaluation)
Location	In TSS Northbound and west of wind park HKZ
Meteo	5 Bft W
SPECIFICATIONS CONTRIBUTING PARTIES	
ERTV	○ Nautical crew from ERTV
Commercial seagoing tug	○ Nautical crew from commercial towing vessels
VTMON	○ 1 VTMON operator
Salvage expert	○ 1 salvage expert for evaluating after loss of tow
EXTRA	
○ All contributing parties use 'thinking out loud' method so that the observers can properly observe the candidates' thought processes. ○ A salvage expert is participating in the evaluation to explore options and consequences for salvaging the drifting ship near or in the windfarm. ○ The recordings can be used afterwards by the Dutch Coastguard for a tabletop exercise. In this tabletop, consequences and complications for salvage in wind parks can be explored any further.	

SIMRUN 6 LOSS OF UNMANNED TOW

OPERATOR FORM		
INITIAL CONDITIONS		
Local Time:	1400	
Date:	25 October 2030	
Current:	Springtide ebbing (max current South)	
Wind:	5 Bft W	
Visibility:	Moderate to poor	
Vessel type:	○ Towing vessel (OS1) ○ Car Carrier (unmanned tow) ○ ERTV	
Loading condition:	-	
Position:	In TSS Northbound and west of wind park HKZ	
Heading:	-	
Speed:	-	
VHF CH:	-	
EVENTS		
Event No.	Party	Description
	OS1	Tug is underway with tow in TSS west of wind park HKZ. And are heading North.
	CARCARRIER	Is an unmanned tow, and being towed by TUG1
01	METEO	30 minutes into the exercise, deterioration of weather. Wind increases to 7 Bft.
	OBSERVER	How is the crew of the towing vessel responding on the deterioration of weather? What considerations and actions are being made?
02	OS1	Line from TUG1 breaks.
	OBSERVER	How is the crew from tugboat responding on losing the tow? Which actions and consideration will they take, whom will they contact?
	OBSERVER	Will VTMON notice the incident before the call from TUG1? And which actions/considerations will be made by VTMON?
	OBSERVER	Is ERTV deployed?
04	CARCARRIER	Unmanned tow is drifting towards wind park HKZ due to westerly winds.
	OBSERVER	How much time is passing until the tow is drifting into the wind park?
05	CARCARRIER	If no actions in due time, unmanned tow is drifting inside wind park HKZ
	OBSERVER	What are the consequences and complication for the salvage operation when the unmanned tow is drifting inside the wind park?
	OBSERVER	What possibilities are being considered for making a new towing connection?
	OBSERVER	How is the cooperation between VTMON, TUG1 and ERTV?

SIMRUN 6 LOSS OF UNMANNED TOW

EVALUATOR FORM	
Observations during exercise	
Evaluator observes the participants on (in particular) the points below. Takes notes and records the time of important events so this can be shown afterwards in the video debriefing.	
VTMON	Will the VTMON operator recognize the unusual events timely?
TOWING VESSEL	What are the consideration and actions from the crew of the towing vessel after deterioration of the weather?
TOWING VESSEL	What are the considerations and actions from the crew of the towing vessel after losing its tow?
SALVAGE	What are the consequences and complications when the unmanned tow is drifting into the wind park?
ERTV	Which possibilities are being considered for making a new towing connection?
Reflection after exercise	
After the exercise, have the participants write a reflection report. Encourage the participants to do this by providing them with cards with human factors and the most important factors in line with the research questions. The participant individually selects the most important 5 events and reflects on them with a reflection model (STARR)	
Reflection cards	
Situational awareness	Was there a time when your SA was low and at what time and why?
Decision making	- What are the most important considerations made in this scenario? - What information was used to make choices about this?
Communication	How did the communication go within your team and with external parties?
Instruments	What was your familiarity with instruments? Did this affect the exercise?
Meteo	Was the weather an influence, if so, why?

SIMRUN 6 LOSS OF UNMANNED TOW

PARTICIPANT FORM

You are on the bridge of the tug and have an unmanned Car Carrier connected. Due to a fire in the engine room the car carrier is out of operation and being towed towards a shipyard in Ijmuiden.

INITIAL CONDITIONS

Local Time:	1400
Date:	25 October 2030
Current:	Springtide ebbing (max current South)
Wind:	5 Bft W
Visibility:	Moderate to poor
Vessel type:	Sea going Tug
Loading condition:	-
Position:	In TSS North bound and west of wind park HKZ
Heading:	-
Speed:	-
VHF CH:	-

SIMRUN 6 LOSS OF UNMANNED TOW



Figure 1 Instructor chart overview

SIMRUN 7 USING PASSAGE OR DETOUR

GENERAL OUTLINE	
General objective	To understand how the passages are used by recreational sailing yachts and how the skippers from recreational yachts interacts with fishing, working and commercial shipping in and around passages and how the weather influences their choices.
Overall description	This SIMRUN consists of four variations (situations). Each situation should be executed with ~ 5 experienced skippers and ~ 5 less experienced skippers on a part-task simulator. Expected is that the realism of the bridge simulator which will be used by the skippers is low. However, these scenarios are written in a manner that the focus is on the decision making process e.g. weather conditions, route choices, influences from turbine lights and so on.
MOSWOZ theme	Using passages: 4 Hydro/Meteo: 15 + 16
Situation	In line with 2030 21 GW Ships with max LOA of 46 meter are allowed to use the passages. Sailing through the wind park (outside passages) is prohibited.
Duration	Four short runs 1 (~ 1 hr.)
Research questions	1. How does recreational yachts respond on workboats, fishing and commercial shipping in and around the passages? 2. Under what (weather) conditions is the decision made by skippers from recreational yachts to pass through a passage or detour, and which aspects play a decisive factor in voyage planning and on route when weather deteriorates. 3. How do the skippers respond to unexpected poor visibility in passages? 4. What considerations do sailing yachts in particular make when sudden wind shifts occur? 5. What is an acceptable wind in which sailors still go out? 6. How do crews experience passage at night due to wind park lighting?
Participants	○ Group of ~5 experienced sailing yacht skippers ○ Group of ~5 less experienced sailing yacht skippers
Location	○ In an around the passage of HKZ. ○ When planning a voyage from Ijmuiden to UK, the passage of HKW also plays a role.
Meteo	○ Various conditions as described in the initial conditions for each situation.
SPECIFICATIONS CONTRIBUTING PARTIES	
Sailing yacht skippers	○ 5 experienced sailing yacht skippers and 5 skippers with less experience on north sea in and around wind farms. ○ Use part task simulators with an outside view, paper charts, VHF radio, GPS, AIS. ○ ECDIS and RADAR shall not be used in the scenarios. ○ Sailing yacht of ~ 10 m LOA
EXTRA	
○ Participants uses 'thinking out loud' method so that the observers can properly observe the participants thought processes. ○ Have paper charts available for the crew of the sailing yacht for planning and monitoring because they usually will not use ECDIS.	

SIMRUN 7 USING PASSAGE OR DETOUR

OPERATOR FORM		
SITUATION 1 STORM WARNING		
INITIAL CONDITIONS		
Local Time :	1330	
Date:	5 th July 2030	
Current:	Spring tide, ebbing	
Wind:	N 3-4 bft	
Visibility:	Good to moderate	
Vessel type:	Sailing yacht (SY) LOA +/- 10 m (OS1)	
Loading condition:	-	
Position:	West of HKZ and South of passage	
Heading:	351	
Speed:	5 kts	
VHF CH:	16	
EVENTS		
Event No.	Party	Description
	OS1	Sailing yacht is sailing west of HKZ and is underway on sails with two passengers. They start 3 Nm south of the transit passage. So, they have the choice to go through the passage or around. They are on a tight schedule and have to drop off the passengers in IJmuiden as soon as possible to catch their flight back to the United States.
01	COASTGUARD	Coastguard will give a METEO warning for the approaching summer storm. Early evening the storm will be in full strength with gusts up to 65 Kts. From 3 PM local time the wind starts to gradually increase.
	OBSERVER	Observe which considerations and decisions skippers from the sailing yacht will make in relation to the METEO warning. Will they take the short route through the passage of the wind park, do they decide to go around. Of completely deviate from planning and make other decision.
02	SIM OPS	Once they have made their decision force the participants to use the shortest route through the transit passage.
03	METEO	Start veering the wind to NE so the passage will be harder to sail.
	OBSERVER	Observe which considerations and decisions skippers from the sailing yacht will make in relation to the shift of wind.
04	SIM OPS	Once the decision is made scenario is finished.

SIMRUN 7 USING PASSAGE OR DETOUR

SITUATION 2 VISIBILITY		
INITIAL CONDITIONS		
Local Time:	1330	
Date:	5 th July 2030	
Current:	Spring tide, ebbing	
Wind:	N 3-4 bft	
Visibility:	Moderate to good	
Vessel type:	Sailing yacht (SY) LOA +/- 10 m	
Loading condition:	-	
Position:	West of HKZ and South of passage	
Heading:	351	
Speed:	5 kts	
VHF CH:	-	
EVENTS		
	SAILING YACHT	Sailing yacht is sailing west of HKZ and is underway on sails with two passengers. They start 3 Nm south of the transit passage. So, they have the choice to go through the passage or around. They are on a tight schedule and have to drop off the passengers in IJmuiden as soon as possible to catch their flight back to the United States.
	OBSERVER	Observe which considerations they will make to use the transit passage or go around the wind park.
01	SIM OPS	When the skippers decide to go around the wind park, force them to use the transit passage.
02	METEO	When sailing yacht entered the passage and is 2 Nm in, visibility decreases due to fog.
	OBSERVER	Which consideration will the crew from the sailing yacht make when the visibility suddenly drops?

SIMRUN 7 USING PASSAGE OR DETOUR

SITUATION 3 VOYAGE PREPARATION		
INITIAL CONDITIONS		
Local Time:	-	
Date:	5 th July 2030	
Current:	Springtide, ebbing	
Wind:	S 3-4 bft	
Visibility:	-	
Vessel type:	Sailing yacht (SY) LOA +/- 10 m	
Loading condition:	-	
Position:	Voyage preparation from: Ijmuiden – Hull (HKW in between) Ijmuiden – Harwich (HKZ in between)	
Heading:	-	
Speed:	-	
VHF CH:	-	
ECIDS Route	-	
EVENTS		
	SAILING YACHT	Skipper from sailing yachts will make a voyage preparation from Ijmuiden to Hull (UK) with HKW in between. Provide them with information they would normally use.
	OBSERVER	What considerations will be made in regard to planning the route through the wind park or around?
	SAILING YACHT	Skipper from sailing yachts will make a voyage preparation from IJmuiden to Harwich (UK) with the wind park and HKZ in-between. Provide them with information they would normally use.
	OBSERVER	What considerations will be made in regard to planning the route through the wind park or around?
		When time allows, the voyage preparation can be done with a variety of weather conditions.

SIMRUN 7 USING PASSAGE OR DETOUR

SITUATION 4 INTERACTION SAILINGYACHT AND COMMERCIAL		
INITIAL CONDITIONS		
Local Time:	2100	
Date:	5 th July 2030 (Dusk)	
Current:	Springtide, ebbing	
Wind:	NE 3-4 bft	
Visibility:	Moderate to good	
Vessel type:	Sailing yacht (SY) LOA +/- 10 m	
Loading condition:	-	
Position:	Inside passage HKZ	
Heading:	080°	
Speed:	5 kts	
VHF CH:	-	
ECIDS Route	-	
EVENTS		
	OS1	Sailing yacht is on route from Harwich (UK) to Ijmuiden. The skipper decided to go through the transit passage of HKZ and is at the start of the scenario 3 Nm inside the transit passage.
	SAILING YACHT	Wind is NE so the sailboat has to tack upwind.
	OBSERVER	How does the crew from the sailing yacht experience tacking upwind in relation to the size of the passage and other opposite traffic?
01	METEO	Cross current is 1.5 knot going south.
	OBSERVER	How will the cross current influence the ships and sailing yacht in the passage?
02	T259	The workboat is westbound in the passage and will meet the sailing yacht halfway in opposite directions.
03	T184	Fishing vessel is also westbound and will meet the sailing yacht in opposite direction.
	OBSERVER	Will there be interaction between the ships in opposite direction? Which considerations take place?
04	METEO	It is getting dark and the lights from the wind park will be visible.
	OBSERVER	How does the crew from the sailing yacht experience the lights from the wind park in nighttime?

SIMRUN 7 USING PASSAGE OR DETOUR

EVALUATOR FORM	
Observations during exercise	
Evaluator observes the participants on (in particular) the points below. Takes notes and records the time of important events so this can be shown afterwards in the video debriefing.	
1. STORM/ WINDSHIFT	○ Observe which considerations and decisions skippers from the sailing yacht will make in relation to the METEO warning. Will they take the short route through the passage of the wind park, do they decide to go around. Of completely deviate from planning and make other decision. ○ Observe which considerations and decisions skippers from the sailing yacht will make in relation to the shift of wind.
2. VISIBILITY	○ Which consideration will the crew from the sailing yacht make when the visibility suddenly drops?
3. TRANSIT PASSAGE OR DETOUR	○ What considerations will be made in regard to planning the route through the wind park or around?
4.INTERACTION /LIGHTS	○ How does the crew from the sailing yacht experience tacking upwind in relation to the size of the passage and other opposite traffic? ○ How will the cross current influence the ships and sailing yacht in the passage? ○ Will there be interaction between the ships in opposite direction and which considerations take place? ○ How does the sailing yacht experience the lights from the wind park?
Reflection after exercise	
After the exercise, have the participants write a reflection report. Encourage the participants to do this by providing them with cards with human factors and the most important factors in line with the research questions. The participant individually selects the most important 5 events and reflects on them with a reflection model (STARR)	
Reflection cards	
Situational awareness	○ Was there a time when your SA was low and at what time and why?
Decision making	○ What are the most important considerations made in this scenario? ○ What information was used to make choices about this?
Communication	○ How did the communication go within your team and with external parties?
Instruments	○ What was your familiarity with instruments? Did this affect the exercise?
Meteo	○ Was the weather an influence, if so, why?

SIMRUN 7 USING PASSAGE OR DETOUR

PARTICIPANT FORM SITUATION 1

You are underway on sails with your 10 m sailing Yacht. You have 2 passengers with you and are underway to Ijmuiden. They have to catch their flight at 8 PM and are worried that they will not make it in time.

INITIAL CONDITIONS

Local Time:	1330
Date:	5 th July 2030
Current:	Springtide, ebbing
Wind:	N 3-4 bft
Visibility:	Good to moderate
Vessel type:	Sailing yacht (SY) LOA +/- 10 m
Loading condition:	-
Position:	
Heading:	351
Speed:	5 kts
VHF CH:	16

PARTICIPANT FORM SITUATION 2

You are underway on sails with your 10 m sailing Yacht. You have 2 passengers with you and are underway to Ijmuiden. They have to catch their flight at 8 PM and are worried that they will not make it in time. You are just in front (3NM) of the transit passage through HKZ.

INITIAL CONDITIONS

Local Time:	1330
Date:	5 th July 2030
Current:	Springtide, ebbing
Wind:	N 3-4 bft
Visibility:	Moderate to good
Vessel type:	Sailing yacht (SY) LOA +/- 10 m
Loading condition:	-
Position:	
Heading:	351
Speed:	5 kts
VHF CH:	-

PARTICIPANT FORM SITUATION 3

You are preparing 2 voyages.

1. Ijmuiden – Harwich
2. Ijmuiden – Hull

Use all means of resources and information you would normally need to prepare your voyage.

INITIAL CONDITIONS

Local Time:	-
Date:	5 th July 2030
Current:	Springtide, ebbing
Wind:	S 3-4 bft
Visibility:	-
Vessel type:	Sailing yacht (SY) LOA +/- 10 m
Loading condition:	-
Position:	Voyage preparation from: Ijmuiden – Hull Ijmuiden – Harwich
Heading:	-
Speed:	-
VHF CH:	-

SIMRUN 7 USING PASSAGE OR DETOUR

PARTICIPANT FORM SITUATION 4

You are on route from Harwich (UK) to Ijmuiden. The skipper decided to go through the transit passage of HKZ and you are at the start of the scenario 3 Nm inside the transit passage from HKZ eastbound. Navigate to Ijmuiden.

INITIAL CONDITIONS

Local Time:	2100
Date:	5 th July 2030 (Dusk)
Current:	Springtide, ebbing
Wind:	NE 3-4 bft
Visibility:	Moderate to good
Vessel type:	Sailing yacht (SY) LOA +/- 10 m
Loading condition:	-
Position:	
Heading:	080°
Speed:	5 kts
VHF CH:	-



Figure 1 Instructor chart overview situation 1

SIMRUN 7 USING PASSAGE OR DETOUR



Figure 2 Instructor chart overview situation 3 and 4

SIMRUN 8 SENSORS

GENERAL OUTLINE	
General objective	Gain insight into how the crew from ships react to the new situation in 2030. With wind farms in operation and maximum traffic movements, crossing shipping, recreational boats, and fishing vessels.
Overall description	This scenario will commence in voyage preparation phase. After the preparation, the crew will execute their planned voyage. The merchant ship sails from Helsinki to Europort in busy traffic according to situation in 2030. There will be several challenging but realistic events (navigational challenges and sensor failure). These events will generate possibilities to observe the level of situational awareness from the crew. Do the wind farms create an additional load on the crew or is this of no issue at all?
MOSWOZ theme	Monitoring: 1 and 2 Collisions/Safety: 18
Situation	In line with 2030 21 GW
Duration	Approx. 3-4 hours
Research questions	1. How are the wind farms perceived by ship crews sailing here for the first time in the new situation? 2. What effect do the wind farms and increased traffic intensity have on ship crews' situational awareness? 3. Is there a point at which the crew loses SA and what actions will follow next? 4. What considerations are made in preparing the voyage at the new situation in 2030 by the ship's crew in relation to the wind farms? 5. Is consideration given to increased risk for sailing in the vicinity of wind farms? 6. How does the ship's crew experience the increased traffic intensity? 7. What considerations are made regarding weather in the proximity of wind farms?
Participants	Merchant vessel (General cargo) (OS1)
Location	Underway and in position North of HKW VI (as shown on chart)
Meteo	4 Bft SW
SPECIFICATIONS CONTRIBUTING PARTIES	
Merchant vessel	○ Captain, 2nd officer, 3rd officer, look-out/Helmsman
Deep Sea Pilot	○ Is stand-by when crew requests Deep Sea Pilot. Otherwise observes behind the scenes, pays attention to where added value can be found for the use of a Deepsea pilot.
EXTRA	
○ Participants uses 'thinking out loud' method so that the observers can properly observe the participants thought processes. ○ Nautical crew should be familiar with the type of vessel, and brand of the bridge instruments (ECDIS/RADAR) ○ VHF recordings should be played for distraction and to increase realism. ○ Captain decides the watch schedule in line with company procedures. ○ Crew should be in tired state. Preferably this scenario should be executed after a shift on board.	

SIMRUN 8 SENSORS

OPERATOR FORM		
INITIAL CONDITIONS		
Local Time:	0230	
Date:	25 October 2030	
Current:	Spring tide, ebbing	
Wind:	SW 4 Bft	
Visibility:	Moderate	
Vessel type:	General cargo (OS1)	
Loading condition:	OS1: loaded 8.5m	
Position:	North of HKW VI	
Heading:	190	
Speed:	14 kts	
VHF CH:	-	
EVENTS		
Event No.	Party	Description
	OS1	Crew will prepare their passage plan from initial position to pilot station Europort in line with their company procedures.
	OBSERVER	Observe crew with the passage planning to see whether they mention the wind parks and if they make any considerations regarding them. When crew is planning the route via deepwater route, ask them for the reasons and note this down. Then direct them to use the route as demonstrated in the overview chart below.
	OS1	The ship is fully loaded with wind turbine parts and underway to Europort, she is continuing her voyage south bound. Second officer is on the bridge and captain in his/her cabin. Captains standing orders should be discussed about when the captain should be called (as per company procedures).
01	SIMOPS	When bridgecrew is ready start simulation
02	T152	Fishing vessel is engaged in fishing and creates distraction for OS1. When OS1 is in vicinity alter course to starboard in direction of OS1 so that reaction from bridge team can be observed.
	OBSERVER	Observe actions from bridge team, are they aware of the fishingvessel engaged in fishing and what are their considerations and decisions?
03	OS1	When OS 1 is passing 52° 40N, primary GPS 1 fails.
	OBSERVER	Observe actions from bridge team, do they pick up the signal that GPS 1 Fails? What are their considerations and actions?
04	OS1	Secondary GPS 2 fails as well, this will cause the ECIDS going to DEADRECKONING.
	OBSERVER	Observe actions from bridge team, do they pick up the signal that GPS 2 Fails? What are their considerations and actions?

SIMRUN 8 SENSORS

05	OS1	Once reaction from bridge team is observed, fix GPS 1 and 2 and report in by phone from technical department that problem is found in the cabling of both GPS and is resolved.
06	T184	Fishing vessel not engaged in fishing in passage wind park HKW will exit from east transit passage and creates a challenge by coming in from starboard with CPA 0. (Speed and course to be managed by simops)
	OBSERVER	Observe actions from bridge team, do they keep a look out for the fishing vessel and what considerations and actions will follow?
07	T004	Westbound general cargo vessel is leaving from Ijmuiden and proceeding west. Turning later to port to enter southbound traffic lane towards Antwerp. This creates a navigational interaction with OS1. T004 is giveaway vessel. (speed and course to be managed by simops)
	OBSERVER	Observe actions from bridge team, do they keep a look out for T004 and realize the small CPA? What considerations and actions will follow?
08	T259	Sailing yacht is westbound in transit passage HKZ and will cross TSS in vicinity of OS1. At first create CPA close to 0 and later pass astern of OS1 (speed and course to be managed by simops).
	OBSERVER	Observe actions from bridge team, do they keep a look out for the sailing yacht and what are their considerations and actions?
09	T184	Sailing yacht is westbound in transit passage HKZ following T259 and will cross TSS in vicinity of OS1. At first create CPA close to 0 and later pass astern of OS1 (speed and course to be managed by simops).
	OBSERVER	Observe actions from bridge team, do they keep a look out for the sailing yacht and what are their considerations and actions?
11	T234	Is leaving anchorage and will cross South bound and enter North bound traffic lane and creates distraction for OS1. (The exact moment of heaving anchor should be managed by simops).
	OBSERVER	Observe actions from bridge team, do they monitor the movement of this ship?
12	SIMOPS	When observers have gathered enough information stop the simulation and proceed to debriefing and reflection.

SIMRUN 8 SENSORS

EVALUATOR FORM	
Observations during exercise	
Evaluator observes the participants on (in particular) the points below. Takes notes and records the time of important events so this can be shown afterwards in the video debriefing.	
OS 1 VOYAGEPLAN	What considerations are made in preparing the voyage at the new situation in 2030 by the ship's crew?
OS1 METEO	What considerations are made regarding weather in the proximity of wind farms?
OS1 VICINITY WF	Is consideration given to increased risk for sailing in the vicinity of wind farms?
OS1 EFFECT SA	What effect do the wind farms and increased traffic intensity have on ship crews' situational awareness?
OS1 LOSS OF SA	Is there a point at which the crew loses SA in relation to the changed situation?
OS1 INCREASE TRAFFIC	How does the ship's crew experience the increased traffic intensity?
Reflection after exercise	
After the exercise, have the participants write a reflection report. Encourage the participants to do this by providing them with human factors and the most important factors in line with the research questions. The participant individually selects the most important events and reflects on them with a reflection model.	
Reflection questions	
Situational awareness	Was there a time when your SA was low and at what time and why?
Decision making	- What are the most important considerations made in this scenario? - What information was used to make choices about this?
Communication	How did the communication go within your team and with external parties?
Instruments	What was your familiarity with instruments? Did this affect the exercise?
Meteo	Was the weather an influence, if so, why?

SIMRUN 8 SENSORS

PARTICIPANT FORM

1. Make a voyage preparation from initial position to pilot station to Europort.
2. The ship is fully loaded with wind turbine parts and is enroute to Europort. You, second officer is watchkeeping on the bridge with AB as lookout. Captain in his/her cabin, taking rest.

INITIAL CONDITIONS

Local Time:	0230
Date:	25 October 2030
Current:	Spring tide, ebbing
Wind:	SW 4 Bft.
Visibility:	Moderate
Vessel type:	General cargo (OS1)
Loading condition:	OS1: loaded 8.5
Position:	Underway and in position North of HKW VI
Heading:	190
Speed:	14 kts
VHF CH:	-

SIMRUN 8 SENSORS

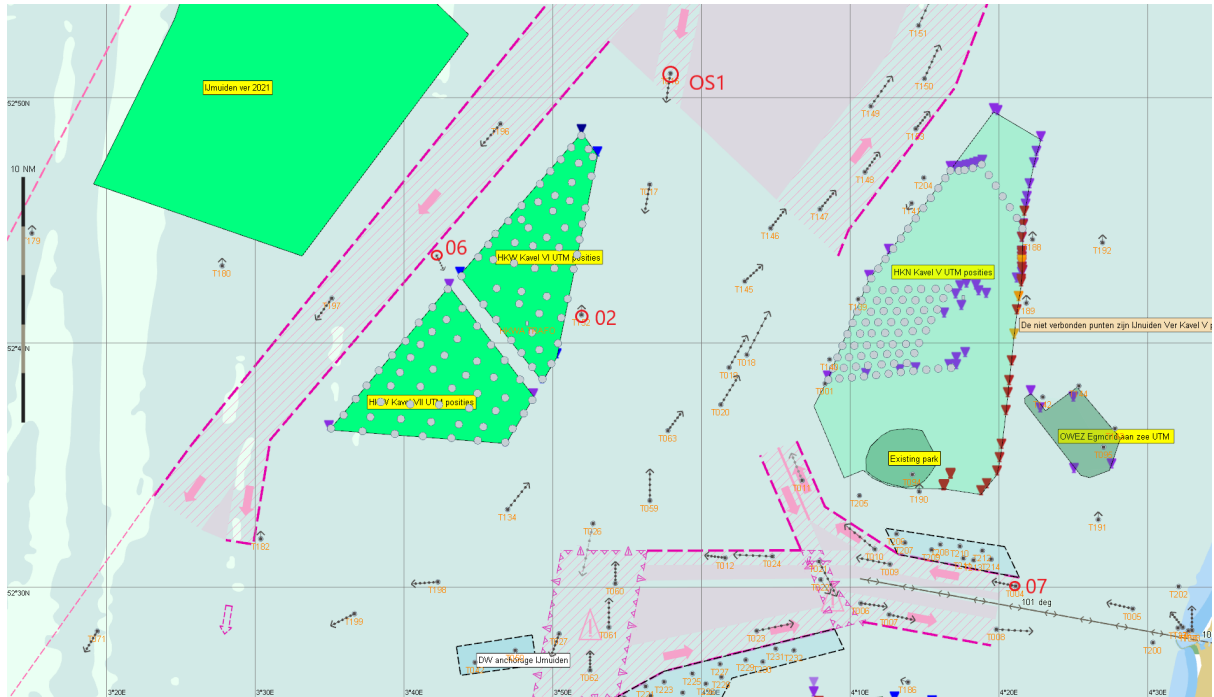


Figure 1 Instructor chart overview North

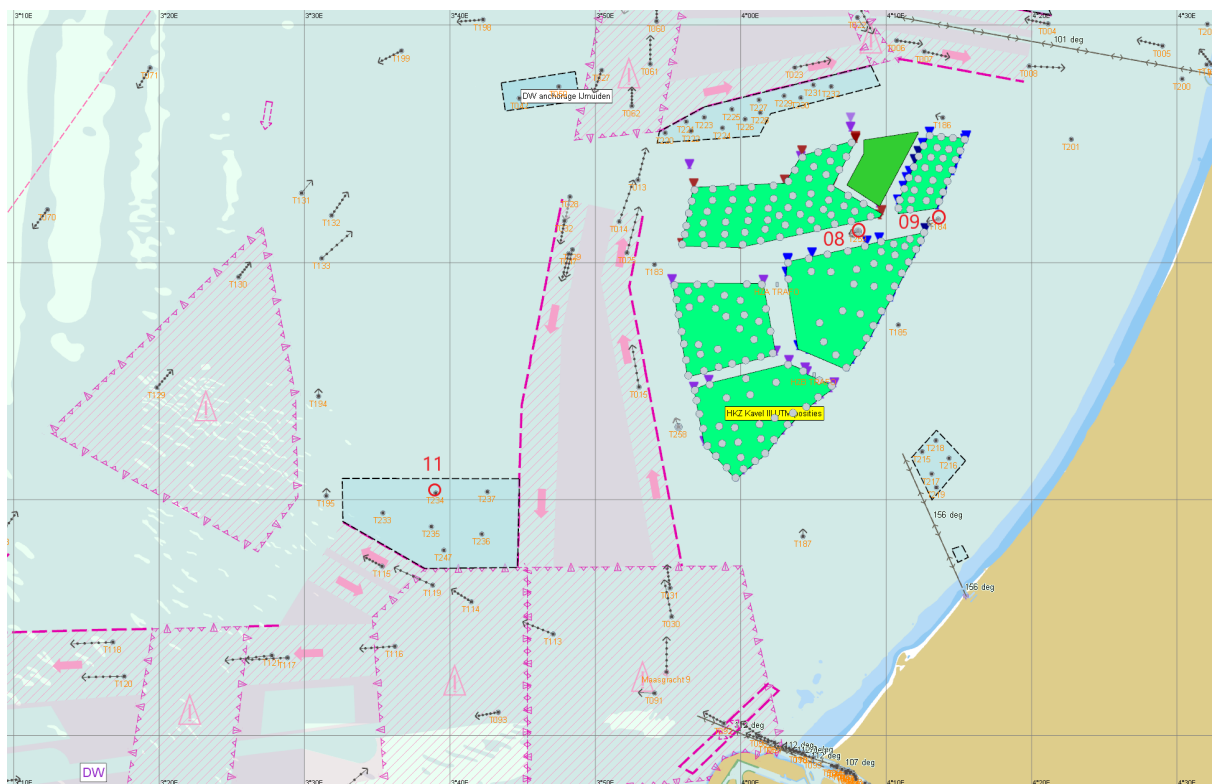
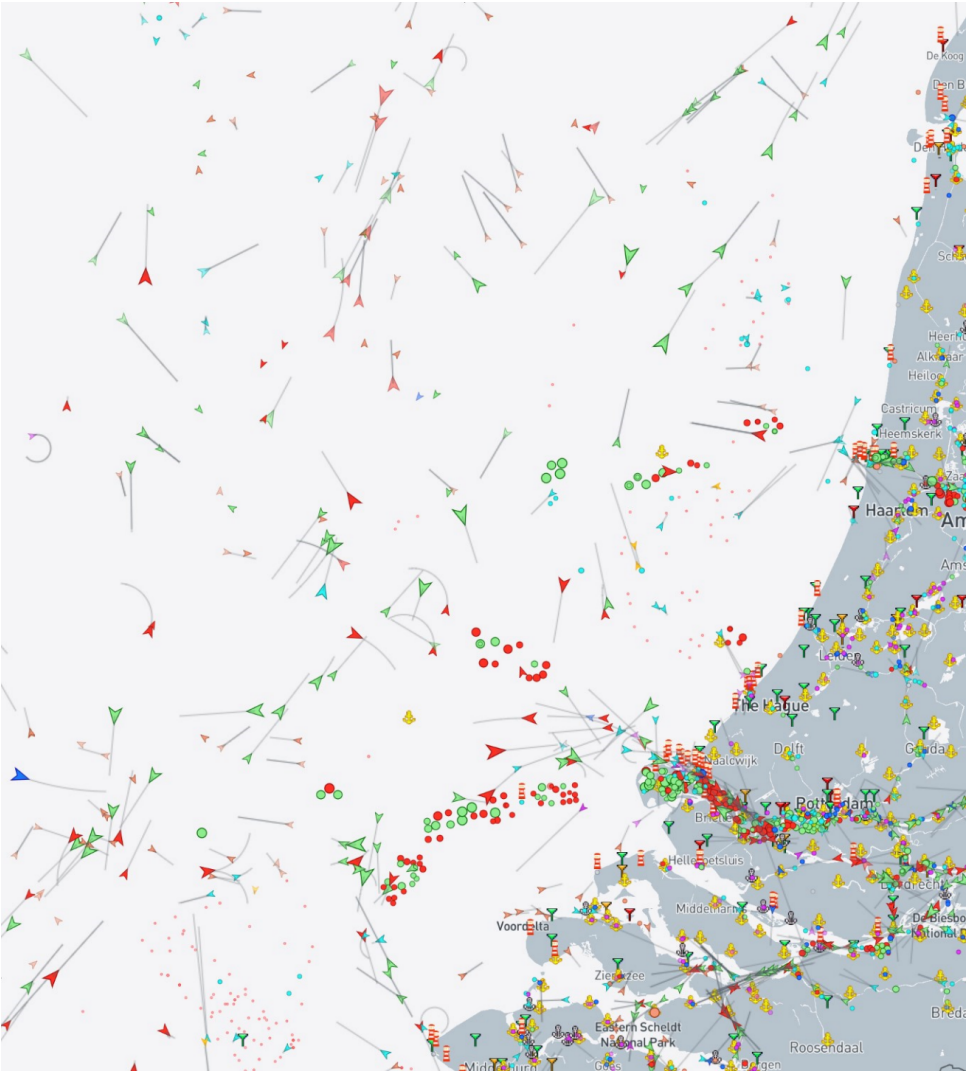


Figure 2 Instructor chart overview South

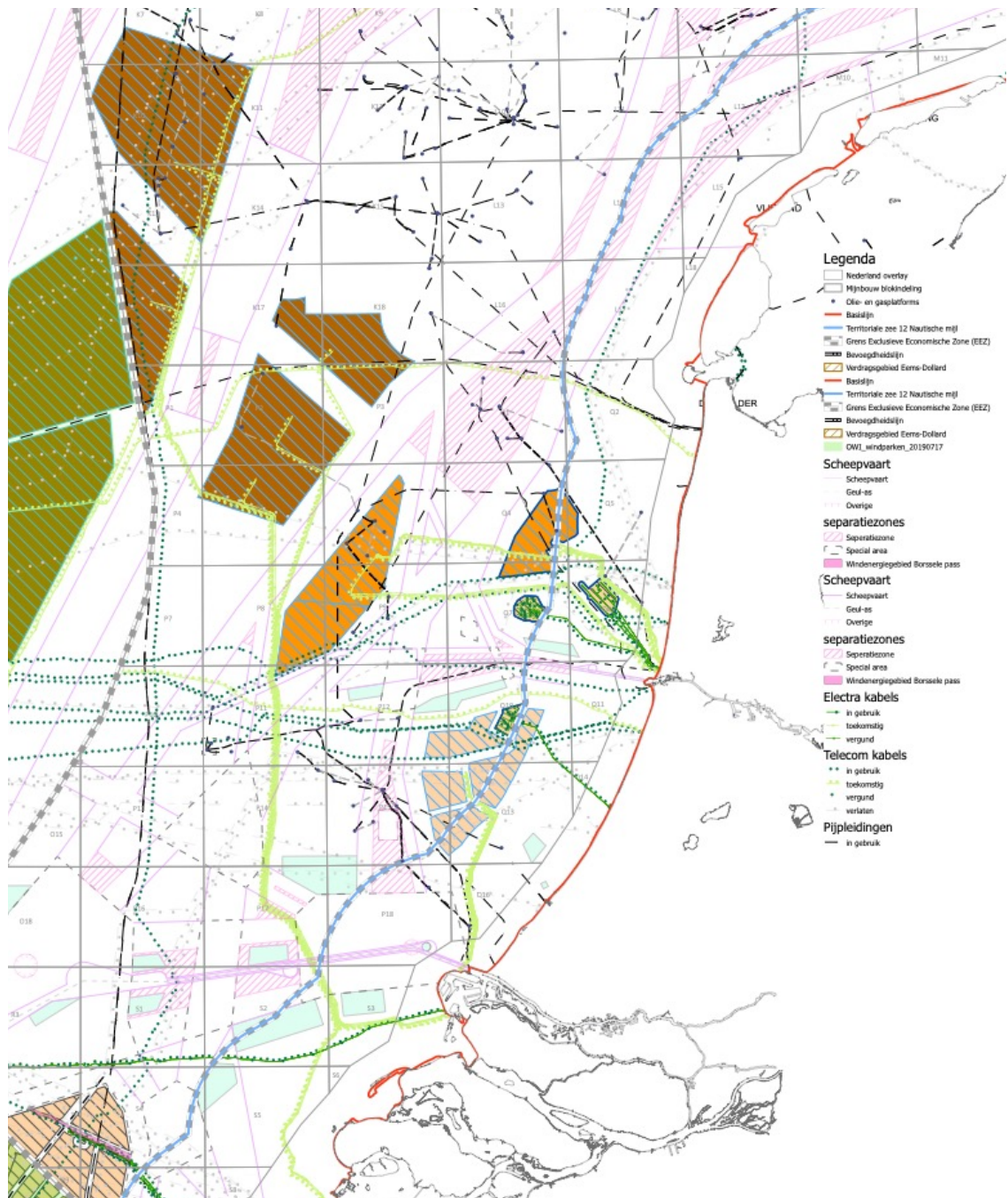
8 Appendix 2: Snapshot AIS targets 27/11/2023



Cargo vessel underway (Bulk, container, general cargo, Ro-Ro, Reefer, Livestock carrier)	68
Cargo vessel at anchor (Bulk, container, general cargo, Ro-Ro, Reefer, Livestock carrier)	36
Tanker underway	85
Tanker at anchor	45
Passenger	2
High speed (windcat/seacat)	4
Tugs and special crafts	50
Fishing	60
Pleasure	2

Total: 352

9 Appendix 3: Overview map of work area



10 Appendix 4: Checklist simulators

- ☐ Do the bridge simulators have DNV Class A certification or similar?
- ☐ Are there 3 full mission bridges?
- ☐ Is one of the full mission simulators an oceangoing tug simulator?
- ☐ Can future ECDIS charts be uploaded to the ECDIS?
- ☐ Can 450 ships sail at the same time, linked to routes?
- ☐ Is the interior equipped with at least 2 comfortable chairs for watchkeeper and lookout?
- ☐ Is there an opportunity for coffee/tea and refreshments on the bridge?
- ☐ Pre-recorded VHF radio traffic can be played back in the simulation run for up to 6 hours?
- ☐ Is there a set-up in place to serve as Vessel Traffic Monitoring?
- ☐ Is this set-up suitable for long-term duty?
- ☐ Is it possible for the operator of this set-up to oversee the entire area?
- ☐ Does this setup have the ability to show the ECDIS chart?
- ☐ Does this setup have the ability to show ship data of ships in the area?
- ☐ Does this setup have the ability to add ship data if it is not shown automatically?
- ☐ Does this setup have a fixed VHF Radio with 'dual watch' option?
- ☐ Are all participating simulators equipped with CCTV?
- ☐ Are all participating simulators equipped with sound recording equipment?
- ☐ Can wind turbines be placed in the sailing area?
- ☐ Do these wind turbines have rotating blades?
- ☐ Are these wind turbines equipped with the prescribed IALA lighting?
- ☐ Tidal currents can be programmed in the simulator for the duration of the simulation runs?
- ☐ Wind, current, swell and waves can be changed during the simulation runs?
- ☐ Is there enough storage capacity available to store the simulation runs including CCTV?
- ☐ Is there a retrospective option available, including screen recordings from Radar and ECDIS, for the researchers to play the simulation run recordings?
- ☐ Can the simulation runs and/or their images be followed from another (foreign) location?
- ☐ Can the length of a tow wire be controlled on the full mission (tugboat) bridge?
- ☐ Can (standby) ships start on a route with a delay?
- ☐ Is the ECDIS duplicated on 3 full mission bridges?