Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat

RWS INFORMATIE

MOSWOZ opstellen simulatiescenario's

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Versie	1.0
Status	Definitief

Colofon

Uitgegeven door	Rijkswaterstaat
Informatie	Rijkswaterstaat Water, Verkeer en Leefomgeving: afdeling Veiligheidsmanagement en Verkeersveiligheid cluster Nautische Veiligheid Rijkswaterstaat Zee en Delta: afdeling Netwerkontwikkeling en Visie Deze rapportage is opgesteld in het kader van Monitorings- en Onderzoeksprogramma Scheepvaartveiligheid Wind op Zee (MOSWOZ) in opdracht van Directoraat-Generaal Luchtvaart en Maritieme Zaken (DGLM).
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Inhoud

Inleiding

De verkeerssituaties op het Nederlandse deel van de Noordzee veranderen en zullen in de toekomst nog meer veranderen door de komst van nieuwe windturbineparken en andere hernieuwbare energie en/of medegebruik. Deze veranderende omstandigheden vragen voor nieuwe inzichten in de veiligheid van scheepvaartverkeer. Rijkswaterstaat heeft hiervoor het Monitorings- en Onderzoeksprogramma Scheepvaartveiligheid Wind op Zee (MOSWOZ) opgezet. Binnen dit programma doet Rijkswaterstaat onderzoek naar het effect op de scheepvaartveiligheid van windparken op zee. Een belangrijke component daarin is het gedrag van scheepsbemanningen die de schepen navigeren.

Een van de hoofdvragen is: welke invloed heeft de nabijheid van windturbines/parken op de oriëntatie, het gedrag (eventueel cultureel beïnvloed) en keuzes van scheepsbemanningen? De opdracht valt binnen het thema Veiligheid en betreft het onderzoeken van situationeel bewustzijn van de scheepsbemanning bij varen in de buurt van windenergiegebieden, waarbij ook de cultuur (interculturele communicatie) als invloed op het maken van keuzes meegenomen moet worden.

Om deze vraag te kunnen beantwoorden moet informatie worden verzameld. Hiervoor zijn simulatiescenario’s ontworpen. In dit document worden die scenario’s zodanig omschreven dat een simulatorcentrum, mits in overeenstemming met de eisen, deze simulaties kan gaan uitvoeren. Die uitvoering zal op een zodanige wijze plaats moeten vinden dat er informatie kan worden verzameld voor het beantwoorden van de (hoofd)vragen vanuit de verschillende MOSWOZ-thema’s.

Het doel van de scenario’s is verzamelen van informatie voor onderzoek. Er is daarom geen sprake van leerdoelen maar van onderzoeksvragen die zijn opgesteld. Elk scenario levert informatie om onderzoeksvragen te kunnen beantwoorden.

De beschrijvingen van de scenario’s zijn zo opgesteld dat bekend is welke hardware eisen worden gesteld aan de uitvoering, ze gebouwd en uitgevoerd kunnen worden zoals ontworpen, en de beschrijvingen geven richting aan de manier waarop de informatie kan worden verzameld die de uitvoering oplevert.

Verklarende woordenlijst

CCTV: Closed Circuit Television used for debriefing and evaluation purposes.

Decision making: The process of making choices 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 with CCTV 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.
Offshore Wind Energy Shipping Safety 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: Department of Waterways and Public Works.

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:	The ability to perceive, understand, and effectively respond to one's situation. It involves comprehending a given circumstance, gathering relevant information, analyzing 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 trough 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 Onderzoeksopzet

1.1. Inleiding

Naar gedrag en keuzes van scheepsbemanningen is al veel onderzoek gedaan. Veelal is hiervoor informatie verzameld vanuit incidentenonderzoek. Daardoor weten we welk gedrag kan bijdragen aan veiliger varen in uitdagende omstandigheden. Vanuit onderzoek weten we ook dat in uitdagende omstandigheden het behouden van situationeel bewustzijn door de bemanning een uitdaging is. Verlaagd situationeel bewustzijn vergroot het risico op ongewilde beslissingen en incidenten.

Wat we niet weten is of de situatie in 2030 op het Nederlandse deel van de Noordzee, met de bouw van nieuwe windenergiegebieden en toenemend verkeer, de situatie uitdagender gaat maken voor de bemanningen. Wat we ook niet weten is of die nieuwe omstandigheden kunnen leiden tot afnemende situatiebewustheid. We kunnen dat veronderstellen maar daarover is geen informatie beschikbaar.

Idealiter wil je situatiebewustheid onderzoeken door eerst de huidige situatie te kennen en die informatie af te zetten tegen verzamelde informatie over de nieuwe situatie. Goede informatie over situationeel bewustzijn in de huidige situatie is er niet en het is bovendien enorm kostbaar en complex een dergelijk onderzoek uit te voeren. Wat een mogelijkheid is, is de toekomstige situatie simuleren, observaties te doen en een bemanning hierover te ondervragen. Informatie en antwoorden op vragen die nog niet eerder zijn onderzocht, worden verzameld. We kunnen daarmee inzicht krijgen of er sprake kan zijn van een probleem of ervaring die we beter willen leren kennen. We noemen dit een exploratief onderzoek.

1.2. Kwalitatief exploratief onderzoek

Door middel van verkennend kwalitatief exploratief onderzoek wil Rijkswaterstaat een beeld vormen hoe scheepsbemanningen in de toekomstige situatie (2030) kunnen reageren bij het varen in of in de nabijheid van windturbineparken. Het onderzoek is bedoeld om nieuwe inzichten te verkrijgen en kennislacunes op te vullen. De kern van het onderzoek richt zich op het gedrag van de zeevarende ten opzichte van de gerealiseerde windparken in 2030 in combinatie met de geïntensiveerde verkeersintensiteit.

1.3. Onderzoeksvragen

De MOSWOZ-thematrekkers van Rijkswaterstaat hebben samen onderzoeksvragen opgesteld. Deze onderzoeksvragen zijn verbonden aan één van de negen MOSWOZ-thema’s. Deze onderzoeksvragen zijn vervolgens geplaatst in één of meer simulatieruns. De simulatierun wordt gezien als het podium om de onderzoeksvraag(en) te beantwoorden.

1.4. Toegepaste onderzoeksmethoden

Gedurende het onderzoek wordt voornamelijk informatie verzameld door observaties. Tijdens de simulatieruns wordt dat verzameld door een team van gedragsspecialisten (cognitieve psychologen) in combinatie met inhoudelijk deskundige experts (nautici). Reflectie rapporten van kandidaten na afloop en gespreksvoering tussen de gedragsspecialisten na de simulatieruns maken ook deel uit van het onderzoek. Waar aanvullende verdieping gewenst is kan verder onderzoek gedaan worden met aanvullende casestudies en expert overleggen op een specifiek geselecteerd onderwerp.

1.5. Respondenten

Om betrouwbare informatie te verzamelen is het van belang aandacht te besteden aan de groep respondenten die deel gaat nemen in de simulatieruns. Rijkswaterstaat is op zoek naar een groep respondenten die aan bepaalde criteria voldoet. Bij de selectie van de respondenten dienen ten minste de volgende criteria in overweging genomen te worden:

- Bevoegd en werkervaring passend bij zijn/haar functie.
- Minder ervaren met het varen in en rondom windturbineparken.
- Niet/minder ervaren in het te simuleren gebied.
- Nationaliteit van het brugteam overeenkomstig met meest voorkomende nationaliteit op zeeschepen.
- Brugteam bestaande uit diverse culturele achtergronden waarin Engels niet de moedertaal is.
- Brugteam van één rederij zodat dezelfde set procedures gebruikt kan worden.
- Brugteam is bekend met het soort schip, maneuvreereigenschappen en gebruikte navigatieapparatuur.

1.6. Beperkingen en betrouwbaarheid

De betrouwbaarheid van een exploratief onderzoek wordt onder meer beïnvloed door subjectiviteit, beperkte structuur en vertekening. Dat risico op beperkte betrouwbaarheid vergroot naarmate de steekproef kleiner is. Exploratief onderzoek is echter één van de eerste stappen om nieuwe ideeën, hypothesen of onderzoeksvragen te verkennen en genereren. Het is belangrijk om de beperkingen en context van exploratieve onderzoeken te begrijpen bij het interpreteren van de resultaten.

Door het brede onderzoeksveld, grote aantal variabelen, hoge mate van complexiteit en beperkte tijd zullen de onderzoeksresultaten niet direct te vertalen zijn naar de praktijk. Ook wordt het niet duidelijk of de resultaten van toepassing zijn op andere personen, teams of beroepsgroepen met iets andere kenmerken dan degenen die aan het onderzoek hebben deelgenomen. Het uit te voeren onderzoek tracht mogelijk kritische aspecten bloot te leggen, waar vervolgonderzoek op gericht zou moeten worden.

2 Opzet van de beschrijvingen

De hoofdvraag waar de simulatieruns aan bijdragen is: *Welke invloed heeft de nabijheid van windturbines/parken op de oriëntatie, het gedrag (cultuur) en keuzes van scheepsbemanningen?* Informatie hiervoor kan verzameld worden vanuit verschillende te simuleren situaties. Deze situaties zijn gekozen op basis van een literatuurstudie van scheepvaartincidenten en gedrag van bemanningen. Tegelijkertijd kunnen observaties van een VTMON-operator in verschillende situaties worden gedaan. Om die reden zijn naast scheepsbemanningen inclusief ERTV-bemanning ook VTMON-operators betrokken bij de scenario's.

Vanuit de MOSWOZ-thema's heeft Rijkswaterstaat een aantal scenario's zorgvuldig geselecteerd op basis van de vragen waarbij de bemanningen (inclusief VTMON-operator en ERTV-bemanning) in realistische situaties worden gebracht. Van die situaties wordt vervolgens gebruik gemaakt om informatie te verzamelen over keuzes, gedrag en handelingen door de scheepsbemanningen. Waar mogelijk wordt ook cultuurgebonden informatie verzameld aan de hand van de situaties.

Deze scenario's zijn vervolgens ondergebracht in zogenaamde 'simulatieruns'. In totaal zijn er acht simulatieruns ontworpen waarbij een combinatie van verschillende scenario's plaatsvindt.

Deze rapportage is in vier delen opgezet:

1. De simulatieruns.
2. Informatie voor het bouwen van de simulatieruns.
3. Informatie voor de uitvoering van de simulatieruns.
4. Verzamelen van informatie met de simulatieruns.

Alle simulatieruns vinden plaats in het Nederlandse deel van de Noordzee (zie 9, Bijlage 3).

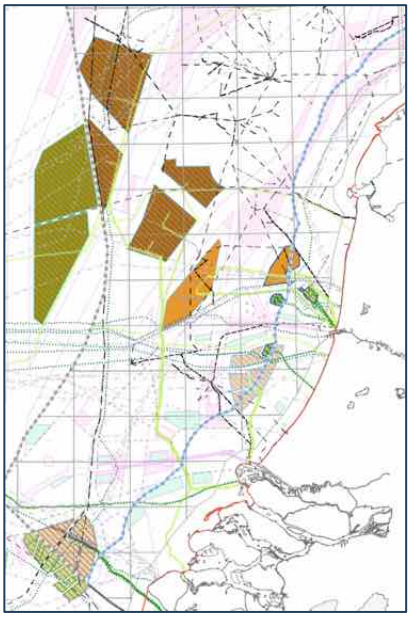


Figure 1: Overzichtskaart van het werkgebied zie ook bijlage 3

3 Simulatieruns

Dit hoofdstuk omschrijft de simulatieruns waarin de scenario’s zijn ondergebracht.

3.1. De simulatieruns

In totaal zijn er acht simulatieruns ontworpen waarin een combinatie van een of meer van de door Rijkswaterstaat geselecteerde scenario’s in voorkomen. Elke uitgevoerde simulatierun zal daarom informatie opleveren voor meerdere onderzoeksvragen die horen bij elk scenario.

De volgende simulatieruns zijn ontworpen:

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

De simulatieruns zijn uitgebreid beschreven in de aparte bijlage 1 ‘*Beschrijving en SIMRUNS 1 t/m 8’*.

4 Algemene informatie voor bouwen simulaties

Dit hoofdstuk omschrijft de algemene informatie ter voorbereiding van het ontwikkelen van de scenario's en de benodigde simulatoren. Alle simulatieruns vinden plaats in het Nederlandse deel van de Noordzee zoals gerealiseerd in 2030. De windturbineparken, de te verwachte verkeersdichtheid in 2030, vaarwegmarkering en verkeersbanen moeten worden geprogrammeerd. De langste simulatieruns duren zes uur aaneensluitend. Als handreiking is een controlelijst bijgevoegd in Bijlage 4: Controlelijst simulatoren.

4.1. Technische specificaties simulatoren

4.1.1. Capaciteit simulatoren

De aard en omvang van de scenario's vraagt veel van de capaciteit van een simulator. De enorme hoeveelheid schepen samen met de 'full model' schepen en uitdagende meteo/hydro-omstandigheden vraagt enorm veel simulatie-capaciteit. Bij de ontwerpers van de scenario's is niet bekend of dit al eerder op deze wijze is uitgevoerd. De gangbare (en vereiste) classificatie voor full mission-simulatoren is een DNV Klasse A certificering. Deze classificatie toetst scenario's met 100 schepen en 20 routes. De simulaties voor dit onderzoek vragen veel meer dan een DNV Klasse A certificering eist.

De beschreven simulaties zijn gebouwd en uitgevoerd op een simulator opstelling van een bepaalde leverancier. Daar is gezien dat de zogenaamde 'exercise load' zo hoog bleek dat de simulator onvoldoende capaciteit had om goed en correct te werken. Om bedrijfszekerheid tijdens de simulaties te waarborgen is een geschikte capaciteit noodzakelijk. Hoe die capaciteit vormgegeven moet worden is afhankelijk van het type en de configuratie van de simulatoren.

4.1.2. Uitrusting en inrichting simulatoren

Omdat voor dit onderzoek de realiteit zo goed als mogelijk nagebootst moet worden is het van belang dat een bemanning comfortabel wacht moet kunnen lopen op de full mission brug. De simulatieruns nemen meerdere uren (tot maximaal zes uur) in beslag en afhankelijk welk brugteam de gezagvoerder zal kiezen moet er gewerkt kunnen worden door een brugteam of een individu. Daarvoor zijn comfortabele (cockpit) stoelen nodig voor de wachtdoende officieren en uitkijk. Net als op een echt schip moet er gelegenheid zijn om koffie/thee en versnaperingen te nuttigen of te bereiden.

4.1.3. Simulatie-ontwikkelapplicatie

In alle simulatieruns is er een ontwikkelapplicatie nodig die niet alleen geschikt is voor een (minimaal) DNV Klasse A-simulator of vergelijkbaar, maar tevens geschikt is om een simulatierun te bouwen en af te spelen waarbij ongeveer 350 tot 500 schepen tegelijk in een bepaald vaargebied kunnen varen. Die schepen moeten kunnen varen volgens ingestelde routes. Het dient aanbeveling ook schepen met een vertraging te kunnen laten starten om bijvoorbeeld een realistisch aanbod van verkeer uit havens te realiseren. Bij zes uur durende simulatieruns is een constante reële verkeersstroom nodig in het aangewezen gebied. De software dient de mogelijkheid te hebben (vooraf opgenomen) VHF-radioverkeer af te spelen gedurende de simulatie.

4.1.4. Benodigde simulatoren voor de runs met scheepsbemanningen

Voor deelname van scheepsbemanningen aan de simulatieruns is een full mission brug simulator nodig. De minimale eis is een DNV Klasse A certificering of vergelijkbare kwalificatie. Deze simulatoren hoeven niet gekoppeld te worden met een machinekamer simulator. De mogelijkheid de ankerketting vanaf de simulatoroperator te kunnen beheersen is een pre. Voor de simulatierun met een sleper is het een pre als de sleepdraad vanaf de brug kan worden bediend.

4.1.5. Benodigde simulatoren voor runs ERTV-bemanning

Voor de simulatieruns waarbij het ERTV-schip een actieve rol heeft, is een full mission simulator met minimaal DNV Klasse A certificering of vergelijkbaar nodig. Het is een pre als deze simulator een realistische offshore of zeeslepersimulator is.

4.1.6. Benodigde simulatoren voor runs VTMON-operators

Voor de simulatieruns waarbij een VTMON-operator deelneemt is een opstelling nodig die een Vessel Traffic Monitoring station/desk benaderd. Deze opstelling moet in een ruimte staan die gescheiden is van de full mission bruggen. De schermen van deze simulator moeten een ECDIS-kaart (of vergelijkbare kaart) weergeven. Daarnaast moet weergave van AIS-beeld en radar-overlay beschikbaar zijn voor het gehele 'te monitoren gebied'. Dit station heeft geen scheepsbediening nodig, wel communicatiemiddelen zoals VHF zenden en uitluisteren. De toekomstige VTMON-desk zal naar alle waarschijnlijkheid met drie tot vier schermen worden ingericht. Het heeft de voorkeur een dergelijke opstelling zo goed als mogelijk te benaderen voor de simulaties.

Het is een pre als er gebruik kan worden gemaakt van een Vessel Traffic Management System dat gekoppeld kan worden in de simulaties met de schepen.

4.1.7. Terugspeelmogelijkheid

De simulator moet in staat zijn simulatieruns op te slaan en terug te spelen. Hierbij moet alle informatie van instrumenten, geluid en CCTV worden opgeslagen, zowel van de bruggen als van het instructeursstation.

4.1.8. ECDIS

In de full mission simulator voor de scheepsbemanning is het een pre als er een dubbeling van de ECDIS beschikbaar is. De ECDIS moet de mogelijkheid hebben een door de opdrachtgever ontwikkelde ECDIS-kaart te uploaden voor gebruik in de simulaties. Indien een nieuwe kaart van 2030 niet beschikbaar is op het moment dat de opdrachtnemer de simulaties gaat bouwen, moet de mogelijkheid bestaan aanpassingen te maken in de beschikbare ECDIS-kaarten om de windenergiegebieden zichtbaar te maken voor de navigator.

4.1.9. Beschikbaarheid CCTV, camerabewaking

Voor observatie- en evaluatiedoeleinden is CCTV in de simulator en met name ook gericht op de deelnemers een vereiste. Naast CCTV is ook opname van het geluid een vereiste. Voor beide geldt dat deze moet worden opgenomen en kunnen worden afgespeeld voor de duur van de simulatierun en op een later moment om te gebruiken voor onderzoeksdoeleinden. Het is zelfs zeer wenselijk als er gebruik kan worden gemaakt van een live verbinding/meekijkmogelijkheid met onderzoekers op een andere (eventueel buitenlandse) locatie die mee willen kijken.

4.2. Benodigde informatie voor het vaargebied

4.2.1. Windenergiegebieden

In het werkgebied van de simulatieruns moeten de windenergiegebieden worden gebouwd die overeenkomen met het jaar 2030. De coördinaten van de contouren van de parken zijn beschikbaar bij de opdrachtgever. Voor de plaatsing van windturbines in de parken mag de locatie per windturbine bij benadering worden ingevuld. Het aantal windturbines per park moet in overeenstemming zijn met de verstrekte informatie door de opdrachtgever. Afhankelijk van de simulatorfabrikant kan er gekozen worden de windturbines al in het gebied op te nemen of deze later als 'target' te plaatsen. De keuze hiervan zal met name uitwerking hebben op de gevraagde capaciteit van de simulator. Op dit moment is er een viewer beschikbaar waaruit de coördinaten kunnen worden gehaald van de windturbineparken via deze link: Coördinaten windenergiegebieden

4.2.2. Scheepvaartverkeer

De dichtheid van scheepvaartverkeer kan bij benadering worden nagebouwd van aanwezige schepen op een gemiddelde drukke dag en daarop een plus van 10%, dit is de verwachting van 2030. Gegevens hiervoor zijn beschikbaar via de opdrachtgever. Het type scheepvaartverkeer kan ook worden nagebouwd van AIS-gegevens. Denk dan aan vissersschepen, klein werkverkeer in en om windenergiegebieden, Deep Water route verkeer, ankerliggers en de variatie in verschillende afmetingen en typen van koopvaardijschepen. In bijlage 2 is een momentopname gemaakt van 27.11.2023 (15:00 uur). Deze momentopname kan gebruikt worden om de verkeerssituatie te ontwikkelen in de simulator. De verwachting is dat deze dag plus 10% een aantal van ongeveer 385 schepen geeft in het te simuleren gebied.
Om een verkeersstroom in stand te houden gedurende het hele scenario dient de aanbeveling gebruik te maken van vertraging in starttijden voor schepen vanuit havens of van buiten het simulatie gebied.

Detailinformatie voor scheepvaartverkeer per simulatierun is weergegeven in de beschrijvingen van de simulatieruns in de losse bijlagen. Er wordt onderscheid gemaakt in verkeer dat een rol krijgt in een scenario en verkeer dat dienst ter aankleding en realisme van de simulatierun.

4.2.3. Vaarwegmarkering, passages en vaarwegen

De vaarwegen en doorvaartpassages in het werkgebied en de TSS gaan niet veranderen ten opzichte van nu. Om het scheepvaartverkeer in de simulatie de juiste routes te laten volgen is het nodig alle routes op te nemen in het simulatiegebied. Voor wat de vaarwegmarkering betreft, hier kunnen wel wijzigingen in optreden. Op dit moment zijn de mogelijke wijzigingen nog niet bekend. De opdrachtgever zal de toekomstige wijzigingen, zodra bekend, aangeven aan de opdrachtnemer.

4.2.4. ECDIS-kaart

Voor een navigator in de simulaties is een juiste ECDIS-kaart van belang. Die ECDIS-kaart moet zijn voorzien van de windenergiegebieden en aanverwante informatie die in 2030 in de kaart zal staan.

4.3. Benodigde schepen en objecten voor de scenario's

4.3.1. Schepen

Er dient een reëel aanbod aan diversiteit van schepen in de simulaties beschikbaar te zijn om te fungeren als scheepvaartverkeer in de simulaties. Deze schepen kunnen eenvoudig zijn ontwikkeld met als doel om te dienen als zogenaamde targetschepen. Minimaal zijn de volgende scheepstypen nodig:

- Vissersschepen.
- Zeiljachten.
- Werkschepen om personeel van en naar windenergiegebieden te transporteren (Crew Tender Vessels).
- Containerschepen.
- Tankers.
- General cargo-schepen.
- Deep-draft schepen.
- Passagiersschepen.
- RoRo-schepen.

Voor de schepen die een rol hebben in de verschillende scenario's zijn schepen nodig die zo realistisch mogelijk zijn ontwikkeld en equipped with a mathematical model, which accounts for motion, drift and steering angles according to forces induced by current, wind or waves. De schepen die minimaal aan deze eigenschappen voldoen zijn:

- ERTV-schip (specifications like active ERTV[1]).
- Zeesleper (can be same as ERTV model).
- Groot koopvaardijschip (Indication 150m – 300m).
- Klein koopvaardijschip (Indication 80 – 100m).
- Auto carrier (of vergelijkbaar windoppervlak).
- Te slepen object (autocarrier, can be same as above).
- Zeiljacht 10 – 15 feet.

De hierboven genoemde schepen moeten gevaren kunnen worden op een full mission simulator. Alle simulaties zijn brugsimulaties en de schepen hebben geen koppeling nodig met een machinekamersimulator. De schepen die in de simulatie met ankeren een rol spelen moeten het anker kunnen laten vallen om ten anker te gaan en dit weer kunnen thuishalen.

4.3.2. Objecten

Er zijn reële windturbines nodig die zijn voorzien van voorgeschreven IALA guideline G-1162 'The marking of offshore windfarms' verlichting. Bij voorkeur met roterende windturbinebladen.
Voor de simulatierun met een sleep is een verbinding nodig tussen een sleper en een te slepen object. Deze verbinding moet verbroken kunnen worden door de simulatoroperator.

4.4. Hydro meteo condities

De benodigde weer-, stroom- en getijdegegevens zijn per scenario aangegeven. Tenzij specifiek anders benoemd is een werkelijke getijdepatroon van het vaargebied nodig voor de simulatierun. Omdat het onderzoek informatie wil verzamelen onder uitdagende condities is in simulatieruns springtij vereist. Voor de bemanning is het noodzakelijk dat die voorzien worden van de getijdegegevens die

[1] https://kustwacht.nl/eenheden/multraship-commander/

ook zijn geprogrammeerd in de simulatieruns. Hiervoor kan de programmeur een andere datum kiezen dan eventueel in de simulatierun benoemd. Voor verschillende simulatieruns is het noodzakelijk dat weersverschijnselen tijdens en gedurende de simulatierun kunnen worden aangepast. Dat kan zowel voorgeprogrammeerd als handmatig worden gedaan. Om die reden zijn de volgende elementen een technische vereiste voor de simulator:

- Wind.
- Golven.
- Deining.
- Mist.
- Stroming.
- Getijden.
- Verschil in dag en nacht met zichtbare navigatieverlichting van scheepvaart, vaarwegmarkering en windturbineparken.

5 Uitvoering van simulatieruns

Dit hoofdstuk beschrijft de belangrijkste kenmerken van de acht simulatieruns. Vervolgens worden per simulatierun deze kenmerken beschreven. Hierdoor kan globaal een beeld worden gevormd voor het bouwen en uitvoeren van de runs. Voor de daadwerkelijke ontwikkeling en uitvoering van de runs zijn gedetailleerde simulatierunbeschrijvingen beschikbaar. Zie Bijlage 1: Beschrijving en SIMRUNS 1 t/m 8. De volgorde van simulatieruns 1 t/m 8 is aan het onderzoeksinstituut zelf mits SIMRUN 1 als eerste wordt uitgevoerd.

- 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. Familiarisatie van deelnemers

Voorafgaand aan de simulatieruns moeten de deelnemende scheepsbemanningen bekend zijn gemaakt met de bruggen en apparatuur. Dat moet op een zodanige wijze gebeuren dat onbekendheid met, of onzekerheid over apparatuur geen rol speelt in de simulatieruns. De verwachting is dat een korte familiarisatie daarvoor niet volstaat. Indien nodig zal er instructie en oefening van vaardigheden nodig zijn voor bijvoorbeeld de Radar, ARPA en ECDIS. De bemanning is er pas gereed voor als die zelf aangeven er gereed voor te zijn.

5.2. Duur en tijdstippen van simulatieruns

Er zijn simulatieruns van enkele uren tot maximaal zes uur, exclusief briefing en debriefing en eventueel benodigde reisvoorbereiding. Afhankelijk van de simulatierun verschillen de deelnemers. In enkele simulatieruns kunnen meerdere deelnemers een rol hebben. Voor elke simulatierun is ook een andere configuratie van simulatoren nodig.

De tijdstippen waarop de simulatieruns uitgevoerd moeten worden verschillen per simulatierun en zijn bij benadering gegeven. Voor enkele simulaties gaat de voorkeur uit naar uitvoering in nachtelijke uren. Per simulatierun is een voorkeur opgegeven wanneer deze uitgevoerd moet worden. Alle simulatieruns vinden plaats in het aangegeven werkgebied. Zie Bijlage 3: Overzichtskaart werkgebied.

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**

Tabel 1: Approximate running hours for each simrun and total expected sim time

5.3. Minimaal benodigde simulatoren

Om alle simulatieruns uit te voeren zijn minimaal 3 DNV Klasse A[2] (of vergelijkbaar) full-mission-simulatoren nodig die in dezelfde simulatierun tegelijk kunnen meedraaien, elkaar kunnen zien en met elkaar kunnen communiceren. Daarnaast is een VTMON-opstelling nodig voor de simulatieruns met VTMON-operators. Ook deze moet in dezelfde simulatierun meedraaien.

Voor de simulatieruns met scheepsbemanningen moeten die varen in een full mission simulator. Als de VTMON-operator een rol heeft, is tegelijk de VTMON-opstelling nodig. Zowel de simulatoren als de VTMON-opstelling moeten zijn voorzien van een CCTV-mogelijkheid.

De simulatierun 'Passages' is het beste uitvoerbaar met een aantal (minimaal vijf) part-task navigatie-simulatoren met buitenbeeld.

SIMRUN	TITLE	SIMULATOR
SIMRUN 1	BASIS	1 FMB (+CCTV)
SIMRUN 2	ARRIVAL IJMUIDEN	2 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	1 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

Voor een voorbeeld van minimale eisen aan een VTMON-opstelling, zie Benodigde simulatoren voor runs VTMON-operators

5.4. Benodigde schepen voor de simulatoren

Buiten de zogenaamde targetschepen (TGT) wordt er voor ieder scenario gebruik gemaakt van één of meerdere own ships (OS) die op de brugsimulator 'geladen' worden. Voor deze schepen is het van belang dat de mathematische modellen zo gemodelleerd zijn dat realistische vaareigenschappen verwacht kunnen worden. De tabel hieronder geeft weer welke schepen er gebruikt dienen te worden per 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

[2] Conform DNV-ST-0033 (August 2023)

SIMRUN 3	COLLISION-NUC	1 x Cargo ship approximate 150 - 250mtr 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. Benodigde scheepsbemanning of deelnemers voor de simulatoren

5.5.1. Inhuren van bemanningen en andere deelnemers

Het is nadrukkelijk de bedoeling dat de benodigde deelnemers aan de simulatieruns worden georganiseerd en ingehuurd door het simulatiecentrum dat het onderzoek uitvoert. Dit is inclusief reis-, verblijfs- en andere kosten.

5.5.2. Bemanning koopvaardijschip

De opdrachtgever vindt het van groot belang dat er met representatieve scheepsbemanningen wordt gewerkt. Er mag geen bemanning worden geselecteerd die vaker als bemanning dient voor een simulatiecentrum in wat voor rol dan ook (uitgezonderd de reguliere trainingen voor bemanningen).

Het koopvaardijschip moet bemand zijn met zo gemiddeld mogelijke bemanning van een veel voorkomende samenstelling qua nationaliteit en culturele achtergrond. De voertaal moet minimaal Engels zijn. Op basis van een EMSA-onderzoek naar bemanningssamenstellingen heeft de Filipijnse nationaliteit de voorkeur en als tweede optie Oekraïens, Grieks of Pools. Geen enkele nationaliteit of combinatie van nationaliteiten is uitgesloten mits de bemanning representatief is voor het gemiddelde zeeschip. Combinaties van verschillende nationaliteiten in een bemanning heeft sterk de voorkeur.

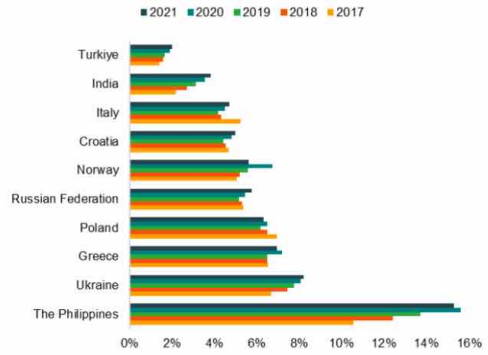


Figure 2: Nationaliteit bemanningen n.a.v. EMSA onderzoek

[3] https://kustwacht.nl/eenheden/multraship-commander/

Voor zover praktisch uitvoerbaar gaat het om een bemanning die niet optimaal op elkaar is ingespeeld. Er zijn rederijen die veel trainen met bemanningen. In dat geval zijn ze meer dan gemiddeld op elkaar ingespeeld en dat willen we voorkomen in dit onderzoek. Het doel van de samenstelling is een bemanning te hebben die professioneel is, ervaren, in de werkelijke functie deelneemt aan het scenario en waarvan verwacht mag worden dat er ervaring is met het type schip met name waar het de grootte en brugpositie (rang) betreft. Ervaring op het Nederlandse deel van de Noordzee is bij voorkeur gering. Het heeft de voorkeur dat de bemanning van dezelfde rederij is zodat ze met bekende en voor iedereen gelijke procedures kunnen werken en dit de werkelijkheid zoveel mogelijk kan benaderen.

Er zijn simulatieruns waarbij de informatie verzameld moet worden van een vermoeide bemanning. Om dit te realiseren zijn passende maatregelen nodig om de bemanning in die toestand te laten verkeren. Bijvoorbeeld een bemanning die van een schip wordt gehaald of de simulatierun in nachtelijke uren uit te voeren.

In onderstaande tabel staat aangegeven welk schip van welke bemanning moet worden voorzien per simulatie run.

5.5.3. Bemanning ERTV-schip en sleepschip

Dit dient een brugbemanning te zijn van een ERTV-schip of vergelijkbaar bestaande uit een kapitein en twee brugofficieren en een uitkijk/roerganger (matroos) die ervaring hebben in soortgelijke functies op het Nederlandse deel van de Noordzee. Tegelijk is voor SIMRUN 6, een sleepbootbemanning nodig die ervaring heeft met slepen op zee met zeeslepers. Deze bemanning bestaan ook uit een kapitein met twee brugofficieren en een matroos als uitkijk/roerganger.

5.5.4. Bemanning VTMON-desk

Hier moet het simulatorcentrum twee operators voor inhuren. Bij voorkeur VTMON-operators als alternatief kunnen twee (zee) VTS-operators voorgesteld worden. Informatie over de VTMON-taken en verantwoordelijkheden zijn te vinden op: Information about VTMON.

5.5.5. Zeiljachtschippers

Voor SIMRUN 7 zijn zeiljachtschippers nodig, vijf personen die ervaring hebben op de Noordzee en vijf die onervaren zijn op de Noordzee.

5.5.6. Overige deelnemers

Een licensed North Sea Pilot, of Deep Sea Pilot gespecialiseerd in de Noordzee, deze stand-by op de achtergrond en wanneer de kapitein een loods aanvraagt, kan deze meedoen in SIMRUN 1,3 en 8. Een bergingsexpert om mee te doen in de evaluatie van 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 (ship)	Merchant vessel	• 1 x crew (Captain – 1st off, 2nd 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/fatique state. • Cultural background as requested
	1 FMB (ERTV)	ERTV	• 1 x crew from ERTV
	1 x VTMON-operator station	VTMON	• 2 VTMON operators
	-	Deep Sea Pilot	• Stand-by in case Captain requires one
SIMRUN 3 COLLISION -NUC	1 FMB	Merchant vessel	• 1 x crew (Captain – 1st off, 2nd 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/fatique state. • Cultural background as requested
	1 x VTMON-operator station	VTMON	• 1 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	• 1x Deep Sea Pilot stand-by for when ordered by Captain, and assisting in evaluation
SIMRUN 4 VTMON SUMMER	1 x VTMON-operator station	VTMON	• 2 VTMON operator
	1 FMB	ERTV	• 1 x crew from ERTV
SIMRUN 5 VTMON AUTUMN	1 x VTMON-operator station	VTMON	• 2 VTMON operator
	1 FMB	ERTV	• 1 x crew from ERTV
SIMRUN 6 LOSS TOW	2 x Tug Simulator	Oceangoing Tugboat	• 1 x Oceangoing tug crew • 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. • 1 x 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 ordered by Captain and assisting in evaluation.

Tabel 4: Participants needed per simulationrun

5.6. Voorbereiding door bemanning

Als de bemanning goed bekend is gemaakt met de apparatuur in de simulator, zoals aangegeven in 5.1, kunnen de simulatieruns voor het onderzoek starten.

Voor de voorbereiding van de reis moet de bemanning beschikbaarheid hebben over gangbare middelen en tijd die nodig is. In die voorbereiding moet de gezagvoerder ook de bemanningssamenstelling bepalen zoals hij die normaal bepaald. Dat kan ingegeven zijn door de omstandigheden, of afhankelijk zijn van de starttijd als de kapitein zijn gangbare wachtschema's en indeling aanhoudt. Er zijn bemanningen vereist in de simulatieruns maar hoe de kapitein zijn of haar brug bemand is aan de kapitein. In de praktijk zal er dus bemanning mogelijk niet meedoen met de simulatierun of slechts gedeeltelijk voor de duur van zijn of haar wacht in het scenario. Dat geld ook voor de uitkijk of roerganger. De Officier van de wacht bepaald wanneer die wordt ingezet.

In de simulaties waarbij een Noordzeeloods beschikbaar is, is het ook aan de kapitein of deze wordt ingezet. De kapitein zal hier zelf om moeten vragen zoals ook in de praktijk geldt.

Door gebeurtenissen in de simulatieruns kan een officier of kapitein hulp inroepen van overige beschikbare bemanningsleden maar belangrijk is dat dit niet gestuurd of gemanipuleerd wordt door de simulatoroperators of onderzoekers.

5.7. Rollen in de simulatieruns

Buiten de tevoren vastgestelde events in de SIMRUN-beschrijvingen zal de simulatoroperator vanuit het instructeursstation diverse rollen vervullen. Het is van tevoren niet te bepalen waar, met wie en wanneer deze interactie plaats zal vinden. Het is hierin wél van belang dat de simulatoroperator beschikt over voldoende nautische kennis om zich te verplaatsen in onderstaande rollen:

- Machinekamer.
- VTS-station/Loods station.
- Bootsman.
- Kustwacht.
- Search and Rescue.

- Overig scheepvaartverkeer.

6 Informatie verzamelen met simulatieruns

Dit hoofdstuk beschrijft de minimale wijze waarop informatie moet worden verzameld die relevant is voor de onderzoeksvragen. Waar de verzamelde informatie digitale informatie betreft, zoals de opname van simulatiebeelden en geluidsopnames alsook CCTV, zal in overleg met de opdrachtgever de bewaartermijn worden afgesproken. Het doel van de informatieverzameling is bevindingen te kunnen opdoen op het gebied van menselijk gedrag, situatiebewustheid en de relatie hiervan tot de aanwezigheid van windturbineparken.

6.1. Meetbare aspecten

Elke simulatierun heeft meetbare aspecten. De onderzoeksvragen per simulatierun zijn afgestemd op die meetbare aspecten. Het is van belang dat voor elke afzonderlijke onderzoeksvraag informatie wordt verzameld.

Tijdens het onderzoek wordt in ieder geval informatie verzameld door:

- Observaties tijdens de simulatieruns door een team van gedragsspecialisten (zoals bijvoorbeeld cognitief psychologen) en een inhoudelijk deskundig expert/ nautici.
- Schriftelijke reflectie rapporten van kandidaten na afloop.
- Gespreksvoering (interview) tussen de gedragsspecialisten en inhoudsexpert na afloop van de simulatieruns (zie tevens hoofdstuk 1 Onderzoeksopzet).

Feitelijke informatie die wordt verzameld met de simulator kan ook worden ingezet om de onderzoeksvragen zo goed als mogelijk te beantwoorden.

6.2. CCTV

In elke simulatierun dient elke full mission brug en VTMON-desk te worden opgenomen met CCTV om gedrag en handelingen terug te kunnen zien. De geselecteerde bemanning moet akkoord zijn met de beeld en geluidsopnames en tevens met het bewaren van deze opnames voor onderzoeksdoeleinden.

6.3. Simulator opnames

Elke simulatierun dient te worden opgeslagen inclusief ECDIS-kaart, Radarscherm, scheepsbedieningen om terug te kunnen spelen.

6.4. Geluidsopnames

De geluidsopnames van deelnemers in de simulatoren en radioverkeer van de deelnemers dient te worden opgenomen om terug te kunnen spelen.

7 Bijlage 1: Beschrijving en SIMRUNS 1 t/m 8

1. Guide to read SIMRUNS

To convey the ideas of the designers to the developers and implementers of the simulation runs in the best possible way, a script for each 'run' is prepared (SIMRUN). This guide explains how these scripts are structured.

1.1. General outline

General objective

This section describes the general purpose of the run.

Overall description

This section provides a brief summary with key elements from this run.MOSWOZ theme

MOSWOZ Theme

This section shows which MOSWOZ themes are included in this scenario. Behind the theme is a number. This number refers to one of the scenarios from the Excel delivered by RWS.

Duration

This is the estimate of time to complete this run.

Participants

These are the participants in the scenario to which the research question applies.

Location

This is the location or area where the run will take place.

Meteo

This section describes the meteorological conditions during the run.

Specifications contributing parties

This section describes the functions participating in this scenario and describes their main characteristics.

Extra

This section provides other information that does not fit elsewhere but is of interest.

1.2. Operator form

This section provides information about the flow of the scenario. It can be used with building the scenario and executing the SIMRUN.

Initial conditions

The starting conditions used to commence the simulation run are displayed here.

Events

In this section, events will be described sequentially to give direction to the scenario. The participants will respond to these. This provides information for the observers and evaluators to answer the research question. A distinction has been made herein between the three colors below:

Black: This describes a particular situation in the simulation run.

Blue: An action to be initiated by the simulation operator. All blue events are numbered. These numbers are matching on the overview chart at the end of each SIMRUN to locate the single events more easily.

Red: An action for the observer.

1.3. Evaluator form

This section provides information for the evaluator and provides direction for observation and evaluation.

Observations during exercise

This section can be used by the observers to observe key events in line with the research questions.

Reflection after exercise

This section shows how the participants can reflect on their own actions in order to gather valuable information for answering the research questions

Reflection questions

Through the questions described in this section, participants can be encouraged to reflect on key factors within this scenario.

1.4. Participant form

This form describes all the information given to the participants. It describes the initial situation and the objective of each scenario.

1.5. Overview chart

As a final step, each SIMRUN concludes with a summary map of the area. This shows the area to be simulated with an example of a traffic situation. The targets with a red circle and number can be found in the event-list of each SIMRUN.

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 on North Sea ○ 1 run with navigators **without** experience 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. 3rd 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	

		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	

		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:	-

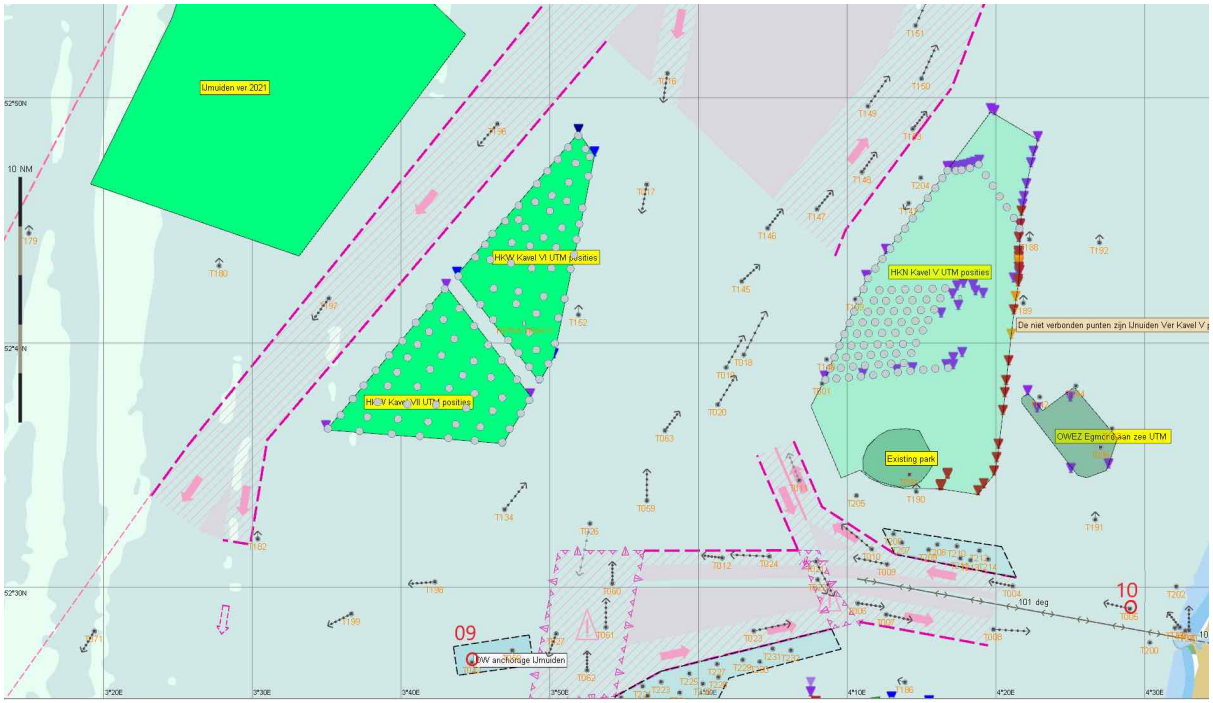


Figure 1 Instructor chart overview Norh

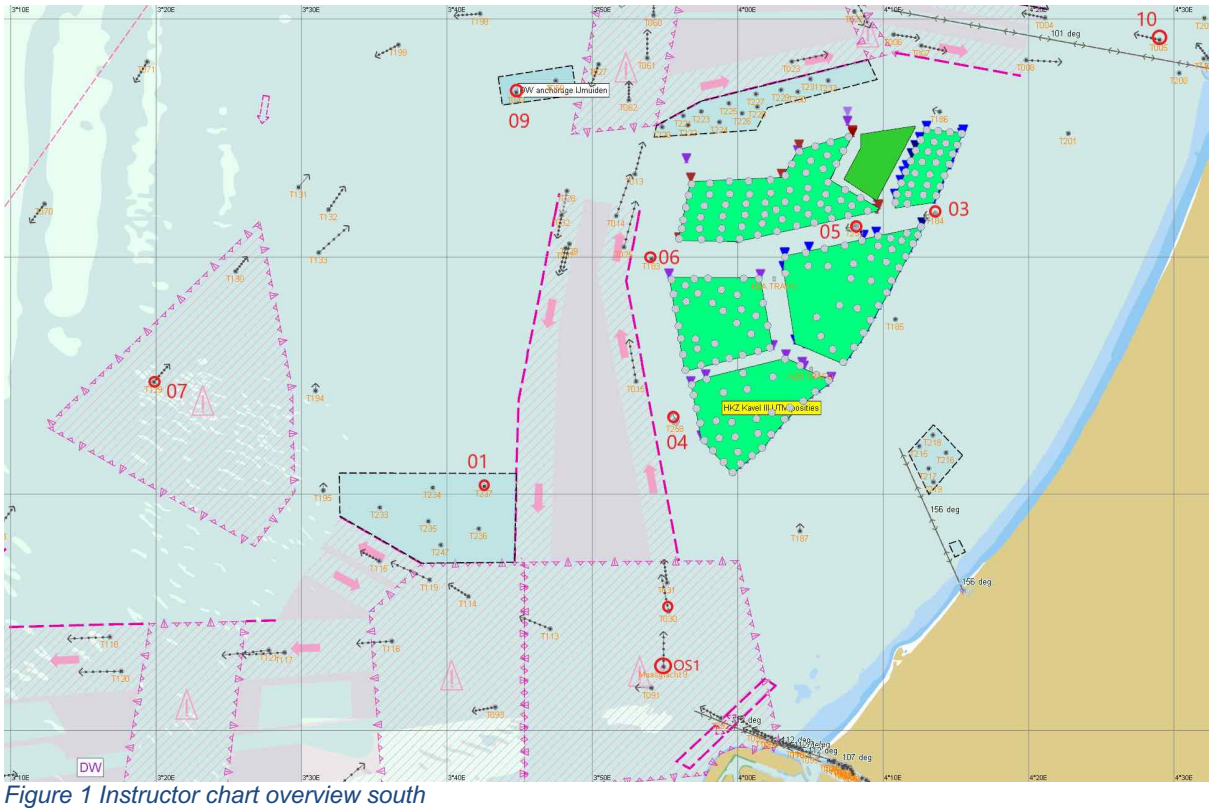


Figure 1 Instructor chart overview south

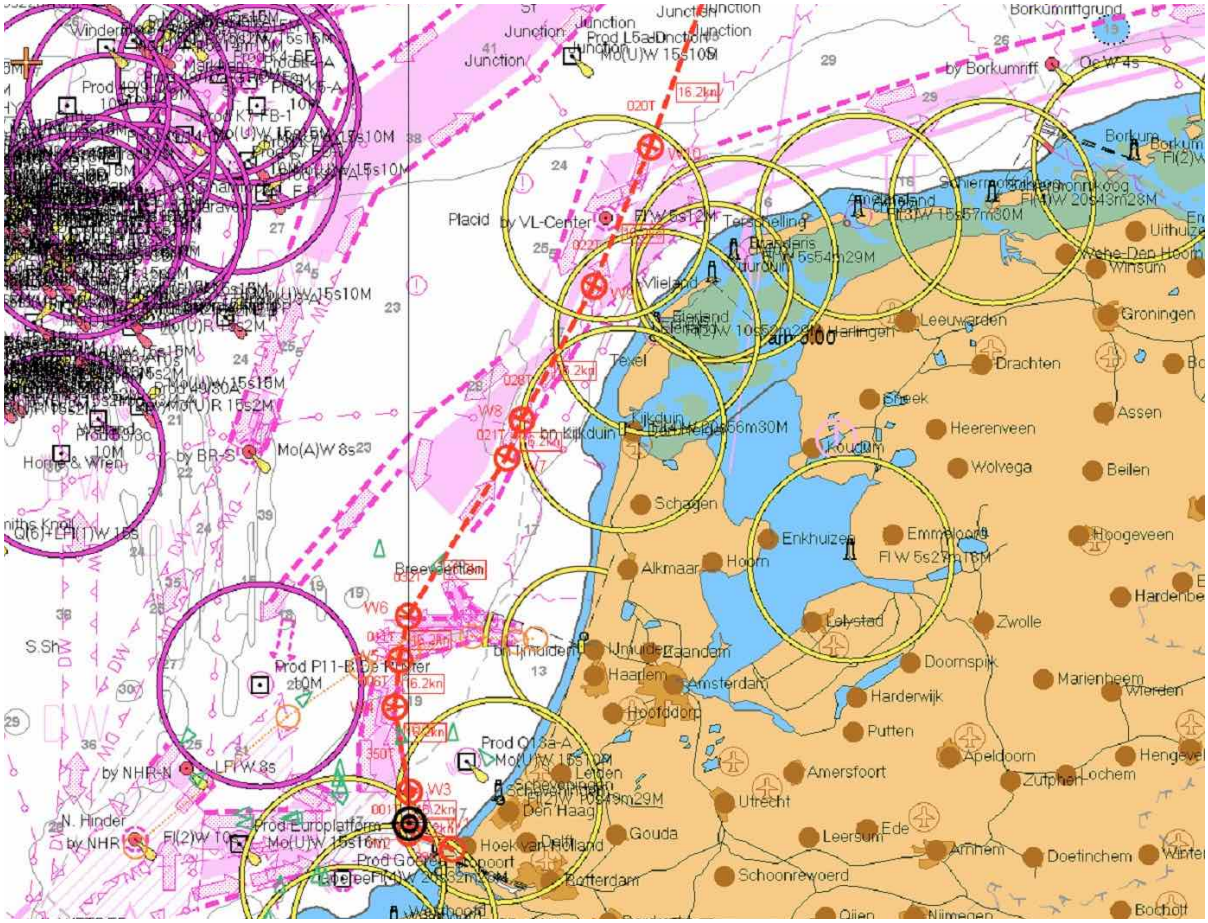


Figure 3 ECDIS overview

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. ○ 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 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 de-briefing 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 1st mate has just taken over the watch from the 2nd 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

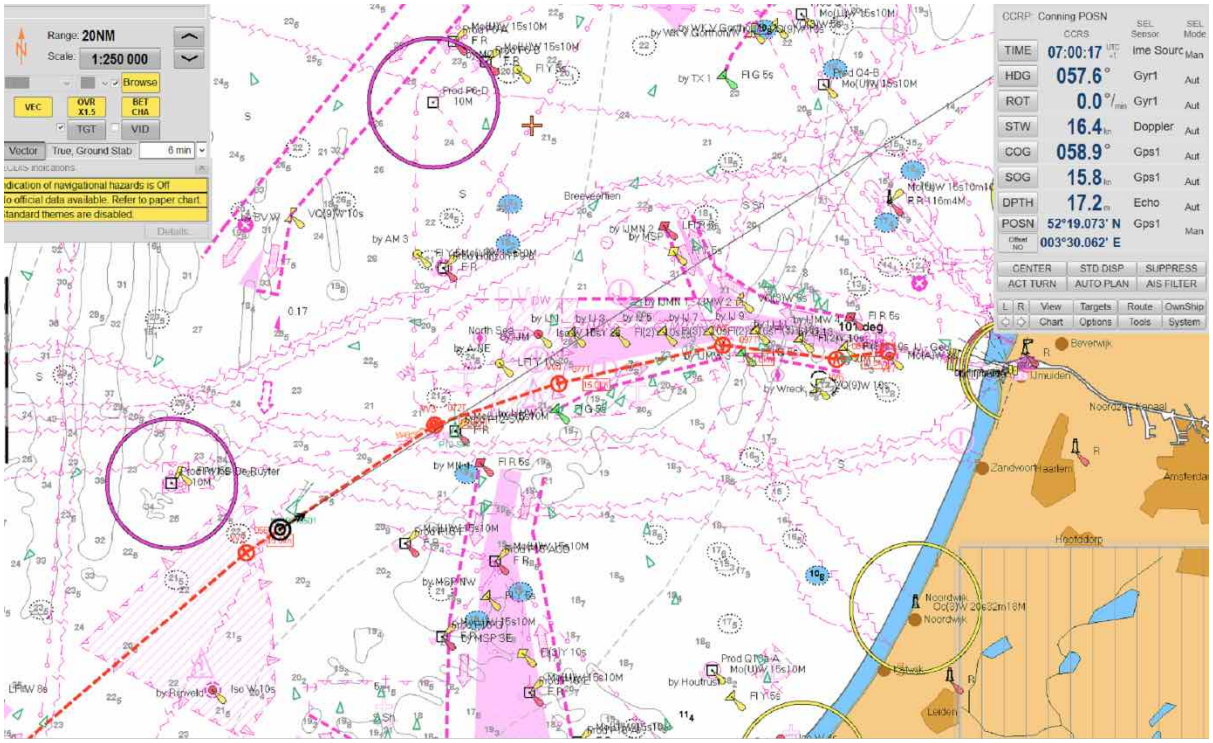


Figure 1 ECDIS overview

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 (VTM1) ○ 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 (1st off, lookout/helmsman) ○ Is familiar with used RADAR/ECDIS type. ○ Is familiar with sailing characteristics of vessel. ○ Engine room on standby as company procedures dictate
VTMON	○ Is familiar with used monitoring systems (Maritime Control or similar Vessel Traffic Monitoring Systems) ○ VHF available
ERTV	○ ERTV (Guardian) 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
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°.

	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 to 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 de-briefing 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:	

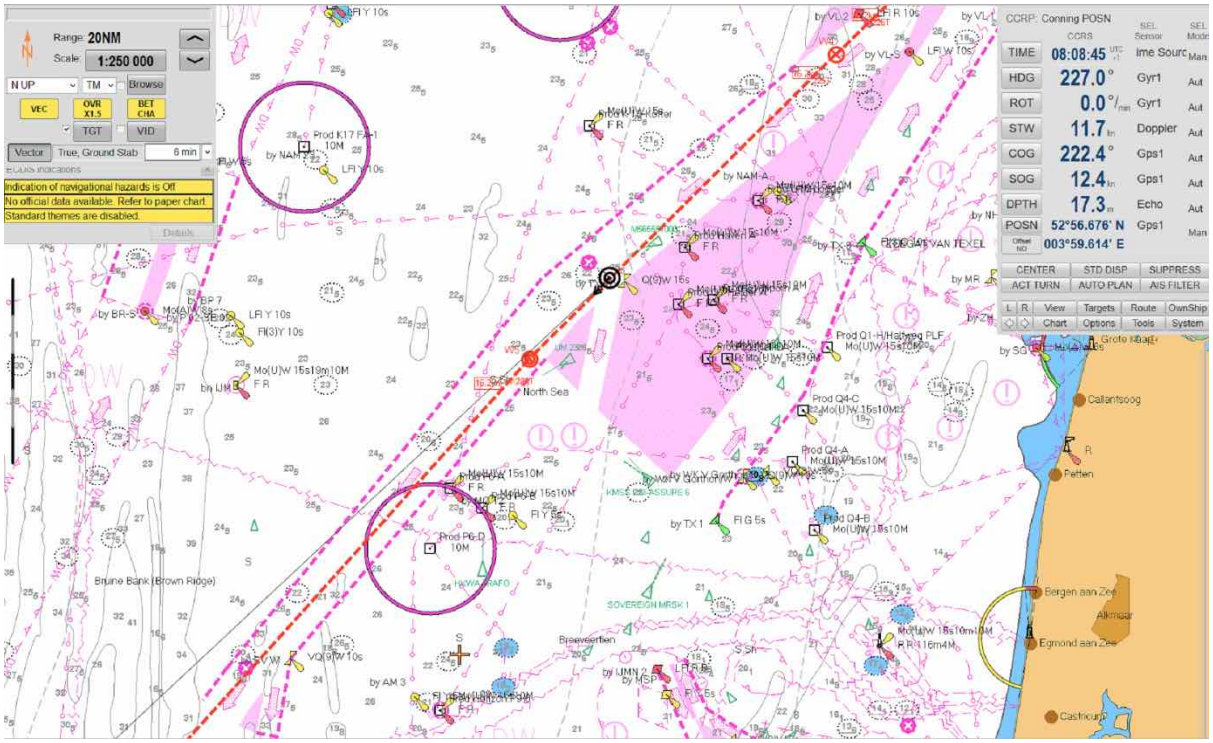


Figure 1 ECDIS overview

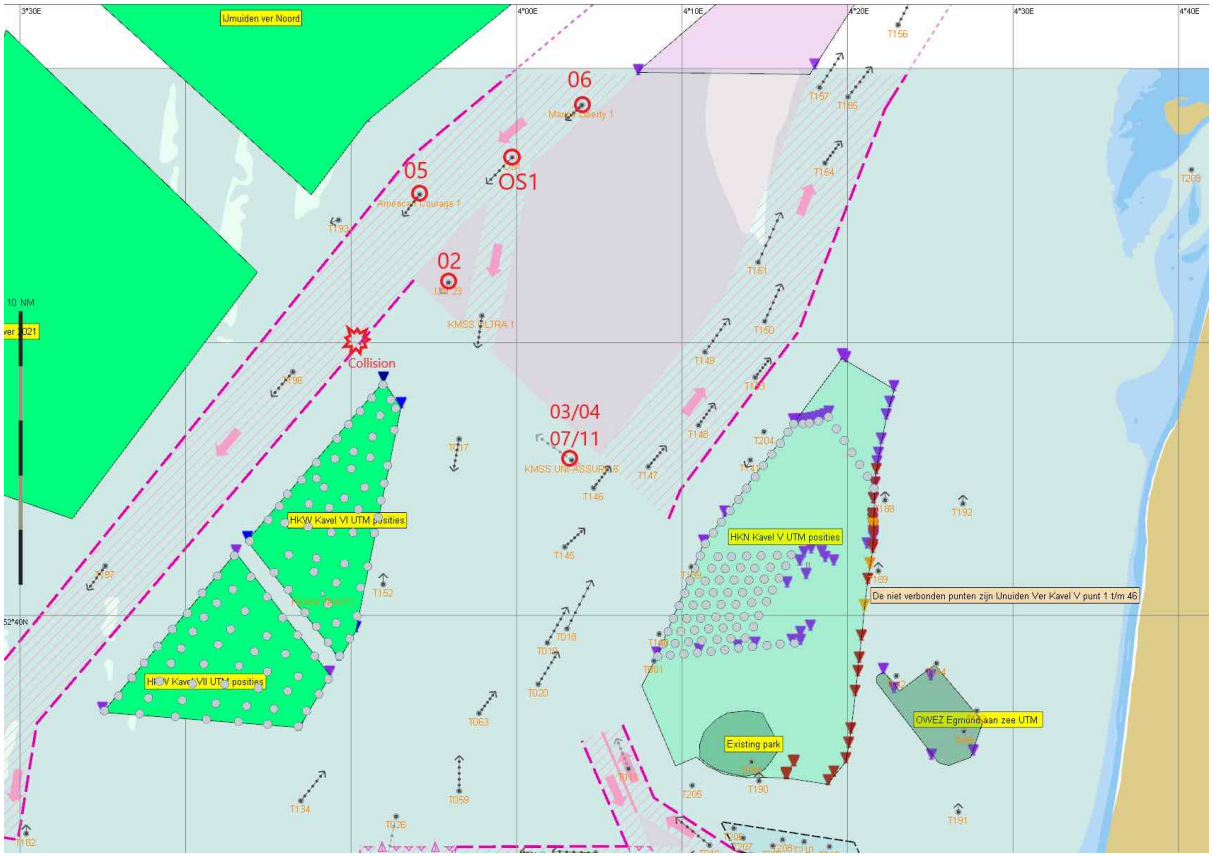


Figure 2 Instructor Overview

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

	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:	-

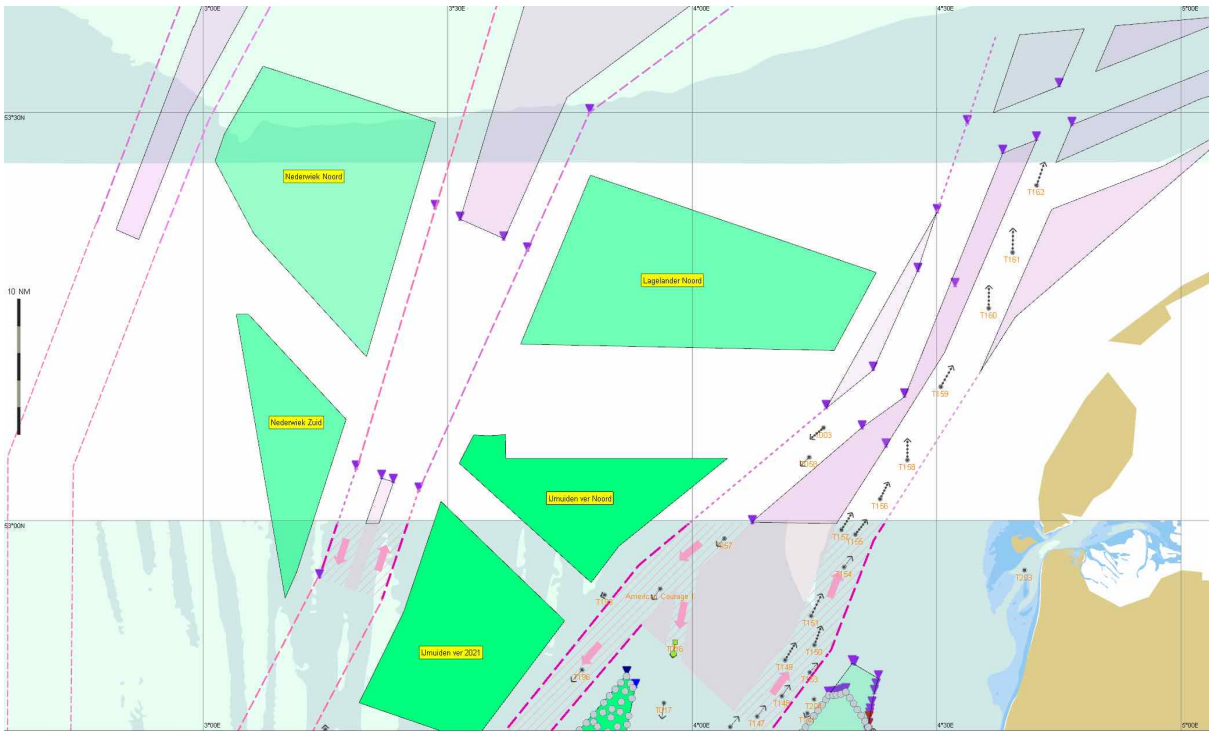


Figure 1 Instructor chart overview North

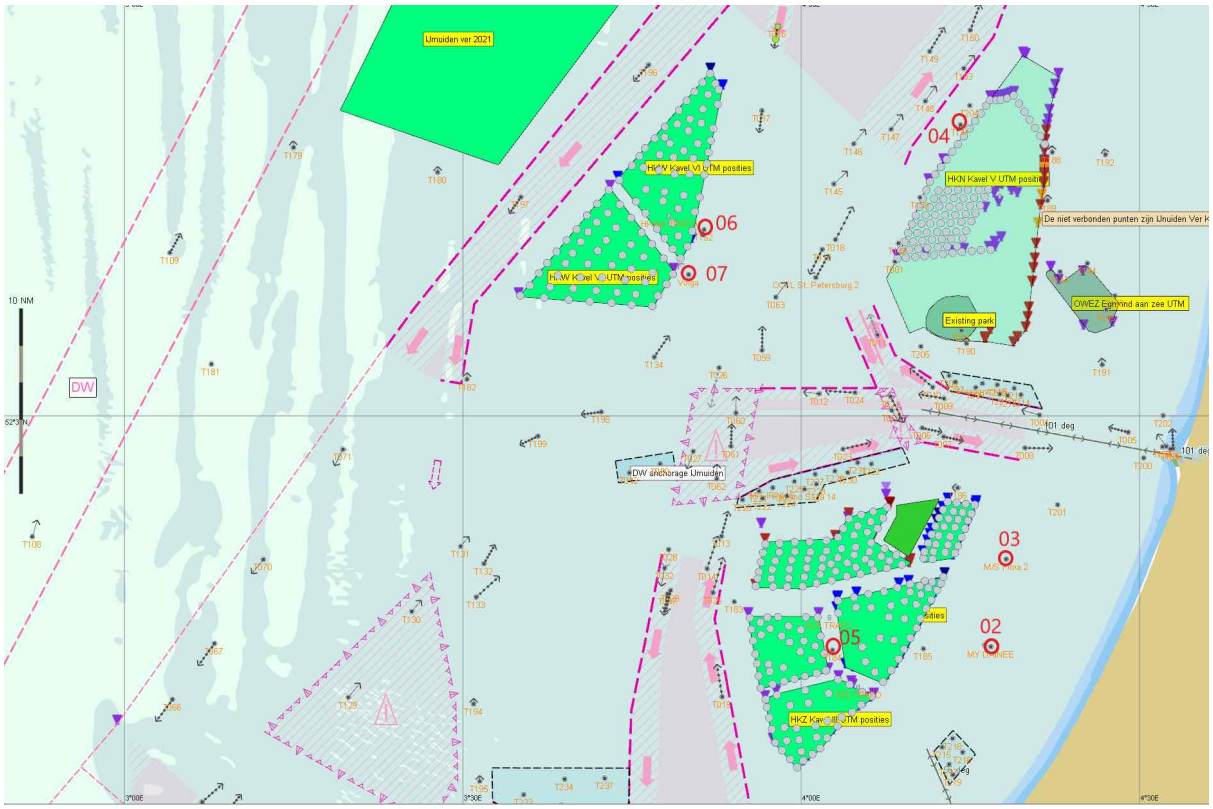


Figure 2 Instructor chart overview middle

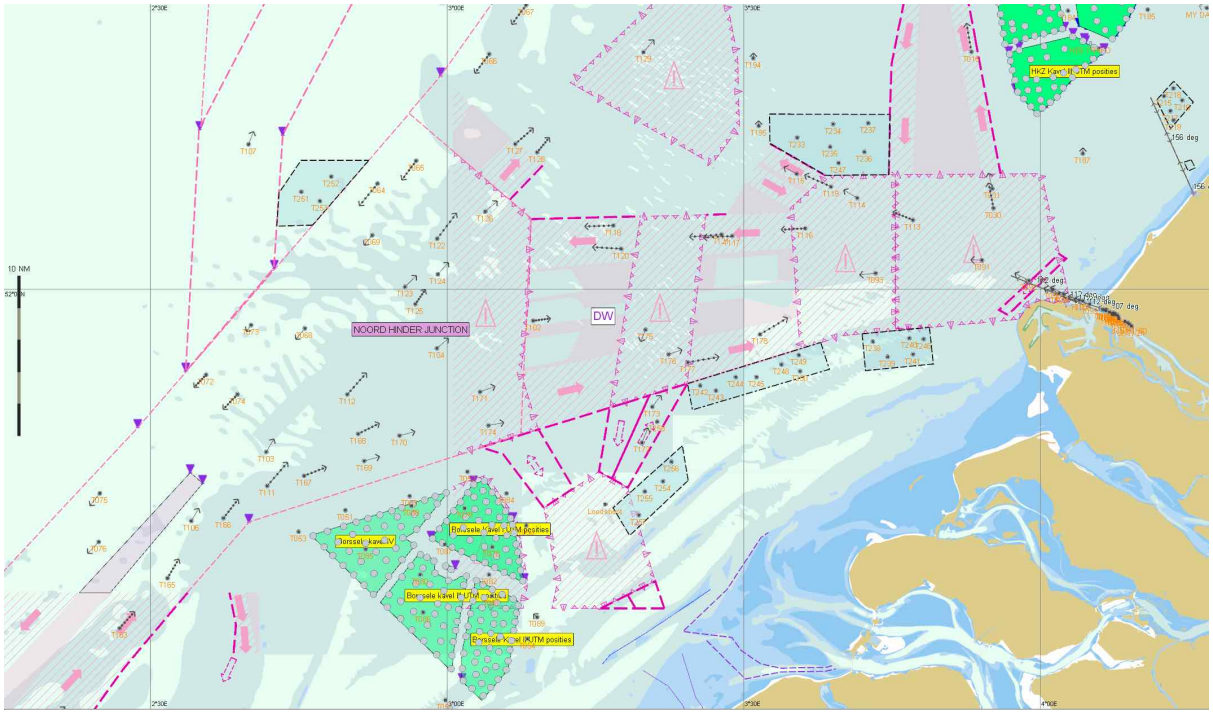


Figure 3 Instructor chart overview South

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	○ 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.
Meteo	4 Bft NW later weather deterioration to 9 bft SW
SPECIFICATIONS CONTRIBUTING PARTIES	
VTMON	○ Is familiar with used monitoring systems (Maritime Control or similar Vessel Traffic Monitoring Systems) ○ 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 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

	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	-

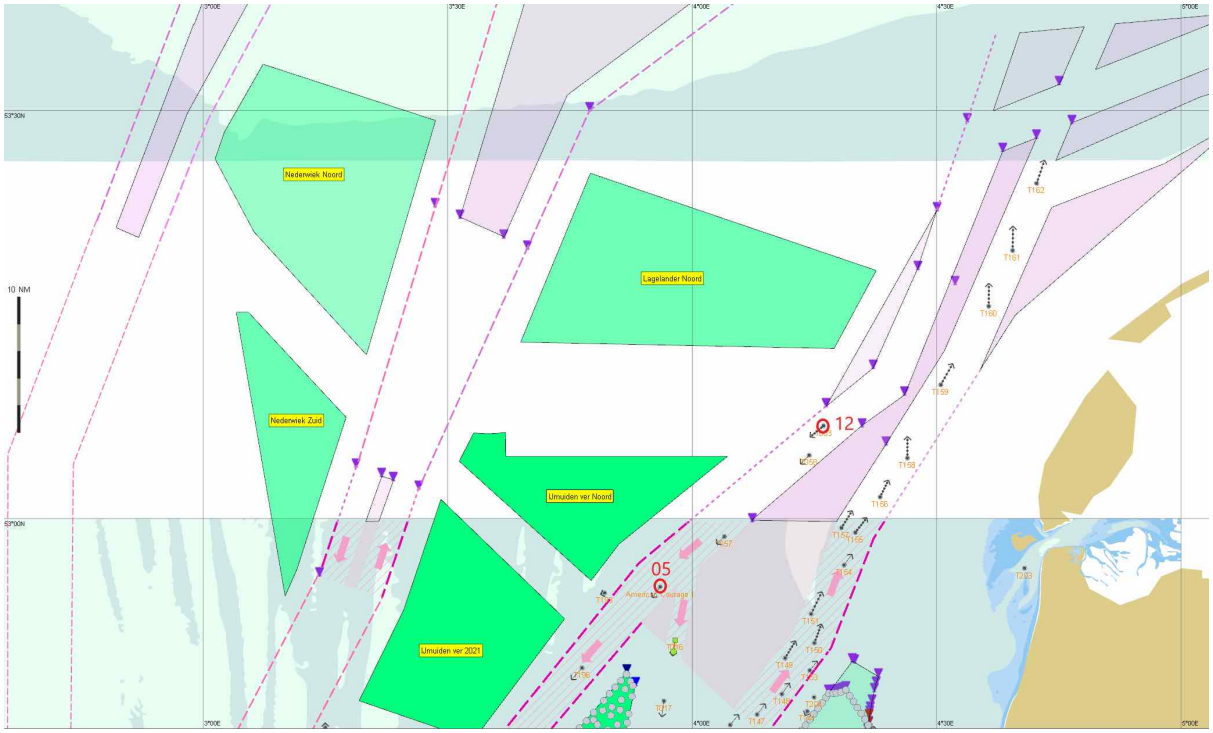


Figure 1 Instructor chart overview North

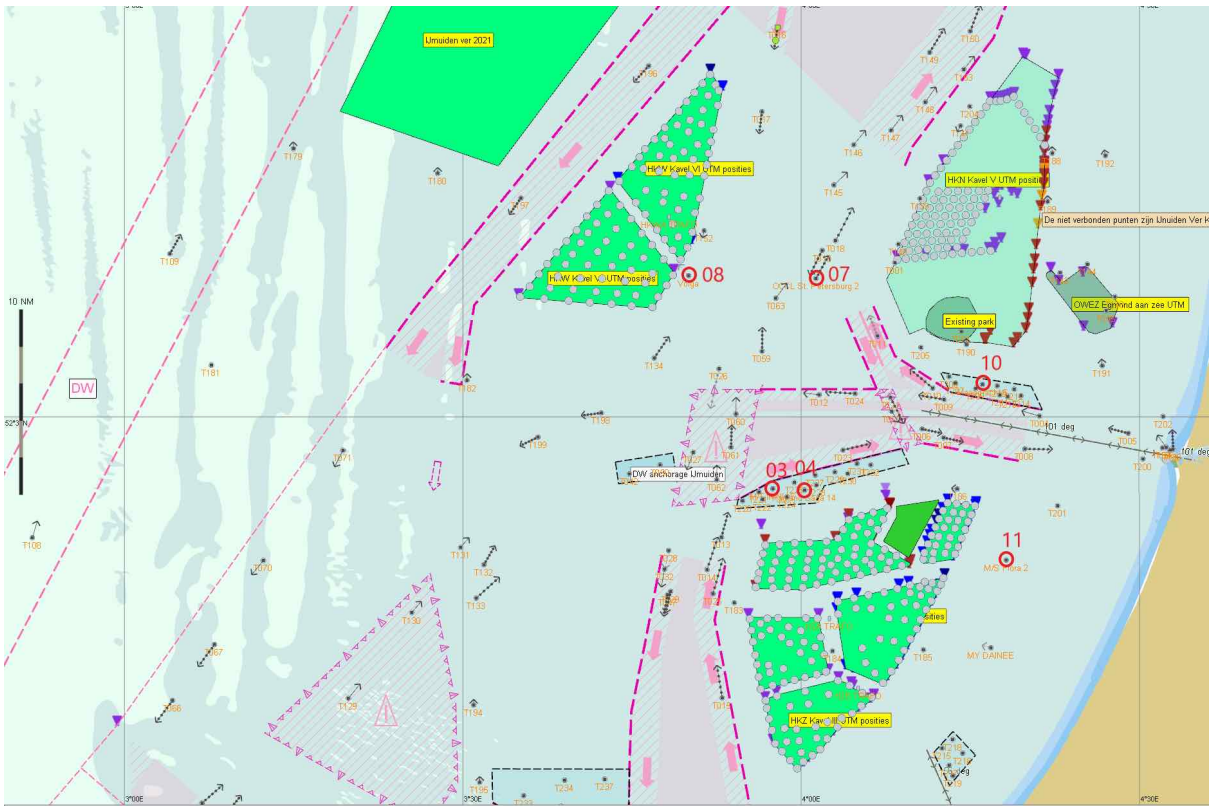


Figure 2 Instructor chart overview middle

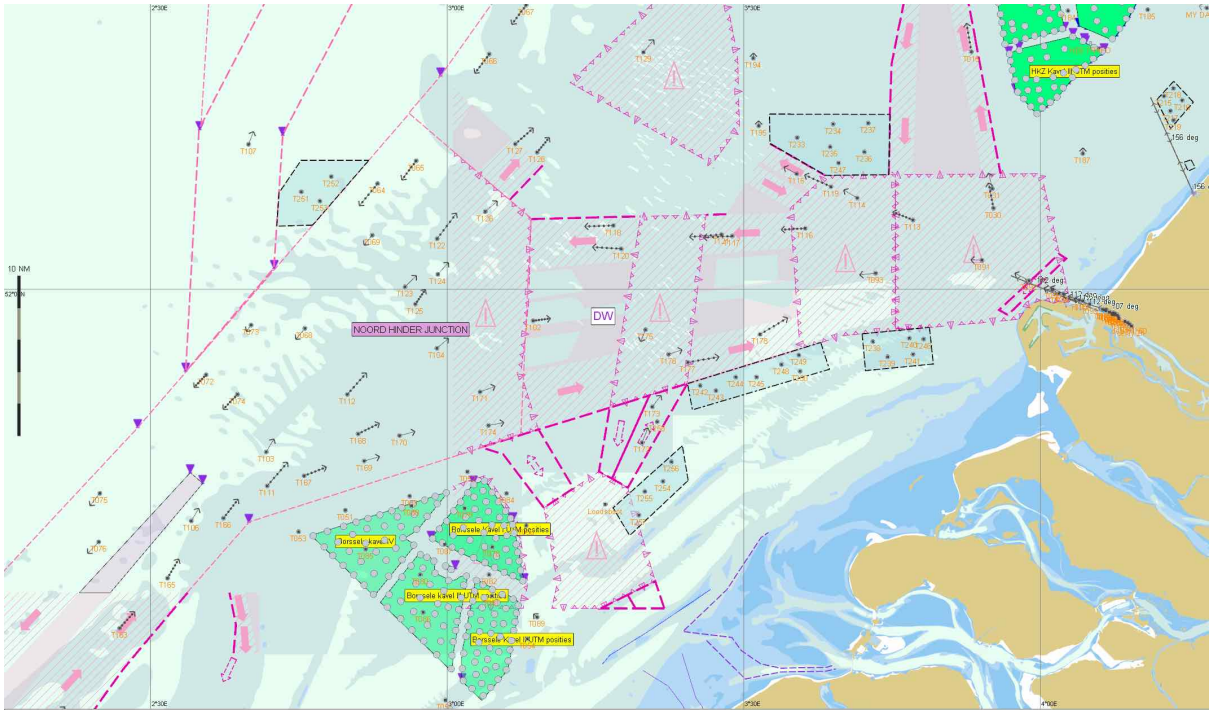


Figure 3 Instructor chart overview South

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 interreacts 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 near wind parks. ○ 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:	5th 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:		5th 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:		5th 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:		5th 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:	5th 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:	5th 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:	5th 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:	5th 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 1 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 1 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	

SIMRUN 1 SENSORS

		Observe actions from bridge team, do they pick up the signal that GPS 2 Fails? What are their considerations and actions?
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.

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 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:	-

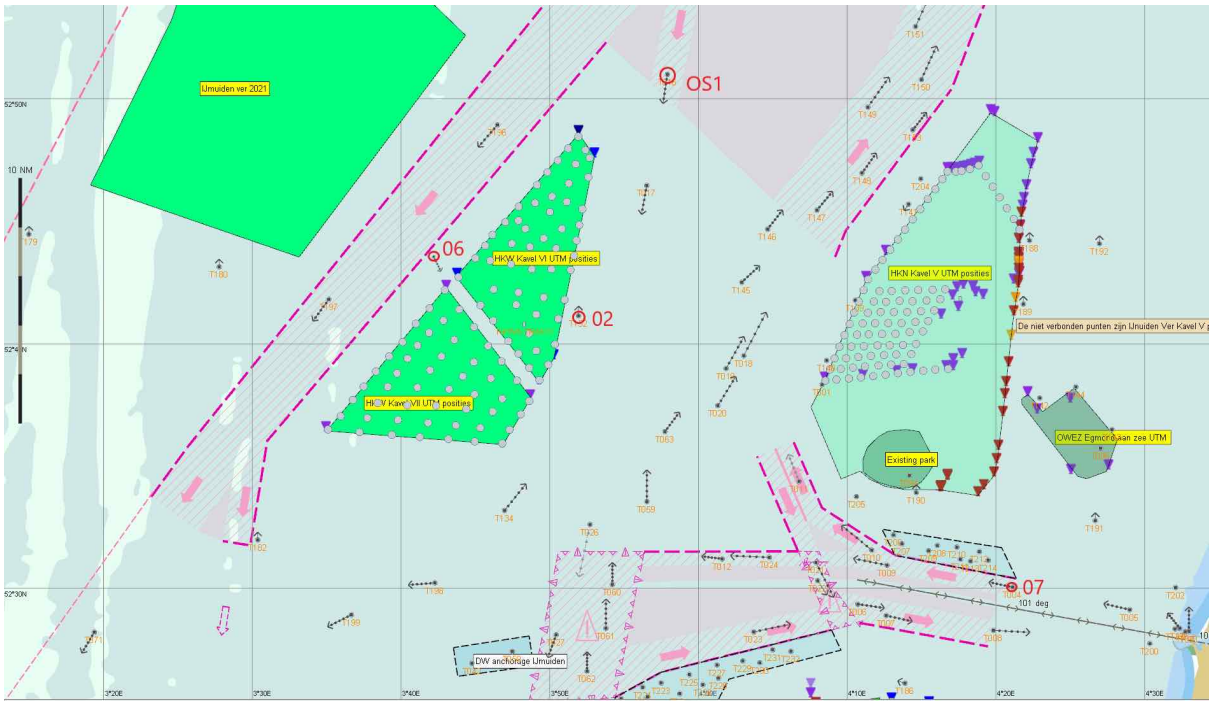


Figure 1 Instructor chart overview North

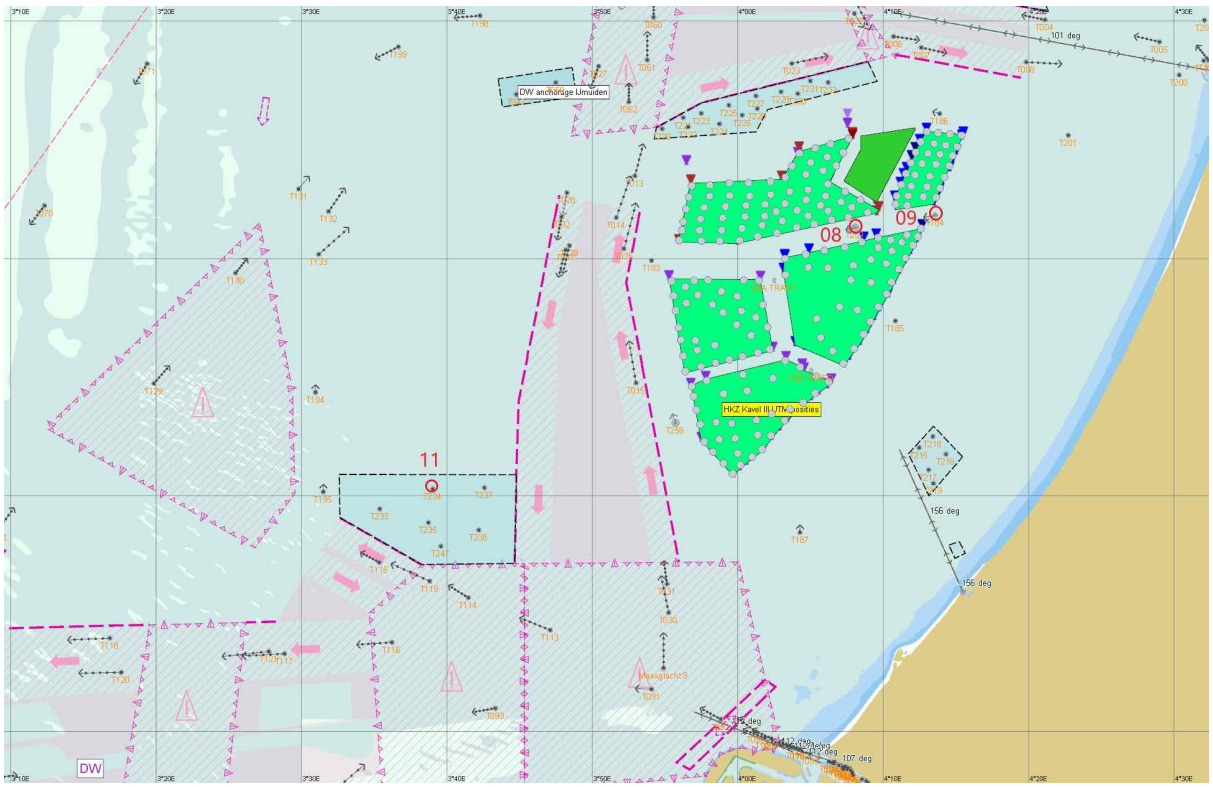
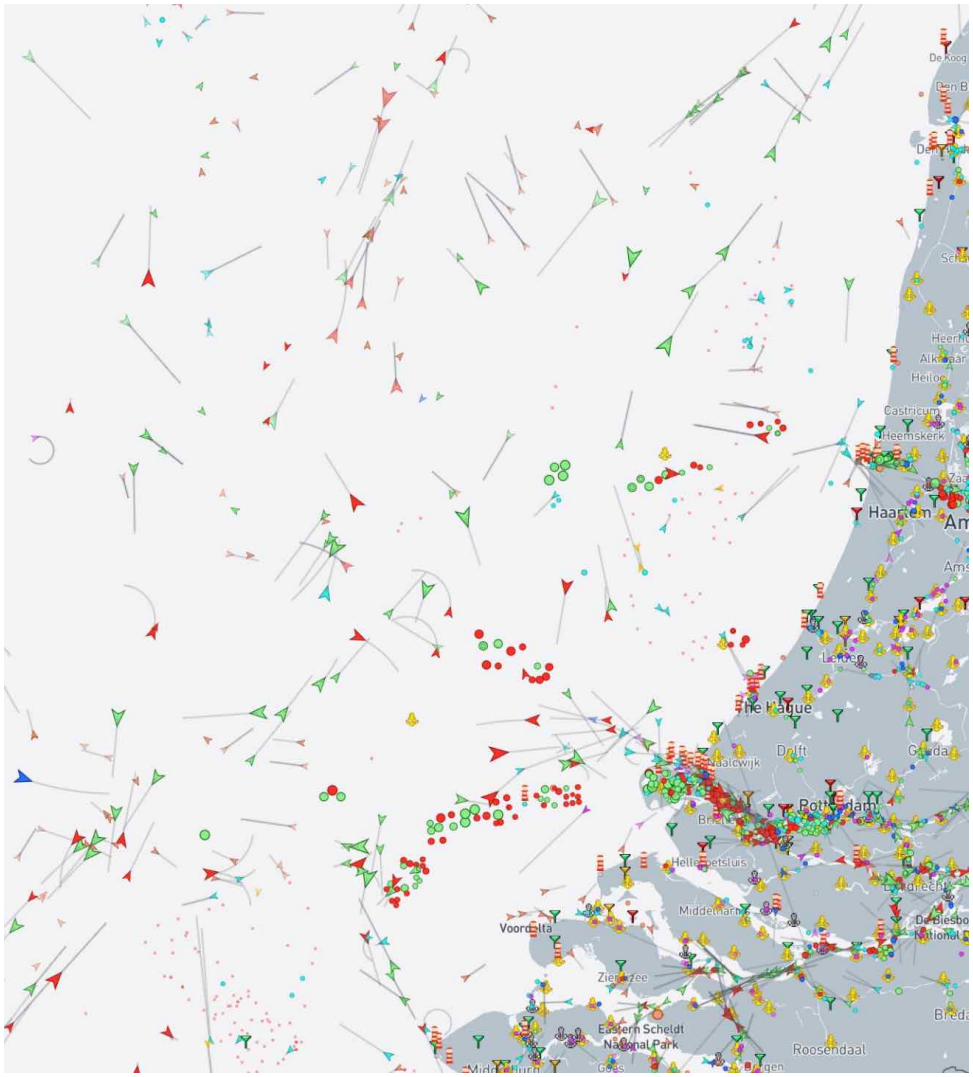


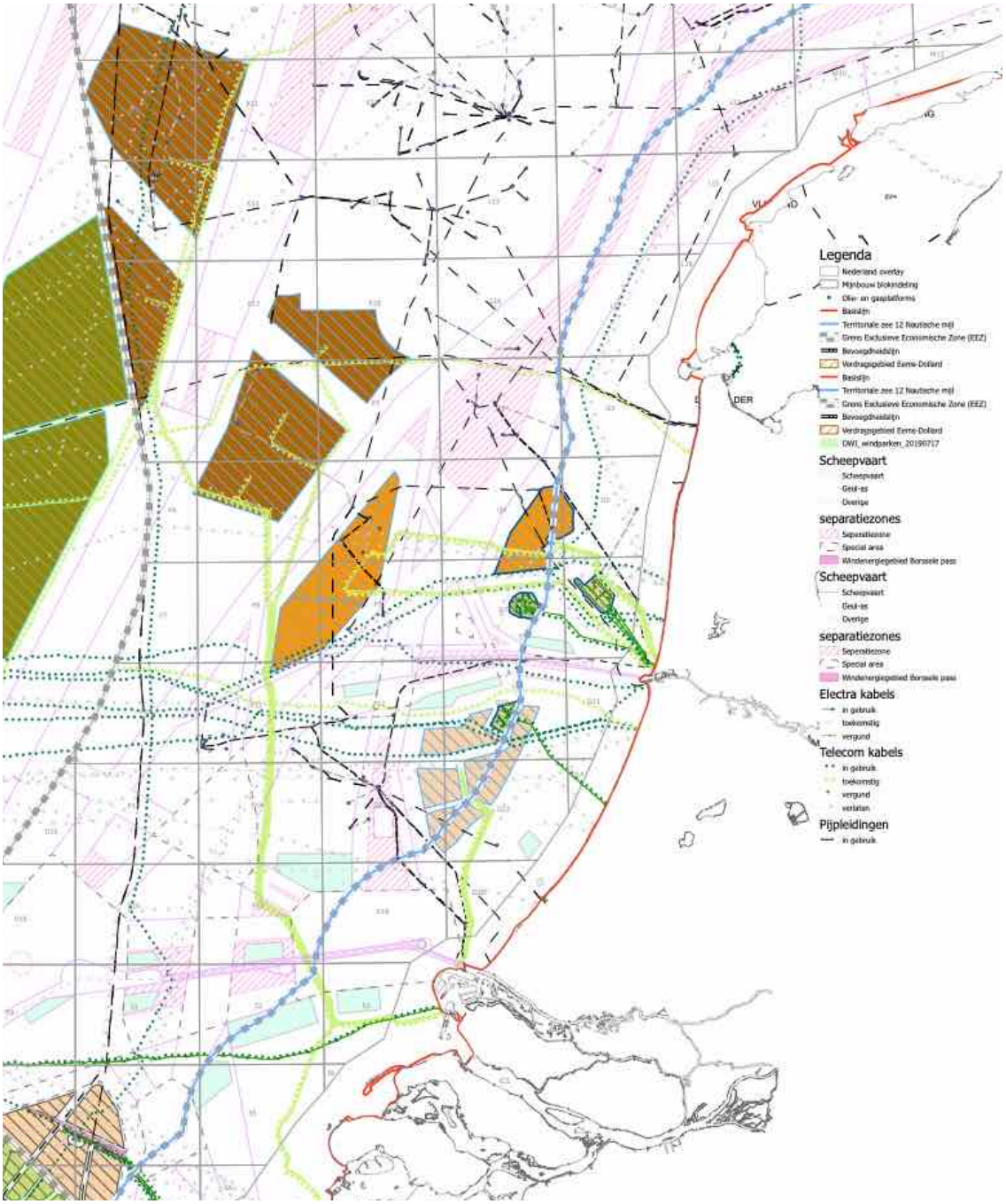
Figure 2 Instructor chart overview South

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



Cargo vessel underway (Bulk, container, generral cargo, Ro-Ro, Reefer, Livestock carrier)	68
Cargo vessel at anchor (Bulk, container, generral 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 Bijlage 3: Overzichtskaart werkgebied



10 Bijlage 4: Controlelijst simulatoren

- ☐ Zijn de brugsimulatoren voorzien van DNV Klasse A certificering of vergelijkbaar?
- ☐ Zijn er 3 full mission bruggen?
- ☐ Kunnen toekomstige ECDIS-kaarten worden ge-upload in de ECDIS?
- ☐ Kunnen er 450 schepen tegelijk varen, gekoppeld aan routes?
- ☐ Is de inrichting voorzien van minimaal 2 comfortabele stoelen van waaruit uitkijk kan worden gehouden?
- ☐ Is er gelegenheid voor koffie/thee en versnaperingen op de brug?
- ☐ Kan er voor de duur tot maximaal 6 uur, vooraf opgenomen VHF-radioverkeer worden afgespeeld in de simulatierun?
- ☐ Is er een opstelling aanwezig om te dienen als Vessel Traffic Monitoring?
- ☐ Is deze opstelling geschikt om langdurig wacht te kunnen houden?
- ☐ Is er voor de operator van deze opstelling de mogelijkheid om het gehele gebied te overzien?
- ☐ Heeft deze opstelling de mogelijkheid om de ECDIS kaart te tonen?
- ☐ Heeft deze opstelling de mogelijkheid om scheepsgegevens te tonen van schepen in het gebied?
- ☐ Heeft deze opstelling de mogelijkheid om scheepsgegevens toe te voegen als deze niet automatisch worden getoond?
- ☐ Heeft deze opstelling een vaste VHF Radio met ‘dual watch’ mogelijkheid?
- ☐ Zijn alle deelnemende simulatoren voorzien van CCTV?
- ☐ Zijn alle deelnemende simulatoren voorzien van geluidsopname apparatuur?
- ☐ Kunnen windturbines worden geplaatst in het vaargebied?
- ☐ Hebben deze windturbines roterende bladen?
- ☐ Zijn deze windturbines voorzien van de voorgeschreven IALA-verlichting?
- ☐ Kunnen getijdestromen worden geprogrammeerd in de simulator voor de duur van de simulatieruns?
- ☐ Kan wind, stroom, deining en golven worden gewijzigd gedurende de simulatieruns?
- ☐ Is er voldoende opslagcapaciteit beschikbaar voor het opslaan van de simulatieruns inclusief CCTV?
- ☐ Is er een terugkijkmogelijkheid beschikbaar, inclusief scherm opnames van Radar en ECDIS, voor de onderzoekers om de simulatierun opnames af te spelen?
- ☐ Kunnen de simulatieruns en/of de beelden daarvan gevolgd worden vanaf een andere (buitenlandse) locatie?

- ☐ Kan op de full mission (sleepboot) brug de lengte van een sleepdraad worden beheerst?
- ☐ Kunnen (stand-by) schepen met vertraging op een route starten?
- ☐ Is op 3 full mission bruggen de ECDIS dubbel uitgevoerd?