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<th>Date</th>
<th>Status</th>
<th>Initials</th>
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<tr>
<td>1.0</td>
<td>2018-01-24</td>
<td>Final</td>
<td>BA</td>
<td>Prepared for 2018 ASR</td>
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**TEN-T PROJECT NO:** 2014-EU-TM-0206-S

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1 Executive summary

This document comprises the services and shore based systems that has been developed as part of the STM Validation project testbed. Services and centers from both the test bed areas, the Nordic (Deliverable 2.11.1) and the Mediterranean (Deliverable 2.9.1) are included and the descriptions verifies that Mediterranean and Nordic shore center has been equipped and manned and that STM capability on ships, icebreakers and SAR units has been developed to be ready for live testbed validation of the effects.

The purpose with the development has been to create shore-side services and functions that can communicate with STM enabled ships using the technical infrastructure and Service Oriented Architecture (SOA) established within the project. This Architecture together with defined payload formats; Route exchange format (rtz), S-124 for area exchange/Navigational Warnings, Port Call Message Format (PCMF) and Text message format will be used for communication ship to shore to study its effects on a number of services. Some are new services developed within the project e.g. Pilot Route Service whilst in other, like shore centers and the Winter Navigation Service, the STM functionalities has been integrated into existing services and systems.

The shore center (SC) in the STM testbed has its origin in traditional VTS (Vessel Traffic Services). There are big similarities between the SC and the VTS but there are also differences. New technique is being developed that can either improve traditional VTS services vastly without changing them profoundly, or be used for new STM Services. This report covers a brief explanation of STM functionalities focusing on the ability for SC to receive and use ships actual routes in real time. Further the included shore centers are presented as well as descriptions/user guides for each of the STM capable systems from Kongsberg, Transas and SAAB.

Next section of the report includes included services that has been developed both as a way to verify the function of the STM architecture and as a way to provide participating ships with value adding services in a new and innovative way. The generic and typical service usage is initiated with the ship giving access to their voyage plan to a service provider to get e.g. optimization for energy efficiency, optimization regarding weather, safety checks, navigational warnings and pre checked pilot routes. The onboard functionality is described in deliverable 2.5.1.

Finally STM in SAR operations are described including the upgrade of the Information and Control tool for SAR that will enable Maritime Rescue Coordination Center (MRCC) to create and digitally send direct to the navigation equipment of the SAR units or Vessel of Opportunity (VoO); text message with distress position and first alarm information, search areas and search patterns.
2 Shore centers

2.1 Introduction and general information

The Shore Center in the STM testbed has its origin in traditional VTS (Vessel Traffic Services). There are big similarities between the shore center (SC) and the VTS but there are also differences. New technique is being developed that can either improve traditional VTS services vastly without changing them profoundly, or be used for new STM Services.

The SC is a new concept based on VTS fundamentals, where the major differences are that the SC provides new services, covers a larger geographical area and is much more loosely defined than VTS, which has been in use and regulated since the 1950’s. During the test period the Shore Centers are likely to function as “hubs”, encouraging and supporting Ship’s Officers who want to try the STM services and the Shore Centers will also provide some services themselves.

When reading this report it must be realized that the Shore Centers of the STM testbed sort of stretches between VTS and SC.

It should also be realized that the manufacturers of the Shore Center Software have chosen slightly different approaches where some of them has made a system tailor made for VTS with new technique, and others have chosen to develop a system that is more integrated with the concept of STM, the idea of sharing information and new services.

The big difference between “old” and “new” technique from a VTS point of view is that the fundamental of STM, sharing of information, will enable the VTS (or SC) to access the intentions of a vessel in advance before the vessel conducts its maneuvers, choice of fairway etc. The purpose of VTS is to enhance efficiency, safety and protection of the environment and with access of the vessels’ intentions the possibilities of achieving this goal will increase hugely.

2.2 Brief explanation of advancements in Software from a VTS point of view

There are several new functions in the newly developed Shore Center Software that will enhance the capability of the VTS. In the following we will focus on the advantages with sharing of routes.

The two pictures below aims to demonstrate the difference between today’s system and tomorrows.
Picture showing a Vessel entering the VTS area:

The Vessel in the picture above is now entering the VTS area of Gothenburg, Sweden and leaves the following information to the VTS: “Entering the area, going south of Vinga, south channel to Port of Gothenburg”. This is perfectly normal and nothing that will alert the VTS Operator. Let us have a look at next picture.

Picture where the route of the Vessel is shared and displayed on the VTS system.

The picture above shows the route that the Vessel is monitoring. The information that the Vessel left previously was correct, but now when the route is displayed it is obvious that the Vessel has planned a highly risky shortcut. This can be detected at an early stage by the VTS Operator.

Picture showing how the VTS can send a new suggested route to the Vessel.
The Vessel’s route has now been edited by the VTS and sent back to the Vessel. It has also been complemented with a short text message. Of course such a suggestion of a new route could have been done by VHF or other means but having this new route displayed directly on the incoming Vessel’s ECDIS will make it more distinct.

It could also be the case that the Vessel’s route is safe and well planned but that the Vessel does not follow it. The VTS operator will be alerted by the system and can then take proper action.

Picture showing one Vessel leaving the harbor bound for sea and another Vessel continuing along the Coastline.

The two black vectors in the picture shows how the situation is going to develop based on how the Vessels are moving for the moment. The red lines are the shared routes indicating the Vessels’ intentions. So, based only on today’s technology Vessel A will pass well ahead of Vessel B, the give way Vessel. With tomorrow’s technology we know already at this stage that vessel A is bound for southwest and hence we have a totally different situation.
There are numerous of different situations where the new STM features can be used. The two above mentioned situations are given as examples of the difference between assessing a situation from what is happening now and how it can be assessed when the intentions of the Officers on board are made clear and shared.

2.3 Participating Shore Centers and software manufacturers

The STM Testbed is planned to include six Shore Centers before the test period is over 2018-12-31. All of the Shore Centers will be situated together with an operational VTS and they will in most cases be manned by VTS operators sharing their duties between their ordinary VTS watch and the new Shore Center role.

What tasks that are expected to be carried out will vary slightly between the Shore Centers. The new technology, the Shore Center Software, will also vary slightly between the manufacturers, but they all have in common that they are based on existing VTS Systems and that the new STM Tools have been merged in to the VTS System.

The six above mentioned Shore Centers are situated in, and equipped with Shore Center Software, as presented in the table below:

Table: Shore Center locations and equipment

<table>
<thead>
<tr>
<th>Name of Shore Center</th>
<th>Country</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tallin VTS</td>
<td>Estonia</td>
<td>Transas</td>
</tr>
<tr>
<td>Kvitsøy VTS</td>
<td>Norway</td>
<td>Kongsberg</td>
</tr>
<tr>
<td>Horten VTS</td>
<td>Norway</td>
<td>Kongsberg</td>
</tr>
<tr>
<td>Gothenburg SC</td>
<td>Sweden</td>
<td>Testing all systems</td>
</tr>
<tr>
<td>Great Belt VTS</td>
<td>Denmark</td>
<td>Airbus</td>
</tr>
<tr>
<td>Tarifa VTS</td>
<td>Spain</td>
<td>Kongsberg</td>
</tr>
</tbody>
</table>

In the sections below each Shore Center will be given a brief description in terms of general purpose, what equipment will be used, manning and a picture of the situation today and the milestones to come.

2.3.1 Kvitsøy VTS and Horten VTS, Kongsberg System

Kvitsøy VTS, situated on the Norwegian West Coast close to Stavanger, and Horten VTS situated at the entrance of Oslo are traditional Port or River services VTS. The VTS Software System used today is Kongsberg C Scope. During the test period the Shore Centres of Kvitsøy and Horten will be manned by the VTS Operators on watch and the new STM Tools will be tested on vessels in respectively VTS area. Both
Kvitsøy and Horten has chosen not to expand their VTS areas during the test period and they will not add further Services to their VTS. The biggest contribution from the two Norwegian Shore Centers is likely to be the comparison of “old” VTS Software with “new” Shore Center Software. Technically both centers’ STM equipment is up and running and they are ready to start testing the new STM services with the test ships.

2.3.2 Tallin VTS, Transas System
Tallin VTS, situated at Tallin Estonia, surveys all Estonian territorial waters and they are a part of GOFREP (Gulf of Finland Reporting). In Tallin VTS ordinary VTS Services will be carried out with new technique and a comparison to the old one will be made. When this is written (mid of January 2018) the Transas Shore Center system has not yet been installed in Tallin VTS.

2.3.3 Tarifa VTS, Kongsberg System
Tarifa VTS is situated at the Strait of Gibraltar. What differs Tarifa VTS from the other VTS Centers is that Tarifa VTS has a much higher involvement in Search and Rescue Operations. The text below is written by Mr. Adolfo Serrano Solís at Sasemar:

“Equipment, VTS Tarifa existing system (Kongsberg 5060) has not been updated, instead of it Kongsberg installed, on June 2017, a standalone PC running a C-Scope Kongsberg system with STM functionalities and connected to AIS Sasemar network, receiving data of all class A vessels sailing in Mediterranean Spanish waters, approximately 40 miles away from Spanish coast.

STM functionalities, the system is able to receive, edit and send Voyage Plans, we have conducted some test with SMA successfully. Service instance description is updated on Maritime Cloud, see attached file.
For other services as cross check, enhanced monitoring, etc. the test area would be adjusted according with automatic detection tools installed by manufacturer.

Use, we are not using the system for VTS and/or SAR purposes due that there are not vessels transiting the area equipped with STM functionalities.

SOP’s, Shore Center has been provided by Kongsberg with an user manual to operate on the Voyage Information Service receive, shown, edit and send voyage plans.
Staff, final decision for manning the system with the VTS operators on duty or a dedicated VTS operator during working days office hours (08.00 to 15.00), must be taken in function of manufacturer update the system with more STM functionalities and number and time of vessels sailing the area equipped with STM.

2.3.4 Gothenburg Shore Center, Transas, SAAB, Kongsberg, Airbus

The Gothenburg Shore Center, situated in Gothenburg, Sweden is the only of the Shore Centres that is completely separated from VTS. The Software System is not shared with the VTS nor is the personnel. The intention of Gothenburg Shore Center is to provide STM Services like Enhanced Monitoring over a large area in the Baltic Sea Region, but also to trigger the ships’ crews to share their routes, both with other ships and Shore Centers. This will be done by sending a text message welcoming STM vessels entering the area.

Technical documentation from the Shore Center Software Manufacturers has been compiled in appendices. The documentation varies a bit between the manufacturers.

Transas
Transas STC_STM_User Manual
Description STM Services

SAAB
SAAB VTS_GBG-Description_Staging_20180104

Kongsberg
Kongsberg C Scope STM Manual
3 Provided services

3.1 Introduction and general information

Sharing of Voyage Plans is the beginning of a new era in Navigation. It opens up for all different kind of services. The imagination is the limit. The service providers within the project are proof of that. The ships gives access to their route to a service provider to get optimisations for energy efficiency, optimisations regarding weather, safety checks, navigational warnings and pre checked pilot routes.

Within the project, we have bi-weekly developers meetings where the service providers meets the ECDIS manufacturers and shore centres manufacturers. This have been a good way of bring all actors forward in the same pace.

The provided services have been tested according to a test plan, which includes several steps.

Once the service provider have the service ready for publishing in the Maritime Connectivity Platform with correct service description, design and instance it will be released in the MCP staging environment. Here extensive test will be done with both a SMA mock up and later with ECDIS manufacturers and their actual systems. When the test are passed, the service are released into the production environment in MCP.

<table>
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<tr>
<th>#</th>
<th>Check</th>
<th>Proof</th>
<th>PASS/FAIL</th>
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<tr>
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<td>Service approved in integration test of public API</td>
<td>Fe! Hittar inte referenskälla.</td>
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<tr>
<td>2.</td>
<td>Service approved in operational tests</td>
<td>Fe! Hittar inte referenskälla.</td>
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</tr>
<tr>
<td>3.</td>
<td>Correct service instance description</td>
<td>Service Instance Description in/to Service Registry</td>
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<td></td>
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<td>• Correct description</td>
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<td>4.</td>
<td>Correct Service Instance as XML in/to Service Registry</td>
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<td>Fe! Hittar inte referenskälla.</td>
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<td>5.</td>
<td>Information Security</td>
<td>Fe! Hittar inte referenskälla.</td>
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The test protocol for release into the production environment of MCP

3.2 Route optimisation, SSPA

Optimization is performed based on bunker consumption/total vessel resistance, i.e. the returned route aims to be the most efficient route from A to B. The service
accounts for water depth as well as the influence of weather (wind, current and waves) during a rolling 12 day window (-7/+5 days). Navigational aids are not accounted for and the returned route has to be checked onboard for compliance with navigational aspects.

The service should be used as the first step in a route planning and the route from the ship should be send in status planned. SSPA efficiently optimises the route according to under keel clearance with a great knowledge of ships particulars they suggest a route that might be longer but causes less resistance, which will lead to less bunker consumption.

For full information see appendix: *Service instance description for the SSPA-Route Optimisation Service*

### 3.3 ETA Calculator, SMHI

A realistic ETA window calculation will allow the masters to adapt the vessels speed to the current weather forecast predictability resulting in a better ability to keep required ETA with a minimum of fuel waste. The service will be offered to STM-ships that are clients of SMHI. The service will be available world wide.

For full information see appendix: *Service instance description for the SMHI-ETA Calculator Service*

### 3.4 Enhanced Monitoring, Navicon

Enhanced monitoring is one of the cornerstones in STM. By sharing of voyage plan, a shore centre can get an overview of the ships planned route in advance and act if there is any unsafe passages. It also allows the shore centre to monitor the ship and immediately find diversions from their route. Navicon has integrated the STM-enhanced monitoring tool in the Danish Defence Joint Operation Centre. The tool compares the ships route to historical AIS to have an indication on if the route is normal.

The tool monitors vessels inside Danish and adjacent waters and alerts operators to unnormal behavior or diversions from monitored route. The operator may choose to inform the vessel via ordinary communication means or text messages if deemed useful.

For full information see appendix: *Service instance description for the Navicon-Enhanced Monitoring Service*
### 3.5 Nordic Pilot Route Service (NPRS), SMA

The pilot routes made available through a smart library that gives you access to prechecked route that concerns the chosen route. The service have two major benefits. The first being the availability of routes made by an authorised expert saving time and providing safety derived from local knowledge. The second being the enforcement of the bridge team as both navigators and pilot have the same picture and are prepared for the same route. This service’s given for all Swedish fairways with pilot routes.

The NPRS is an onshore service that provides pilot routes to vessels when planning their voyages. The vessel can send their voyage plan to NPRS and get back one or several pilot routes in return. The vessel responsible personnel can chose among the returning routes which to add to their voyage plan. If the vessel’s voyage plan is planned from/to the berth, NPRS will calculate the best pilot route(s), if the voyage plan ends near a pilot boarding point, all pilot routes from that boarding point will be returned. When the voyage plan reaches from port to port within Swedish waters, NPRS will return both departing as well as arriving pilot routes.

For full information see appendix: *Service instance description for the Nordic Pilot Route Service*

### 3.6 Baltic Navigational Warnings service, SMA

The purpose with the Baltic Navigational Warning service is to provide the service consumer, i.e. ship, with only those warnings that are relevant for that specific route that they intend to sail/are currently at and at the time specified in the route schedule. Moreover, the warnings will be displayed directly in ECDIS and automatically deleted when they are expired and no longer valid.

The benefits are:

- **Reduced workload** – No need to manually plot positions/areas received by NAVTEX/voice communication at ENC/paper chart. This allows the navigator to concentrate on safely navigating the ship.
- **Increased safety of navigation** – According to London P&I Club Insurance inspections regularly find deficiencies in managing navigation warnings and notices to mariners as officers fail to implement navigational safety notices. By providing the notices directly to ships ECDIS manual work and risk of missing important information is reduced and T&P notices can be received digitally already before sent out as ENC updates. In addition all Temporary and Provisional (T&P) Notice to Mariners are not sent out today which means that full ECDIS ships, sailing paperless, do not get all notices.
- **Reduced human errors** – As warnings are provided digitally and seamlessly shown directly on ECDIS possible human errors possible errors in misunderstandings and manual plotting can be avoided.
- **Increased Navigational Warning focus** - Since only notices relevant for the planned and/ or actual route will be sent to the ECDIS, the Officer On Watch can concentrate on these and need not bother with warnings issued outside the adjacent areas.
The service provides safety notices to ships in S-124 format. The S-124, navigational warnings, product specification is being developed by an IHO Correspondence Group with the purpose to submit it for endorsement. Before being mature for endorsement the STM Validation Project will serve as one of the testbeds to validate a draft version of the specification.

The service is initiated when a ship shares its Voyage Plan (VP) with the Baltic Navigational Warning service. In response, the Baltic Navigational Warning service initially provides the ship with all related safety notices in the concerned area(s), and then continuously all updates in the concerned area(s). Notices that are within the sub-areas that the route crosses, see figure 1 in paragraph 3.2 for sub-area division, are deemed as relevant and returned to the ship. Notices in other sub-areas will not be returned.

When ship has left the service coverage area, the Baltic Navigational Warning service stops sending updates to the ship. More operational details are to be found in paragraph 3.5, functional description.

The Baltic Navigational Warning service provides the following navigational safety notices:

- **Coastal warnings** - Navigational warnings that apply to open waters are classified as coastal. The same information that today is transmitted on NAVTEX.
- **Local warnings** for Swedish waters - Warnings that apply only to waters inside the belt of the skerries are regarded as local. Today transmitted only on VHF.
- **Temporary and Provisional notices** for Swedish waters

Note: The Baltic Navigational Warning service is not intended to relieve the service users from ordinary receipt of Maritime Safety Information (MSI) as part of the Global Maritime Distress and Safety System (GMDSS), which every ship, while at sea, has to comply to. Since the service is intended to be used for test and validation purposes during the STM Validation Project the Swedish Maritime Administration, as service provider, cannot guarantee any service level or take any responsibility that all relevant warnings and information are provided by the service.

For full information see appendix: *Service instance description for the Baltic Navigational Warning Service*

### 3.7 Winter Navigation Service, FTA

Winter Navigation Service provides ships ice routes and detailed information regarding icebreaker assistance. Information will be provided from ice-coordination centers and directly from icebreakers.

Finland's and Sweden's foreign trade is highly dependent on shipping. Approximately 90% of Finnish exports and 80% of imports is done thorough shipping. This means that ship traffic must be reliable throughout the year, also in ice conditions. To ensure this effective icebreaking operation must be in place.
STM Winter Navigation service will enable Swedish and Finnish icebreakers, test-ships and shore centers to share routes and other operative information via the Winter Navigation Service, leading to increasingly automated communication through machine to machine interfaces rather than by human intervention. Thereby information will become more precise and up to date, the amount of manual tasks for information management will be reduced and the risk of errors and misunderstandings decrease.

The icebreaking operations in Finnish, Swedish and Estonian icebreakers are coordinated using common system, IBnext. This system contains information of all of the ship traffic in the area, weather and ice conditions, satellite images of ice conditions, port visits etc. The system is also used for information exchange between different actors involved in the coordination of winter navigation; icebreakers, authorities, shore centers, meteorological institutes and icebreaker operators.

During STM validation project interfaces to SeaSWIM environment and functionalities for route and text message exchange have been integrated to this system. This development includes also the user interfaces to display, modify and send route plans that are received from merchant vessels.

The STM functionalities will be available for all Finnish and Swedish icebreakers and shore centers that uses IBnext system.

STM functionalities will enable IBnext users to:

- Receive and display merchant ships detailed route plans
- Send route recommendations to ships
- Send and receive text messages to / from ships

Merchant vessels using the STM Winter Navigation service will be able to:

- Receive active ice routes directly to their navigational equipment
- Receive other route recommendations from icebreakers and shore centers directly to ships navigational equipment
- Receive other information related to icebreaker assistance as text messages

For full information see appendix: Winter Navigation Service
- Service instance description
- Brief technical description
- IB Next STM features and user manual
4 SAR

STM SAR service will include STM upgrades both in the Information and Control tool for Search and Rescue at MRCC as well onboard the Search and Rescue Units SRU or to a Vessel of Opportunity VoO engage in a SAR operation.

By using the STM upgrade Information and Control tool for SAR, MRCC will be able to create and digitally send direct to the navigation equipment of an SRU or VoO:

- Text message with distress position and first alarm information.
- Search area
- Search patterns

By Route exchange the STM upgraded information and Control tool at MRCC will also be able to receive and display on map, STM Vessels route and voyage plans VP when entering the area interest.

This will greatly improve MRCCs overview and possibility to control SAR-units in search operations. By using STM SAR the digitally way of distribute information, it will improve the accuracy and clarification when describing search area and distress position. And also the situation awareness onboard the selected RSU or VoO will increase.

For full information see appendix: SAR Service
- Service instance description
- User guide to STM SAR tools
- Swedish Search and Rescue organisation
5 Appendices

Transas Shore Center
Transas STC_STM_User Manual
Transas Description STM Services

SAAB Shore Center
SAAB VTS_GBG-Description_Staging_20180104

Kongsberg Shore Center
Kongsberg C Scope STM Manual

Route optimisation, SSPA
Service instance description

ETA Calculator, SMHI
Service instance description

Enhanced Monitoring, Navicon
Service instance description

Nordic Pilot Route Service, SMA
Service instance description

Baltic Navigational Warnings service, SMA
Service instance description

Winter Navigation Service, FTA
Service instance description
Brief technical description
IB Next STM features and user manual

SAR service, SMA
Service instance description
User guide to STM SAR tools
Swedish Search and Rescue organisation
60+ partners from 13 countries, containerising maritime information

Demonstrating the function and business value of the Sea Traffic Management concept and its services.

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Appendix:

Shore Center

- Transas
  Transas STC.STM_User Manual
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  SAAB VTS_GBG-Description_Staging_20180104
- Airbus
- Kongsberg
  Kongsberg C Scope STM Manual
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       3.3.3. Position Prediction Mode .............................................................................................. 32
# Printing House Conventions

<table>
<thead>
<tr>
<th>SAMPLE OF NOTATION</th>
<th>USAGE COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup.exe</td>
<td>Messages, commands, files, folders and other Windows OS info</td>
</tr>
<tr>
<td>&lt;Enter&gt;</td>
<td>Keyboard key names</td>
</tr>
<tr>
<td>Start &gt; All Programs</td>
<td>Menu items</td>
</tr>
<tr>
<td>Interface</td>
<td>Window names, tabs, icons, checkboxes, buttons, radio buttons and text box captions, and other interface elements, important text</td>
</tr>
<tr>
<td>NOTE</td>
<td>Notes</td>
</tr>
<tr>
<td>WARNING</td>
<td>Warnings</td>
</tr>
<tr>
<td>Auxiliary text</td>
<td>Auxiliary text</td>
</tr>
<tr>
<td><a href="http://www.amver.com">http://www.amver.com</a></td>
<td>URL</td>
</tr>
</tbody>
</table>
1. Introduction

Planning and Monitoring stations are intended to provide to Shore Centre operators the following STM functionality:

- **Planning Station**
  - Route planning
  - Receiving routes and schedules from ships
  - Sending routes and schedules to ships
  - Text messages exchange with ships
  - S-124 zones editor

- **Monitoring Station**
  - Receiving monitored routes from ships
  - Enhanced monitoring.

Planning Station is presented by web-based application. For Monitoring Station, the Navi-Harbour program is used.

2. Planning Station

2.1. Configuration Requirements

It is advisable to use the following browsers of specified or more recent versions:

- Internet Explorer ver. 11.1
- Mozilla Firefox 53.0
- Chrome 58.0
- Microsoft Edge 40
- Safari iOS 10
- Safari Desktop 10.

2.2. Open Planning Station

Follow the link:

- [http://stage.fos.transas.com](http://stage.fos.transas.com) (to use Planning Station in STM staging environment)
- [http://fos.transas.com](http://fos.transas.com) (to use Planning Station in SM production environment)

The login page will appear:
Enter your e-mail address and password. The Planning Station start page will appear.

2.3. Planning Station Page Header

The Planning Station page header consists of the following parts:

- to open the Vessels page (see Chapter 2.4)
- to open the Routes page (see Chapter 2.5)
- to open the S-124 zones editor (see Chapter 2.6)
- notifications area.

User interface settings:

Language – to select an interface language.
Settings – to open the Settings page.
2.4. Vessels Page

The Vessels page displays a chart, chart settings and a sidebar with vessels list.

2.4.1. Chart Area

The Chart Area displays the map with various layers and data rows. It includes a sidebar for chart settings and a data row for vessel information.
In the lower left corner of the chart area there is a row with data on the chart scale, current time (UTC), cursor coordinates (latitude and longitude), chart relevancy.

<table>
<thead>
<tr>
<th>ICON</th>
<th>Icon name</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zoom In/Zoom Out</td>
<td>To zoom the chart in or out</td>
</tr>
<tr>
<td></td>
<td>Layers</td>
<td>To open the Layers control sidebar</td>
</tr>
<tr>
<td></td>
<td>Distance to Shore</td>
<td>To calculate the ship-to-shore distance (see Chapter 2.4.1.3).</td>
</tr>
<tr>
<td></td>
<td>Electronic Range and Bearing Line</td>
<td>To enable the ERBL function (see Chapter 2.4.1.2).</td>
</tr>
<tr>
<td></td>
<td>View Fullscreen</td>
<td>To switch to the full screen mode</td>
</tr>
<tr>
<td></td>
<td>Exit Fullscreen</td>
<td>To exit from the full screen mode</td>
</tr>
</tbody>
</table>

2.4.1.1. Chart Scaling and Shifting

To scale a chart, use one of the following procedures:

- Use the Zoom In/Zoom Out icon:
  - Click the Zoom In icon \( + \) to increase the chart scale
  - Click the Zoom Out icon \( - \) to decrease the chart scale.

- With the mouse cursor over the chart area, rotate the mouse wheel
  - Forward (push) to increase the chart scale
  - Backward (pull) to decrease the chart scale.

To shift a chart, position the mouse cursor over the chart area and drag the chart to the required position holding down the left mouse button.

2.4.1.2. ERBL Function

- Click the ERBL \( A \) icon

- Position the cursor in the chosen start point and left-click the mouse:

- Move the cursor to the measurement endpoint. The tooltip will show the distance and bearing:

- To measure the distance between several points, move the cursor and click the left mouse button successively on each point. The tooltip will show the total distance, distance and bearing between the last two points:
To cancel the tool selection, press Esc or click the icon.

2.4.1.3. Distance to Shore

Click the Distance-to-shore icon

Position the cursor in the chosen point and left-click the mouse. The tooltip will show the bearing and range to the shore:

To cancel the tool choice, press the Esc or click the icon.

2.4.2. Layers Panel

The Layers panel is intended for setting up the display of chart layers (chart overlays control sidebar).

2.4.2.1. Chart Types

The Layers panel can be used for selecting the chart type. The following chart types are supported:

<table>
<thead>
<tr>
<th>ABBREVIATION</th>
<th>PICTURE</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAR</td>
<td><img src="mar.png" alt="MAR" /></td>
<td>Marine charts</td>
</tr>
<tr>
<td>MQ</td>
<td><img src="mq.png" alt="MQ" /></td>
<td>Map Quest OSM</td>
</tr>
<tr>
<td>SAT</td>
<td><img src="sat.png" alt="SAT" /></td>
<td>Satellite</td>
</tr>
<tr>
<td>COM</td>
<td><img src="com.png" alt="COM" /></td>
<td>Combined</td>
</tr>
<tr>
<td>T-UTT</td>
<td><img src="tutt.png" alt="T-UTT" /></td>
<td>Transas Tile (UTT)</td>
</tr>
</tbody>
</table>
2.4.2.2. Marine Chart Layers

For the Marine charts, the displaying of chart layers can be set.

- To set the chart layers display, click the icon:

  ![Icon Image]

- Select checkboxes next to the names of layers to be displayed on the chart. Changes will be instantly applied.

2.4.2.3. On-Chart Display of Additional Information Layers

On the Layers panel, you can enable/disable the display of additional information layers on the chart: AIS data and S-124 zones.

2.4.3. Vessels Sidebar

The list of the vessels received from the Monitoring station is displayed in the sidebar. Vessels are sorted in alphabetical order, vessels supported STM functionality (connected ships, or C-ships) are marked with the symbol and displayed in the top of the list:
2.4.3.1. Selecting Vessel

There are several ways to select a vessel:

- By clicking the mouse on the vessel symbol on chart
- From the list of vessels on the Vessels sidebar
- By entering the vessel name in the search line.

The `<Vessel name>` sidebar for the chosen vessel will appear:
To switch to the list of vessels, click on the arrow on the left of the vessel name.

To cancel the vessel selection, close the <Vessel name> sidebar or return to the list of vessels.

When the cursor is hovered over the vessel symbol, then a tooltip with an associated position report appears. The following information is displayed on the tooltip:

- Vessel name
- Position coordinates
- SOG
- COG
- MMSI number
- Call sign
- IMO number
- Navigational status
- Position accuracy
- Destination.

If sidebar is opened for vessel connected to STM service, it includes additional sections:
2.4.3.2. Chat Window

To send text message to vessel connected to STM, click the **Open chat** button in the vessel's sidebar.
Type a message and click the **Send** button.

When a new text message from vessel is received, pop-up notification is displayed in the notifications area:

![VIS-SMA_ELVIRA Messages received](image)

Click this notification to open chat window.

### 2.4.3.3. Routes

The Routes group contains a list of routes received from vessel or sent to vessel.

The **»** sign marks a route that is monitored by the ship ECDIS [Monitored by vessel](image)

The route row contains the following information:

- **Name**

- **Status**: Received from vessel, Not sent to vessel, Sent to vessel

- **Recentness of changes**

- **Availability of a schedule (number of schedules)**

- **To view a route on the chart, click the route row.**

- **To delete a route, click the **X** cross in the right part of the route row. The route monitored on the ship cannot be deleted.**

To edit a route or see the schedule, click the **»** button (see Chapter 2.4.3.3.2).
2.4.3.3.1. Creating New Route

Click the New Route button.

The New Route sidebar appears:
Information

**Vessel** – vessel name

**Route name** – route name

**From** – route’s initial point. Click the ⬇️ button and specify the port name or click the mouse to set a point on the chart. The coordinates can also be edited.

**To** – route’s end point. Click the ⬇️ button and specify the port name or click the mouse to set a point on the chart. The coordinates can also be edited.

**Default settings** – specify parameters necessary for route calculations. To enter parameter values, click the ⬇️ button.

The following parameters are set by default:

- Turn radius
- Portside XTD
- Starboard XTD

---

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Safety contour
Safety depth
Geometry type.

If these parameter values are not subject to changes, the route calculations will use the values set by default.

To create a route use one of the following procedures:

1. Creating a new route
   - Set the route name, specify the route’s start and end points.
   - Set values in the Default settings group.
   - Click the Create button. The sidebar with the name of the route in the editing mode will appear.

2. Loading a route from the RTZ format file:
   - Click the Upload button and load the route from the RTZ format file.
   - The sidebar with the name of the route in the editing mode will appear.

For the route editing see the Chapter below.

2.4.3.3.2. Route Editing

The route loaded on the ship ECDIS for monitoring cannot be edited. To enable editing of the monitored route, it is necessary to create its copy that can be saved under a new name. The created copy is at once opened for editing.

Click the Duplicate button to duplicate monitored route or click the Download to download the RTZ format file.

▶ To edit the route, click the Edit button. The sidebar with the route name will appear:
The **Overview** tab contains the following parameters:

**General**

- **Name** – route name
- **Status** – route status:
  - Original – template or basic voyage route planned and received from the shore
  - Planned for voyage – route and schedule prepared by the crew
  - Optimized – route and schedule optimized by the third-party service provider
  - Cross checked – route verified by the third-party service provider
  - Safety checked – safety check by the ECDIS/crew
  - Approved – master approved route
  - Inactive – voyage completed or cancelled.

**Information** – route information

- **Waypoints** - number of route waypoints
- **Alternative branches** - availability of alternative branches
- **Schedules** - number of schedules.

**Active path**

Availability of alternative route branches (not to be changed).

**Default settings** – parameters set at the route creation stage (not to be changed).

**Actions**

- **Reverse** - to reverse the route direction
- **Duplicate** - to create a route copy
- **Delete** - to delete a route
- to assign a route to the vessel. The vessel selection window will appear:

Select vessel

Select the vessel name and click the Select button. The route copy will appear on the list of the selected vessel routes.

- to save the route in the form of an RTZ format file.

- to send the route to the vessel’s ECDIS.

To edit the route waypoints, go to the Waypoints tab:

The waypoint row contains the following information:

- **Lat, Lon** – point coordinates
- **Turn radius** – turn radius
- **PXTD** - portside XTD
- **SXTD** - starboard XTD
- to show the rest of parameters set for a waypoint.

The editing panel is in the bottom part of the browser window:

Part of the editing panel parameters can be hidden.

If the field is not available for editing, the sign appears.

- to enable the waypoint editing mode. This mode will be select by default when the Waypoints tab is switched to. In this mode, the point editing is done in the following way:

  - Click the mouse to select the route waypoint.

  - Holding the left mouse button down, move the point to a new position

  - Release the left mouse button to fix the waypoint’s new position.

- to enable the mode of adding route waypoints. The handle points will be added in the middle of each route leg. For the handle point to become a new waypoint, left click it or move.

Handle points are being added until another mode is enabled, e.g., . If the handle points were no edited, they will be deleted after the mode switch.

Handle points at the ends of the route look as follows:

- to enable the waypoint deleting mode. In this mode, a click on the waypoint deletes it.
To create a schedule, switch to the **Schedules** tab:

![Schedules tab](image)

To create a new schedule, click the **New schedule** button. The **New schedule** sidebar appears:

![New schedule](image)

- In the Information group specify the following settings:
  - **Schedule name** - schedule name
  - **Departure** – time of departure from the route’s initial point
  - **Arrival** – time of arrival at the route’s endpoint
  - **Speed** – average speed on the route that is used in the schedule calculations, if the time of arrival at the route’s endpoint is not specified.

- Click the **Create** button.

To edit a schedule, on the Schedules tab click on the schedule row. The selected schedule sidebar appears:
Information

- **WPs defined** – number of route waypoints, for which parameters are set manually. Parameters should be set for at least two waypoints.
- **Avg. speed** – average speed on the route specified by the Speed parameter at the schedule creation stage.

**Waypoints** – list of route waypoints, for which parameters are set manually.
To show all the waypoints, click the 🕵️‍♂️ symbol:

To hide waypoints for which the parameters are not set, click the ⚠️ symbol.

To change the waypoint parameters, click on this waypoint row.

To manually set parameters for a waypoint, click the + Add button in this waypoint row.

The editing panel will display the waypoint name.

Set the necessary parameters and click the Save button on the panel.

To exclude a waypoint from the schedule calculations, click on the ☐️ symbol in this waypoint row.

Actions

After all the waypoint parameters have been set, click the Calculate button for the schedule to be calculated.

To view the schedule calculation results, go to the Calculated tab:
2.5. Routes Page

The Routes page contains all the routes created by users of Planning Station. On this page the following actions are available:

- Creating new routes (see Chapter 2.4.3.3.1)
- Routes editing (see Chapter 2.4.3.3.2)
- Removing routes
- Assigning routes to vessels (see Chapter 2.4.3.3.2)
2.6. S-124 Zones Editor

S-124 zones editor is intended to create and send navigational warnings zones.

To display the list of navigational warnings, click the **Warning List** button:
To add a new zone, click the + button. The **Block NW Preamble** window will appear:

### Block NW Preamble

**Title**

Navigational Warning

**Language**

English

**ID (Disabled)**

local

**General Area**

area

**Locality**

locality

**Category**

special operations

**From**

12/19/2017

**To**

12/21/2017

**Source Date**

12/19/2017

**Navigational Warning Part**

**Subject**

Military exercises in the area

**Language**

English

**From**

12/19/2017

**To**

12/21/2017

**Send**

Enter all required fields values and click the **Map** button. Editor tools will appear in the window:
- to draw a zone on chart
- to edit previously created zone
- to delete previously created zone

Panel - to open the Block NW Preamble window.

Draw the zone, open the Block NW Preamble window. The button will be available. Click the button to send navigational warning.

3. Monitoring Station

As Monitoring Station the Navi-Harbour program is used. This Manual is a supplement to Navi-Harbour User Manual and describes only STM functions.

3.1. Receiving Routes

Only routes with monitored status are received and displayed in Navi-Harbour. Received monitored routes are displayed in the Personal Routes table. To open this table, choose the Window > Personal Routes menu item:

Records in the table have different colors:
- Black – there is tracked target assigned to the route
- Grey – there is no target to assign to the route.

The Personal Routes table has a context menu. The context menu can be used for the following operations:
- Never show route – not to display the route in the chart windows
- Show linked route – to display the route in the chart windows only if there is a tracked target assigned to this route
- Show route always – to display the route in the chart window always.

Double-click the Personal Routes table route row. The chart will move so that the whole route can be seen in the Chart window.

The Personal Routes table includes the following information arranged in columns:
### DATA COMPONENT

<table>
<thead>
<tr>
<th>DATA COMPONENT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route name</td>
<td>Name of the route from RTZ</td>
</tr>
<tr>
<td>Target name</td>
<td>Name of the target tracked in Navi-Harbour</td>
</tr>
<tr>
<td>Route state</td>
<td>If incorrect RTZ was received, error message will be displayed</td>
</tr>
<tr>
<td>IMO number</td>
<td>Vessel IMO number from RTZ</td>
</tr>
<tr>
<td>MMSI number</td>
<td>Vessel MMSI number from RTZ</td>
</tr>
<tr>
<td>Vessel name</td>
<td>Vessel name from RTZ</td>
</tr>
<tr>
<td>MRN</td>
<td>Vessel MRN from RTZ</td>
</tr>
</tbody>
</table>

### 3.2. Assigning Targets to Personal Routes

If the route was received and target with the same IMO number or MRN is tracked by Navi-Harbour, the target is automatically assigned to this route and the Route mode pictogram will be displayed in the target symbol.

![Route visualization](image)

The details of the route are displayed in the **Target data** window on the **Ship route** tab.
To open the **Target data** window, use one of the following operations:

- Click the **Target data** icon. The Target data cursor will appear in the Chart window. Click the cursor on the target symbol.

- Right-click the target and select the **Target data** item from the context menu.

If target was assigned to the route by mistake, assign Free traffic mode using one of the following operations:

- Click the **Free Mode** icon. The Free mode cursor will appear in the Chart window. Click the cursor on the target symbol.

- Right-click the target and select the **Mode > Free** item from the context menu.

To revert to automatic route assignment, assign Free traffic mode to the target once more.

### 3.3. Enhanced Monitoring

#### 3.3.1. Reference Target

The target is called a reference target if it is chosen for the starting point in calculating approach to other targets and chart objects.

To assign a reference target, right-click the target and select the **Reference** item from the context menu.
Vessels supported STM functionality (connected ships, or C-ships) are marked with the symbol. If the target is assigned to personal route, it is provided with a panel with route characteristics:

- **Route name** - route name

- **Next waypoint** - list of waypoints. The next and the last waypoints presented in the top of the list. The next waypoint is selected by default.

- **XTD** – cross track distance. Port XTD is highlighted in red, starboard XTD – in green
  (+) - tendency to increase the XTD value
  (-) - tendency to decrease the XTD value
  (=) - the XTD value does not change.

  XTD value is also displayed on the graph:

  - in black if target is inside the route edges
  - in orange if target is out of route edges

- **WP Dist.** – distance to the waypoint selected from the drop-down list of waypoints

- **ETA** – estimated time of arrival to the waypoint selected from the drop-down list of waypoints

- **TTG** – time to go to the waypoint selected from the drop-down list of waypoints

- **Schedule deviation** – if RTZ contains the schedule, deviation from scheduled ETA to the waypoint selected from the drop-down list of waypoints

- **Route info.** - click the button to open the Target data window on the Ship route tab.

### 3.3.2. Route Navigational Alarms

If the target is assigned to the personal route, the following alarms are generated in the Navigational Alarms window:
### ALARM GENERATION CONDITIONS

<table>
<thead>
<tr>
<th>ALARM</th>
<th>GENERATION CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grounding on route</td>
<td>The Draught parameter value for the route target is larger than the safetyDepth value of RTZ</td>
</tr>
<tr>
<td>Off XTE on route</td>
<td>The target deviates from the route axis by more than the portsideXTD/starboardXTD value of RTZ</td>
</tr>
<tr>
<td>Out of schedule</td>
<td>The target’s ETA to the next waypoint is behind the schedule</td>
</tr>
</tbody>
</table>

#### 3.3.3. Position Prediction Mode

If the target is assigned to the personal route and **Target Position Prediction** tool is enabled, the targets position is predicted using its personal route trajectory. After the end of the route, the target continues moving in the direction of the last route line.

To predict targets positions use one of the following operations:

- Click the **Position prediction** icon

![Position prediction icon](image)

- Choose the **Tools > All targets > Position prediction mode** menu item.

The cursor disappears.

The left bottom corner of the Chart window will display a panel with a time interval which the prediction is provided for.

![Position prediction panel](image)

You can change the prediction time interval in one of the following ways:

- By moving the mouse up and down
- By using the mouse scroll button
- By using the `<Page UP>` and `<Page Down>` keys (which change time by 1 minute)
- By using `<↑>` and `<↓>` keys (which change time by 1 second).

You can disable the prediction mode in one of the following ways:
● By right-clicking the mouse
● By pressing the <ESC> key

In the prediction mode you can display targets’ actual and predicted positions, or predicted positions only. This capability can be adjusted in the Chart Settings window on the Prediction tab (choose the Chart > Setting... menu item to open this window).
STM FUNCTIONS IN STC PRODUCTS
USER MANUAL
DATE OF ISSUE: DECEMBER 2017

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Sea Traffic Management

Version: 3.01.350

Date of Issue: October 2017
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in this manual being different from the product delivered after its publication.
The names of actual companies and products mentioned herein may be the trademarks of their respective
owners.
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Transas Ship Solution

1. **Planning Station:**
   - Voyage Planning /Optimization;
   - Route Exchange (Planning phase);
   - Sharing of voyage plan;
   - Route cross-check;
   - Area management;
   - Ability of subscribing to services (e.g. Pilot Services, Winter Navigation Services, Weather Routing services, etc.);
   - Ability of subscribing services to own personal information (e.g. Voyage Plans);
   - Granting access rights to Organizations.

2. **ECDIS:**
   - Route Exchange (Monitoring);
   - Data Presentation (Safety related);
   - Route Monitoring (Enhanced Tracking);
   - Schedule monitoring;
   - Ship to Ship Route Exchange over AIS;
   - Ship-Port ETA synchronization.

3. **STM Module:**
   - Ship to Shore Communication (FOS/STM);
   - Service Ordering (MSP);
   - Data presentation (none safety related);
   - Port Call Management (Arrival Time, Port Call Status);
   - Chat Service.

Main Components.

- Transas Connected ECDIS (IEC 61174:2015, STM Module);
- Transas Navi-Planner (STM Module);
- Transas Gateway Translink (IEC 61162/450/460);
- Onboard Data Management System.
STM – Functions

- Ship-Shore Route Exchange:
  - Route Cross Check Service;
  - Route Optimization Service;
  - Route Monitoring and Navigational Assistance Service.
  - Nordic Pilot Route Service (service that provides routes from [to] pilot boarding places to [from] ports).

- Port Call Coordination:
  - Just-In-Time Arrival support - time of arrival coordination.

- Route Optimization;
- Enhanced Monitoring;
- Winter navigation:
  - Ice routing;
  - Ice breaker coordination (Waiting Position, Convoy Info, Text Message).

- Navigational Warning Area Management (IHO S-124 format).
- Chat.
- Ship-to-Ship Route Exchange over AIS.

Transas Fleet Operation Service

Transas FOS is a new scalable web-based service for ship owners and ship operators.

The goal is to reduce work load and administrative burdens, enhance situation awareness, fleet monitoring and prevent errors and accidents.

The following services will be available for ship owner and test ships during the test campaign:

- Enhanced Asset Monitoring - “ECDIS Tracking”, with every 15 secs positioning;
- Route monitoring and deviation notifications;
- Route Exchange services (Route Database Service);
- Advanced Intelligent Routing Service – service which is all about help in route planning. Highlighting the benefits of service as oppose to the traditional routing service that was widely used in the past;
- Chart Data Management online – smart way of digital data handling in terms of dynamically analysing the chart usage, chart update and purchasing history for multiple options within their fleet and find the most efficient utilization of vessels in terms of safety and cost;
- Remote Service;
- Performance Monitoring – Fleet Dashboard, a snap shot of key performance indicators;
- Ship-to-Shore Text Communication – Simple and very familiar way of operative information exchange.
STM Scope and Objectives

About STM

In the STM Validation Project, we will validate the concepts by connecting ships, Shore Centres, External services and Ports.

STM is an information sharing framework that primarily deals with the benefits that different parties can get if they share their route with others in real time. This is one of the fundamental pillars of STM: The shipping company/ship is always the information owner and shares the information they want with the parties they want.

The central feature is that the routes are shared directly from and to an ECDIS, which allows to see suggested routes, cut and paste and use the parts you want directly on the ECDIS. You can retrieve nautical information about the passage such as if there are any current Navigation Warnings on one's route or accept one of the Pilot suggested routes into the port.

Shore Centres can actively monitor ships in their area of responsibility, not only if they are following their route at any moment but also, if they have planned properly according to the latest information available.

Ports can get information of a ships ETA and Planned Time of Arrival (PTA) at a much earlier stage and this can make the port call much more efficient. Because of the port's ability to collaborate by means of the “Port CDM” tool, they can also convey a time when all port operators can receive the ship. This enables you to decide on slowing down and conducting “Just-In-Steaming” during the passage with the potential to save bunkers thereby having a positive impact on the environment etc.

An amazing side effect of this information sharing will be that ships will be able to share routes with each other. That is, you can see another vessel's current route in your own ECDIS. Here, however, you will only share a segment of the route, which will be transmitted over the AIS system, because the AIS bandwidth is not sufficient to share more. STM helps you plan a traffic situation before you end up in it. Here comes our second pillar: STM should not be used in COLREG situations. That is, when you are in a close quarter situation, always observe COLREGs.

The following main STM objectives can be singled out:

- The STM permits optimizing processes of data exchange among the sea-going ships, service providers, shore-based ship traffic managements services and sea transport regulatory agencies.

- The STM provides optimum solutions for the following participants involved in the sea navigation process:
  - Fleet operators (ship owners, support and supply services, etc.);
  - Vessel Traffic Management Systems;
  - Pilot services;
  - Information providers – state and private-owned services supplying hydrographic and weather information;
  - Navigators.

The diagram below shows relationship among the parties participating in the process of cargo transportation by the marine vessels. The STM objective is to unite all the participants in a single information space, which will ensure operational and commercial advantages for each of the participants, improve safety and reduce the harmful effect on the sea environment.
The STM uses the following communication technologies supplemented with solutions developed for ensuring information security:

- Ground communication technologies (3G/4G, WiMAX, AIS);
- Satellite communications (Inmarsat, Iridium, VSAT);
- Soft- and hardware solutions for providing safe Ship-Shore connections.

Based on these technologies and developments, Transas STM provides the following capabilities:

- Ship-Shore and Ship-Ship route exchange (Internet and AIS);
- Ship route generation and optimizing, used both ashore and on board;
- Delivery of nautical charts and their updates;
- Relay and presentation of safety related information (via the dedicated AIS VHF channel);
- Planning of ship calls at ports for the shipboard use and display of information on the ship arrival time.

Within the framework of accomplishing the aforementioned tasks, Transas develops the following product lines intended for certain groups of users:

- **SHIP** – products and services provided to the shipboard users;
- **FOS** – products and services provided to the shore users (ship owners and operators);
- **STC** – products and services provided to the shore users (VTS operators).
Ship Product Line
Within the framework of this product line, the following products are developed:

- Connected ECDIS – hard-and software suite interfaced with a set of sensors and devices like GPS, GLONASS, Gyro, Log, Radar Scanner, etc., used on board for accomplishing navigation tasks.

FOS Product Line
The Fleet Operations Solutions product developed within the framework of this line provides access to a set of services connected with the fleet management, planning, monitoring and analysis of the voyage accomplishment. The server part of the services may be both located in a cloud and installed direct on the customer office servers.
**STC Product Line**

The following products are developed within the framework of this line:

- Sea Traffic Control is an information system for the vessel traffic monitoring and management in the off-coast sea areas.

**STM Components Interaction**

The Connected ECDIS define the STM onboard segment.

The FOS, and STC define the STM shore-based segment.

The STM is used for establishing connection among different segments for the effective interaction and data exchange.

The connections schematic is shown in the diagram below:
It is assumed that there are two data exchange channels between the ship-ship and ship-shore services.

- Data exchange via the AIS VHF channel is intended for receiving current information on the ships positions and motion parameters along with the brief operational information. The AIS data is supplied direct from the ship navigation system to other ships and shore-based VTS centre;
- Since the AIS channel throughput is limited, large amounts of data are transferred via the Internet secure channel. Data transmitted via the Internet is placed and processed in the Azure and Amazon public cloud services. Shore-based agencies use public cloud services. If the connection is available, the shipboard system synchronizes data with cloud services, the synchronized data stored in the ship system, so that the data on the ship may be available even in the absence of an Internet channel.

The services and data arrangement architecture is presented below:
The exchange of certain information among the STM segments is performed with the aid of services. Services are distributed among the products listed above. Functionality connected with the services is planned to be implemented on the stage-by-stage basis.

STM FUNCTIONS

Service Register, ID Register (Service Ordering)

Identity Registry
The **Identity Registry** enables identity management and authentication mechanisms.

Service Registry
The **Service Registry** allows businesses to efficiently discover and communicate with each other using certain services. The ultimate goal is to allow fast and reliable communication and interoperability among diverse applications with minimal human oversight.

In the context of service-oriented architecture, a service usually refers to a set of related software functionalities that can be reused for different purposes, together with policies that govern and control its usage.
The Service Registry will contain service specifications according to an envisioned Service Specification Standard and provisioned service instances implemented according to these service specifications. The Service Registry aims at improving the visibility and accessibility of available maritime information and services. This enables service providers, consumers, and regulatory authorities to share a common view on service standards and provisioned services. The Service Registry does not provide actual maritime information, but a specification of various services, the information they carry, and the technical means to obtain it. The Service Registry also provides the mechanisms to manage the lifecycle of service specifications and service instances.

As depicted below, the Service Registry enables the “provider” to “publish” information related to its service instances so that the “consumer” is able to “discover” them and obtain everything (e.g. interface information) required to ultimately use these services.

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Consumers</td>
<td>Consumer uses service instances provided by service providers. All users within the maritime domain can be service customers, e.g., ships and their crews, authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
</tr>
<tr>
<td>Service Providers</td>
<td>Provides instances of services according to a service specification, e.g., deploys the service to the Service Registry. All users within the maritime domain can be service providers, e.g., ships and their crews, authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
</tr>
<tr>
<td>Service Specification Implementers</td>
<td>Implementers of services from the service provider side and/or the service consumer side. Everybody can be a service implementer but mainly this will be commercial companies implementing solutions for shore and ship.</td>
</tr>
<tr>
<td>Service Specification Producers</td>
<td>Producers of service specifications in accordance procedures.</td>
</tr>
</tbody>
</table>
Voyage Information and Port Information Services

Navi-Planner Service Window

General

The Navi-Planner has a special Service Window in which the operator can see all the available services the vessel is holding subscription for and those services that are available to subscribe. The route can also be shared among the stakeholders who have editing rights.

From this service window, the user can obtain the following information:

- Services available for the ship to subscribe (with prices and some brief information describing the service).
- Services that the ship is already subscribed to.
- Status of shared information like Voyage Plan, Chat Messaging, MSI, etc.
- Information on the authorized users that have been given the access to ship’s information.

The Service Window shows all the possible services from the STM and Transas infrastructures.

All the stakeholders are registered in infrastructures like Transas infrastructure, Sea SWIM (Maritime Cloud) infrastructure or any others. Each of these infrastructures has Identity and Service Registries (IR and SR). The Service Window displays all the registered structures.

With the aid of IR and SR the user can promptly find the necessary services. The STM, Maritime Cloud Identity and Service Registries contain different attributes that help the user in the search. Found stakeholder, which provides necessary service, can be added to Service Book for further operations (subscription, chat, sharing of selected route, etc.).

From the Service Window, users (Nav Officers, Fleet Ops operators or pilot) can subscribe to any service available in the list (via the Service Register).

The Service Window provides a capability to view all the subscribers and subscribed-to services.

To open Service Window press the Services button in the Route Editor page ribbon.
The Service Window consists of 2 parts:

- Service Registry group;
- Ship Service Book group.

**Find a service**

The Service Registry provides a capability to search for services by the following parameters:

- text,
- by using the filter

For the search-by-text in the cloud, use the search line to type key word contained in the service description and press the Search button.

To search by the filter, press the button.
In the filter window that will open up, select one or several criteria of search for the service:

- **By Route.** From the drop-down list containing all the routes available in the Navi-Planner, select the necessary one. The services will be searched for in the area through which the selected route passes.
- **LOCODE.** Use the input line to enter the LOCODE that the search is required to be made by.
- **Geoposition.** Press the Select area button. Use the cursor on the chart panel to select an area in which services will be searched for.
- **Service Provider.** Select the necessary provider from the drop-down list.
- **Type of service.** Select the necessary service type from the drop-down list (Voyage Information Services. Enhanced Monitoring, Winter Navigation, Weather Optimization, Traffic Optimization, etc.)
- **IMO.** Use the search field to enter the IMO number that the search is required to be made by.
- **MMSI.** Use the search field to enter the MMSI that the search is required to be made by.

To search for a service by the settings made, press the enabled Search by filter button.

To reset all the filter settings, press the Clear filter button.

The services found in the cloud and meeting the search criteria, are displayed in the Service Registry group table.
There is a capability to find a service in the table by the key word, and to sort the services in the alphabetic order with the aid of the button.

Each service’s row contains the Add to book and button.

**Add services to the Ship Service Book**

Press the Add to book to add a service to the Ship Service Book.

After the service has been added to the Ship Service Book, the button displays the service status (Subscribed or Unsubscribed).

Press the button to obtain brief information on the service.
Ship Service Book

Services selected by the user for the subsequent use are stored in the Ship Service Book.

The Ship Service Book also provides a capability to search for the necessary service by the text and to sort in the alphabetic order with the aid of the **button.**

Each service’s row contains the **Send once, Share and ** buttons.

Press the ** button to open a chat window (see below) with the selected service for the details clarifications. The Chat Window will open automatically with the already selected service as an addressee. If the chat isn't started yet, it will be offered to start the chat application.

Press the ** button.

The drop-down list presents all the available routes. For one-time sending of the necessary route to the service, select it from the list.
**Route Sharing**

Press the Share button.

The drop-down list presents all the available routes. To send the necessary route to the service each time the route is modified, check the checkbox next to this route.

Press the Subscribe button to subscribe to the selected service's routes. After the service has approved the subscription, the button will be renamed to Unsubscribe.

To cancel the service subscription, press the Unsubscribe button.

If the service does not confirm your request for subscription, the button will be renamed to Denied.

Press the button to obtain brief information on the service (see the previous item).

A press on the button results in this service unsubscribing, as well as its unsubscribing from our routes that it was subscribed to.

A press on the button in the bottom part of the Ship Service Book results in the unsubscribing of all the services from our routes, as well as the deleting of the service list from the Service Book.

**Subscribers Menu**

Load the necessary route.

To open a menu for the selected route, press the Subscribers button in the **Route Editor** page ribbon. The drop-down list contains all the services that were added to the Ship Service Book of the Service Window.
If the selected route is not shared for some service, this service has the Subscribe button, otherwise, it is the Unsubscribe button. To share the selected route for some service, press the Subscribe button. To unsubscribe some service from the selected route, press the Unsubscribe button.

**Access Menu**

Load the necessary route.

To open a menu for the selected route, press the Access button in the Route Editor page ribbon.
The drop-down list contains all the organizations authorized in the STM system. Select the organization and press the Authorize button to grant rights of access to the selected route for all the services that this organization provides.

To deny access to the selected route, press the Unauthorize button.

**Grant Access**

If some service which out monitored route is not shared for, tries to get access to it, the following warning is displayed:

Press the Grant access to monitored route button to grant access or Deny access to deny access.

**Route Exchange during Planning and Monitoring**

**Internet-Aided Ship-Shore Route Exchange in RTZ Format**

The functionality permits route exchange between the ship and other stakeholders with the aid of the Internet via the TCP/IP protocol.

When a route plan is set for monitoring, it is automatically assigned with a unique voyage identifier (UVID).

Selected by default is the Current Voyage which is available to all the stakeholders with its own UVID. As the route itself is changed, the UVID remains unchanged. If a New Voyage is selected, the route with a new UVID will be sent to the stakeholders.
Select the necessary calculated schedule from the list.

Press the OK button.

The route will be loaded in the monitoring mode and will be automatically sent to all stakeholders who are subscribed to it (see above) or have a granted access to the ship monitoring route.

The shore-based route optimization services can make necessary changes and sends the corrected route back to the ship.

The shipboard operator can accept the changes made by the 3rd party route optimization services (the Save and review the suggestions button) or reject them (the Reject the suggestion button).
If the changes are accepted, the route will be loaded on the **Planning Route** panel under the “Route Name amended by Optimization Services”, and will be available for further editing.

As the ship is set for monitoring, it is automatically shared between all stake holders, who have a granted access to the monitoring route.

**Ship-Ship AIS route exchange**

**Ship-Ship AIS Routes Broadcasting**

The ECDIS has been supplemented with a capability to broadcast the own monitored route via the AIS.

The ship can transmit the monitored route segment in the broadcast mode (the broadcast period is set by the operator in the **Broadcast Own Route** input window).

The route can be broadcast via the AIS channels in the following modes:

- **ECDIS IMO type** (DAC: 001 FI: 27):
  Details: Up to 15 waypoints of the monitored route, no XTD, no Radiuses.

- **ECDIS STM type** (DAC: 265 FI: 01).
  Details: Up to 7 WP waypoints of the monitored route with Radiuses, no XTD.

- **VDES STM type** (DAC: 265 FI: 02).
  Details: Up to 10 WP waypoints of the monitored route with Radiuses and XTD.

Recommended settings for the **STM Ships**:

- Message type: **ECDIS STM type**
- Broadcast Own route default interval: **6 minutes** (for any message type).
Requesting Monitored Route from AIS Target – Route Interrogation

The ECDIS has implemented a capability to request the monitored route from the operator-selected target. The reply is sent by the relevant target via the AIS channel and is displayed in the table of received routes.

Reception of Route (Ship-Ship), Broadcast or Sent Direct to Requesting Ship

The route received via the AIS channel is automatically processed by the ECDIS and is displayed in the table of received routes.

The route can be output on the ECDIS screen direct by positioning free View cursor on the necessary STM AIS target. After 3 seconds of displaying of target’s card, the route will also displayed. The second way is direct from the table with the aid of the Show checkbox.

The AIS Route Label checkbox shows AIS targets transmitting their routes to be displayed on the ECDIS screen.

In this case, the “STM” (STM AIS type messages) or “RTE” (IMO Circ. 289 type messages) postfixes are shown next to the AIS target identifier, showing that this target’s route is available in the ECDIS database.

The AIS Route turns red once the ship deviates and sails out of the set XTD (geographical deviation)

The ECDIS implements a capability to notify the operator about abnormal situation on the STM participant ships. Two criteria are used:

- STM AIS target beyond its XTD or adjusted XTD limit in the ECDIS (adjusted manually or received via incoming VDES STM type AIS messages);
- STM AIS target exceeding one of the set CPA/TCPA values.

The setting is enabled on the Target Table page of the Targets panel.
STM Functions

If both checkboxes are unchecked, the functionality is disabled.

1. The By Target Out of XTD deviation checkbox is checked:

In this case, if an STM AIS target is following its route (New AIS ASM Route message) within the XTD range, no alerts are triggered ON.

- **Note:** The route display can be turned off by Pick View cursor and long tap (3 sec) command or in the IMO special messages page of the AIS panel.

If STM AIS target is not following its route line and is out of its XTD range limit, the AIS route is automatically shown in red.
STM Functions

The route will become red by such criteria even it is not displayed on the Chart panel.

2. The By CPA/TCPA criteria checkbox is checked:

The STM AIS target parameters exceed the both CPA/TCPA set values: the AIS route is automatically shown in red.

RDV Functionality (Route Intersection points and Meeting Points)

AIS targets are acquired for determining rendezvous (RDV) points on the RDV page of the Route Data display on the Control panel. All RDV calculation are based on the actual movement data, Speed-Over-Ground of the Ownship and AIS target.

If a route received from STM AIS target crosses our route, the own ship position in the point of its route intersection with the AIS target’s route is shown on the Chart Panel with the symbol.
The ECDIS calculates the STM AIS target’s position at the time when the own ship is going to cross the STM AIS target’s route. On the chart panel, this position is indicated with a mark perpendicular to the STM AIS target’s route.

The CPA RDV intersection points are shown as bold dots on the routes. These are the points of the own ship and STM AIS target’s positions at the minimum CPA moment.

These points show the CPA RDV intersection points, referenced to the own ship route and STM AIS target route (normally with a perpendicular, as the own ship and AIS target positions may have some actual XTD values).

The RDV page shows the TTG to RDV and RDV time intersection point for the own ship.

The AIS target’s route may not cross the own ship route (see example below):
In this case, the ECDIS shows only the CPA intersection points without or

Port Call Message Support
Load route and schedule.

Open the Port Call page of the Planning Route panel and select the ports of departure and arrival from the list.

The ports of departure and arrival can also be entered manually. To do this, check the Manually entered LOCODE checkbox.
In the window, enter the LOCODE (5 symbols) and press the button. An inquiry about the availability of the Port CDM Service in the port entered will be sent. In this case, the LOCODE is shown in yellow. If the Port CDM Service for the port in question is successfully subscribed to, the LOCODE is shown in white, otherwise it is shown in red.

Select the waypoint for the Port Call Messages from the list.

Select the waypoint type from the Type drop-down list.

As a schedule for the monitored route is loaded, it is automatically sent to the Port CDM Service PTD for the port of departure, and PTA for the WPT set for the port of arrival.

On the Port Call page of the Route Data display, in the Control Panels display the WPT for which the Port Call Messages (PCM) with PTA will be sent.

The value is shown in yellow until the receipt confirmation is received from the Port CDM Service, whereupon this value will be shown in white.

In the STG window speed of proceeding to the specified WPT for the set PTA is displayed.
After the ship has started proceeding along the route, ETA with the current SOG at the selected WPT is regularly sent to the Port CDM Service. The ETA transmission frequency is set in the **PCM Settings** window. Press the PCM Settings button.

Press the PCM ETA Update Rules button.

From the drop-down list, select a rule for sending ETA to the Port CDM Service.

If the Standard menu item is selected, ETA is sent according to the following rules:

- 24 hrs in advance;
- 12 hrs in advance;
- 6 hrs in advance;
- 3 hrs in advance;
- 1 hr in advance;
- Each Day, 12.00 UTC - regardless of the arrival time.

With the Out of Schedule ETA Update checkbox checked, the PCM will be sent if there is out of schedule on assigned number of minutes for the selected WPT.

After the sending, the ETA value is shown on the **Port Call** page of the **Route Data** display.
The value is shown in yellow until the Port CDM Service receipt confirmation is received, whereupon the value will be shown in white.

The Port CDM Service sends a RTA (Recommended Time of Arrival) to the ship. Upon the receipt of the RTA, the ECDIS screen displays the following notification.

The **Port Call** page of the **Route Data** display shows the RTA.

On the Navigational MASTER status station, the Accept and Decline buttons are enabled, the operator can accept (the Accept button) or reject (the Decline button) the RTA.

In the STG window speed of proceeding to the specified WPT for the set RTA is displayed.

As the Decline button is pressed, the ECDIS sends to the port the previously calculated time of arrival (PTA) at the selected waypoint, if Send PTA after RTA rejection checkbox is checked in in the **PCM Settings** window.

As the Accept button is pressed, a warning is displayed.

**Note:** If in the schedule there are no data entered manually the warning doesn't appear.

Press Yes button.
The port RTA is accepted, and the current schedule is re-calculated for the monitored route. The PTA at the selected point is equal to the RTA.

A new schedule will be automatically loaded for monitoring. But in the monitored route, it will not be saved.

A new route will also be created, with the same geometry and with a new schedule that has the “XXX hh-mm-ss dd.MM.YY” name, where XXX is the monitored route name, hh-mm-ss dd.MM.YY is the RTA accept time and date.

If for some reasons it is impossible to create schedule with the sent RTA, it will be shown in orange (the Accept and Decline buttons are disabled).
If the ship has already arrived at the selected point, sent to the Port CDM Service is the ATA (Actual Time of Arrival).

**Area Message Management**

The ECDIS and NPL implement a capability to show navigation warnings (NW) issued on line with the S-124 standard.

The NW’s are received via the internet from the provider of this service. To this end, the ship is required to have a relevant subscription in the Service Window of the Navi-Planner application (see Navi-Planner Service Window paragraph above). In this case the NW’s are provided automatically or by planed route via “Send Once” (single route sending) function in the Service Window / Ship Service book section.

There is a capability to load the NW database manually with the aid of the Load button.

When a NW is received (or loaded manually) the Indications window on the Control panel displays the NW message indication.

The NW is displayed in the text form on the MSI page of the Overlays panel.
The NW’s are displayed in the form of a table. When a NW is selected in the table, the detailed NW contents is displayed in a window under the table. The objects contained in the NW, and their coordinates are shown in a window on the right below the table. A double click on them moves their display to the centre of the Chart Panel.

The NW are also shown on the Chart Panel in the form of certain symbols, IEC 62288 (2014).
By using the free cursor, the user can display the NW contents in a special pop-up window on the Chart Panel.

The context menu (Focus on map) can be used for the on-chart display of objects contained in the NW.

The NW in the table can be filtered by the following criteria:

- Warning type,
- Category,
- Date,
- Geographic area.

Search by the message contents is also implemented.

By default, all the received NW” are assigned with the “Danger” status. This is the reason why the Navigational hazard caution will be generated when any of these objects turn up within the safety frame.

The NW can be deleted by the operator. The deleted messages are stored on a local disk for 1 year and are then automatically deleted. These messages can be displayed by using the Show deleted button. On the Chart Panel, objects from these NW are shown in grey.

**Text Messaging**

The following capabilities are provided in the course of text message exchange:

- Exchange of text messages without a group chat capability;
- Local storage of message history;
- Search for users in the STM Identity Registry;
- Local storage of user list;
- Context search in the local user database.
Contact Selection
Run the STM Chat application and press the Show Contacts button.

The STM Chat Contact List window which will open up, contains a list of contacts whom the communication is already established with. Enter the contact's name first letters in the search line.

The list will display only those contacts whose names start with the entered combination of letters.

To request for a contact from the cloud, press the STM button. This will send a request with a Free Text contained in the search line.
For an advanced request press the Adv button.

Set the contacts search parameters:

- **ServiceType.** There may be the following service types:
  - Vessel (SHIP-VIS);
  - Route optimization (ROS-VIS);
  - Route check (RCS-VIS).
- **KeyWords** – set of key words for search;
- **IMO** – IMO number;
- **MMSI**;
- **UnLoCode** – port UN/LOCODE.

To send an advanced request, press the STM button.

Correspondence with the selected contact is maintained on the STM Chat Messenger page. The message is entered in the bottom window of the page.
At this stage, the Send button is unlocked. Correspondence between the user and the contact is displayed in the page’s top window.

Upon receipt of a message from another contact with whom the correspondence is currently not maintained, the top right corner of the window on the STM Chat Messenger page displays a notification in the form of a red flashing light.

In the case, the contact from whom the message has been received, is moved to the topmost line of the STM Chat Contact List. There is a red flashing light to the right of it, too.

If during the chat it is necessary to send the monitored route, press the Reference to VP button.
From the drop-down list, select the route that should be sent.

Press the OK button.

Type the message and press the Send button. The route will be sent.
If the Shore Centre has sent some Area, the **STM Chat Messenger** page looks as follows:

![STM Chat Messenger](image)

To request for a route referenced to this Area, press the **Get VP** button.

To convert the received Area, press the **Show Area** button.

![User map with sent objects](image)

A user map with sent objects will appear on the **Maps** panel.
Abbreviations and Explanations

- “Service and Service Registry (SR)”
  - A service is an action that provide support or work to someone (ship);
  - The work done by a service can be fully automated or it can include manual work by a human;
  - A service can be related to a specific geolocation or generic for the whole world;
  - An information service supports the operation service with information exchange, e.g. Voyage Information Service;
  - Available services are registered in Service Registry;
  - Service Registry (SR) is a catalogue with information of services;
  - Service Registry contain all necessary information a consumer need to use a service;
  - Service Registry is searchable with both text and geography.

Example of services:
  - A ship can ask for enhanced monitoring as a service from a shore centre.
  - A ship can ask for route optimization from a service provider.
  - A ship or a shore centre can ask for pilot routes from a service that provides pilot routes.

- “Identity Registry (IR)”
  - Identity Registry (IR) is a catalogue of identities grouped in organisations, users, devices, vessels and services;
  - Service Registry (SR) and Identity Registry (IR) are a core parts of the Maritime Connectivity Platform.

- “Voyage Information Service (VIS)”
  - The VIS will be serving as the ship’s representation that will always be online, e.g. if a VoyagePlan (VP) is sent to a ship, when the ship is not online, the VIS will make sure the VP will be forwarded to the ship when it’s online again;
  - The VIS will make sure that all message contents that are used in STM is following the standards that are setup.

- “SeaSWIM”
  - Sea System Wide Information Management (SeaSWIM);
  - Secure exchanges are supported by requirements on encryption, authentication mechanisms, etc.;
  - Provides software and guidance to support actors to connect, translate and share existing information.
“Unique Voyage ID (UVID)”
- Invisible for the Navigational Officer and used for the Machine-To-Machine (M2M) voyage exchange;
- A Voyage is a “route” that has a schedule “attached”, including departure and arrival time/date;
- One Voyage ID (UVID) per voyage/passage between two consecutive ports without stops, berth to berth.

“Departure and Arrival times”
- PTD: Planned Time of Departure (Based on planned schedule information from the monitored route);
- ATD: Actual Time of Departure (Based on actual departure event);
- PTA: Planned Time of Arrival (Based on planned schedule, speed and distances to go from the monitored route);
- ETA: Estimated Time of Arrival (Based on present Speed-Over-Ground, distance to go and schedule parameters of the monitored route);
- ATA: Actual Time Of Arrival (Based on the actual arrival event to the specified route WP. It might be Berth, Pilot Boarding area or just waypoint);
- RTA: Recommended Time Of Arrival (Ports Recommended Time of Arrival for a ship to e.g. for example to the Pilot Boarding Area).

“Port Synchronization (PortCDM)”
- Port Synchronisation: Ship and port communicates arrival times, using the ECDIS and its monitored route and schedule;
- Swift ETA communications will enable more just in time arrivals;
- Port Collaborative Decision Making (PortCDM): Within a port, all different actors e.g. Linesmen, Tugboats, Stevedores etc. are sharing the same “timing picture” regarding a ship´s port call, enabling better planning and collective information regarding ETA/ETD for the ship to/from the port.

“Shore Centres (SC)”
- A Shore Centre (SC) is similar to a VTS, the SC is covering a larger geographical area than a VTS. The services offered by the SC are user-selectable;
- A Shore Centre can receive and display Ship’s Voyage and send proposed changes in return;
- A Shore Centre can perform Enhanced monitoring among other services.

Example of Shore Centres:
- Tarifa SC – Spanish Mediterranean Coast;
- Kvitsøy SC – Entrance to Stavanger Norway;
- Horten SC – Entrance to Oslo;
- Gothenburg SC – Swedish West Coast and Baltic Region;
- Tallin SC – Finnish Gulf.
Document No:

Title: Service instance description for the

SAAB Gothenburg VTS Service

Date: 2018-01-04
## Document status

### Authors

<table>
<thead>
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<tr>
<td>SAAB TransponderTech</td>
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### Document History

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### Review

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1 Introduction

Purpose of the Document
The purpose of this service instance description document is to provide an operational
description of the specific service instance.
The aim is to document the key aspects of the VTS service instance. This includes:

- identification and summary of the service instance
  - reference to the design description
  - identification of the service instance
- service instance details
  - operational details
  - specific interaction pattern
- release notes
  - feature list
  - bug list.

Intended Readership
This service instance description document is intended to be read by service consumers in
charge of selecting the service instance to consume.
2 Service Instance Identification

The purpose of this chapter is to provide a unique identification of the service implementation and describe where the service is in terms of the engineering lifecycle.

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<thead>
<tr>
<th>Name</th>
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<tr>
<td>Name</td>
<td>VTS Gothenburg (Test)</td>
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<tr>
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<tr>
<td>Version</td>
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<tr>
<td>Service Design Version</td>
<td>2.2</td>
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<tr>
<td>Description</td>
<td>Test instance. Allows get request, subscriptions and uploads of voyage plan (RTZ 1.1) Allows sending and receiving of textmessages(TXT 1.3) with geographical information (point, circle, area). Supports route information broadcast over AIS</td>
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<tr>
<td>Keywords</td>
<td>VTS, Gothenburg, GBG, AIS, RTZ, TXT, Voyageplan, Textmessage</td>
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<td>SAAB TransponderTech</td>
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<td>Status</td>
<td>Released for test</td>
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3 Service Instance Details

3.1 Overall description
The GBG VTS is an onshore service that provides support and information to vessels around Gothenburg. The vessel can send their voyage plan to the VTS, the VTS can then inspect and/or edit the voyage and send it back to the vessel if needed. The VTS can also use STM textmessages to communicate with the vessel.

3.2 Service coverage
The service covers the whole world

3.3 Allowed methods
The Implementation is based on voyage information service design version 2.2

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method</th>
<th>Allowance/handling</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>Receive voyage plan in RTZ</td>
<td>uploadVoyagePlans</td>
<td>Yes</td>
<td>RTZ v1.1STM</td>
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<tr>
<td></td>
<td>incl ACK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receive STM text messages</td>
<td>uploadTextMessage</td>
<td>Yes</td>
<td>STM TXT v1.3</td>
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<tr>
<td>Receive area (S124) messages</td>
<td>uploadArea incl ACK</td>
<td>No</td>
<td>S124 v0.0.7</td>
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<tr>
<td>Return list of voyage plans on request</td>
<td>getVoyagePlans</td>
<td>Yes</td>
<td>RTZ v1.1STM</td>
</tr>
<tr>
<td>Accepts subscription request</td>
<td>subscribeToVoyagePlans</td>
<td>Yes</td>
<td>RTZ v1.1STM</td>
</tr>
<tr>
<td>Accepts removal of subscriptions</td>
<td>removeSubscriptionToVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Accepts request for list of subscribed voyages</td>
<td>findSubscriptionsToVoyagePlans</td>
<td>No</td>
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## 4 Release Notes

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<td>The service is released in staging environment for testing.</td>
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<td>0.2</td>
<td>The service is updated with functionality to send and receive text messages.</td>
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## 5 References

<table>
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<tr>
<th>Nr.</th>
<th>Version</th>
<th>Reference</th>
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<tbody>
<tr>
<td>[1] Service Documentation Guidelines</td>
<td>01.00</td>
<td>E2 Deliverable D3.4 - Service Documentation Guidelines</td>
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</table>
6 Acronyms and Terminology

9.1 Acronyms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>URL</td>
<td>Uniform Resource Locator</td>
</tr>
<tr>
<td>VIS</td>
<td>Voyage Information Service</td>
</tr>
<tr>
<td>VTS</td>
<td>Vessel Traffic Service</td>
</tr>
</tbody>
</table>

9.2 Terminology

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>The provision of something (a non-physical object), by one, for the use of one or more others, regulated by formal definitions and mutual agreements. Services involve interactions between providers and consumers, which may be performed in a digital form (data exchanges) or through voice communication or written processes and procedures.</td>
</tr>
<tr>
<td>Service Consumer</td>
<td>A service consumer uses service instances provided by service providers. All users within the maritime domain can be service customers, e.g., ships and their crew, authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
</tr>
<tr>
<td>Service Instance</td>
<td>One service implementation may be deployed at several places by same or different service providers; each such deployment represents a different service instance, being accessible via different URLs.</td>
</tr>
<tr>
<td>Service Instance Description</td>
<td>Documents the details of a service implementation (most likely documented by the service implementer) and deployment (most likely documented by the service provider). The service instance description includes (but is not limited to) service technical design reference, service provider reference, service access information, service coverage information, etc.</td>
</tr>
<tr>
<td>Service Interface</td>
<td>The communication mechanism of the service, i.e., interaction mechanism between service provider and service consumer. A service interface is characterised by a message exchange pattern and consists of service operations that are either allocated to the provider or the consumer of the service.</td>
</tr>
<tr>
<td>Service Operation</td>
<td>Functions or procedure which enables programmatic communication with a service via a service interface.</td>
</tr>
<tr>
<td>Service Provider</td>
<td>A service provider provides instances of services according to a service specification and service instance description. All users within the maritime domain can be service providers, e.g., authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
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C-Scope STM Functionality

Quick Guide
Revisions

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# Table of contents

1 CSOC STM FUNCTIONALITY

1.1 Receive a voyage plan

1.2 Edit a voyage plan

1.2.1 Name and schedule

1.2.2 Waypoints position

1.3 Approve and send a voyage plan

1.4 Show or hide the voyage plan

1.5 Abbreviations and Acronyms
1 CSOC STM FUNCTIONALITY

Voyage plans that are sent to the VTS through the STM VIS API will, if the voyage plan is valid, be displayed in the C-Scope Operator Client.

1.1 Receive a voyage plan

Once you receive a Voyage plan it will be displayed as an alert in the “Misc. Alerts” panel. When a voyage plan is received a “subscribe to voyage plan” message is automatically sent back to the vessel so that the VTS get the next updates on the plan from the vessel.
1.2 Edit a voyage plan

Right click on the voyage plan in the “Misc. Alerts” panel and choose “Edit Route plan”.

1.2.1 Name and schedule

In this dialog one can change the Name, Eta or ETD of the voyage plan by double clicking on the fields.
1.2.2 Waypoints position

While Edit dialog is open the voyage plan waypoints can be moved by dragging them in the chart view. Right click on the voyage plan line in the chart and choose “Add waypoint” to add waypoint on that position.
When clicking the OK button the voyage plan is sent back to the vessel that provided it. If no action is required click the “Cancel” button to avoid sending the unchanged voyage plan. If the voyage plan is unchanged it is returned to the sender by clicking the “OK” button.

1.3 Approve and send a voyage plan

Right click on the voyage plan in the “Misc. Alerts” panel and choose “Edit Route plan”.

Check the checkbox called “Approved By VTS operator” and click OK. The voyage plan will now be sent back to the vessel with the status set to “Cross checked”
1.4 Show or hide the voyage plan

Right click on the voyage plan in the “Misc. Alerts” panel and choose “Show/Hide”. The voyage plan’s visibility will now be toggled on or off.
1.4.1 Create new voyage plan

Click the “Create route” button in the «Tracks» menu in CSOC.

Draw a by clicking in the chart. Finish the line by clicking the right mouse button or by pressing the “Enter” key and the “Edit route plan” dialog will appear. Edit the voyage plan as described in section 1.2 “Edit a voyage plan”. When

To bind a voyage plan to a vessel the first waypoint must be placed directly on the preferred vessel. A solid line from the vessel to the next waypoint will indicate that the vessel is bound to the voyage plan.
1.4.2 Delete a voyage plan

To delete a voyage plan open the edit dialog and uncheck both the checkboxes in the “Approved By” section and then click OK. If the voyage plan was created in the CSOC it will be removed from both the CSOC and the online VIS repository. If the voyage plan was created by a vessel it will be removed from CSOC and a unsubscribe message will be sent to the vessel. If the vessel decides to send you the voyage plan again it will reappear in CSOC.

1.5 STM Module

The STM Module is a temporary tool developed by SMA to test, simulate and operate on the Voyage Information Service independent of an operator client.
1.5.1 VTS voyage plan access
On the tab called “Voyageplans” the access to the voyage plans created by the VTS can be controlled.

1.5.1.1 Load plans
Click the “Load from VIS” button to see the voyage plans that have been created in CSOC.

1.5.1.2 Give access to voyage plan
To give another STM actor access to a voyage plan created in CSOC select the plan in the list and click the “ACL” button at the bottom of the STM module.

Select the identity of the organization that should have access to the voyage plan and click the “Add” button. Once an organization is granted access to a plan all its services and vessels will be able to access the voyage plan.
1.5.1.3 **Add subscribers to voyage plan**

To add another STM actor as a subscriber to a voyage plan created in CSOC select the plan in the list and click the “Subscribers” button at the bottom of the STM module.

Select the identity of the organization and enter the address of its VIS service in the “Endpoint URL” text field. Click “Add” to add it as a subscriber.

This vessel / service will now get updates for the given voyage plan when it is changed by the VTS.

![Add subscribers to voyage plan](image)

1.5.2 **Vessel voyage plan access**

To request a voyage plan from a vessel go to the “Find services” tab and execute a search for the desired service. Once the service is found and selected in the list click the “Subscribe” button at the bottom of the window.

![Vessel voyage plan access](image)
Click “OK” to get the latest relevant voyage plan or enter a UVID to get a specified voyage plan.

Once your organization is granted access to the voyage plan it will appear in the CSOC.
## 1.6 Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>CSOC</td>
<td>C-Scope operator client</td>
</tr>
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<td>STM</td>
<td>Sea Traffic Management</td>
</tr>
<tr>
<td>VIS</td>
<td>Voyage Information Service</td>
</tr>
<tr>
<td>API</td>
<td>Application programming interface</td>
</tr>
<tr>
<td>SMA</td>
<td>Swedish Maritime Administration</td>
</tr>
<tr>
<td>ACL</td>
<td>Access control list</td>
</tr>
<tr>
<td>UVID</td>
<td>Unique Vessel ID</td>
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Appendix:

SSPA-Route optimisation service

- Service instance description
Document No:

Title: Service instance description for the SSPA Route Optimization service

Date: 2017-12-04
## Document status

### Authors

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
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<tbody>
<tr>
<td>Fredrik Olsson</td>
<td>SSPA Sweden AB</td>
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<td>2017-11-01</td>
<td>FO</td>
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<td>2017-12-04</td>
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1 Introduction

1.1 Purpose of the Document
The purpose of this service instance description document is to provide an operational description of the SSPA Route Optimization service as well as details about usage and release notes.

1.2 Intended Readership
This service instance description document is intended to be read by service consumers (e.g. ECDIS, VTS & Shore Center equipment manufactures) in charge of selecting the service instance to consume.
2 Service Instance Identification

The purpose of this chapter is to provide a unique identification of the service implementation and describe where the service is in terms of the engineering lifecycle.

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<td>Service Specification ID</td>
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<tr>
<td>Service Specification Version</td>
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<tr>
<td>Service Design ID</td>
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<tr>
<td>Service Design Version</td>
<td>2.2</td>
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<tr>
<td>Description</td>
<td>Provides route optimization for RTZ 1.1 with STM extension routes in European waters.</td>
</tr>
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<td>Keywords</td>
<td>Route, Optimization, SSPA Route Optimization</td>
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<td>Route Optimization</td>
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<tr>
<td>Provider</td>
<td>SSPA Sweden AB</td>
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<tr>
<td>Status</td>
<td>Released (staging), Provisional (production)</td>
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3 Service Instance Details

3.1 Overall description

The SSPA Route Optimization Service is an onshore service that provides optimized routes to vessels when planning their voyages. The service requires a manually planned route (with sufficient UKC) as input and returns an optimized route.

Optimization is performed based on bunker consumption/total vessel resistance, i.e. the returned route aims to be the most efficient route from A to B. The service accounts for water depth (resistance increase from shallow waters) as well as the influence of weather (wind, current and waves). Please note that weather is only accounted for during a period consisting of 5 days ahead and 7 days prior to the current date, i.e. a rolling 12 day-period is covered. Submitted routes with waypoints outside this period will be optimized without influence of weather condition.

The returned route does not account for any navigational aspects such as TSS:s and therefore the returned route has to be checked from a nautical perspective on board once received.

3.2 Service coverage

The service covers the European waters. Received routes starting/ending/passing outside European waters will be partly optimized for the parts of the route falling inside the covered area. The parts of the route falling outside the area of coverage will be passed through unoptimized.

![Map of European waters]
3.3 Required input

The service has the following requirements on the inputs:

- The incoming RTZ must be an RTZ version 1.1 with STM Extension according to the VIS Design 2.2. In addition, the following attributes in the RTZ is required:
  - vesselIMO or vesselMMSI and vesselDisplacement in routeInfo-element
  - draughtForward and draughtAft in defaultWaypoint-element
  - At least one (1) manual schedule with etd on first waypoint and eta on last waypoint

Failing to comply with the above requirements will result in a return code = 400 with an error message stating what is missing/wrong.

The input route is used as guideline in the search algorithm and as fallback option if no optimum route can be found for any parts of the voyage, hence the inputted route has to be a valid, navigable route.

3.4 Output from the service

The Route Optimization service responds with an optimized route in RTZ 1.1 format (with STM extension). The output RTZ route contains a single, optimized set of waypoints and a single optimized schedule; original schedule(s) are discarded. The returned route has routeStatusEnum=3 (Optimized).

Response url is either a provided callbackEndpoint or a url found through look-up in the service registry based on the mrn of the requesting party.

Please note that the optimization may take several minutes to complete, depending on route length and complexity.

3.5 Allowed methods

The SSPA Route Optimization Service is based on the Voyage Information Service design version 2.2, but handle only a set of the methods.

SSPA Route Optimization Service handles interaction on the following methods:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method</th>
<th>Allowance/handling</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive voyage plan in RTZ</td>
<td>uploadVoyagePlans</td>
<td>Yes</td>
<td>RTZ v1.1STM</td>
</tr>
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<td>Receive STM text messages</td>
<td>uploadTextMessage</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Receive area (S124) messages</td>
<td>uploadArea</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Return list of voyage plans on request</td>
<td>getVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Accept subscription request</td>
<td>subscribeToVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

3.6 Constraints

The service has the following constraints.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method</th>
<th>Constraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive voyage plan in RTZ</td>
<td>uploadVoyagePlans</td>
<td>Provided RTZ route must comply with section 3.3.</td>
</tr>
<tr>
<td></td>
<td>The first manual schedule in the provided RTZ is used as basis for the optimization.</td>
<td></td>
</tr>
</tbody>
</table>
## 4 Release Notes

<table>
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<tr>
<th>Version</th>
<th>Date</th>
<th>Notes</th>
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<tbody>
<tr>
<td>0.1</td>
<td></td>
<td>The service is release in its first version.</td>
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5 References

This chapter shall include all references used in the service instance description. Specifically, the service specification document as well as the applicable service design description shall be listed.

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### 6 Acronyms and Terminology

#### 6.1 Acronyms

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<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS</td>
<td>Traffic Separation Scheme</td>
</tr>
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</table>

#### 6.2 Terminology

<table>
<thead>
<tr>
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<th>Definition</th>
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<tr>
<td>Service Interface</td>
<td>The communication mechanism of the service, i.e., interaction mechanism between service provider and service consumer. A service interface is characterised by a message exchange pattern and consists of service operations that are either allocated to the provider or the consumer of the service.</td>
</tr>
<tr>
<td>Service Operation</td>
<td>Functions or procedure which enables programmatic communication with a service via a service interface.</td>
</tr>
<tr>
<td>Service Provider</td>
<td>A service provider provides instances of services according to a service specification and service instance description. All users within the maritime domain can be service providers, e.g., authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
</tr>
</tbody>
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Appendix:

SMHI-ETA calculation service
  • Service instance description
Document status

Authors

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oskar Eriksson</td>
<td>Swedish Meteorological and Hydrological Institute</td>
</tr>
</tbody>
</table>

Document History

<table>
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Review

| Name | Organisation |
|------|--------------|-------------|
|      |              |             |
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5. References 12  
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No table of figures entries found.

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No table of figures entries found.
1. Introduction

1. Purpose of the Document

The purpose of this service instance description document is to provide an operational description of the specific service instance.

2. Intended Readership

This service instance description document is intended to be read by service consumers in charge of selecting the service instance to consume.
2. Service Instance Identification

The purpose of this chapter is to provide a unique identification of the service instance and describe where the service is in terms of the engineering lifecycle.

<table>
<thead>
<tr>
<th>Name</th>
<th>STM ETA Calc</th>
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<tr>
<td>ID</td>
<td>urn:mrn:stm:service:instance:smhi:etacalculator</td>
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<tr>
<td>Version</td>
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<tr>
<td>Service Specification ID</td>
<td>urn:mrn:stm:service:specification:sma:vis</td>
</tr>
<tr>
<td>Service Specification Version</td>
<td>2.2</td>
</tr>
<tr>
<td>Service Design ID</td>
<td>urn:mrn:smt:service:design:sma:vis-rest-2.2</td>
</tr>
<tr>
<td>Service Design Version</td>
<td>2.2</td>
</tr>
<tr>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>Keywords</td>
<td>SMHI, Route optimization, ETA calculation, ETA window calculation, RTZ, TXT, ROS, ETA</td>
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<tr>
<td>Service type</td>
<td>Route Optimization</td>
</tr>
<tr>
<td>Provider</td>
<td>Swedish Meteorological and Hydrological Institute, SMHI urn:mrn:stm:org:smhi</td>
</tr>
<tr>
<td>Status</td>
<td>Released for test</td>
</tr>
</tbody>
</table>
3. Service Instance Details

3.1. Overall description
The STM Eta Calc service main purpose is to combine the information provided in the RTZ with information about weather, sea current and ship characteristics. This information is used to calculate a more probable ETA for each waypoint on the route. AIS Polls are also used when available to find the current position of the vessel for an accurate position of the ship if the ship is on an ongoing voyage.

The service also calculates an ETA Window before and after in addition to the updated ETA. The ETA Windows is based upon ensemble forecasts and is a reflection of the uncertainty in the prognosis. A high duration ETA windows means that the weather forecast has a lot of variation.

To be able to use the STM Eta Calc service the ship / operator have to be an active customer of SMHI Routing Services.

3.2. Service coverage
The service covers the World.
3.3. Required input
The incoming RTZ must be an RTZ version 1.1 with STM Extension according to the VIS Design 2.2.

The service is only available to customers of SMHI since there is a need for more ship data for calculation of ETA.

Required components on the RTZ are:

- Vessel IMO
- Speed on the waypoints (calculated schedule)
- At least 2 waypoints in schedule
- ETD on the first waypoint (calculated or manual schedule) and ETA on the rest of the waypoints (calculated or manual schedule). This is to be corrected in next version to only require ETD on the first WP.

draughtForward and draughtAft on defaultwaypoint-element are not required but will help improving the accuracy of the calculated ETA.

3.4. Output from the service
The output is the inputed RTZ with an updated ETA for the calculated schedule. The waypoints that get a calculated ETA also will get ETA window before and after calculated that is a measure of the certainty of the ETA.

The calculated section should look like this:

```xml
<calculated>
  <scheduleElement waypointId="0" etd="2017-04-18T06:00:00Z" eta="2017-04-18T06:00:00Z">
  </scheduleElement>
  <scheduleElement waypointId="1" etd="2017-04-18T06:10:05Z" eta="2017-04-18T06:10:05Z" speed="8" etaWindowBefore="PT0H0M5S" etaWindowAfter="PT0H0M2S">
  </scheduleElement>
  <scheduleElement waypointId="2" etd="2017-04-18T06:16:21Z" eta="2017-04-18T06:16:21Z" speed="8" etaWindowBefore="PT0H0M8S" etaWindowAfter="PT0H0M3S">
  </scheduleElement>
  <scheduleElement waypointId="3" etd="2017-04-18T06:56:45Z" eta="2017-04-18T06:56:45Z" speed="12" etaWindowBefore="PT0H0M30S" etaWindowAfter="PT0H0M11S">
  </scheduleElement>
  <scheduleElement waypointId="4" etd="2017-04-18T10:01:29Z" eta="2017-04-18T10:01:29Z" speed="14" etaWindowBefore="PT0H2M14S" etaWindowAfter="PT0H0M50S">
  </scheduleElement>
  <scheduleElement waypointId="5" etd="2017-04-18T10:24:19Z" eta="2017-04-18T10:24:19Z" speed="14" etaWindowBefore="PT0H2M26S" etaWindowAfter="PT0H0M45S">
  </scheduleElement>
</calculated>
```
<scheduleElement waypointId="6" eta="2017-04-18T11:18:30Z" etd="2017-04-18T11:18:30Z" speed="14" etaWindowBefore="PT0H2M56S" etaWindowAfter="PT0H1M55S">
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</scheduleElement>

<scheduleElement waypointId="11" eta="2017-04-19T07:14:47Z" etd="2017-04-19T07:14:47Z" speed="14" etaWindowBefore="PT0H14M9S" etaWindowAfter="PT0H5M19S">
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<scheduleElement waypointId="12" eta="2017-04-19T22:40:23Z" etd="2017-04-19T22:40:23Z" speed="14" etaWindowBefore="PT0H22M52S" etaWindowAfter="PT0H8M37S">
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</scheduleElement>
</calculated>
3.5. Interaction diagram
The STM Eta Calc only accepts voyageplans
3.6. Allowed methods

STM Eta Calc is based on the Voyage Information Service design version 2.2, but handle one of the methods.

PRS handles interaction on the following methods:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method</th>
<th>Allowance/handling</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive voyage plan in RTZ</td>
<td>uploadVoyagePlans</td>
<td>Yes</td>
<td>RTZ v1.1STM</td>
</tr>
<tr>
<td>Receive STM text messages</td>
<td>uploadTextMessage</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Receive area (S124) messages</td>
<td>uploadArea</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Return list of voyage plans on request</td>
<td>getVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Accept subscription request</td>
<td>subscribeToVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Delete subscription</td>
<td>removeVoyagePlanSubscription</td>
<td>No</td>
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</table>

3.7. Constraints
4. Release Notes

The service is released in its first version.
5. References

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Version</th>
<th>Reference</th>
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<td>01.00</td>
<td>E2 Deliverable D3.4 - Service Documentation Guidelines</td>
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| | | http://stmvalidation.eu/vis/
| | | http://stmvalidation.eu/vis/ |
6. Acronyms and Terminology

6.1. Acronyms

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<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
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<tr>
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</table>
## 6.2. Terminology

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service</strong></td>
<td>The provision of something (a non-physical object), by one, for the use of one or more others, regulated by formal definitions and mutual agreements. Services involve interactions between providers and consumers, which may be performed in a digital form (data exchanges) or through voice communication or written processes and procedures.</td>
</tr>
<tr>
<td><strong>Service Consumer</strong></td>
<td>A service consumer uses service instances provided by service providers. All users within the maritime domain can be service customers, e.g., ships and their crew, authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
</tr>
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<td>One service implementation may be deployed at several places by same or different service providers; each such deployment represents a different service instance, being accessible via different URLs.</td>
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</tr>
</tbody>
</table>
Appendix:

Navicon-Enhanced Monitoring Service

- Service instance description
### Document status

#### Authors

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bjarke B. Blendstrup</td>
<td>NAVICON A/S</td>
</tr>
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### Document History

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### Review

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<th>Organisation</th>
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1 Introduction

1.1 Purpose of the Document
The purpose of this service instance description document is to provide an operational description of the Royal Danish Navy Command Control & Information System Enhanced Monitoring Service (RDNCCIS-EMS) which monitors the movement of all vessel inside the area of responsibility for the Danish Defence Joint Operations Centre in Karup. Vessels inside the monitored area will be requested to submit voyage plans to the service which will be used in the enhanced monitoring. Vessels will be made aware of unwanted behavior by text messages sent by an operator via the VIS interface.

The service will be named Royal Danish Navy Shore Center in the service registry to clarify its role to vessels / participants.

1.2 Intended Readership
This service instance description document is intended to be read by service consumers in charge of selecting the service instance to consume.
# 2 Service Instance Identification

The purpose of this chapter is to provide a unique identification of the service instance and describe where the service is in terms of the engineering lifecycle.

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<tr>
<td>Service Design ID</td>
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<tr>
<td>Service Design Version</td>
<td>2.2</td>
</tr>
<tr>
<td>Description</td>
<td>Monitors vessel inside Danish and adjacent waters and alerts operators to unwanted behavior, which the operator may choose to inform the vessel about via text messages.</td>
</tr>
<tr>
<td>Service Type</td>
<td>Enhanced Monitoring Service-VIS</td>
</tr>
<tr>
<td>Keywords</td>
<td>Route monitoring, voyage information service, VIS, EMS</td>
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<td>Provider</td>
<td>NAVICON A/S on behalf of the Royal Danish Navy.</td>
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<tr>
<td>Status</td>
<td>??? (Released for test in MCP PRODUCTION)</td>
</tr>
</tbody>
</table>
3 Service Instance Details

3.1 Overall description
The RDNCCIS Enhanced Monitoring Service monitors the movement of all vessel inside the area of responsibility for the Danish Defence Joint Operations Centre in Karup.

When a vessel which is registered as released or provisional in the service registry moves inside the monitored area (according to AIS), they will automatically be asked to submit a voyage plan.

Voyage plans submitted will be used to determine if the vessel navigates according to the voyage plan by comparing the submitted route to the AIS received for the vessel.

If no voyage plan is submitted, the vessel will be monitored according to known sailing patterns for the type and size of vessel in question.

Operators will be alerted to any unwanted behavior, and will have the option to forward the alert directly to the vessel via text messages.

Text messages sent from vessels to the Royal Danish Navy Shore Center will be displayed to the operators in the JOC.

3.2 Service coverage
The service covers the area of responsibility for the Danish Defence Joint Operations Centre:
3.3 Required input
The incoming RTZ must be an RTZ version 1.1 with STM Extension according to the VIS Design 2.2.

3.4 Output from the service
Only TXT messages are sent from the service. These are v1.3.
3.5 Functional description
The Royal Danish Navy Shore Center is searchable through Maritime Cloud Service Registry.

Vessel enters monitored area (according to AIS)

Is IMO from AIS registered in MC?

No

Vessel will be monitored according to normal navigational patterns

Yes

Send a subscription request and poll for a voyage plan

Wait a while

Is a voyage plan submitted?

No

Send a TXT message to the vessel, informing them that they will be monitored inside Danish waters and that the Danish Navy wishes to receive an active voyage plan.

Yes

Is voyage plan parsable with status=7 and at least two waypoints?

No

No

Vessel will be monitored according to voyage plan

Yes

Send a TXT message to the vessel, informing them that they will be monitored inside Danish waters.

Yes
3.6 Messages sent automatically
When a vessel enters the monitored area, and voyage plans cannot be polled / subscribed to:

“You have entered an area monitored by the Danish Defence Joint Operations Centre. Please allow the Royal Danish Navy Shore Center access to your voyage plans.”

When a vessel enters the monitored area, and voyage plan submitted is either not active (status 7) or contains less than two waypoints:

“You have entered an area monitored by the Danish Defence Joint Operations Centre. Please submit an active voyage plan.”

When a vessel enters the monitored area, and submits an acceptable voyage plan:

“You have entered an area monitored by the Danish Defence Joint Operations Centre. The Royal Danish Navy Shore Center will be monitoring your journey according to the voyage plan you have submitted.”

3.7 Allowed methods
The Royal Danish Navy Shore Center application is based on the Voyage Information Service design version 2.2, but handle only a subset of the methods:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method</th>
<th>Allowance/handling</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive voyage plan in RTZ</td>
<td>uploadVoyagePlans</td>
<td>Yes</td>
<td>RTZ v1.1STM</td>
</tr>
<tr>
<td>Receive STM text messages</td>
<td>uploadTextMessage</td>
<td>Yes</td>
<td>TXT v1.3</td>
</tr>
<tr>
<td>Receive area (S124) messages</td>
<td>uploadArea</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Return list of voyage plans on request</td>
<td>getVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Accept subscription request</td>
<td>subscribeToVoyagePlans</td>
<td>No</td>
<td></td>
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<tr>
<td>Delete subscription</td>
<td>removeVoyagePlanSubscription</td>
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</table>

3.8 Constraints
There are no constraints.
## 4 Release Notes

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<td>1.0.0</td>
<td>June 2017</td>
<td>The service is released in BETA.</td>
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<tr>
<td>1.0.1</td>
<td>November 2017</td>
<td>The service is released (provisionally) in production.</td>
</tr>
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</table>
## 5 References

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Version</th>
<th>Reference</th>
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<tr>
<td></td>
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<td>[3]</td>
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</tr>
<tr>
<td>[4]</td>
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</tbody>
</table>
## 6 Acronyms and Terminology

### 6.1 Acronyms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS</td>
<td>Enhanced Monitoring</td>
</tr>
</tbody>
</table>

### 6.2 Terminology

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>Service</td>
<td>The provision of something (a non-physical object), by one, for the use of one or more others, regulated by formal definitions and mutual agreements. Services involve interactions between providers and consumers, which may be performed in a digital form (data exchanges) or through voice communication or written processes and procedures.</td>
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Appendix:

Pilot Route Service

- Service instance description
Document No:

Title: Service instance description for the Nordic Pilot Route Service

Date: 2018-01-19
## Document status

### Authors

<table>
<thead>
<tr>
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<td>Swedish Maritime Administration</td>
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### Document History

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### Review

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<tr>
<td>Håkan Heurlin</td>
<td>SMA</td>
</tr>
<tr>
<td>Per DeFlon</td>
<td>SMA</td>
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</table>
1 Introduction

1.1 Purpose of the Document
The purpose of this service instance description document is to provide an operational description of the specific service instance.

The aim is to document the key aspects of the service instance. This includes:
- identification and summary of the service instance
  - reference to the design description
  - identification of the service instance
- service instance details
  - operational details
  - specific interaction pattern
- release notes
  - feature list
  - bug list.

1.2 Intended Readership
This service instance description document is intended to be read by service consumers in charge of selecting the service instance to consume.
## 2 Service Instance Identification

The purpose of this chapter is to provide a unique identification of the service instance and describe where the service is in terms of the engineering lifecycle.

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>ID</td>
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<td>Version</td>
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<tr>
<td>Service Specification ID</td>
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<td>Service Specification Version</td>
<td>2.2</td>
</tr>
<tr>
<td>Service Design ID</td>
<td>urn:mrn:smt:service:design:sma:vis-rest-2.2</td>
</tr>
<tr>
<td>Service Design Version</td>
<td>2.2</td>
</tr>
<tr>
<td>Description</td>
<td>The service provides pilot routes from initially Swedish ports, but aims to cover the Nordic countries.</td>
</tr>
<tr>
<td>Keywords</td>
<td>Pilot, Route, Nordic Pilot Route Service, NPRS, PRS, Route Catalogue, VIS, TXT</td>
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<td>Provider</td>
<td>Swedish Maritime Administration, SMA urn:mrn:stm:org:sma</td>
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<tr>
<td>Status</td>
<td>Released for test</td>
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</table>

*Table 1 – Service Instance Description*
3 Service Instance Details

3.1 Overall description
The Pilot Route Service, PRS is an onshore service that provides pilot routes to vessels when planning their voyages. The vessel can send their voyage plan in RTZ 1.1 format to PRS and get back one or several pilot routes in return. The vessel responsible personnel can chose among the returning routes which to add to their voyage plan. If the vessel’s voyage plan is planned from/to the berth, PRS will calculate the best pilot route(s), if the voyage plan ends near a pilot boarding point, all pilot routes from that boarding point will be returned. When the voyage plan reaches from port to port within Swedish waters, PRS will return both departing as well as arriving pilot routes.

3.2 Service coverage
The service cover the following area;

![Service Coverage Area](image)

The following ports are included:
- All Swedish ports where pilot is compulsory
3.3 **Required input**
The incoming RTZ must be an RTZ version 1.1 with STM Extension according to the VIS Design 2.2.

3.4 **Output from the service**
When PRS receives a voyage plan the following actions will be performed:

1. Find departure routes from ship’s route starting waypoint and pilot routes starting waypoint within a distance of 2.7Nm (5000 meters)
2. Find arrival routes from ship ending waypoint and pilot routes starting waypoint within a distance of 2.7Nm (5000 meters)
3. Check if the ship route starts or ends at a pilot route waypoint endpoint (often the pilot boarding point).
   a. If this is the case, return all pilot routes from 1 and/or 2
   b. If not, for all the departure and arriving pilot routes, calculate the best routes by comparing the distance of the corresponding ship voyage plan segment to each pilot route. PRS will return all routes within a 10% distance from the best pilot route. The ship route segment is found by searching for the ship waypoint that is closest to the pilot routes from 1 and/or 2. Depending on the route direction, the segment is taken either from that waypoint to the ending waypoint (arrival) or, from the starting waypoint and the found waypoint (departure).

PRS responds with a text message if no arrival and/or departure routes can be found, or the route already contains a correct pilot route.
3.5 Interaction diagram
Interacting with PRS is done through the VIS public interface UploadVoyageplan. For further details about the interface, see the VIS documentation.

- PRS is searchable through the STM Service Registry
- Ship will request PRS by sending their voyage plan through the UploadVoyageplan interface
- PRS will return a list of pilot routes by calling the vessel’s VIS instance UploadVoyageplan interface

![Interaction Diagram]

Figure 2 - Interaction Diagram
3.6 PRS Backend

When the voyage plan is received at PRS VIS, VIS will inform PRS backend through the VIS private interface by pushing a notification to PRS.

The backend of PRS is implemented as a web services using the Microsoft .NET WebApi component. PRS backend receives new voyage plans by posting to its Notify controller. Inside the controller, the voyage plan is fetched through a VIS private client by calling its GetMessage() method. The controller will fetch all uploaded STM messages and for each message of type RTZ, call internal method to find pilot routes.

The result is returned from the controller through a web client call to the CallService() method on the VIS private side interface.
3.6.1 Software architecture

PRS backend system is a web service implemented using .NET WebAPI component. The system consists of the following sub systems:

- **WebAPI controller** – NotificationController, this is where VIS pushes notifications of new uploaded voyage plans to. The controller also calls PRS private search methods.
- **Class library** – VisService, a web client that uses VIS private interface GetMessage and CallService.
- **Class library** – Calculation, comprises functionality to calculate distance and bearing of routes. Uses Sql Server Types DbGeography built-in calculation.
- **ASP.NET Web page** – AdminWeb, a basic interface to PRS database
- **Sql Server DB** – PRS private database for storing pilot routes and its meta data

3.6.2 Logic

When PRS controller gets message from VIS the following chain of events occur:

1. Check if message is of type RTZ
2. Call sub routine PilotRouteFinder.FindBestPilotRoutes(string rtz)
   a. Divide the search into three sub-categories
      i. Departures
      ii. Arrivals
      iii. Open sea
3.6.2.1 Departures and arrivals

- Find the nearest departing/arrival pilot route (PR) with starting/ending waypoint distance to ship route (SR) starting/ending waypoint less than 5000 meters.
- If such a route was found, perform a new search for other PR candidates that 1) starts/ends close the nearest PR’s starting/ending point and 2) ends/starts not too far from the SR.
- If there are more than one candidate, call the calculation sub-routine (CRS).
- CRS does a distance and bearing comparison on each PR w.r.t the SR. In order to do this comparison, the SR is shorted. The shortening of SR is done by finding the waypoint of SR with the nearest distance of the ending/starting waypoint in the PR candidate list. The shorted SR will now contain waypoints from the starting/ending waypoint to the found one. For each PR candidate a weighted distance measure is calculated and the PR candidate with the minimum measure is chosen.
- The bearing of the shorted SR is compared to each PR candidate and only candidates with bearing < 45 degrees are added to result.
- CRS also checks if there are PR candidates within a 10% measure and adds those to the result.

3.6.2.2 Open sea

For finding open sea PR’s a slightly different approach is performed:

For each of open sea PR in PRS
- Calculate the distance between the starting waypoint and SR
- Calculate the distance between the ending waypoint and SR
- Calculate average distance
- Calculate the bearing and compare that with bearing of the SR segment corresponding to the current PR
- Add open sea route to result only if bearing is < 22.5 degrees and distance < 1000 meters

3.7 Allowed methods

The Pilot Route Service is based on the Voyage Information Service design version 2.2, but handle only a set of the methods.

PRS handles interaction on the following methods:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method</th>
<th>Allowance/handling</th>
<th>Comment</th>
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<td>uploadVoyagePlans</td>
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<td>RTZ v1.1STM</td>
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<tr>
<td>Receive STM text messages</td>
<td>uploadTextMessage</td>
<td>No</td>
<td></td>
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<tr>
<td>Receive area [S124] messages</td>
<td>uploadArea</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Return list of voyage plans on request</td>
<td>getVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Accept subscription request</td>
<td>subscribeToVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 - Allowed methods

The Pilot Route Service does not nominate actors internally, but will always respond with either pilot routes or text messages for every uploaded voyage plan to the service.
4 Release Notes

The service is release in its first version.
5 References

This chapter shall include all references used in the service instance description. Specifically, the service specification document as well as the applicable service design description shall be listed.

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Table 3 - References
6 Acronyms and Terminology

6.1 Acronyms

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<th>Definition</th>
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<td>PRS</td>
<td>Pilot Route Service</td>
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Table 4 - Acronyms

6.2 Terminology

<table>
<thead>
<tr>
<th>Term</th>
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<tr>
<td>Service</td>
<td>The provision of something (a non-physical object), by one, for the use of one or more others, regulated by formal definitions and mutual agreements. Services involve interactions between providers and consumers, which may be performed in a digital form (data exchanges) or through voice communication or written processes and procedures.</td>
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<td>Service Consumer</td>
<td>A service consumer uses service instances provided by service providers. All users within the maritime domain can be service customers, e.g., ships and their crew, authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
</tr>
<tr>
<td>Service Instance</td>
<td>One service implementation may be deployed at several places by same or different service providers; each such deployment represents a different service instance, being accessible via different URLs.</td>
</tr>
<tr>
<td>Service Instance Description</td>
<td>Documents the details of a service implementation (most likely documented by the service implementer) and deployment (most likely documented by the service provider). The service instance description includes (but is not limited to) service technical design reference, service provider reference, service access information, service coverage information, etc.</td>
</tr>
<tr>
<td>Service Interface</td>
<td>The communication mechanism of the service, i.e., interaction mechanism between service provider and service consumer. A service interface is characterised by a message exchange pattern and consists of service operations that are either allocated to the provider or the consumer of the service.</td>
</tr>
<tr>
<td>Service Operation</td>
<td>Functions or procedure which enables programmatic communication with a service via a service interface.</td>
</tr>
<tr>
<td>Service Provider</td>
<td>A service provider provides instances of services according to a service specification and service instance description. All users within the maritime domain can be service providers, e.g., authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
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Table 5 - Terminology
Appendix:

Baltic Navigational Waring Service instance description
Service instance description for the Baltic Navigational Warning Service

2018-01-18
Document status

Authors

<table>
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</tr>
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<tbody>
<tr>
<td>Björn Andreasson</td>
<td>Swedish Maritime Administration</td>
</tr>
<tr>
<td>Mikael Olofsen</td>
<td>Swedish Maritime Administration/Combitech</td>
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<td>Swedish Maritime Administration</td>
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<td>Mattias Johansson</td>
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Contents

1 Introduction 4
  1.1 Purpose of the Document 4
  1.2 Intended Readership 4
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3 Service Instance Details 6
  3.1 Overall description 6
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No table of figures entries found.
1 Introduction

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  - reference to the design description
  - identification of the service instance
- service instance details
  - operational details
  - specific interaction pattern
- release notes
  - feature list
  - bug list.

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### 2 Service Instance Identification

The purpose of this chapter is to provide a unique identification of the service instance and describe where the service is in terms of the engineering lifecycle.

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<td>Description</td>
<td>The service provides Navigational Warnings in the Baltic region and Swedish T&amp;P notices</td>
</tr>
<tr>
<td>Keywords</td>
<td>NW, Navigational Warning, Baltic, S-124, T&amp;P</td>
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<td>Status</td>
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3 Service Instance Details

3.1 Overall description

DISCLAIMER:
The Baltic Navigational Warning service is not intended to relieve the service users from ordinary receipt of Maritime Safety Information (MSI) as part of the Global Maritime Distress and Safety System (GMDSS), which every ship, while at sea, has to comply to. Since the service is intended to be used for test and validation purposes during the STM Validation Project the Swedish Maritime Administration, as service provider, cannot guarantee any service level or take any responsibility that all relevant warnings and information are provided by the service.

The purpose with the Baltic Navigational Warning service is to provide the service consumer, i.e. ship, with only those warnings that are relevant for that specific route that they intend to sail/are currently at and at the time specified in the route schedule. Moreover, the warnings will be displayed directly in ECDIS and automatically deleted when they are expired and no longer valid.

The benefits are:

- Reduced workload – No need to manually plot positions/areas received by NAVTEX/voice communication at ENC/paper chart. This allows the navigator to concentrate on safely navigating the ship
- Increased safety of navigation – According to London P&I Club Insurance inspections regularly find deficiencies in managing navigation warnings and notices to mariners as officers fail to implement navigational safety notices. By providing the notices directly to ships ECDIS manual work and risk of missing important information is reduced and T&P notices can be received digitally already before sent out as ENC updates. In addition all Temporary and Provisional (T&P) Notice to Mariners are not sent out today which means that full ECDIS ships, sailing paperless, do not get all notices.
- Reduced human errors – As warnings are provided digitally and seamlessly shown directly on ECDIS possible human errors possible errors in misunderstandings and manual plotting can be avoided.
- Increased Navigational Warning focus - Since only notices relevant for the planned and/ or actual route will be sent to the ECDIS, the Officer On Watch can concentrate on these and need not bother with warnings issued outside the adjacent areas.

The service provides safety notices to ships in S-124 format. The S-124, navigational warnings, product specification is being developed by an IHO Correspondence Group with the purpose to submit it for endorsement. Before being mature for endorsement the STM Validation Project will serve as one of the testbeds to validate a draft version of the specification.

The service is initiated when a ship shares its Voyage Plan (VP) with the Baltic Navigational Warning service. In response, the Baltic Navigational Warning service initially provides the ship with all related safety notices in the concerned area(s), and then continuously all updates in the concerned area(s). Notices that are within the sub-areas that the route crosses, see figure 1 in paragraph 3.2 for sub-area division, are deemed as relevant and returned to the ship. Notices in other sub-areas will not be returned.

When ship has left the service coverage area, the Baltic Navigational Warning service stops sending updates to the ship. More operational details are to be found in paragraph 3.5, functional description.
The Baltic Navigational Warning service provides the following navigational safety notices:

- **Coastal warnings** - Navigational warnings that apply to open waters are classified as coastal. The same information that today is transmitted on NAVTEX.
- **Local warnings** for Swedish waters - Warnings that apply only to waters inside the belt of the skerries are regarded as local. Today transmitted only on VHF.
- **Temporary and Provisional notices** for Swedish waters

**NOTE:** weather/ice information is not provided by the service. T&P notices is not included in the first release.

### 3.2 Service coverage

The service covers the following area:

- The Baltic sea area

![Figure 1 Service coverage area](image)
3.3 Required input
The incoming Voyage Plan must be an RTZ version 1.1 with STM Extension according to the VIS Design 2.2.
The Voyage Plan must include a schedule, which can be of type manual or calculated, with a date and time within the validity period of the issued Navigational warning.

3.4 Output from the service
The output from the service is Navigational Warnings in S124 v0.0.7 format according to the VIS Design 2.2.

3.5 Functionality description
When voyage plan is received by the service, the consumer/ship is added in a subscription list for Navigational Warnings in the Baltic Sea area. The ship will initially receive all active warnings concerning the sub-areas that the route crosses/enters into, see Figure 2, and then continuously receive updates, new and cancelled messages until the route leaves the area and subscription is removed by the service.

Figure 2 Example of relevant notices based on ships Voyage Plan and sub-area division

The notices are not limited to specific transmission times but are sent as soon as warnings are registered in Sweden Traffic.
If a Navigational Warning belongs to several areas or if it not assigned to a specific (in Sweden traffic the Swedish management systems for Navigational Warnings) area it will be sent out as if it concerns all sub-areas i.e. if a route passes any sub-area will receive the warning.
The service will remove the ship from subscription list when the ship has:

- Left the service coverage area, according to the Voyage Plan schedule and waypoint locations
- The Voyage Plan is inactivated onboard the ship
- The Voyage Plan is finalised (the ship has arrived to a destination/port in the service coverage area) according to arrival time at last waypoint
- If a new Voyage Plan is shared with the service without prior plan being
inactivated the service will use the last plan received and filter so that no
duplicate messages are sent to the ship
As an example a ship that departs from the Mediterranean Sea with a Voyage Plans that
goes into the Baltic will receive all active warnings when they call the service and updates
throughout the voyage. A ship with a voyage in the opposite direction will only receive
updates until they leave, based on waypoint geography and arrival time, the service
coverage area.

How received notices are handled in each STM compatible ship system are described in
respective user manual but the common requirements are that the ECDIS/bridge system
should be capable of:

- Display received areas
- Handle updated notice area
- Delete notices when expiredobsolete

3.6 Dynamic description
Interaction with the service is initiated from the ship by sending a Voyage Plan. The service
then responds by sending back relevant Navigational Warnings.

- The service is searchable through the Service Registry
- Ship will request safety notices by uploading (sending) their voyage plan to the Baltic
  Navigational Warning service
- The Baltic Navigational Warning service will return a list of safety notices by
  uploading area messages (S124) to the ship

Interacting with the Baltic Navigational Warning service is done through the VIS public
interface UploadVoyageplan. The warning messages are returned to the ships VIS public
interface uploadArea. For further details about the interface, see the VIS documentation

3.7 Allowed operations
The Baltic Navigational Warning Service is based on the Voyage Information Service design
version 2.2, but only handle a set of the methods.

The service handles interaction on the following methods:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method</th>
<th>Allowance/handling</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive voyage plan in RTZ</td>
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<td>Yes</td>
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</tr>
<tr>
<td>Receive STM text messages</td>
<td>uploadTextMessage</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Receive area (S124) messages</td>
<td>uploadArea</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Return list of voyage plans on request</td>
<td>getVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Accept subscription request</td>
<td>subscribeToVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
The Baltic Navigational Warning Service does not nominate actors internally, but will respond with new or updated navigational warnings when receiving uploaded voyage plan to the service.
4 Release Notes

The service is to be released in its first version. T&P notices is not included in the first version.
## 5 References

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# Acronyms and Terminology

## 6.1 Acronyms

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<th>Definition</th>
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## 6.2 Terminology

<table>
<thead>
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<th>Definition</th>
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</tr>
</tbody>
</table>
Appendix:

**Winter Navigation Service**

- Service instance description
- Brief technical description
- IB Next STM features and user manual
## Document status

### Authors

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuomas Martikainen</td>
<td>Finnish Transport Agency</td>
</tr>
<tr>
<td>Antti Koskimaa</td>
<td>Atostek</td>
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### Document History

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<tr>
<td>0.1</td>
<td>2017-07-06</td>
<td>TM</td>
<td>Initial version</td>
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<tr>
<td>0.2</td>
<td>2017-08-10</td>
<td>AK</td>
<td>Corrections, additions</td>
</tr>
<tr>
<td>1.0</td>
<td>2017-12-19</td>
<td>TM</td>
<td>First released version</td>
</tr>
</tbody>
</table>

### Review

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mikael Olofsson</td>
<td>Swedish Maritime Administration</td>
</tr>
<tr>
<td>Björn Andreasson</td>
<td>Swedish Maritime Administration</td>
</tr>
</tbody>
</table>
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  1.2 Intended Readership 4
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1 Introduction

1.1 Purpose of the Document
The purpose of this service instance description document is to provide an operational description of the Winter Navigation Voyage Information Service. Winter Navigation Voyage Information Service ("service", “WINVIS”) provides official ice routes and assistance in ice conditions by exchanging RTZ routes and text messages using VIS Rest Design.

1.2 Intended Readership
This service instance description document is intended to be read by service consumers in charge of selecting the service instance to consume.
# 2 Service Instance Identification

The purpose of this chapter is to provide a unique identification of the service instance and describe where the service is in terms of the engineering lifecycle.

<table>
<thead>
<tr>
<th>Name</th>
<th>Winter Navigation Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>urn:mrn:stm:service:instance:fta:winvis</td>
</tr>
<tr>
<td>Version</td>
<td>1.0</td>
</tr>
<tr>
<td>Service Specification ID</td>
<td>urn:mrn:stm:service:specification:sma:vis</td>
</tr>
<tr>
<td>Service Specification Version</td>
<td>2.2</td>
</tr>
<tr>
<td>Service Design ID</td>
<td>urn:mrn:stm:service:design:sma:vis-rest-2.2</td>
</tr>
<tr>
<td>Service Design Version</td>
<td>2.2</td>
</tr>
<tr>
<td>Description</td>
<td>Provides ice routes and information on icebreaker assistance. Supports exchange of STM Text Message version 1.3 and RTZ 1.1 with STM extensions.</td>
</tr>
<tr>
<td>Keywords</td>
<td>winter, winter navigation, winvis, ice, iceroute, iceroutes, icebreaker, dirway, dirways, VIS, Voyage Information Service</td>
</tr>
<tr>
<td>Service Type</td>
<td>Winter Navigation</td>
</tr>
<tr>
<td>Provider</td>
<td>Finnish Transport Agency</td>
</tr>
<tr>
<td></td>
<td>urn:mrn:stm:org:fta</td>
</tr>
<tr>
<td>Status</td>
<td>Released for production</td>
</tr>
</tbody>
</table>
3 Service Instance Details

3.1 Overall description

Winter Navigation Service provides ships ice routes and detailed information regarding icebreaker assistance. Information will be provided from ice-coordination centres and directly from icebreakers.

In ice-covered areas, the coordinating icebreaker provides waypoints, which indicate the assistance route. The waypoints are set in order to help vessels navigate more easily and safely in ice conditions and in order to enable vessels to navigate unassisted for as long as possible. Vessels are, however, at all times responsible for their own safe navigation.

General ice waypoints for all ships will be available for all vessels for route planning. Ships can also subscribe to receive all new ice routes. Ice routes won’t change after they are published, but they can only be removed when they are not valid anymore.

Icebreaking authorities recommend that all ships that are bound for ports in ice-covered water send their voyage plan to the service. Information will be used for monitoring of the vessels voyage in ice conditions and for planning of icebreaker assistance.

When needed, icebreakers will send detailed recommended ice routes to vessels. These recommendations can be either short alternative segments for the planned route or the modifications in the vessels original route. After receiving the information, vessels navigational personnel can update the current voyage plan and send it to all interested parties.

In addition, icebreakers and coordination centres can send further information using text messages. This can include information such as; the position, name and VHF working channel of the icebreaker, recommended time of arrival to icebreaker meeting point, assistance order or other navigational instructions.
3.2 Service coverage
The service covers the area's leading to Finnish and Swedish ports in Baltic Sea, including Gulf of Finland and Gulf of Bothnia.
3.3 **Required input**
The incoming RTZ must be an RTZ version 1.1 with STM Extension according to the VIS Design 2.2.
Incoming text messages must be in STM TXT v1.3 format. Text messages must include a reference to vessels voyage plan [informationObjectReferenceId].

3.4 **Output from the service**
Outgoing voyage plans are in RTZ v1.1 STM format. If vessels original RTZ file is modified by the service, all original RTZ-extensions are included in the returned file.
The service will not modify the schedules in the route, but the original schedules will be sent back untouched, even when waypoints are modified, added or removed.
Outgoing text messages are in STM TXT v1.3 format.

3.5 **Functional description**
Winter Navigation Service is searchable through Maritime Connectivity Platform Service Registry.

3.5.1 **Voyage planning**
- Vessels request ice routes from the service [getVoyagePlans]
- WINVIS returns all active ice routes
- Vessels can subscribe to receive all changes in ice routes and all new routes [subscribeToVoyagePlans]

3.5.2 **During vessels voyage**
- Vessels send WINVIS it's voyage plan
- WINVIS receives the voyage plan and uses it for monitoring of vessels in ice covered waters. Additionally WINVIS subscribes to the further changes in the route.
- WINVIS sends vessel recommended route to the vessel

3.5.2.1 **Alternative 1**
- WINVIS modifies voyage plan received from vessel and sends the complete route plan back to the vessel.
- Vessel receives the recommendation and accepts or rejects suggested route.

3.5.2.2 **Alternative 2**
- WINVIS creates and sends a new alternative part for the route
- Vessel receives the route segment and modifies route plan in on-board system.
- WINVIS sends a text message to vessel. Information can include, e.g.:
  - Recommended time of arrival to icebreaker meeting point, incl. reference to geographical point
  - Information on general instructions on icebreaker assistance
  - Detailed information regarding icebreaker assistance; such as, assistance order, convoy information, towing arrangements.
3.6 Interaction diagram

Interacting with Winter Navigation Service is done through the Voyage Information Service interface. For further details about the interface, see the VIS documentation.

3.6.1 Voyage planning

![Interaction diagram]

- **Ship Voyage Information Service**
  - Request active ice routes
  - Subscribe to ice routes

- **Winter Navigation Service**
  - getVoyagePlans
  - uploadVoyagePlan (RTZ)
  - subscribeToVoyagePlan
  - uploadVoyagePlan (RTZ)
  - Send all active ice routes
  - Send new or changed Ice routes

0..n
3.6.2 During vessels voyage

Ship Voyage Information Service

Nominate interested parties

Handle modified route or new route snippet

Handle new message

Update voyage plan

New text message

Winter Navigation Service

uploadVoyagePlan (RTZ)

0..n

uploadVoyagePlan (RTZ)

uploadTextMessage (TXT)

0..n

uploadVoyagePlan (RTZ)

uploadTextMessage (TXT)

Handle new message

New route recommendation

New text message

New route recommendation

New text message

New route recommendation

New text message
3.7 Allowed methods

The Winter Navigation Service is based on the Voyage Information Service design version 2.2, but handles only a set of the methods.

WINVIS handles interaction on the following methods:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method</th>
<th>Allowance/handling</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive voyage plan in RTZ</td>
<td>uploadVoyagePlans incl ACK</td>
<td>Yes</td>
<td>RTZ v1.1 with STM extensions v. 1.0.0</td>
</tr>
<tr>
<td>Receive STM text messages</td>
<td>uploadTextMessage incl ACK</td>
<td>Yes</td>
<td>STM TXT v1.3</td>
</tr>
<tr>
<td>Receive area (S124) messages</td>
<td>uploadArea</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Return list of voyage plans on request</td>
<td>getVoyagePlans</td>
<td>Yes</td>
<td>RTZ v1.1 with STM extensions v. 1.0.0</td>
</tr>
<tr>
<td>Accept subscription request</td>
<td>subscribeToVoyagePlans</td>
<td>Yes</td>
<td>RTZ v1.1 with STM extensions v. 1.0.0</td>
</tr>
<tr>
<td>Accepts request for list of subscribed voyages</td>
<td>findSubscriptionsToVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Accept subscription delete request</td>
<td>removeVoyagePlanSubscription</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

The Winter Navigation Service does not have any kind of access control in the getVoyagePlans interface since all the ice routes are public.

3.8 Constraints

The service has the following constraints.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method</th>
<th>Constraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive active ice routes</td>
<td>getVoyagePlans</td>
<td>UVID parameter is ignored. One can get all the active ice routes</td>
</tr>
<tr>
<td>Subscribe to ice routes</td>
<td>subscribeToVoyagePlans</td>
<td>UVID parameter is ignored. One can only subscribe to all the active ice routes</td>
</tr>
<tr>
<td>Receiving text messages</td>
<td>uploadTextMessage</td>
<td>The text message must have a reference to a route that is uploaded to the service.</td>
</tr>
</tbody>
</table>
## 4 Release Notes

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td></td>
<td>The service is released in its first version.</td>
</tr>
</tbody>
</table>
## 5 References

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Version</th>
<th>Reference</th>
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</thead>
<tbody>
<tr>
<td>[1]</td>
<td>01.00</td>
<td>E2 Deliverable D3.4 - Service Documentation Guidelines</td>
</tr>
<tr>
<td>[2]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[3]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[4]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6 Acronyms and Terminology

6.1 Acronyms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>WINVIS</td>
<td>Winter Navigation Voyage Information Service</td>
</tr>
<tr>
<td>DIRWAY</td>
<td>Recommended ice waypoints</td>
</tr>
</tbody>
</table>

6.2 Terminology

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ice route</td>
<td>Same as DIRWAY</td>
</tr>
<tr>
<td>Service</td>
<td>The provision of something (a non-physical object), by one, for the use of one or more others, regulated by formal definitions and mutual agreements. Services involve interactions between providers and consumers, which may be performed in a digital form (data exchanges) or through voice communication or written processes and procedures.</td>
</tr>
<tr>
<td>Service Consumer</td>
<td>A service consumer uses service instances provided by service providers. All users within the maritime domain can be service customers, e.g., ships and their crew, authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
</tr>
<tr>
<td>Service Instance</td>
<td>One service implementation may be deployed at several places by same or different service providers; each such deployment represents a different service instance, being accessible via different URLs.</td>
</tr>
<tr>
<td>Service Instance Description</td>
<td>Documents the details of a service implementation (most likely documented by the service implementer) and deployment (most likely documented by the service provider). The service instance description includes (but is not limited to) service technical design reference, service provider reference, service access information, service coverage information, etc.</td>
</tr>
<tr>
<td>Service Interface</td>
<td>The communication mechanism of the service, i.e., interaction mechanism between service provider and service consumer. A service interface is characterised by a message exchange pattern and consists of service operations that are either allocated to the provider or the consumer of the service.</td>
</tr>
<tr>
<td>Service Operation</td>
<td>Functions or procedure which enables programmatic communication with a service via a service interface.</td>
</tr>
<tr>
<td>Service Provider</td>
<td>A service provider provides instances of services according to a service specification and service instance description. All users within the maritime domain can be service providers, e.g., authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
</tr>
</tbody>
</table>
STM Winter Navigation Service

Brief technical description.

The icebreaking operations in Finnish, Swedish and Estonian icebreakers are coordinated using a common system, IBnext. This system includes information on all ship traffic in the area, weather and ice conditions, satellite images of ice conditions, port visits etc.

Together with other system development IBnext has been integrated to SeaSWIM -environment. This enables IBnext to receive route files in RTZ-format ([http://cirm.org/rtz/index.html](http://cirm.org/rtz/index.html)), display received routes as part of the traffic image, users can modify received routes and send them back to merchant ships as route recommendations. Also functionalities for text message exchange have been integrated. These functionalities have been implemented using a separate WINVIS (Winter Navigation Voyage Information Service) component in connection to IBnext.

All services that connect to SeaSWIM implement https-based VIS API's that enables different services to load and receive routes in RTZ format and text messages from other services. The STM WINVIS service has a database where all routes from received either from IBnext or SeaSWIM -environment are stored. WINVIS implements VIS API towards SeaSWIM which allows other services, eg. merchant ships, to call the service. Towards IBnext the service implements internal interface that allows IBnext to get and post route and text files.

Communication to SeaSWIM environment goes through the SeaSWIMConnector developed during the project.

*WN VIS architecture*
IBNEXT

STM

FEATURES
STM – WHAT IS IT FOR THE USERS

› STM features in IBnext will be tested during the Sea Traffic Management validation project. In the project 300 merchant vessels will be equipped with STM compatible ECDIS’s

› STM functionalities will enable IBnext users to:
  
  • Receive and display merchant ships route plans on the map
  • Send detailed route recommendations to ships
  • Send and receive text messages from ships

› Merchant vessels using the STM Winter Navigation service will be able to:
  
  • Receive active Dirways directly to their navigational equipment
  • Receive other route recommendations from icebreakers directly to ships navigational equipment
  • Receive information related to icebreaker assistance as text messages
USING STM ON SEVERAL DISPLAYS

Application can be used with several displays by duplicating the browser tab and dragging the tab to the other display. If you use 2 monitor setup, you can easily view and edit routes so that you can see route details in the table view and route on the map at the same time.

1) Right click browser tab.
2) Click Duplicate.
3) Drag the tab to another display.
SEARCH SHIPS WITH STM COMPATIBILITY

1) Click Filters.
2) Click Filter vessels.
3) Click STM compatibility enabled.
4) Only vessels with STM compatibility are visible on map.
If a vessel has active route it will be displayed automatically when the vessel is active.

1) Click the vessel, route is displayed.

2) The route is hidden when you click off the ship.

3) To keep the route visible click “Keep the ship’s current route visible on the map”.

VIEW RECEIVED ROUTES
VIEW ROUTES ON MAP

Routes-page displays all routes with delivery status.

1) Click Routes

2) Click “eye” and Route is shown on the map

If you use one monitor, navigate to map page to see route on map.

3) Route is shown on the map with blue line. Hover the route to view waypoint details.

4) Hide the route, click ship symbol and click “Keep the ship’s current route visible on the map” off.
Show only latest routes filters the ship’s latest route for the last 24 hours.
You can filter route list by status. Delivery status is indicated by color.

1) Click **Details** to view detailed route information in the table view (See next slide).
2) **Messages related to route** are shown (if there are any). You can send a message related to route from this view. Type the message and click Send.

3) **View Detailed Route data.**

<table>
<thead>
<tr>
<th>Route Status</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Original</td>
<td>Template or basic voyage planned and received from shore</td>
</tr>
<tr>
<td>2</td>
<td>Planned for voyage</td>
<td>Route and schedule prepared by crew</td>
</tr>
<tr>
<td>3</td>
<td>Optimized</td>
<td>Route and schedule optimized by 3rd party service provider</td>
</tr>
<tr>
<td>4</td>
<td>Cross Checked</td>
<td>Route verified by 3rd party</td>
</tr>
<tr>
<td>5</td>
<td>Safety Checked</td>
<td>Safety check by ECDIS/crew</td>
</tr>
<tr>
<td>6</td>
<td>Approved</td>
<td>Approved by master</td>
</tr>
<tr>
<td>7</td>
<td>Used for monitoring</td>
<td>Loaded in ECDIS for monitoring</td>
</tr>
<tr>
<td>8</td>
<td>Inactive</td>
<td>Voyage completed or cancelled</td>
</tr>
</tbody>
</table>

4) Navigate back to list view or edit route. Click **Back to list** or click **Edit route** if you want to edit it (see next slide).
TWO MONITOR SETUP: EDIT RECEIVED ROUTE AND SEND ROUTE BACK TO THE SHIP

Monitor 1: Map view

Monitor 2: Click Routes > Click Eye i.e show route on map > Click Details > Click Edit route.

1) Edit route on map and table at the same time. Changes what you do on the map are visible on the table and vice versa.

Use dragging if you want to move existing waypoints on the map. Green line is received route, edited route is visualized with the white dashed line.

2) Click Send route.
"New route snipped" – feature is available only for vessels with STM compatibility.

1) Click ship on map view.

2) Click New route snipped.

3) Select route template from dropdown. Dropdown consists all published dirways, own dirway drafts and route templates.

4) Selected template info is shown here (Name, Type, Created)

5) Click Select template. (See next slide)
2/2 SEND ROUTE RECOMMENDATION E.G DIRWAY WITH "NEW ROUTE SNIPPED" -FEATURE

"New route snipped" –feature is available only for vessels with STM compatibility.

6) Route details are shown. You can edit waypoints, if needed. View route on map.

7) Click Send route.
1/2 CREATE A NEW ROUTE RECOMMENDATION E.G. GIVE LOCAL WAYPOINTS

"New route snipped" – feature is available only for vessels with STM compatibility.

1) Click ship on map view.

2) Click New route snipped.

3) Select NEW from the list.

4) Click Select template. (See next slide)
5. Add **Route name and waypoint details.**
Turn radius is not mandatory.

In the table view: Click **Insert before** or **Insert a new waypoint to the end** if you want to add more waypoints.

6. Click **Send route.**

Route recommendation draft is visible on the map. You can adjust waypoints positions on the map. Changes are visible on the table in the real time and vice versa.
ONE MONITOR SETUP: EDIT RECEIVED ROUTE AND SEND ROUTE BACK TO THE SHIP

1) Click Edit route.

2) You can first edit route on table and then open it on the map or vice versa.

3) Click Open on the map. (See next slide)
ONE MONITOR SETUP: EDIT RECEIVED ROUTE AND SEND ROUTE BACK TO THE SHIP

4) Route is visible on the map.

5) Use dragging if you want to move existing waypoints.

6) Click Routes.
ONE MONITOR SETUP: EDIT RECEIVED ROUTE AND SEND ROUTE BACK TO THE SHIP

7) Route in the edit mode is highlighted. Click Details.
ONE MONITOR SETUP: EDIT RECEIVED ROUTE AND SEND ROUTE BACK TO THE SHIP

8) Click Continue editing.

9) Check details, add waypoint names and make changes if needed.

10) Click Send route.
ONE MONITOR SETUP: EDIT RECEIVED ROUTE AND SEND ROUTE BACK TO THE SHIP

11) Route with recommend (sending) status is in the first in the list. When it is delivered, delivery status will be green.
1) Click View all route messages.

2) Browse and read messages. The messages you have sent yourself will appear on gray background.
VIEW MESSAGE POSITION ON MAP

1) Click Show message related geographical features on map.

2) View the map. Message position is shown on the map with red map marker. Hover to map marker to see the message header.
1) Click Reply to message

2) Fill in the message header and content.

3) Include position to the message, if needed. If you add position, other users can view the message position on map e.g. if you want to inform them about difficult ice or some other issue related to some position.

4) Click Send.

Read message history related to route. After sending, the newest message is on the top.
SEND A MESSAGE FROM ROUTE DETAILS VIEW

1) Click Details.

2) View and read message history related the route (if there are any). After sending your message is shown here.

3) Type the message with header and content.

4) Include position to the message, if needed.

5) Click Send.
THANK YOU
Appendix:

SAR Service
- Service instance description
- User guide to STM SAR tools
- Swedish Search and Rescue organisation
Document No:

Title: Service instance description for the SAR Service

Date: 2017-10-12
Document status

Authors

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Åkesson</td>
<td>Carmenta AB</td>
</tr>
<tr>
<td>Fredrik Kokacka</td>
<td>SMA</td>
</tr>
</tbody>
</table>

Document History

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<th>Date</th>
<th>Initials</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>0.1</td>
<td>2017-10-12</td>
<td></td>
<td>Initial version</td>
</tr>
<tr>
<td>0.2</td>
<td>2017-12-19</td>
<td>FK</td>
<td>Corrections, additions</td>
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</table>

Review

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mikael Olofsson</td>
<td>SMA</td>
</tr>
</tbody>
</table>
1 Introduction

1.1 Purpose of the Document

The purpose of this service instance description document is to provide an operational description of the specific service instance.

The aim is to document the key aspects of the service instance. This includes:

- identification and summary of the service instance
  - reference to the design description
  - identification of the service instance
- service instance details
  - operational details
  - specific interaction pattern
- release notes
  - feature list
  - bug list.

1.2 Intended Readership

This service instance description document is intended to be read by service consumers in charge of selecting the service instance to consume.
## 2 Service Instance Identification

The purpose of this chapter is to provide a unique identification of the service instance and describe where the service is in terms of the engineering lifecycle.

<table>
<thead>
<tr>
<th>Name</th>
<th>SAR Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>urn:mrn:stm:service:instance:carmenta:vistest</td>
</tr>
<tr>
<td>Version</td>
<td>0.3.0</td>
</tr>
<tr>
<td>Service Specification ID</td>
<td>urn:mrn:stm:service:specification:sma:vis</td>
</tr>
<tr>
<td>Service Specification Version</td>
<td>2.2</td>
</tr>
<tr>
<td>Service Design ID</td>
<td>urn:mrn:smt:service:design:sma:vis-rest-2.2</td>
</tr>
<tr>
<td>Service Design Version</td>
<td>2.2</td>
</tr>
<tr>
<td>Description</td>
<td>The service provides search area, search patterns and Initial Alert information to Search and Rescue Units (SRU) and Vessels of Opportunity (VoO)</td>
</tr>
<tr>
<td>Keywords</td>
<td>SAR, VIS, RTZ, S-124, TXT</td>
</tr>
<tr>
<td>Provider</td>
<td>Carmenta AB</td>
</tr>
<tr>
<td></td>
<td>urn:mrn:stm:org:carmenta</td>
</tr>
<tr>
<td>Status</td>
<td>Released for test in staging environment.</td>
</tr>
</tbody>
</table>
3 Service Instance Details

3.1 Overall description
The SAR service enables the Swedish Information and Control Tool for Search and Rescue, NILS, with the functionality to send SAR Areas, Search Patterns and text messages digitally to SAR-units and vessel of opportunities in the STM Test beds. The service can also receive text messages and routes used by NILS.

3.2 Service coverage
Covers the Swedish Search and Rescue Region (SSR) equal to the Swedish economic zone.
3.3 Required input
The incoming RTZ must be an RTZ version 1.1 with STM Extension according to the VIS Design 2.2. The incoming text message must be version 1.3. The route is expected to be active (under monitoring by ship, status=7) and contain a valid waypoint list and (calculated) schedule.

3.4 Output from the service
The service output are SAR areas in S-124 version 0.0.7, search patterns in RTZ version 1.1 with STM Extension and text messages in version 1.3.

The SAR service may send search patterns that needs to be adjusted by ship to conform to ship particulars.
### 3.5 Functional description

1. When it’s decided to use SRU or Vessels of Opportunity (VoO) in a SAR operation. The SAR coordinator at MRCC create the search area, search pattern and/or Text message by using the STM equipped Information and Control Tool for Search and Rescue.
2. The SRU or VoO have nominated nominate SAR as interested party to monitored route.
3. The SAR coordinators identify and select the SRU/VOO that will be used in the SAR operation and send out to the ship SAR area, search pattern or text message.
4. The unit receive the information and the acknowledge the information, The SAR area, search pattern and tex message will now be visible on the ECDIS onboard.
5. When the SAR operation is completed cancelations is sent out from the system to the SRU or VoO.

   Alternative:
6. The STM SAR tool can also request a SRU or VoO even though an SRU or VoO not have cheered there voyage plans. When the ship are identified and selected, the coordinator send a subscriptions for monitored route to the ship
7. The SRU or VoO can now accept or deny the request. If accept the voyage plane are sent and upload by the STM Information and Control Tool for Search and Rescue (continue main flow 2-5)

### 3.6 Interaction diagram

The VIS-NILS Test service accepts voyage plans and text messages. The VIS-NILS Test sends search areas, search patterns and text messages.
Main flow from SAR perspective

SAR

Ship Voyage Information Service

send (upload) voyagePlan (RTZ)

Nominate SAR as interested party to monitored route

send (upload) voyagePlan (RTZ)

Update monitored route

Search area (S124)

Search pattern (RTZ)

Textual information (TXT)

Reply on text message

SAR starts

Send search area to ship

Send search pattern to ship

Send text message to ship

SAR finished

Cancel Search Area

Search area cancellation (S124)
Alternative flow where SAR has not received any voyage plan and then sends a request to the ship

SAR

Search for VIS for the ship in Service Registry

Request subscription of monitored route

Ship Voyage Information Service

Accept (or deny) subscription to interested parties

If accept; Nominate interested party

Send (upload) voyagePlan (RTZ)

Continues in main flow
Send search area
3.6 Allowed methods
The VIS-NILS Test service is based on the Voyage Information Service design version 2.2, but handle only a set of the methods.

VIS-NILS Test service handles interaction on the following methods:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Method</th>
<th>Allowance/handling</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive voyage plan in RTZ</td>
<td>uploadVoyagePlans</td>
<td>Yes</td>
<td>RTZ v1.1STM</td>
</tr>
<tr>
<td>Receive STM text messages</td>
<td>uploadTextMessage</td>
<td>Yes</td>
<td>TXT v1.3</td>
</tr>
<tr>
<td>Receive area (S124) messages</td>
<td>uploadArea</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Return list of voyage plans on request</td>
<td>getVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Accept subscription request</td>
<td>subscribeToVoyagePlans</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Delete subscription</td>
<td>removeVoyagePlanSubscription</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

3.7 Constraints
The service has no constraints.
4 Release Notes

The service is release in its first version.
## 5 References

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Version</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>Service Documentation Guidelines</td>
<td>01.00</td>
</tr>
<tr>
<td>[3]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[4]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# 6 Acronyms and Terminology

## 6.1 Acronyms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAR</td>
<td>Search and Rescue</td>
</tr>
<tr>
<td>SRU</td>
<td>Search and Rescue Unit</td>
</tr>
<tr>
<td>VoO</td>
<td>Vessel of opportunity</td>
</tr>
<tr>
<td>SSR</td>
<td>Search and Rescue Region</td>
</tr>
</tbody>
</table>

## 6.2 Terminology

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>The provision of something (a non-physical object), by one, for the use of one or more others, regulated by formal definitions and mutual agreements. Services involve interactions between providers and consumers, which may be performed in a digital form (data exchanges) or through voice communication or written processes and procedures.</td>
</tr>
<tr>
<td>Service Consumer</td>
<td>A service consumer uses service instances provided by service providers. All users within the maritime domain can be service customers, e.g., ships and their crew, authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.</td>
</tr>
<tr>
<td>Service Instance</td>
<td>One service implementation may be deployed at several places by same or different service providers; each such deployment represents a different service instance, being accessible via different URLs.</td>
</tr>
<tr>
<td>Service Instance Description</td>
<td>Documents the details of a service implementation (most likely documented by the service implementer) and deployment (most likely documented by the service provider). The service instance description includes (but is not limited to) service technical design reference, service provider reference, service access information, service coverage information, etc.</td>
</tr>
<tr>
<td>Service Interface</td>
<td>The communication mechanism of the service, i.e., interaction mechanism between service provider and service consumer. A service interface is characterised by a message exchange pattern and consists of service operations that are either allocated to the provider or the consumer of the service.</td>
</tr>
<tr>
<td>Service Operation</td>
<td>Functions or procedure which enables programmatic communication with a service via a service interface.</td>
</tr>
<tr>
<td>Service Provider</td>
<td>A service provider provides instances of services according to a service specification and service instance description. All users within the maritime domain can be service providers, e.g., authorities, VTS stations, organizations (e.g., meteorological), etc.</td>
</tr>
<tr>
<td><strong>NILS</strong></td>
<td>The Information and Control tool for Search and Rescue, support system that are used in the rescue coordinating center JRCC in Sweden.</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>

commercial service providers, etc.
User Guide to the Sea Traffic Management STM Search and Rescue Tools

This document describes the steps to handle the Sea Traffic Management STM Search and Rescue Tools in the Data support system used by Joint Rescue Coordination Center JRCC in Sweden. The documents do not describe the overall SOP for the SAR coordinator that he should follow during the rescue operation.

The Information and Control Tool for Search and Rescue (NILS) is a multi-user response system designed for JRCC and can handle both maritime and aeronautical incidents and accidents. The system is designed to meet all requirement of demanding search and rescue operations to ensure the operator able to locate incidents and direct resources to the distress position.

The system consists of two different modules; one case handling module (CoordCom), were relevant data, case id and time stamps are logged and one map module (RescueMap) were land maps and see-charts are displayed together with resources, drift calculations, findings, search areas etc.

The system is now added with STM functionalities which improve communications, situations overview and allow the SAR coordinator to communicate digitally with the STM equipped Search and Rescue Units (SRU) and vessel of opportunity (VoO).

According to STM guidelines, the system uses the Maritime Connectivity Platform MCP, SeaSWIM (System Wide information Management) by using the new maritime standards S124 and RtZ.

The STM compliant Information and Control Tool for Search and Rescue (NILS) offers the following STM features:

- Display Route/Voyage Plan (VP) from STM vessels
- Find STM vessels in the selected region
- Send out Search Area to designated STM vessels
- Send out Search Patterns to designated STM vessels
- Send out text message to designated STM vessels

The route, text message and acknowledge from selected STM vessels and the search area are displayed on the map module of the Information and Control Tool for Search and Rescue (NILS)
Example of information flow

Figure 1 - picture showing information flow example

This picture shows how the information flows in the STM network.

1. The rescue coordination center receives a report that members of the crew are overboard in high seas.

2. The SAR-operator decides to start a search operation

3. The position and a text message describing the situation is sent to selected SAR-units nearby

4. An automatic acknowledgement from each SAR-unit is returned and displayed in the SAR-system as confirmation that the message is received.

5. A text message confirmation is received from the SAR-unit that the task is accepted.

6. The SAR-operator creates a search area and a search pattern in the SAR-system. The area is sent in S124 format and the search pattern is sent as RTZ format to the SAR-units.

7. An automatic acknowledgement from each SAR-unit is returned and displayed in the SAR-system as confirmation that the message is received.

8. The search area and the search pattern are displayed in the SAR-units STM-display or ECDIS, giving all engaged SAR-Units a common operational picture.
Descriptions of handling the different STM SAR features

1. Display routes (VP) from STM Vessels (SRU/VoO)
All routes for STM Vessels that have reported to the SAR VIS can be displayed in the map by turning on the STM routes layer in the Layers tab.

2. Find and select STM Vessels (SRU/VoO)

![Figure 2 - Menu icon to open the STM Message Dialog](image)

![Figure 3 - STM Message window](image)

By first panning and zooming to the area of interest in the map window and then opening the STM Message window and “select receivers” the system will automatically search for STM vessels that are passing through or near by the area of interest and in advance have subscribed the STM SAR service (the STM vessel have to agree to share voyage plan VP with JRCC in advance). The vessels name will be displayed in a roll list. The SAR coordinator can select one or more vessels from the list to be recipients in the next step.

If the checkbox Only Ships in the Map Area is unchecked then all known STM vessels will be presented in the list.
3. Send out Search Area, Search Patterns and text message to designated STM vessel (SRU/VoO)

![STM Window used to send Search Area, Search Pattern or text message](image)

By using the STM Message Windows and the 3 different sections; Search Area, Search Patterns or text message the information that should be sent out can be typed or uploaded.

Text message can be written together with a subject in the sections “Text message” and sent out to the selected recipient(s).

Search Area and Search Patterns are first created in the ResQMap system by using the existing tools for creating area and patterns (not describe here). The STM Message window is then opened and the desired area and pattern are selected from the Search Area and/or Search Patterns lists. The information is then sent out to the selected recipient(s).

The messages that have been sent is displayed in the left part of the STM Message window. If an automatic acknowledgment has been received from the vessel (SRU/VoO) a green tick is displayed next to the item in the list representing that message.
Display in the ECDIS

The information is now showed on the ECDIS of the Vessel (SRU or VoO) which increase the common situational averseness and reduce misunderstanding.

Screenshot of navigation tabloid of SSRS SRU displaying Search Area and text message with search information sent from the rescue coordinating centre JRCC
Swedish Search and Rescue organization and Sea Traffic Management

This document describes the Swedish Search and Rescue (SAR) organization and how STM will support SAR and SAR units.

The Swedish Maritime Administration (SMA) is responsible authority for Maritime and Aeronautical Search and Rescue Services in Sweden.

The objective of the Swedish Maritime Administration is to ensure search and rescue of people in distress at sea and emergency transportation of patients from ships at sea. Maritime Search and Rescue including medical evacuation from ships shall be performed on 24-hour basis, within areas specified in the Civil Protection Act.

SAR operations can commonly be divided into three functions, SAR-Management, Mission Co-Ordination and Mobile Facilities.

SAR-Management

SAR Management has overall responsibility for the Swedish SAR-organization. It deals with policy-related issues, organizes co-operation with other Swedish organizations involved with Rescue Service, participates in international activities such as exercises, organizes international co-operation and is responsible for drawing up agreements, both national and international, involving SAR organization. SAR Management also supervises the JRCC (Joint Rescue Co-Ordination Centre) and evaluates SAR-missions of interest, in accordance with the quality assurance plan of the Swedish Maritime Administration.
Mission Co-Ordination

A Joint Rescue Co-Ordination Centre, JRCC, is responsible for Mission Co-Ordination. The Swedish JRCC, Sweden Rescue, is located in Gothenburg together with the Swedish Coastguard and the Defence Forces Navy Control.

Mobile Facilities

Mobile Facilities includes the operational tasks performed by the units within the SAR mission as a whole.

The alert levels is divided into 3 levels: Sea and flight rescue resources are divided into four different SAR levels depending from availability (time), capacity and competence; SAR Level 1, SAR Level 2 and SAR Level 3, which are other rescue resources and SAR Level 4 where others resources available on the basis of a national ability in attendance (Vessels of opportunity VoO) to the objective of the Maritime and Airborne SAR Service.

SAR helicopters (SAR level 1)
The SMA rescue helicopters AW 139 are standby for search and rescue operations from five bases in Sweden: Göteborg (Säve), Ronneby (Kallinge), Visby, Stockholm (Norrtälje) and Umeå. All 5 helicopter bases have 15 minutes of preparedness.

Resources on the sea (SAR Level 1)
Swedish Sea Rescue Society SSRS has approximately 190 specially designed marine rescue units (SRU) and hovercrafts distributed on 67 Sea Rescue Stations along the Swedish coast as well as lager lakes. Emergency should begin immediately, but no later than 15 minutes.

The coastline has been divided into fifteen SAR Areas. It is the duty of each Regional SAR Coordinator to ensure that there are adequate SRUs within their area to fulfil the above-mentioned SAR objective in Sweden. The SRUs must also be manned with crews which have an adequate level of competence and training.

To accomplish this objective, a high degree of co-operation between various organizations involved in rescue services must be achieved in order to make best use of all available rescue units, even those primarily designated for other tasks. The Swedish Civil Protection Act supports and ensures this co-operation between organizations.

Sea Traffic Management in SAR

1. The Information and Control tool for Search and Rescue at system at the coordination center JRCC

Today when a SAR operation start and the information that should be delivered to the designated SRUs the information is given by voice communication. In STM this will be given digitally directly to the navigation system onboard the SRU.

During 2017 the Information and control tool for Search and Rescue at JRCC have been upgrade with the STM SAR tools
• All search areas, tracks, messages and descriptions of casualties, will be possible to send from the JRCC to the STM ships navigation-unit via internet and the STM infrastructure.

• The STM SAR Tools makes it possible to send detailed information how the search unit (SRU), or a vessel of opportunity (VoO), is expected to move and what to look for. It makes it easier for the crew when the ship gets the information directly in the Navigational system.

• Types off messages that can be sent out to all STM equipped Vessels and SRUs:
  1. Search Areas
  2. Search Tracks
  3. Text information, Distress positions, Waypoints, Initial Alert information

The system handle route exchange which means that STM Vessels in the area or passing through or passing nearby can share their voyage plans (VP) and the VP will be displayed on the map module of the system.

The STM SAR tools in the Search and Rescue information and control system at JRCC Sweden offer the following features to help the SAR Coordinator to plan and conduct the operation:

Search Area (Existing):

• Rectangle Area
• Circle Area
• Line Borderline/Search Track
• Polygon Area

STM-SAR (new tools):

• Track line Search Search Track
• Parallel Sweep Search Search Track
• Air Coordinator Template Flow planning
2. Equipment onboard the SRUs

During the STM validation project the SRUs at Swedish Sea Rescue Society SSRS, SMA Pilot boats will have their ECDIS upgraded with the STM functionalities. Also smaller SSRS SRUs will have the STM functionalities supplied by a tabloid solution with TRANSAS navigation system C-Ship on the SRUs. During the testbed we will use internet connections via 4G form communication.

The SRUs will after the STM upgrade be able to receive information from MRCC; Text message such as alarm information, distress position, number of casualties etc., receive Search Area and Search pattern and from other STM vessels receive routes.
Rescue 11-00 and Marta Colin sharing their routes with Stena Germanica

During 2017 two trials have been conducted to test how the STM SAR functionalities affect the methodology regarding communication, situation awareness and administration. The trials were done both onboard and in the coordinating center. Also to examine how the various functions work in practice and if by introducing STM in SAR services, would it improve Maritime Rescue Coordination Centre (MRCC) and the On Scene Coordinator (OSC) overview and possibility to control SAR-units in search operations? The objective for the exercise is through practical tests gain knowledge and experience in order to develop standard operating procedures for the use of STM in SAR operations. (Doc; STM SAR test1 and STM in SAR Table Top Exercise May 2017)
38 partners from 13 countries - Creating a safer more efficient and environmentally friendly maritime sector

Demonstrating the function and business value of the Sea Traffic Management concept and its services.

SAFETY - ENVIRONMENT - EFFICIENCY

Swedish Maritime Administration ◦ SSPA ◦ RISE Viktoria ◦ Transas/ Wärtsilä Voyage ◦ Chalmers University of Technology ◦ The Swedish Meteorological and Hydrological Institute ◦ Danish Maritime Authority ◦ Navicon ◦ Novia University of Applied Sciences ◦ Fraunhofer ◦ Carnival Corp. ◦ Italian Ministry of Transport ◦ SASEMAR ◦ Valencia Port Authority ◦ Valencia Port Foundation ◦ CIME ◦ University of Catalonia ◦ Norwegian Coastal Administration ◦ GS1 ◦ Cyprus University of Technology ◦ Port of Barcelona ◦ Costa Crociere ◦ Svitzer ◦ OFFIS ◦ Finnish Transport Agency ◦ Southampton Solent University ◦ Frequentis ◦ Wärtsilä SAM Electronics ◦ University of Flensburg ◦ Airbus ◦ Maritime Instituut Willem Barentsz ◦ SAAB TransponderTech AB ◦ University of Oldenburg ◦ Magellan ◦ Furuno Finland ◦ Rörvik ◦ University of Southampton ◦ HiQ

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