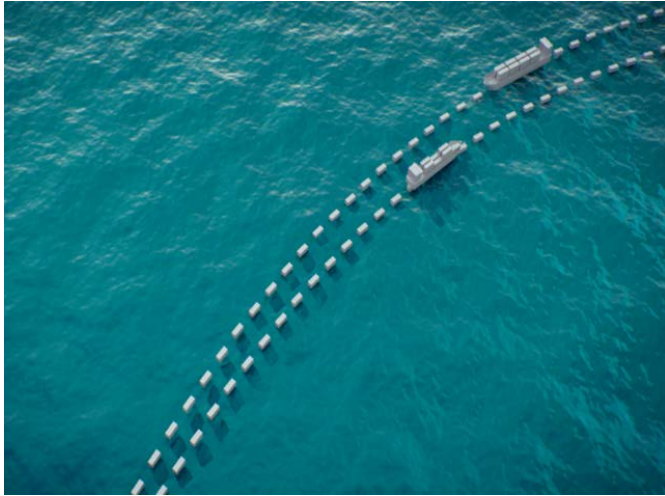


Route exchange ship-ship



Information needs

- Ship name
- Call sign/UVID
- Waypoints
- Target ships speed
- (Schedule/ETAs, not for test beds)
- (Turn radius, not for test beds)
- Position
- info/flag on ships that participates in STM test beds. ASM?

Description

Introducing route exchange ship-ship, will give the intentions of other ships. The route exchange will solely introduce a new tool which helps the OOW to plan ahead, foresee possible dangerous situations and reduce route detours due to traffic conditions.

Nothing in the current “navigational process” will be changed, the master is still responsible and COLREGs are always in force. The route exchange should be used to avoid close quarter situations; when in close quarter situations, e.g. TCPA 15 minutes, no changes in the route/voyage plan should be allowed.

Test bed usage

Ships participating in the test beds should exchange routes (send and receive route segments) ship to ship via AIS ASM and display them on ECDIS. Message 8 (SN.1/Circ.2892 June 2010) is probably preferred since a broadcast to all ships can reduce data traffic compared to message 6 where route have to be sent several times if more than 1 ships is interested. Routes should not be displayed unless activated/clicked by other ship. Route exchange should only be tested when it does not interfere with the safe navigation of participating ships which is up to OOW to decide. When a WP is passed a “new” WP from the route should be included in the message and broadcasted so that the ship always broadcasts 8 WPs (1 already passed), see picture in end of document.

Use case/functions to be supported

1. Voyage is loaded for monitoring and a choice is made to allow other vessels to see route segments.
2. Ship changes route (waypoint or ETA) and load new route for monitoring. New route should automatically be sent.
3. Other ship acquire own ships route and displays it on ECDIS/STM-display. This process needs to more automated than in previous tests of route exchange ship-ship.
4. Consider if possible: If/when other ships deviates from planned route it is visualized on ECDIS

Enhanced Monitoring



Description

Enhanced monitoring will be supported by adding route information and a more detailed service than present VTS can be provided; shore centres will be able to detect if planned schedule is not kept or if ship deviates from planned route. Thus shore centres can monitor that ships are following their planned route and also foresee possible dangerous situations and suggest route modifications (geographic and/or speed) due to traffic or other impeding conditions.

Test bed usage

The shore centres should exchange routes with the ships (send and receive routes/ route segments) ship to shore via internet (using the RTZ format, described in IEC61174 ed4.0 Annex S August 2015) and display them on the VTS/STM shore centre system. All STM ships within AIS coverage (only for ship navigational data, not format for route exchange) from shore centre will be monitored from shore centre. The shore centre operators will be supported by anomaly detection tools to be taken into operation in the project. Internet based exchange of navigational data via new message format will be tested on some ships.

Use case/functions to be supported

1. Voyage is loaded for monitoring on board and a choice is made to allow shore centres to see routes/ route segments.
2. Ship changes route (waypoint or ETA). New route should be sent (automatically when loaded for monitoring).
3. Shore centre send route suggestion (route segments), ship reply and approve/disapprove
4. If/when monitored ship deviates from planned route (outside XTE limits set by shore centre) it should be visualized on shore centre system

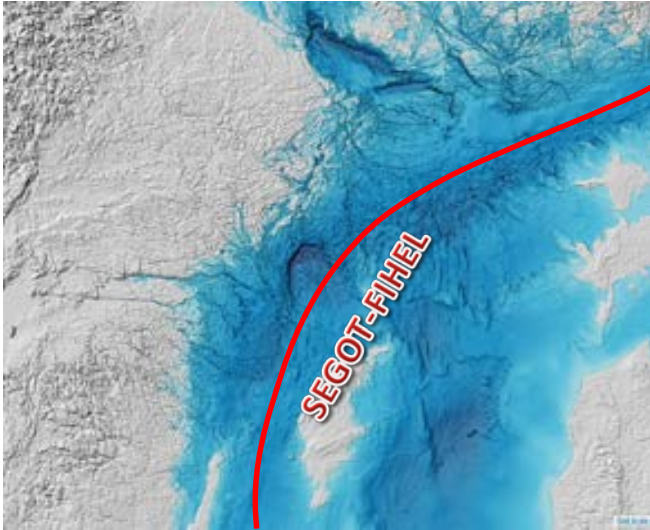
Information needs

- Ship name
- Call sign/UVID
- POS, SOG (STW), COG, HDG
- Route (Waypoints/Schedule/ETAs, Destination)

For anomaly detection tools

- Draught
- Air draught
- Locode
- AIS
- Historical AIS

En route navigational assistance



Information needs

N/A for all ships in test beds due to mainly simulator tests

- Ship name
- Call sign/UVID
- POS, SOG, COG, STW, HDG, ROT, CCRP, Steering mode (hand steering/auto pilot)
- Route (Waypoints/Schedule/ETAs, Destination, XTD limits)
- UKC (From Echo sounder)
- Rudder position
- RPM/Pitch position
- Radar picture
- XYZ.... (Additional fields anticipated to be needed...)

Description

En route navigational assistance (ERNAS) is to be seen as an extra support to onboard navigation where the final decision is still up to the Master. The purpose is to provide a new tool to existing services (NAS/TOS) in VTS-areas as well as open up for similar services in new areas. The objective with ERNAS is to support vessels own navigation, in confined areas and/or with dense traffic conditions, with shore based navigational assistance. This can be a cost-efficient alternative to deep sea pilotage outside of areas with compulsory pilotage.

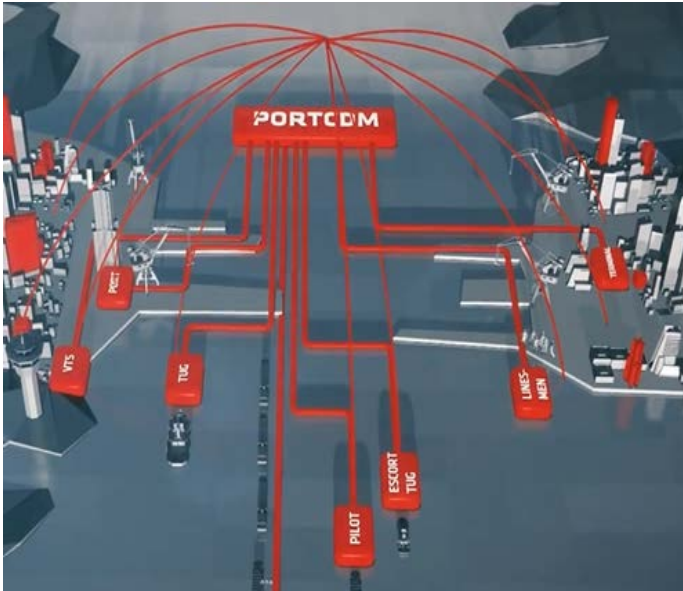
Test bed usage

Mainly tested in simulator environment (act 3). Some ships in the test beds can be test-assisted by designated qualified Master Mariners/Pilot in the shore centres. This will require new format/information for exchange of online vessel data as described in Information needs.

Use case/functions to be supported

1. Voyage is loaded for monitoring on board and a choice is made to allow shore centres to see route/route segments.
2. Ship decide to use ERNAS and qualified master mariner/Pilot in shore centre gets designated to assist the ship
3. Active monitoring by shore based operator

PortCDM



Information needs

- Unique Voyage Id (UVID)
- Ship name
- Call sign
- POS, SOG
- ETA/RTA/PTA/ATA
- More information is needed in ports. Specified in act 1 (draft port call message format)

Description

Port Collaborative Decision Making (PortCDM) will provide a basis for collaboration between key actors within the port and towards its surroundings based on shared situational awareness enabling increased predictability. To enable just-in-time arrivals of ships, just-in-time operations and further on just-in-time integration with hinterland transportation leading to optimized turn-around processes; and to enable improved resource utilization for all involved port actors and optimized operations.

Test bed usage

Ports in the testbed can collaborate with participating ships exchanging information about arrival/departure times using standardized information (e.g. STM/Port Call message format). This gives earlier information on port availability and is a prerequisite for ships to optimize arrival times (JIT arrivals, all port actors ready to perform operations). Ships ETA should be updated frequently online and pushed out (together with PTA) to stakeholders. Update interval TBD.

Use case/functions to be supported

1. Due to tugboat shortage arrival port sends new RTA to ship, ship updates it's voyage plan, ship automatically "sends" new PTA and ETA to port
2. Due to severe weather, ship sends new RTA, port replies with confirmation/rejection, ship updates it's voyage plan and automatically sends new PTA and ETA to port
3. Due to Pilot shortage departure is delayed, as a consequence a new ETD and PTA is sent

Winter Navigation



Information needs

- Ship name
- Call sign/UVID
- POS, SOG, COG,
- Route (Waypoints/Schedule/ETAs and Destination)
- Text message
- Past Track
- Risk factor for delays (in text message function?)

Description

Information regarding best route, waiting positions, preparations for assistance, position in convoy, time for departures from port is important for the Icebreaking services. The information should preferably be transmitted directly to ships navigation system. Introducing route exchange will give both Icebreaker services and assisted ships better information in more automated procedures reducing workload and risk for misunderstandings.

Test bed usage

ICEINFO, ships and Ice breakers participating in the test beds should exchange routes and if possible “Past Track”. Ice breakers and assisted ships should exchange information by means of a text message function.

Use case/functions to be supported

1. Ship with destination in ice infested waters share route/voyage plan with Icebreaking service (ICEINFO). ICEINFO send route proposal and instructions (text) to ship before entering the ice or before leaving an ice-port.
2. Icebreaker send route and instructions (text) to ship. If possible icebreakers “past track” is transformed to a route.
3. If escort assistance icebreaker sends a Requested Time of Arrival (RTA) to a flow/rendezvous waypoint, ship updates its voyage plan and send new PTA and ETA to rendezvous/flow point to Icebreaker.
4. When ship is assisted PTA (incl. risk factor) is given by Icebreaker to ship. Ship updates its voyage plan and new PTA is updated to stakeholders in final port

Area management



Description

Introducing Maritime Spatial Planning tool into the maritime domain will give a more graphic overview on areas where ships are not allowed to pass due to e.g. whale nursery areas, military exercises or SAR operations . The areas should be attached with a date attribute so that they disappear when they are obsolete.

Test bed usage

Areas (e.g. Area to avoided and/or search area) should be sent by the shore centre to ships in the testbeds.

Use case/functions to be supported

1. Area to be avoided should be visible on an ECDIS or other STM display
2. Area should be “erased” automatically when obsolete

Information needs

- Will S 121 Format be possible? (if not possible, use rtz. to create polygon)
- Date/time of enforcement
- Date/time of expiry
- Text Information regarding the area

Automated Reporting



Information needs

- RTZ information
- Port Call message
- SWIM connection
- NSW connection
- Vessel database (i.e Lloyds)
- Voyage ID
- PCDM community system

Description

By creating Automated reporting we will reduce workload on board and ashore by automate otherwise time-consuming tasks. This will be made possible by combining relevant data created elsewhere in the STM project such as in the PortCDM activity, Port Call message and voyage exchange information with existing data from NSW and vessel databases. This will be done via the use of the Voyage ID and geographical information from the rtz format (described in IEC61174 ed4.0 Annex S) to fuse data from different sources and match the created data stream with demands from those require information, i.e. Port or SRS/VTS.

Test bed usage

Selected ships participating in the test beds that calls suitable areas that requires a certain set of data should be used as test ships for automated reporting. Preferred those who regular transits areas and ports that are included in the Project. No additional requirements on onboard or shore-side softwares, only test of SeaSWIM information sharing principles.

Use case/functions to be supported

1. Report generated ashore as soon as route (rtz.) passes/enters area that requires data/report, or when crossing reporting line/point
2. Notification on sent and received reports both to ship and other relevant stakeholders such as Shore stations and PortCDM community systems.
3. "Sniffer" software that accesses different data sources and match the existing data with requested one. With help of Voyage ID, rtz information and other keys.

Route optimisation



Description

The route optimisation tools will be different in nature with a common purpose to provide more information for the navigator on board. The STM concept will provide the means to get the ships route optimised from different service providers. The service providers has different focus including best route regarding; the weather forecast, surface currents, fuel consumption, no-go areas regarding draft, areas with sensitive nature, conflicts with other ships routes etc.

Test bed usage

Ships participating in the test beds will be offered to take part of the route optimisation services that are developed within the STM project.

Information needs

- Ships identification/UVID
- Route (Waypoints/Schedule/ETAs and Destination)
- Draught
- Fuel type
- Block coefficient
- Dimensions (Length, beam)
- Speed-to-power profile
- Max Sign Wave height
- Speed/Apparent wind direction speed reducing ratio
- XYZ.... (Additional fields anticipated to be needed in long-term...)

Use case/functions to be supported

1. The route is shared to a service provider for optimisation.
2. The service provider alter the route as to their calculations.
3. The optimised route is send back to the ship.
4. The Master/OOW decides upon changing route or not

Route Cross-check



Description

The intended voyage plan is sent to a shore based service provider for cross-checking. The purpose is to include updated regional area information that could affect ships voyage plan. The cross-checking can be done before the vessels departure or before arrival at a certain geographical area. The cross-check can include, but is not limited to, Under Keel Clearance (UKC), air draught, no violation of no-go areas, MSI and compliance with mandatory routeing. No optimization service as such is included in the route validation.

Test bed usage

In the test beds shore centres will act as the service providers performing route cross-checking. The cross-checking will be limited to the shore centres area of responsibility (TBD).

Information needs

- Ship identification
- Route (with turn radius)
- Draught
- Air draught
- Rtz.
- LOA/Breadth
- DG onboard

Use case/functions to be supported

1. Voyage is loaded for monitoring on board and a choice is made to allow shore centres to see route/route segments and that cross-checking is requested
2. Shore centre cross-checks route according to their available information. Sends verification or new suggested route back. (ref. SOP Voyage Planning on last slide)
3. If new suggestion ships decides if to use suggested route as monitored.

Flow management



Information needs

- Ship name
- Call sign/UVID
- POS, SOG, COG
- Route (Waypoints/Schedule/ETAs, Destination)

Description

A shore-based operator is performing flow optimization through advice to the ships within a defined sea area using an enhanced traffic image, consisting of AIS targets, radar targets and with the planned routes for the STM compliant ships. As a part of the route schedule, the operator has access to the ship's ETA to some key waypoint, denoted Flowpoint (FPT). Based on the above information, the operator is continually assessing the overall maritime traffic situation within his sector of responsibility. If a developing traffic situation is identified, the operator can recommend a new ETA for the FPT in order to resolve the situation at an early stage. In case of a MSI receipt, e.g. a fairway or traffic lane is closed; the operator can use both re-scheduling and suggested route/s, which is a proposed new route segment. In the case of a port approach the approach could be synchronized with the port call.

Test bed usage

The flow management concept for flow management of complete traffic situations will be tested in the simulator network. Test plan to be elaborated but no other information/functions than stated in information needs is anticipated. Basic flow functionalities as Recommended Time of Arrival (RTA) to a given flowpoint will be included in the test beds.

Use case/functions to be supported

1. The routes are exchanged ship-shore
2. The operator gives a RTA to a FPT for a ship in order to resolve traffic situations at an early stage (this could be done as a route proposal where a new WP/FP is inserted in ships original route plan by shore centre)

SAR

Description

Introducing STM in SAR services will greatly improve MRCCs overview and possibility to control SAR-units in search operations. The MRCC will be able to send areas and routes to SAR-units.

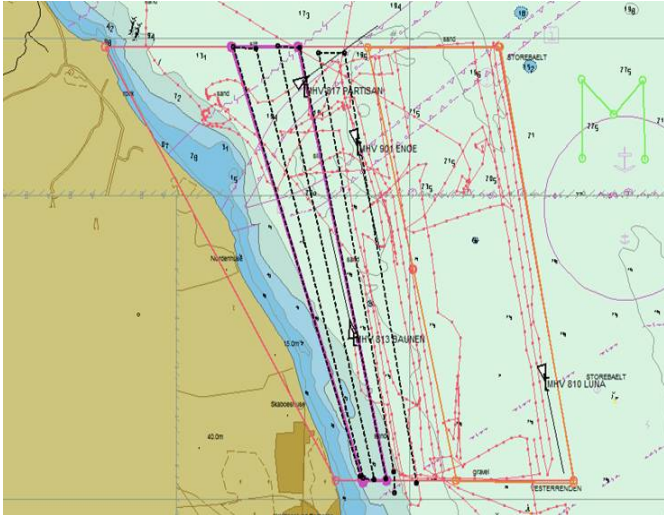
Test bed usage

Route exchange will be used in SAR operations by MRCCs and SAR-units in both simulator exercises, real life exercises and/or real emergency situations to evaluate the services. If possible MRCC uses all involved SAR-units “past tracks” and swept areas to evaluate and take decision if the search area is completely searched. Test bed plans for SAR applications will be developed.

Use case/functions to be supported

TBD. Test bed plans for SAR applications will be developed.

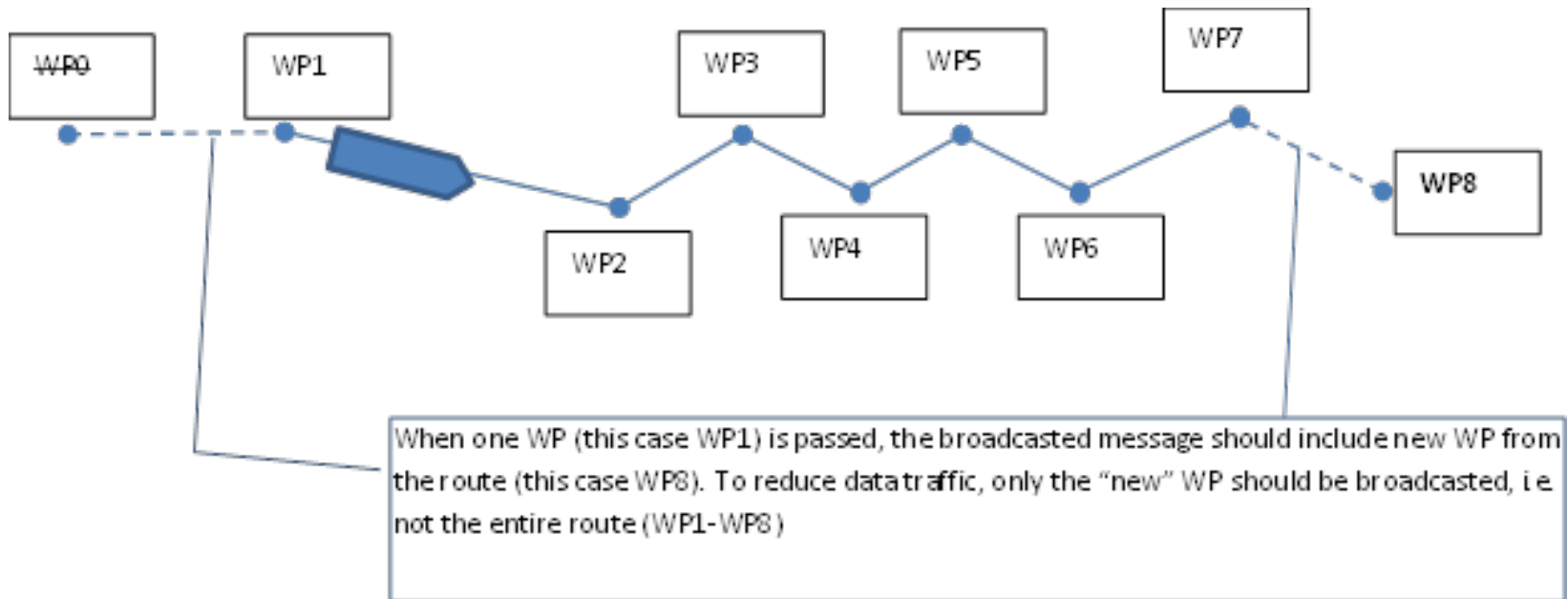
1. Search area is calculated by means of Man over board position, wind and current information by MRCC, Search Pattern-Routes are sent out to SAR-Units, SAR-Units automatically transmits their “past track” to MRCC.



Information needs

- Ship name
- Call sign /UVID
- POS, SOG, COG,
- Route (Waypoints/Schedule/ETAs, Destination, XTD limits)
- (Search) areas
- Past track
- Swept areas
- Text message

Route exchange ship-ship WPs to be broadcasted



STM Standard Operating Procedures Voyage Planning (To be updated)

