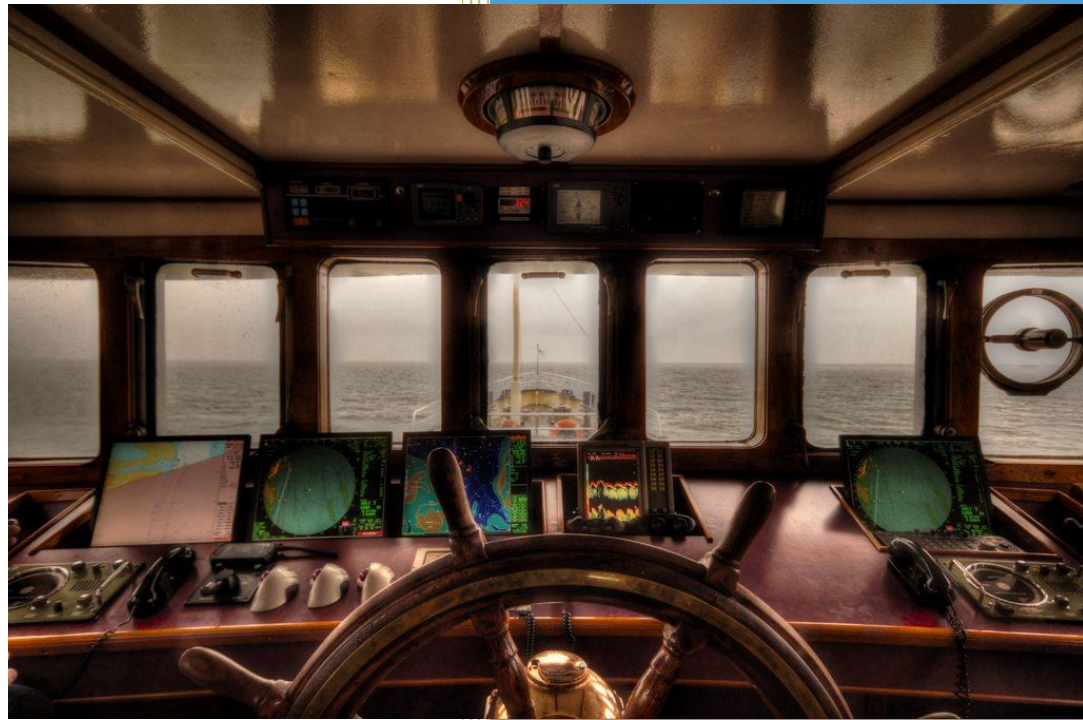


# STM\_Validation\_D2.7.2 Procurement 2.0 of STM ship systems 2017\_03\_21



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## **Executive summary - Procurement 2.0 of STM ship systems**

This document comprises the entire documentation from the second procurement of STM ship systems in the STM Validation project. It encompasses both how the procurement was conducted, the tender documentation sent out and the results of the procurement including contract award and number of contracted systems. The first procurement is reported in Deliverable 2.7.1.

### **Scope and objective of the procurement**

The target number of merchant ships that will be engaged in in the test bed is 300. The first procurement of STM ship systems gave a total of 225 STM systems since pricing from the tenderers led to that the original objective of 300 systems could not be achieved. STM services, especially within flow management, build on analyzing the overall traffic situation and suggest optimized solutions to the ships in densely trafficked areas or where there are particular navigational challenges. The test beds need to include a large number of ships in order to validate the Flow Management concept and generate sufficient data for validation. Accordingly SMA project management decided that the goal of 300 systems was crucial and that it was desirable to include even more manufacturers. After SMA internal budget reallocation, an additional budget, to be used in a supplementary procurement (Procurement 2.0), was approved. Procurement 2.0 is to be regarded as a separate process but together with the previous and finalized procurement (1.0), it makes up to a whole.

### **Choice of procurement form**

The budget that was possible to allocate to procurement 2.0 reached a total of 300 000 Euros compared to procurement 1.0 which had a budget of 1 200 000 Euros. The in comparison lower budget sum for procurement 2.0 gave the decision to only award contract to only one (1) tenderer. If several tenderers should have shared the relatively small budget it was estimated that there would have been too few systems per tenderer to make the procurement and delivery to the project worthwhile to participate in. As a result, the procurement was decided to be conducted in accordance with the Swedish Public Procurement Act (2007:1091) as an open procedure.

### **The procurement process**

Since the project work on specifications had been matured since the first procurement it was possible not only to reuse these specifications but also to have specifications that were even more detailed and to have a faster procurement process than in the first procurement.

The procurement was published on the TendSign portal and SMA did not receive any questions during the tendering phase and after the deadline had passed SMA had received only one (1) tender. The tender was examined for the fulfillment of mandatory shall-requirements, both regarding requirements placed on the Supplier and on the scope of the deliveries. All the mandatory shall requirements as specified in the procurement documents were fulfilled but nevertheless, the submitted tender did not clarify the fulfillment of a few should-requirements in regards of technical reason and in addition the offered price did not meet the procurement target for the number of systems that should be delivered. Due to the initial condition and the fact of the absence of competition SMA changed the procurement procedure (pursuant to article 4 paragraph 5, the Swedish Public Procurement Act (2007:1091)) to negotiated procedure without prior publication. Accordingly, SMA required to conduct a negotiation without any substantial changes.

The main objective of the negotiation was to ensure that both parties had the same view of the fulfillment of the requirements, to meet the project budget and to clarify any technical



issues without any substantial changes of requirements. The result of the negotiation was that the tenderer could lower their price which was possible due to clarifications regarding which ships that should be part of the testbed and the resulting simplified logistics regarding installation work.

### **Contract award**

Finally, Furuno Finland OY was awarded a contract for the second procurement of STM ship systems and were allocated 43 systems. With the 225 systems from procurement 1.0, a total of 268 STM compatible systems will be installed onboard merchant vessels. Together with Icebreakers in the Nordic testbed and a number of equipped SAR-units, to make use of STM functionality for SAR purposes, the targeted 300 ship systems will be reached given that all tenderers deliver according to contracts.

# INVITATION TO TENDER

The Swedish Maritime Administration (SMA) invites you to tender for:

Additional Installations of Sea Traffic Management (STM) ship system prototypes for the STM Validation Project .

STM ship systems refers to ECDIS functionality, communication with ECDIS, STM module, communication with access point and online access point according to description in requirement specification

The Invitation to Tender documentation comprises:

- Invitation to Tender and tendering form (this document)
- Appendix 1: STM Ship system technical specification and tendering form 2016-11-17
- Appendix 2: The Main Contract (this document) 2016-11-18
- Appendix 3: SeaSWIM Testbed Specification (Procurement) 2016-11-18
- Appendix 4: Voyage Information Service specification 2016-11-18
- Appendix 5: Appendix 5 - STM Voyage management use cases and F.A.T. Procedure handbook 2016-11-17
- Appendix 6: Appendix 6 - Route Message system requirements,C1 2016-11-03
- Appendix 7: Ship Port Information Service Specification (Procurement) 2016-11-17
- Appendix 8: Route Planning Process Flowchart 2016-05-13
- Appendix 9 - System Design Description Template 2016-11-17

SMA uses the online procurement portal Visma TendSign, [www.TendSign.com](http://www.TendSign.com). Through TendSign the complete procurement documentation is made available, as well as any notifications and updates regarding the procurement. TendSign provides an easy way for you to ask questions regarding the procurement. Your tender shall also be submitted electronically through TendSign.

All communication during the procurement will be linked to the e-mail address which you have linked to your TendSign account. There is no cost associated with submitting a tender.

Questions about the system should be put to Visma TendSign support by e-mail to [tendsignsupport@visma.com](mailto:tendsignsupport@visma.com) TendSign support is open weekdays 07.00-17.00. Manual and Q/A is found on [www.tendsign.com/support](http://www.tendsign.com/support). It is the responsibility of the Tenderer to check that all documents in accordance with this specification have been received and to also keep updated on the procurement through TendSign.

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# 1 Introduction and procurement information

## 1.1 Contracting authority

Swedish Maritime Administration  
Östra Promenaden 7  
602 78 Norrköping  
Sweden

Swedish organization number: 556487-2751

## 1.2 Definitions

Tenderer - a company that submits a tender

Shall-requirement - mandatory demand that must be fulfilled by the tender/Tenderer.

Should-requirement - non-mandatory demand that grants the tender additional value in the evaluation.

## 1.3 Background to this procurement

The SMA has previously conducted a procurement of STM ship system within the STM-project. The procurement resulted in contracts with three suppliers and they are currently working with a System Design Review as the first contractual milestone.

However, the SMA has recognized that for a full utilization of the project and to ensure the final goal of making a standard. It would be a great advantage to add additional systems from **other** suppliers.

SMA has therefore made the decision to carry out an additional procurement of STM ship systems. This procurement is to be regarded as a separate process but together with the previous and finalized procurement it makes up to a whole.

## 1.4 Background to the STM-project

Based on MONALISA (2010-EU-21109-S) and MONALISA 2.0 (2012-EU-21007-S), [www.monalisaproject.eu](http://www.monalisaproject.eu), significant steps have been taken in bringing advancements in technology and innovation into the maritime sector. Both projects have been defined and tested on the core STM components as well as it has shown very promising results.

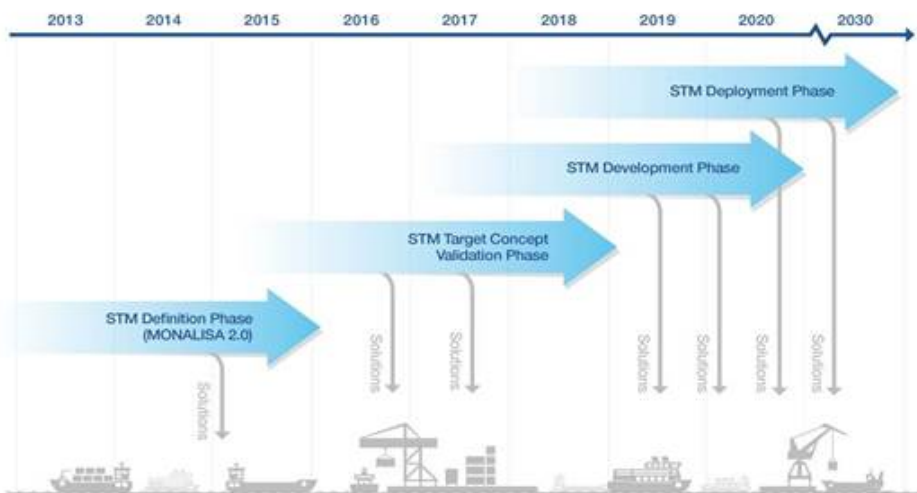
The STM concept sets a focus upon enabling safe, sustainable, and efficient sea transports. STM is a response to the need to increase efficiency in operations within and between ports. The concept takes a holistic approach to services putting the berth-to-berth voyage in focus and uses that as a core element for process optimisation, stakeholder interaction and information sharing. An enhanced sharing of information ship-to-ship, ship-to-shore, and shore-to-shore is also an important enabler for increased situational awareness and safety during sea transports. STM has already shown that substantial savings of bunker costs could be earned and that high utilization of resources of the facilities in ports can be reached while the degree of safety is increased.



The information sharing principles in STM leads to improvements in:

- Predictability of arrivals and departures enabling better planning for all parties
- Just in time operations by better predictability and information sharing in and between ports and ships
- New innovative services that are non-vendor dependent, interoperable and with low cost
- Situational awareness – knowing others intentions optimises resource utilisation and reduces number of accidents

The next step in this development, Fig .1, is to validate the STM Target Concept. This is mainly done in the STM Validation Project, running from 2015 to 2018, by establishing large-scale test beds in order to test and validate different STM concepts. The output will be a validated target concept for STM and additional quantitative and qualitative support for the broader development of STM.



**Fig. 1 The Development, Validation, and Deployment of STM  
STM Validation Project**

The STM Validation Project, see project information brochure, co-financed by the EU (Connecting Europe Facility/Motorways of the Sea) shall demonstrate and validate STM by using the European Maritime Simulator Network and by establishing large-scale test beds in both the Nordic and Mediterranean Seas, encompassing 300 ships and 13 ports. Key strategic services of STM will be tested and validated. The project encompasses:

- **Validation of Voyage Management** in two test beds. In the Nordic region, the application of STM for more efficient winter navigation will be tested and validated. In the Mediterranean Sea, the application of STM for crisis management (i.e., Search and Rescue) will be tested and validated.
- **Validation of Flow Management** utilizing the European Maritime Simulator Network and the test beds for Voyage Management. This simulator network was developed within the MONALISA 2.0 project and will be used both to simulate different traffic conditions and further test and validate other parts of STM, which are not possible to test and validate in real life at this stage, such as area management.
- **Validation of Port Collaborative Decision Making (Port CDM)** by expanding the network of ports and Port CDM services developed in MONALISA 2.0 in the Nordic and Mediterranean regions. The contextual differences between different port approaches will be gathered and analysed, together

with other information that will serve as a basis for the concept's refinement. The test beds will also constitute a first step towards inviting both commercial and public service developers/distributors to further develop Port CDM Services.

- **Validation of System Wide Information Management (SeaSWIM)** using the Maritime Cloud as the infrastructure for information exchange in the validation test beds. (Further information regarding Draft SeaSWIM Requirement Specification based on needs from PortCDM and Voyage Management can be found here: <http://monalisaproject.eu/documents/> )

Extensive **Analysis and Evaluation** will be carried out and the different perspectives used in MONALISA 2.0: business, socio-economic, risk, technological, legal and institutional will be incorporated. Competencies and training requirements for STM implementation will also be considered within this activity.

The results from testbeds, which involve rigorous, transparent and replicable testing of, for example, route exchange, route optimization, scientific theories, computational tools and new technologies. As there are linkages between STM and IMO's e-navigation Strategy Implementation Plan (SIP), these test beds would allow for early detection of new system functionality, operational usability, areas of enhancement and identification of weakness. The results will be submitted to IMO in accordance with the format outlined in MSC.1/Circ.1494 on Guidelines on Harmonization of Testbed Reporting. The results of the project will thus also form the basis for policy making, further research and development of STM services and concepts and pre-deployment of STM services and concepts.

This procurement is a part of the STM Validation Project. The project includes fulfilment of the terms of the Grant Agreement (<http://monalisaproject.eu/documents/>) whereby the European Commission has decided to award a grant for the STM Validation Project. The following parts of the GA should therefore also apply to the future supplier agreements.

II.3 – LIABILITY FOR DAMAGES

II.4 – CONFLICT OF INTERESTS

II.5 – CONFIDENTIALITY

II.8 – PRE-EXISTING RIGHTS AND OWNERSHIP AND USE OF THE RESULTS (INCLUDING INTELLECTUAL AND INDUSTRIAL PROPERTY RIGHTS)

## 1.5 Standard formats development

Already in MONALISA 2.0 several major manufacturers of navigational equipment joined forces in order to develop a format allowing route/voyage plans to be seamlessly exchanged irrespective of the equipment brand. A standardized route exchange format, RTZ, has been developed and approved as an international standard by IEC (International Electro Technical Commission) in its IEC 61174 ed. 4.

Further development and verification of operational and technical aspects, arising from the usage of the RTZ-format, such as route exchange between ships and shore centre, route optimization and enhanced monitoring supported by route exchange are important steps towards future deployment and will be included in the STM Validation Project.

In addition to this the need for other new standards, necessary for STM applications, will be identified, developed and implemented in the STM compliant on-board prototypes. SMA invites more companies to join this work group and participate in the standard development to shape the future of on-board systems.

## Benefits for system manufacturers in STM validation project

- Possibility to be in a leading position with developing new services.
- Affect and create development of new standards that are beneficial for the market.
- Opportunity to test and get feedback from users on the prototype functionalities.
- STM Validation Project offers free services, for safer and more efficient voyages, to participating ships that will create goodwill to system manufacturers from participating ship owners.
- The Maritime Service Infrastructure/SeaSWIM will improve communication with customers for existing and future planned services.
- Possibility to combine prototype installations with other already planned tests and updates.

Interested system manufacturers are welcome to contact the Swedish Maritime Administration through the procurement portal TendSign. SMA will also provide updates of the work group's progress on the following web page: [www.monalisaproject.eu](http://www.monalisaproject.eu). Description of scope

The scope of this procurement is to contract the additional supply of STM ship systems including

- The test period runs until 31 December 2018.
- Installation and configuration of STM ship systems
- Installation or utilization of all necessary communication links and associated services, including 200MB data transmission, required to achieve the specified capabilities for the duration of the project
- Recruiting of test ships for the test bed
- Training and education of ship's crew including a manual on system usage
- Necessary updates and service for maintaining the system operational during the test period
- Report on system technical functionality after the test bed period is finalized
- Possibly options for further modification of system functionality during test beds

## 1.6 Project budget

The total budget for the contract for the supply of the STM ship systems is limited to 300 000 Euro. As an information SMA wants to point out that the project goal is to reach a total of 300 systems which means that the aim of the this procurement is 75 systems.

## 1.7 Number of suppliers

SMA will award one (1) supplier.

## 1.8 Cancellation/Alteration of the call for tender

SMA reserves the right not to make an award and/or to cancel the invitation to tender, to issue a new invitation for tendering, to adapt the procedure for the invitation to tender and/or to introduce alterations to the nature of those according to unexpected economic, political or organizational changes. If offered price per system results in too few systems according to the goal of the project, SMA has the right to cancel the procurement.

## 1.9 Procurement form

This procurement is conducted in accordance with the Swedish Public Procurement Act (2007:1091) as an Open Procedure.

### 1.10 Procurement process overview

The Open procedure consisting of the following steps.

- Publication of the tender invitation in TED (Tenders Electronic Daily) through TendSign.
- All suppliers are invited to tender according to this Invitation to tender.
- Tenders are submitted and SMA examines tenders for fulfilment of shall-requirements and should-requirements.
- After examination of tenders, SMA will invite all tenderers that has fulfilled all shall-requirements to a tender-presentation. The purpose of the tender-presentation is to make sure that the Tenderer has an extensive understanding for the scope of this procurement and vice versa for the SMA to grasp the content of the Tender. Please note that the Tender-presentation is not a negotiation. Tenderers should reserve time in their calendars for tender-presentations according to the time plan below.
- After the tender-presentations and final evaluation is carried out, an information of contract award will be sent to all tenderers.
- When the information of contract award is made public, the 10 day stand-still period commences
- Subsequently, contract will be signed

### 1.11 Time plan

This time plan might be changed during the process and it is the responsibility of the Tenderer to check when the tender shall be submitted etc. Any updates to the time plan will be made known through TendSign.

Procurement Milestones	Description	Acceptance date (calendar months)
1	Announcement of the tender invitation	2016-11-21
2	Question and answers during the tendering period	Until 10 days before last day of submission of tender
3	Last day for submission of tenders	As stated in section 2.5
5	Examination and preliminary evaluation of tenders	2017-01-10 to 2017-01-15

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6	Tender-presentations and final evaluation	2017-01-16 to 2017-01-19
7	Award of tenders	2017-01-20
8	Last day of Stand Still period	2017-01-30
9	Signing of contracts	2017-01-31

The milestones for the project after signing of the contract are stipulated in the Main Contract.

## 1.12 Points of contact

Questions regarding the procurement shall be put forward through TendSign.

Only in urgent matters the contact person below may be contacted directly.

Per Kyhle

[per.kyhle@colligio.se](mailto:per.kyhle@colligio.se)

+ 46 23 661 66 12

Anders Wiksell

[anders.wiksell@colligio.se](mailto:anders.wiksell@colligio.se)

+ 46 23 661 66 19

Switchboard

+ 46 661 66 10

[info@colligio.se](mailto:info@colligio.se)

Tenderers may not communicate procurement matters with the Contracting Authority's employees through other ways of contact than described in this document.

## 1.13 Questions, clarifications and amendments

Questions regarding the procurement shall generally be submitted through TendSign, where all general responses, clarifications and amendments will be advertised and thereby notified to all Tenderers. It is the Tenderers responsibility to keep updated on TendSign. Answers to questions, clarifications and amendments published through TendSign become an integral part of the procurement documentation.

SMA's answers to questions will be published at the latest six days before the last submission day of tender SMA encourages Tenderers to ask questions, especially if any information is unclear, appears falsely or even inappropriate.

However please ask questions in good time to allow SMA to answer them, preferably not later than ten days before the tendering deadline.

Only clarifications and amendments announced through TendSign are valid.

Insofar as questions relate to solutions which the Tenderer is considering to put forward, but which in their opinion should not be available for all Tenderers, for instance, because of the need to protect their intellectual property rights the Tenderer may request that Contracting Authority to deal with their question without notifying everyone. The Contracting Authority will decide on such a request and it will only be granted if deemed that it will not give information that will in any way give the requesting Tenderer an advantage or information that might be useful to all Tenderers. If the Contracting Authority is of the opinion that it must provide the answer to a request for information to all Tenderers, the Contracting Authority shall notify the requesting Tenderer. The Tenderer will then be entitled to withdraw its request. If the Tenderer does not do so within the stipulated period, the Contracting Authority will publish the answer in the form of a clarification visible to all Tenderers.

## 2 Tender instructions

Interested parties submitting tenders are obliged to do so in accordance with the instructions detailed below.

### 2.1 Form of tenders

This tender invitation also serves as tender form. This means that this tender invitation/form filled in with the required information from the tender and contain the following appendices, forms a complete tender,

- Appendix 1 Requirements filled in with required information and possible appendices asked for in Requirements.
- Draft project management plan (Use Appendix 9 as template)

All tender documents must be uploaded in TendSign

SMA prefers that

- Submitted electronic files are readable in PDF or Microsoft Office.
- Documents are provided unlocked, for example text search should be enabled in PDFs.
- Submitted electronic files have clear and logical file names.
- Your tender is structured in a logical way, if cross-referencing please provide clear references.

It is a fundamental principle for procurements carried out in accordance with the Public Procurement Act that all Tenderers must be treated equally. As a consequence, the possibility to elucidate or amend the information already submitted in a tender is very limited.

Thus please make sure that your tender is complete and contains answers to all requested information and that all tickboxes are marked.

Unclearities in your tender may be interpreted to your disadvantage. If the tender is incomplete, lacking in information or does not comply with the provisions of this Invitation to tender the tender may be rejected.

## 2.2 Signing of the tender

The signing of the tender is made on the last page of this tender invitation/form. When submitting the tender, **the last page must be printed, signed, scanned and uploaded in TendSign.**

The last page of this tender invitation/form is signed and uploaded in TendSign?	Yes <input type="checkbox"/>
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## 2.3 Tenderer information

Name of the company	
Organization-number or corporate ID	
Address	
Postcode and city	
Name of point of contact (POC)	
Phone-number to POC	
e-mail to POC	
e-mail to whom information of award of contract should be sent if other than above.	

## 2.4 Language

**Requirement:** The tender shall be written in English or in Swedish.

Formal certificates and information leaflets etc. may be supplied in other languages only if accompanied by a translation. SMA may by its own verify the translation.

## 2.5 Submission of tenders

**Requirement:** Complete tenders shall have been registered electronically on TendSign no later than 23:59 on the 9<sup>th</sup> of January 2017.

It is the responsibility of the tenderers to ensure that the tender is received in time. Any attempt to lodge a tender after the closing date will not be permitted or considered.

A submitted tender may be modified up until and including the last day for submission of tenders. Please note that tenders submitted by post, fax or e-mail will not be accepted.

## 2.6 Tender validity Period

**Requirement:** The Tenderer must accept the following – the tender shall be binding and valid for 120 days after the closing date of the tender submission. If the procurement is subject to court proceedings the

tender validity shall be extended until a contract can be signed after the court proceedings, however not for more than an additional 120 days.

The tender validity is accepted.	Yes <input type="checkbox"/>
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## 2.7 Commercial conditions

The commercial conditions for the framework agreement are attached as Appendix 2 – Main Contract. The Tenderer must accept these commercial conditions in their entirety without reservations.

If a Tenderer finds any commercial conditions and/or any requirements cost-driving or unreasonable it is important to notify SMA as early as possible during the tendering period using the Q/A-function in TendSign.

## 2.8 Remuneration for submitting tenders

SMA will not accept any costs or expenses incurred by the Tenderers in connection with the tendering process, for example for preparation or submission or in the evaluation of the tender.

## 2.9 Opening of tenders

Tenders will be opened electronically on the next weekday after the last day for submission of tenders.

# 3 Requirements placed on suppliers

To ensure that the Tenderer is suitable as a Supplier, the following **Requirements** must be satisfied.

## 3.1 Legal requirements

**Requirement:** The Tenderer shall have fulfilled its obligations related to payment of taxes as well as social security contributions in accordance with the legal provisions of the country in which the Tenderer is located.

**Requirement:** The Tenderer shall be registered with a company register, commercial register or similar in the Tenderers country of operation.

### *Required proof*

The SMA will check fulfilment of the above. At the request of SMA, the Tenderer shall submit the following:

- A copy of a certificate of enrolment in a professional and trade register, and
- A copy of a certificate proving fulfilled obligations relating to payment of social security contributions and payment of taxes, issued by the appropriate authorities. The certificate should not be older than 3 months.



If a Tenderer is unable to submit information as above due to it not being possible to obtain such information from the relevant authority, written confirmation of this from the authority must be enclosed.

The Tenderer fulfills all Legal requirements	Yes <input type="checkbox"/>
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### 3.2 Exclusion grounds

Any tenderer which has been the subject of a conviction by final judgment of which the contracting authority/entity is aware, for one or more of the reasons listed below, by a conviction rendered at the most five years ago or in which an exclusion period set out directly in the conviction continues to be applicable, shall be excluded from participation in a contract:

1. Participation in a criminal organization
2. Corruption
3. Fraud
4. Terrorist offences or offences linked to terrorist activities
5. Money laundering and terrorist financing
6. Child labour and other forms of trafficking in human beings

Furthermore, In the Swedish Public Procurement Act (SFS 2007:1091) 10 Chapter 2 § considerations which may result in exclusion of tenders are also listed below.

If the tenderer, to its knowledge, breached its obligations in the fields of environmental, social labour law and in any of the following situations:

1. is in bankruptcy or is in liquidation, where its affairs are being administered by court, where it has entered into an arrangement with creditors, where it has suspended business activities or is in any analogous situation arising from a similar procedure under national laws and regulations,
2. is the subject of proceedings for a declaration of insolvency, for an order for compulsory winding up or administration by a court or of an arrangement with creditors or of any other similar proceedings under national laws and regulations,
3. has been convicted by a judgment which has the force of res judicata in accordance with the legal provisions of the country of any offence concerning its professional conduct, such as, for example, infringement of existing legislation on the export of defence and/or security equipment
4. has been guilty of grave professional misconduct proven by any means which the contracting authority/entity can supply, such as a breach of obligations regarding security of information or security of supply during a previous contract
5. has not fulfilled obligations relating to the payment of social security contributions in accordance with the legal provisions of the country in which it is established or with those of the country of the contracting authority/entity
6. is guilty of serious misrepresentation in supplying the information required under this section, or has not supplied such information

The Tenderer confirms that the exclusion grounds in this legislation do not apply and circumstances pursuant to the Act 10 chapter 1§-2§ are nor present.

The Tenderer declares that the above is accurate and correct and that it has been set out in full awareness of the consequences of serious misspresentation.

Yes 

### 3.3 Economic and financial standing

**Requirement:** The Tenderer shall have the financial strength, stability and liquidity to finance the contractual undertakings throughout the contract period.

The SMA reserves the right to exclude Tenderer from further examination due to:

- Tenderer failure to provide evidence confirming economic and financial stability
- Indications exist in the financial statement that the Tenderer does not satisfy the requirements for economic and financial stability

A credit rating of at least 3 from the credit rating institute Upplysningscentralen [www.uc.se](http://www.uc.se) or a similar rating (i.e. "A" or "moderate/low risk") from a renowned credit rating institute is seen as sufficient to fulfil the above Requirement.

#### *Required proof*

The SMA will check that the requirement is fulfilled by contacting [www.uc.se](http://www.uc.se). If information about the Tenderer cannot be provided by UC, the Tenderer shall, at request of SMA, submit the following:

- An independent credit report or financial reports (balance sheet, financial statement for the last two years), or equivalent information.

The SMA reserves the right to ask Tenderers to supplement their information or provide sufficient warranties if there are any uncertainties about the financial capacity. The SMA also reserves the right to supplement their examination of the Tenderer by requesting a 3<sup>rd</sup> party credit report.

A Tenderer who is not able to fulfil the Requirement for economic and financial stability may fulfil the Requirement by including, in addition to what is requested above, a bank or parent company guarantee or similar to the Tender. Such a guarantee must clearly show that the other party is willing and able to guarantee the Tenderers economic and financial capacity throughout the contract period. The other party must also in itself fulfil the Requirement for Economic and financial capacity as well as the Legal requirements.

The Tenderer fulfills all economic and financial requirements

Yes

### 3.4 Technical and professional ability

**Requirement:** The Tenderer must prove in writing that it has the technical ability and capacity to deliver what is requested in the scope.

This includes:

- Have developed and delivered ECDIS systems (i.e. which fulfill IMO RESOLUTION A.817(19))
- Have access to experienced and properly qualified personnel including manufacturing capacity for development, delivery and installation of systems
- Being able to recruit ships for installations
- Have access to experienced and properly qualified personnel for training and providing support to end users (the crew of the installed ships)

Required proof

- Enclose a copy of an ECDIS certificate
- Enclose information how each of the above are fulfilled.

The Tenderer has enclosed a copy of their ECDIS certificate	Yes <input type="checkbox"/>
---	------------------------------

The Tenderer has enclosed information how each bullet-point above are fulfilled.	Yes <input type="checkbox"/>
--	------------------------------

### 3.5 Subcontractors

A Tenderer is allowed to refer to a subcontractor's capacity in fulfilment of technical and economical requirements. If a subcontractor is used the subcontractor must also fulfil Legal requirements (3.1).

If a subcontractor will be used, then the tender must include information on the following:

- Subcontractors company name and VAT/organizational number
- Brief description of what parts of the supply that a subcontractor likely will provide

If a subcontractor is used to fulfil requirements, then the SMA may during the procurement process request proof that the subcontractor's technical ability and/or capacity at the time of production/delivery will be available to the Tenderer. This may be proven by, for example, a written verification from the subcontractor, through a formal agreement between the Tenderer and subcontractor or by for example showing a working business relation between the companies.

Failure to prove this means that the subcontractor's capacity cannot be referred to.

Additional subcontractors may be added during the tendering phase, in so far as new requirements are introduced, for example special expertise which was not obviously needed based on the scope in this invitation to apply for tendering. The requirements on subcontractors must also be met by any subcontractors which are added in the tendering phase.

#### Required proof

- If any subcontractor will be used, please enclose information how each of the above are fulfilled.

Is the Tenderer referring to a subcontractor's capacity?	Yes <input type="checkbox"/> No <input type="checkbox"/>
--	--

If the Tenderer is referring to a subcontractor's capacity, state the company name and VAT/organizational number. (If there are several subcontractors please use a separate document.)	Company name:  Org. number:  Brief description of what parts the subcontractor will provide:
---	--

## 4 Examination and evaluation of tenders

### 4.1 Examination

Based on submitted tenders, SMA will examine whether all Shall-requirements are fulfilled, Tenders that do not fulfil all Shall-requirements will be excluded from contract award.

### 4.2 Tender price

#### 4.2.1 Tender sum

Item	Price
Installation and configuration of STM ship system. All costs shall be included	per ship system exclusive VAT
Hourly rate for development, adjustment to the System or other needs. Only applies to projects separately ordered by the Purchaser.	per hour exclusive VAT
Currency (Euro or SEK)	

#### 4.2.2 Currency

Prices may be offered in Euro or in SEK.

To be able to compare prices with regard to the principle of equal treatment the exchange rates at the last day of submission of tenders will be used. The following web-site will be used:

<http://www.nordea.se/foretag/utland/valutahantering/valutakurser.html#tab=Betalningskurs>

On the website the selling exchange rate (Säljkurs) will be used.

Please observe that the above procedure will only be used for evaluation purposes. Actual payments during the project is not affected by the above.

### 4.3 Evaluation

The evaluation is carried out on the principle “ most economically advantageous” which means that both price and should-requirements are considered, as described in the following sections.

The evaluation will be performed according to a Value of Quality (VoQ) model (the value of fulfilled should-requirements), as per below:

Tender sum – (minus) deductions for VoQ = Comparative value

The Tender sum is a monetary sum as described below, consisting of costs related to the system. Tenders receive deductions for VoQ by fulfilling should-requirements, also described below.

Please note that the tender sum as well as deductions for VoQ constitute a fictive model for awarding the contract, they do not influence the prices or scope of the awarded contract.

The evaluation will be made in SEK using the web-site as described.

#### 4.3.1 VoQ

The only purpose of this procurement is to broaden the number of different systems from various suppliers in the project. This means that a tender which offers a system that is already included in the project has a lower value to the project and such a tender does not fulfil the purpose of this procurement.

Simultaneously, SMA has come to the conclusion that it is not possible to disqualify a tender with a system, which already exist in the project.

However, a tender with a system that is not already part of the project will be advantaged and possess a major Value of Quality to the project. Therefore, the VoQ for systems not already part of the project will be given an additional value in the evaluation.

In the below chart the should-requirements for all VoQ are listed.

Please note that if a tender fulfils a should-requirement and the tender is given an additional value in the evaluation, the Tenderer is bound to fulfil the should-requirement when delivering.

Please note that the quantity of hourly rate is only a fictional quantity for the evaluation process.

Item	Quantity that will be evaluated
Deployment of the abilities for one ship according to the scope in section 0. All costs shall be included	1 ship system
Hourly rate for development, adjustment to the System or other needs. Only applies to changes/amendments separately ordered by the Purchaser. <sup>1</sup>	1 hour
<b>Criteria's</b>	<b>VoQ if fulfilled (Euro)</b>
The offered STM-system is not already part in the project	1000
R-2.1:13	270
R-3.2:4	210
R-3.2:5	180
R-3.2:6	210
R-3.4:5, R-3.4:6 and R-3.6:4 <sup>2</sup>	240
R-3.4:17	240
R-3.5:2	180
R-3.5:5	240
<b>Maximum VoQ</b>	<b>2770 Euro</b>

### 4.3.2 Example of evaluation

To illustrate how the evaluation will be carried out a fictitious example is shown below.

A tenderer has given a price per ship of 37 500 SEK and an hourly rate of 1050 SEK.

Using the web-site (Nordea) gives an exchange rate of 9.2777 SEK/Euro (the example is made 2016-05-11)

The comparative price will then be 4042 Euro for the ship-system and the hourly rate will be 113 Euro.

Prices		
Price per ship system		4042 Euro
Price per hour		113 Euro
<b>Total price</b>		<b>4 155 Euro</b>
Criteria's	Fulfilled	VoQ
The offered STM-system is not already part in the project	Yes	1000
R-2.1:13	yes	270
R-3.2:4	no	0
R-3.2:5	no	0
R-3.2:6	yes	210
R-3.4:5, R-3.4:6 and R-3.6:4	yes	240

<sup>1</sup> See change request as described in chapter 18 in Main contract

<sup>2</sup> All 3 requirements 3.4.5, 3.4.6 and 3.6.4 must be fulfilled to give VoQ

R-3.4:17	yes	240
R-3.5:2	no	0
R-3.5:5	yes	240
<b>Total given VoQ</b>		<b>2 200 Euro</b>
<b>Comparative value</b>		<b>1955 Euro</b>

The Tenderer who receives the lowest comparative value has offered the most economically advantageous tender and will be given first place in the procurement. Please observe that in the example the Comparative value is a negative value. This is correct and an effect due to that the VoQ is high.

#### 4.4 Contract award

Contract will be awarded to the tenderer with the lowest Comparative value.

Please note that the Comparative value and the VoQ are only fictive values used for evaluation purposes, and does not affect the Suppliers prices in the Agreement.

#### 4.5 Decision

A decision regarding the procurement will be made by SMA – a tendering award - and will be communicated in writing to all Tenderers prior to the procurement Agreement being signed. Agreements may be signed at the earliest 10 days after the decision has been made known (Stand Still period).

### 5 Confidentiality

Details provided in procurement matters are considered confidential in accordance with the Swedish Public Access and Secrecy Act (2009:400) until such time as a decision is made and the procurement is made public, or the procurement is terminated. This means that details provided in procurement matters are only released to those requiring such information for the completion of work due to the procurement. At such time as the procurement is made public, it is standard practice for all details to be considered official and open documentation.

#### 5.1 Commercial confidentiality

Details may, in certain cases, continue to be considered confidential even after the procurement is made public. Tenderers may claim commercial confidentiality for information pertaining to business or operational matters, and where there is particular reason to assume that disclosure of such information could damage the Tenderer.

In those cases, where Tenderers consider that the details provided in the procurement process satisfy that which is required for commercial confidentiality, the Tenderer may submit a request for such. Such a request must contain a specification of which details are being referred to, as well as the damage that aforementioned details could incur in the event of disclosure. Please note however that information supplied for the purposes of tender evaluation can only be granted commercial confidentiality in exceptional circumstances. In those cases, where Tenderers choose to request commercial confidentiality regarding parts of their tender, the below form must be used.



Author:  
-

Registration No: 16-03465  
Invitation to tendering

Version:

Do the Tenderer request part of the information in the tender to be granted commercial confidentiality?

Yes  No

If Yes, which part or parts are requested to be granted commercial confidentiality?

Motivation to the request (Describe the damage which could occur if the information is revealed)

## 6 Signing of Tender

By signing of this tender form all requirements and conditions in the tender invitation including all appendices are accepted.

**Please observe that this page must be printed, signed and uploaded together with all other required tender document in TendSign!**

Place and date	
----------------	--

Signature: \_\_\_\_\_

Printed name	
--------------	--





*Document No: Appendix 1*  
*Title: STM Ship system technical specification  
and tendering form*  
*Date: 2016-11-17*



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# 1 Summary

## 1.1 General

This document contains the technical requirement for the procurement of STM ship system within the scope of the STM Validation Project. The document describes the scope of the required functional and technical characteristics of the systems. The technical specifications, APIs and xml-codes are anticipated to be accurate but some are yet to be prototyped. This means that minor updates might be necessary. Latest updates to the specifications will be presented at the latest before the negotiation phase of the tender is commenced in order to tenderers to take updates into consideration in their final bid.

## 1.2 Definitions

### 1.2.1 Terminology for denoting a requirement

The following requirement is valid throughout this document:

- A mandatory requirement is denoted with the word “shall” and must be fulfilled.
- A criteria is denoted with the word “should” and gives added value in the evaluation if fulfilled.

All requirements are labeled with R-X.Y:Z, where X.Y is the current chapter number and Z is a consecutive numbering to separate each requirement within the chapter. There can be several “shall” or “should” in one numbered requirement, which means that all must be fulfilled in order for the requirement to be fulfilled.

Descriptive text occurs throughout the document but is not labeled.

### 1.2.2 Select, turn-on, set etc.

All functions that are said to be selectable, turned-on, set, etc. will implicitly also be said to be the reverse, i.e. de-selected, turned-off, de-set, etc. unless specified explicitly to something else.



## 2 General requirements on the STM ship system

In this chapter the requirements that cannot be categorized into one or more of the 5 different components of the STM ship system as depicted in Figure 1 below, is stated.

R-2.1:1

*The tenderer **shall** state which of the existing hardware and software versions presently installed onboard that is intended to be compatible with the requirements on STM ship systems. The tenderer should also state how big share of existing customers that has this equipment onboard.*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-2.1:2

*The Tenderer **shall** supply SMA with a system description that describes the configuration and functionalities of the whole STM ship system (including communication with the online access point, see section 3.1 for details) the system description shall be based on the use cases provided in the procurement documentation (use SDR System description template)*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	





R-2.1:3

*The System Design Review (SDR) of the STM ship system at Milestone 1 **shall** be based on the use cases provided in the procurement documentation (use F.A.T. Procedure handbook)*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-2.1:4

*The Tenderer of STM ship system **shall** at milestone 2 prove that the ship system can exchange .rtz, port call message (pcm), text- and area message with the Voyage Information Service (VIS) instance run by SMA, according to the use cases which the FAT procedure handbook **shall** be based on*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-2.1:5

*The Tenderer **shall** be fully responsible of recruiting ships for system installation*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	





R-2.1:6

The Tenderer **shall** provide a list of ships that are appropriate test ships for STM validation project. All test bed ships shall be above 2000GRT (see R-2.1:12 for details)

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-2.1:7

The Tenderer **shall** at Milestone 1 have a demonstration plan from each shipping company that are listed in the list above, the demonstration plan should include which STM services the company intend to use

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-2.1:8

The Tenderer **shall** provide a Draft Project Management Plan (with dates) including development, SDR, FAT, SAT and installation.

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	







R-2.1:9

*The Tenderer **shall** be fully responsible for the installation of the STM ship systems on the ships.*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-2.1:10

*The installed STM ship systems **shall** have an operational and functional availability, end-to-end, of at least 90% (328 days in a 365days period), this availability requirement is calculated as an average on all the recruited ships by one tenderer.*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-2.1:11

*Tenderer **shall** be responsible for decommissioning and removal of the STM ship systems (only if deemed necessary by ship owner or tenderer)*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	





R-2.1:12

*The Tenderer **shall** conduct appropriate training and provide documentation (manual) for onboard equipment users.*

Is above “shall” requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-2.1:13

*The ships recruited by the Tenderer **should** operate at regular intervals within the area of the STM validation project testbed regions (Mediterranean and/or Nordic (Baltic, Skagerrak, Kattegat and Norwegian coast)). If ships are sold or shift to a trading area outside the testbed regions, there will be no further requirements from SMA on recruiting replacement ships*

Is above “should” requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	



### 3 Functional/Technical Requirements

#### 3.1 STM Ship system overall description

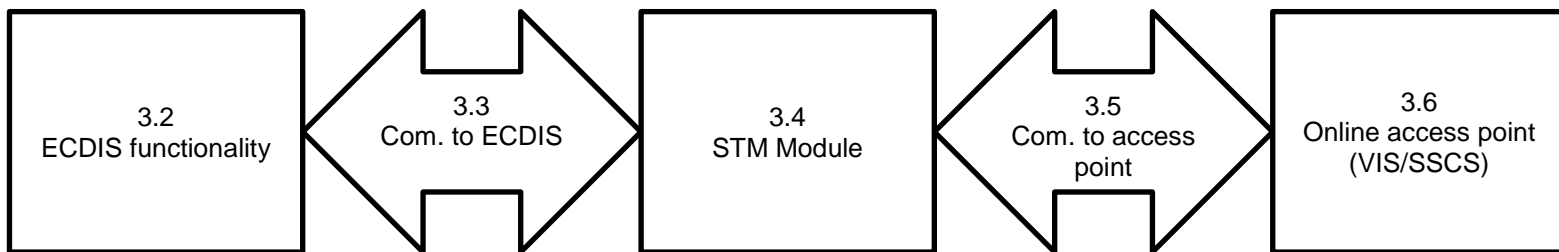
At least one ECDIS workstation on the ship’s bridge shall be able to interact with the STM Module. The main functions are; to receive voyage plan (VP) for further processing until used for navigation, to send the VP used for navigation to the STM Module, to send ETA to the STM Module.

Communication between the ECDIS and the STM Module will ensure that the maximum possible degree of consistency is upheld between information held in the ECDIS and the STM Module. If information consistency decreases due to the status of communication link between the ECDIS and the STM Module the communication status and the age of information shall be known by both ends.

The STM Module is a set of software functions on some hardware located on the ship’s bridge. The STM Module may be integrated in the ECDIS, if certification allows, it may be integrated into an existing planning station or it may be running on a dedicated device which is supplied by the supplier.

Communication between the STM Module and Online access point<sup>1</sup> will ensure that the maximum possible degree of consistency is upheld between information held in the STM Module and at the Online access point, depending on the online status of the ship. If information consistency decreases due to the status of communication links with the ship, the communication status and the age of information shall be known by both ends. If the ship is online but the bandwidth does not allow transfer of payloads, the receiving end shall be aware of that new information is stored in the sending end.

The online access point is constantly and stably connected to the internet and represents the ship towards other actors and services. The main functions in the online access point are the VIS, Port Information Service and the SeaSWIM Connector Service (SSCS). The Online access point may be implemented onboard the ship or at another location. Each VIS is attached to one (1) SSCS and each ship has one (1) VIS instance.



<sup>1</sup> By Online access point is meant a site with stable and constant access to the internet. This access point can be located onboard the ship or could be provide from shore, by the ship owner or a service provider.



Figure 2

### 3.2 ECDIS functionality

R-3.2:1

*The STM ship systems **shall** be able to send and receive route segment ship to ship via AIS, ASM message (8), according to Appendix 6 - Route Message system requirements, C1. The STM ship system **shall** be able to present route segment accordingly in ECDIS.*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.2:2

*In the STM ship system it **shall** be possible to make a default choice that the route segments will be shared or not, with other STM-ships.*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.2:3

*The STM ship system **shall** be able to present, via ASM message (8), according to appendix: Route message format (version1.0), info/flag on AIS targets that participates in STM test beds.*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
---	------------------------------



How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):

R-3.2:4

*STM ship systems **should** be able to calculate CPA and intersection points between own/other-ships route segments (including leg speed), even if the routes are not crossing each other*

Is above “should” requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.2:5

*If a ship is deviating from its intended route (exceeding pre-set limits, geographically and in time, set by own ship), that **should** somehow be presented on own ships STM ship system*

Is above “should” requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	





R-3.2:6

*It **Should** be possible to do some kind of "Trial Manoeuvre" including own and other ships routes (including leg speed)*

Is above "should" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.2:7

*The ECDIS **shall** be able to upload and download VP to and from the STM Module*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	





### 3.3 Communication between STM Module and ECDIS

R-3.3:1

*The communication between the STM Module and ECDIS **Shall** have Information consistency (e.g. ship receives a VP in the STM module, accepts it, then the operator shall be able to choose it for monitoring in ECDIS, it shall then be identical to the one in the STM module).*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	



### 3.4 STM Module

R-3.4:1

*STM module **shall** be able to send, receive and show text messages to/from other STM actor according to “STM text format”, in SeaSWIM technical specification appendix (e.g. Text body, Message subject, receiver id (actor id), sender id (actor id), reference to information object ID (e.g. UVID))*

Is above “shall” requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.4:2

*The STM module **shall** include the functionality to communicate the following (but not limited to) to and from VIS*

- Publish VP to VIS
- Retrieve VP proposals from VIS
- Send and receive VP, Area- and text messages to other STM services through VIS

Is above “shall” requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	





R-3.4:3

The STM module **shall** include the functionality to show, create, edit and save VP. It **shall** be possible to graphically clearly distinguish received VP updates, e.g. route suggestions

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.4:4

The STM module **shall** be able to set VP status (by operator) according to .rtz format in SeaSWIM technical specification appendix

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.4:5

STM module **should** be able to communicate states with Ship Port Information Service (SPIS) according to PCM, Interface according to SPIS specification, Appendix-7

Is above "should" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	





R-3.4:6

The STM module **should** include the functionality to retrieve and display the following states according to PCM format in SeaSWIM technical specification

- Planned time of arrival (PTA), Estimated time of arrival (ETA) to SPIS
- Recommended time of arrival (RTA) retrieved from SPIS

Interface according to SPIS specification, Appendix-7

Is above "should" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.4:7

OOW **shall** be made aware of relevant events such as incoming messages (VP updates, text messages new RTA etc.)

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.4:8

Events in the system **shall** be stored and logged for later evaluation. Events could include, but are not limited to: system downtime (excluding communication), operator actions such as: Number of STM Module – VIS/SPIS exchanges.

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
---	------------------------------



How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):

R-3.4:9

*The STM Module **shall** be able to upload and download VP to/from the ships ECDIS*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.4:10

*Operator **shall** be able to search for services in STM module acc. to VIS spec. Based on attributes available in service registry*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.4:11

*STM module **shall** be able to store lists of services (for offline purposes)*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
---	------------------------------



How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):

R-3.4:12

*Operator **shall** be able to give access to actors in STM module acc. to identity in service registry. Based on attributes available in service registry. See VIS specification*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.4:13

*Operator **shall** on the STM module be able to assign/remove access rights on VP to actors according to VIS specification*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	



R-3.4:14

*STM module **shall** be able to inform operator of which actors that have been given access rights to VP*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.4:15

*There **shall** be a functionality in the STM Module to correlate transaction sequences irrespective payload format e.g. a text message shall be correlated to a VP*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.4:16

*The STM Module **shall** be able to show area according to S-124 standard*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	





R-3.4:17

The STM ship systems **should** handle real time calculation (including schedule) of ETA and or STG (Speed To Go to reach a WP at a given time) to one or more selected WP(s) (e.g. arrival traffic area or Pilot Boarding Position) along the route, a Flow Point (FP), not necessarily the last waypoint in the route.

Is above "should" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	



### 3.5 Communications between the STM Module and Online access point

R-3.5:1

*The STM ship system **shall** be able to log outgoing and incoming “STM data traffic” (Bytes). See STM Data Communication Annex-A in this document*

Is above “shall” requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.5:2

*The STM ship system **should** log availability to online access point (the time when it’s possible to communicate)*

Is above “should” requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.5:3

*Each recruited ship **shall** be equipped with a data link to the access point. This can either be an existing data link which is allowed to use for the tests, or a dedicated link installed by the supplier. The Tenderer shall include 200MB of data traffic in the tender price.*

Is above “shall” requirement fulfilled?	Yes <input type="checkbox"/>
---	------------------------------



How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):

R-3.5:4

*Each recruited ship **shall** have data link connectivity between the STM Module and the Online access point. The connectivity has the ability to be continuous with adequate capacity according the following: Communication between the STM Module and Online access point ensures that the maximum possible degree of consistency is upheld between information held in the STM Module and at the Online access point, depending on the online connectivity status of the ship.*

*Further, the communication link supports, but not limited to, all use cases in Appendix 5 – STM Voyage Management use cases and is able to handle all data transfers in minimum near real-time. All communication has security measures, in order to protect the information from unauthorized access. The connectivity is functional within, but not limited to, coastal waters of the ship’s normal area of operation.*

Is above “shall” requirement fulfilled?

Yes

How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):

R-3.5:5

*Each recruited ship **should** have data link connectivity between the STM Module and the Online access point additional to the requirement [R-3.5:4] the following: The connectivity is functional within coverage of the ship’s entire normal area of operation with the most cost effective means of communications, i.e. terrestrial and satellite communication.*

Is above “should” requirement fulfilled?

Yes





How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):





### 3.6 Online access point (VIS/SPIS including SSC)

R-3.6:1

*Online access point **shall** hold a VIS instance that is the internet connected representation of the ship, the VIS shall represent the ships VP towards other actors via a SSC*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.6:2

*If yes on 3.4.5 and 3.4.6 the online access point **shall** hold a SPIS instance that is the internet connected representation of the ship, the SPIS shall represent the ship in port-call synchronization interactions towards other actors via a SSC*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.6:3

*Online access point **shall** be able to expose and consume (to other STM actors) rtz-format, S124-format and text format using VIS see appendices (3 and 4)*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
---	------------------------------



How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):

R-3.6:4

*Online access point **should** be able to expose and consume (to other STM actors) PCM-format/SPIS, see appendices (3,4 and 7)*

Is above "should" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	

R-3.6:5

*The STM ship system **shall** be able to give the VP an Unique Voyage ID (UVID) using the maritime resource name (mrn) structure, e.g. "urn:mrn:stm:voyage.id:<short org>:<local-id>" according to STM Act2 SeaSWIM Testbed Specification. The functionality to create UVID based on a local ID shall be integrated into any component provided by tenderer.*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	





R-3.6:6

*Online access point **shall** be permanently and stably internet connected*

Is above "shall" requirement fulfilled?	Yes <input type="checkbox"/>
How is above requirement fulfilled, if needed, refer to System description or other documentation (Page and Bullet):	





## Annex-A

### STM data communication estimates

		COST per Kb €								
Actual pricelevel (2015)					0,02	0,02	0	0,006	0,01	0,008
Payload	Comment	Kb	Freq/day	Total	F77 1)	FBB 150/250/300	VSAT	Thuraya	Iridium	Global Star
Voyage Plan (rtz)	3 route updates per day (incl cross-check, optimization and change of ETA). More seldom on open sea, more frequent last 24 hours.	5	3	15	0,26	0,26	0	0,08	0,18	0,13
Port call format (PCMF)	Number of interactions is up to ships decision. More seldom on open sea, more frequent last 24 hours. Only applicable on calls to PortCDM ports in the test beds. The frequency is an estimated average taking this into consideration	2	2	4	0,07	0,07	0	0,02	0,05	0,03
STM text message format		2	1	2	0,04	0,04	0	0,01	0,02	0,02
Area exchange format	Not expected to be used frequently.	2	0,5	1	0,02	0,02	0	0,01	0,01	0,01
Cost per day/Ship					0	0	0	0	0	0
Cost per year/Ship					141	141	0	45	99	67
	USD/EUR	0,878								

#### Viscon notes:

Sources: VISCON, Cordland Marine , Internet.  
Retrospective analysis over the last 15 years shows that prices are in the same level, but usage of data have increased in average with shipping companies.

1) F77 End of service 2017.



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Maritime Authority ◦ Navicon ◦ Novia University of Applied Sciences ◦ Fraunhofer ◦ Jeppesen  
◦ Carnival Corp. ◦ Italian Ministry of Transport ◦ SASEMAR ◦ Valencia Port Authority ◦  
Valencia Port Foundation ◦ CIMNE ◦ University of Catalonia ◦ Norwegian Coastal  
Administration ◦ GS1 ◦ Cyprys University of Technology ◦ Port of Barcelona ◦ Costa Crociere  
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University of Southampton ◦ HiQ

[www.stmvalidation.eu](http://www.stmvalidation.eu)



**Co-financed by the European Union**

Connecting Europe Facility

Main Contract

between

the Swedish Maritime Administration

and

[Supplier]

for

Installations of Sea Traffic Management (STM) Ship System prototypes  
for the STM Validation Project.

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# Main Contract

## 1 Whereas

The Swedish Maritime Administration (SMA) is a governmental agency and enterprise within the transport sector and is responsible for maritime safety and availability. This means a collective responsibility for achieving the government's transport and economic policy goals in the field of shipping. The goals of the transport policy, guiding our operations, are to attain an accessible transport system, a high level of transport quality, secure shipping, a favourable environment, positive regional development and an equitable transport system.

SMA's services include, for example:

- Pilotage
- Fairway Service
- Maritime Traffic Information
- Icebreaking
- Hydrography
- Maritime and Aeronautical Search and Rescue
- Seamen's Service

Our activities focus primarily on merchant shipping, but also take the pleasure boating and fishing interests into account.

### 1.1 Background

Based on MONALISA (2010-EU-21109-S) and MONALISA 2.0 (2012-EU-21007-S), see [www.stmvalidation.eu](http://www.stmvalidation.eu), significant steps have been taken in bringing advancements in technology and innovation into the maritime sector. Both projects have defined and tested core STM components and shown very promising results.

The STM concept sets a focus upon enabling safe, sustainable, and efficient sea transports. STM is a response to the need to increase efficiency in operations within and between ports. The concept takes a holistic approach to services putting the berth-to-berth voyage in focus and uses that as a core element for process optimisation, stakeholder interaction and information sharing. An enhanced sharing of information ship-to-ship, ship-to-shore, and shore-to-shore is also an important enabler for increased situational awareness and safety during sea transports. STM has already shown that substantial savings of bunker costs could be earned and that high utilization of resources of the facilities in ports can be reached while the degree of safety is increased.

The information sharing principles in STM leads to improvements in

- Predictability of arrivals and departures enabling better planning for all parties
- Just in time operations by better predictability and information sharing in and between ports and ships
- New innovative services that are non-vendor dependent, interoperable and with low cost
- Situational awareness – knowing others intentions optimises resource utilisation and reduces number of accidents

The next step in this development, Fig. 1, is to validate the STM Target Concept. This is mainly done in the STM Validation Project, running from 2015 to 2018, by establishing large-scale test beds in order to test and validate different STM concepts. The output will be a validated target concept for STM and additional quantitative and qualitative support for the broader development of STM.

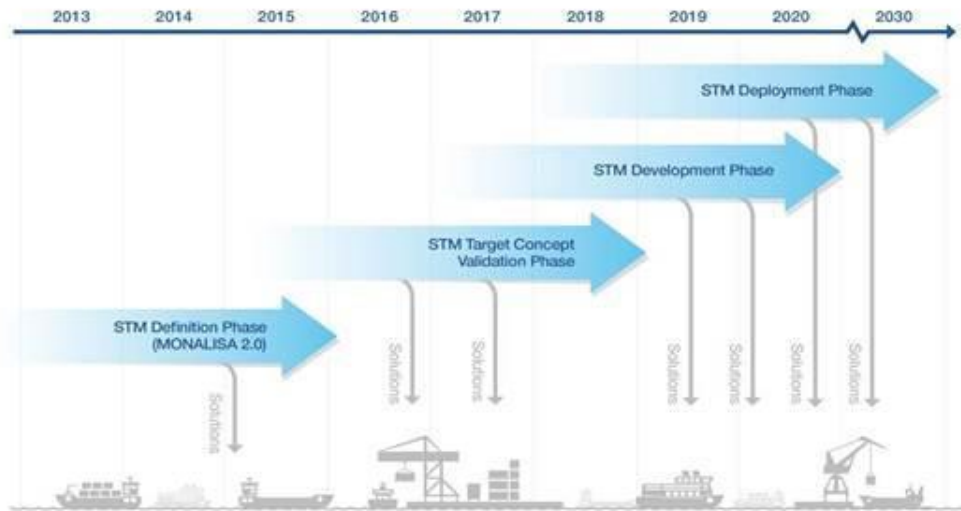


Fig. 1 The Development, Validation, and Deployment of STM

## 1.2 STM Validation Project

The STM Validation Project, see project information brochure, co-financed by the EU (Connecting Europe Facility/Motorways of the Sea) shall demonstrate and validate STM by using the European Maritime Simulator Network and by establishing large-scale test beds in both the Nordic and Mediterranean Seas, encompassing 300 ships and 13 ports. Key strategic services of STM will be tested and validated. The project encompasses:

- **Validation of Voyage Management** in two test beds. In the Nordic region, the application of STM for more efficient winter navigation will be tested and validated. In the Mediterranean Sea, the application of STM for crisis management (i.e., Search and Rescue) will be tested and validated.
- **Validation of Flow Management** utilizing the European Maritime Simulator Network and the test beds for Voyage Management. This simulator network was developed within the MONALISA 2.0 project and will be used both to simulate different traffic conditions and further test and validate other parts of STM, which are not possible to test and validate in real life at this stage, such as area management.
- **Validation of Port Collaborative Decision Making** (Port CDM) by expanding the network of ports and Port CDM services developed in MONALISA 2.0 in the Nordic and Mediterranean regions. The contextual differences between different port approaches will be gathered and analyzed, together with other information that will serve as a basis for the concept's refinement. The test beds will also constitute a first step towards inviting both commercial and public service developers/distributors to further develop Port CDM Services.
- **Validation of System Wide Information Management** (SeaSWIM) using the Maritime Cloud as the infrastructure for information exchange in the validation test beds.

Extensive Analysis and Evaluation will be carried out and the different perspectives used in MONALISA 2.0: business, socio-economic, risk, technological, legal and institutional will be incorporated. Competencies and training requirements for STM implementation will also be considered within this activity.

The results from testbeds, which involve rigorous, transparent and replicable testing of, for example, route exchange, route optimization, scientific theories, computational tools and new technologies. As there are linkages between STM and IMO's e-navigation Strategy Implementation Plan (SIP), these test beds would allow for early detection of new system functionality, operational usability, areas of enhancement and identification of weakness. The results will be submitted to IMO in accordance with the format outlined in MSC.1/Circ.1494 on Guidelines on Harmonization of Testbed Reporting. The results of the project will thus also form the basis for policy making, further research and development of STM services and concepts and pre-deployment of STM services and concepts.

This Agreement is a part of the STM Validation Project. The project includes fulfillment of the terms of the Grant Agreement (GA) ([https://ec.europa.eu/inea/sites/inea/files/model\\_grant\\_agreement\\_en.pdf](https://ec.europa.eu/inea/sites/inea/files/model_grant_agreement_en.pdf)) whereby the European Commission has decided to award a grant for the STM Validation Project. The following parts of the GA should therefore also apply to this Agreement.

II.3 – LIABILITY FOR DAMAGES

II.4 – CONFLICT OF INTERESTS

II.5 – CONFIDENTIALITY

II.8 – PRE-EXISTING RIGHTS AND OWNERSHIP AND USE OF THE RESULTS (INCLUDING INTELLECTUAL AND INDUSTRIAL PROPERTY RIGHTS)

## 2 Parties

This contract (the "Main Contract" or "Contract") is made on the xx of xx 2017 (the "Effective Date") between:

**Sjöfartsverket** – the Swedish Maritime Administration, with organization number 202100-0654, a central administrative authority organized under the laws of Sweden, having its principal office at Östra Promenaden 7, 602 78 Norrköping, Sweden (hereinafter referred to as "SMA");

And

**[Supplier]**, with organization number xxxxxxx, having its principal office at xxxxxxx, (hereinafter referred to as "the Supplier").

SMA and the Supplier are hereinafter sometimes individually referred to as "Party" or collectively as "Parties".

This Contract is concluded for the purpose of installations of Sea Traffic Management Ship System prototypes for the STM Validation Project (the "Implementation Project").

## 3 Contract documents

### 3.1 Precedence

This Contract consists of the following documents:

- Invitation to Tender and tendering form
- Appendix 1: STM Ship system technical specification and tendering form 2016-11-17
- Appendix 2: The Main Contract (this document) 2016-11-18
- Appendix 3: SeaSWIM Testbed Specification (Procurement) 2016-11-18
- Appendix 4: Voyage Information Service specification 2016-11-18
- Appendix 5: Appendix 5 - STM Voyage management use cases and F.A.T. Procedure handbook 2016-11-17
- Appendix 6: Appendix 6 - Route Message system requirements,C1 2016-11-03
- Appendix 7: Ship Port Information Service Specification (Procurement) 2016-11-17
- Appendix 8: Route Planning Process Flowchart 2016-05-13
- Appendix 9 - System Design Description Template 2016-11-17
- Supplier's Draft Project Management Plan

All appendices are by this reference hereby incorporated into this Contract, all as amended from time to time as provided herein.

In case of a conflict the Main Contract shall take precedence over any appendices.

### **3.2 Appendices**

Should information in appendices be contradictory, the appendices shall apply in the order in which they are numbered and listed below:

1. The SMA's tendering documentation, including amendments and clarifications both to the tendering documentation and to the Suppliers offer as per sub-appendices:
  - a. Questions and Answers
  - b. Amendments to procurement documentation
2. The Suppliers Tender

## **4 Suppliers undertakings and system responsibility**

### **4.1 Suppliers undertakings**

The Supplier undertakes to design, develop, and install the Sea Traffic Management (STM) ship system prototypes ("System") for the STM Validation Project, fully compliant with Appendix 1, The SMA's tendering documentation, and to maintain those systems operational throughout the test period which runs until 31 December 2018.

The undertaking includes all undertaking described in Requirements appendix (Appendix 1).

The Supplier is also responsible for managing any required implementation activities, training and giving advice in how the System should be used to reach the best quality and efficiency. The scope of delivery (as set forth in Supplier's Draft Project Management Plan) should include required licenses as well as support and maintenance.

The Supplier is fully responsible for a fully setup System ready for deployment, and fully responsible for deploying the System. The delivery includes all components, software, and licenses for the System. The Supplier is also fully responsible for support during the test period.

### **4.2 System responsibility**

The Supplier shall have responsibility for the fully satisfactory function of the complete System throughout the test period. The Supplier shall have full responsibility for design even if design proposals are put forward by SMA. SMA's approval of drawings, designs or products and services does not constitute a discharge of the Supplier from his design and System responsibility.

The Supplier is fully responsible that all installations of software and/or hardware, fulfilling the tender specifications, does not interfere with existing navigational systems and that the System is compliant with existing rules and regulations including but not limited to SOLAS Ch V reg 17 on electromagnetic compatibility.

### **4.3 Specifications**

The Supplier shall deliver the System in accordance with this Contract.

### **4.4 Delivery requirements**

The Supplier will cooperate with all parties involved in the Implementation Project as well as SMA.

The Implementation Project will be executed in close cooperation with SMA to assure that the high quality in the System and deployment is achieved.

In no event shall Supplier be liable for any acts or omissions of any third party under the present Contract other than Supplier's subcontractors.

#### 4.5 Subcontractors

The engagement by the Supplier of any subcontractor shall not relieve the Supplier from any liabilities or obligations under this Contract and the Supplier shall be responsible for any acts or omissions of any subcontractor as if they were acts or omissions of the Supplier.

The Supplier shall ensure that the terms and conditions of this Contract are reflected in all subcontracts, if any, to the extent necessary to enable the Supplier to fully meet his obligations to SMA. Such terms and conditions include, but are not limited to, technical, functional and operational requirements and technical specifications; time of delivery; warranty terms; and quality control.

#### 4.6 Subcontractors substitution

The Supplier may not substitute the subcontractors identified in scope of delivery (as set forth in Supplier's Draft Project Management Plan) without informing SMA in advance of such substitution and receiving SMA's written approval. Such approval shall not be unreasonably withheld.

### 5 SMA:s undertaking and responsibilities

SMA is responsible for the following undertakings:

- SeaSWIM central services
  - Service Registry, including registration of service instances in the Service Registry
  - Identity Registry, including registration of organizations in the Identity Registry and provide credentials for an administrative login in the Identity Registry (after registration each organization will be able to create and maintain own entities).
- SeaSWIM connector<sup>1</sup>, Voyage information service and Port Information Service

These three services will be provided as three different alternatives

- SSC implementation run by SMA (to facilitate the test bed)
  - SSC open source code for tenders own implementation
  - SSC specification for tenders own implementation
- Issuing of identity name spaces according to Unique Identification chapter in SeaSWIM specification (Appendix 3).

## 6 Project overview

### 6.1 Scope

The Implementation Project includes all activities to reach final acceptance. It includes project management, product training and solving problems identified during acceptance tests.

### 6.2 Contractual milestones

#### Milestone 1: System Design Review

The Supplier shall perform a System Design Review (SDR) and produce and deliver the documentation specified below as part of its undertakings. The purpose of the System Design Review is for SMA and the

---

<sup>1</sup> Cimne maintains the Intellectual property on the SSC code based on the openSource GPL Rules. This means that any use or improvements of the code must be referenced to Cimne.

Supplier to jointly agree on the scope of the delivery and the fundamental technical design of the STM Ship Systems.

The System Design Review, including documentation, shall be approved by SMA before the Supplier may proceed towards the next Contractual Milestone. SMA shall approve or reject the System Design Review, including documentation.

Documentation to be, but not limited to, included in the SDR delivery:

- Updated Project Management Plan (PMP)
- Updated System design description (including demonstration of progress within hardware and software development)
- List and installation plan of recruited test ships (Ship Name, Call sign, MMSI #, IMO #, e-mail address to ship (if available) and ship owner/manager stated in the ship list)
- According to Requirement R-2.1:7 "The Tenderer shall at Milestone 1 (SDR) have a demonstration plan from each shipping company that are listed in the list above, the demonstration plan should include which STM services the company intend to use"
- Factory Acceptance Test (FAT) procedure book (Version 1 at SDR, Final version 14days before FAT)

### **Milestone 2 and 3: Acceptance Tests**

The Supplier shall carry out the inspection and Acceptance Tests of the STM Ship System as a Factory Acceptance Test (FAT) (Milestone 2) and a Site Acceptance Test (SAT) (Milestone 3).

Milestone Acceptance shall be issued by SMA without undue delay upon successful execution of an Acceptance Test.

Each Party shall be responsible for any and all costs incurred by its representatives in attending the inspection and Acceptance Tests.

An Acceptance Test cannot be completed successfully if it results in a defect or in a deficiency. A defect prevents SMA from using the STM Ship System for its intended purpose and thereby the normal operation of the STM Ship System. A defect must be corrected before the Acceptance Test is re-started or continues. A deficiency will not prevent SMA from using the STM Ship System for its intended purpose or the normal operation of the STM Ship System and the Acceptance Test continues.

In addition to the inspection and Acceptance Tests specified above, SMA shall have the possibility of free-testing for the benefit of both SMA and the Supplier.

### **Factory Acceptance Test (FAT)**

The FAT shall verify that the Requirement Specification (Appendix 1) is fulfilled. The FAT shall be carried out in an adequate environment, such as the Suppliers factory or simulator facility.

Should problems materialize during the FAT or should the FAT test results be deemed unsatisfactory by SMA, the problems shall be corrected and the status shall be mutually verified and agreed. The Supplier shall take the full responsibility for any required rectification and re-testing program

### **Site Acceptance Test (SAT)**

Site Acceptance Test (SAT) procedure book and Installation test protocol shall be submitted 14 days before SAT, (subject for changes))

The SAT shall verify that the STM Ship Systems fulfills the intended purpose and normal operation in a live environment. The SAT shall be carried out on two (2) of the recruited ships, approved by SMA. Should problems materialize during the SAT or should the SAT test results be deemed unsatisfactory by SMA, the problems shall be corrected and the status shall be mutually verified and agreed. The Supplier shall take the full responsibility for any required rectification and re-testing program.

Notwithstanding anything to the contrary contained herein, in no event shall the Supplier be liable to SMA or to any third party for any problems in SAT results which are attributed to any other party involved in the

Implementation Project other than Supplier or its subcontractors. Any additional costs incurred due to such problems during SAT shall be borne by SMA.

#### **Milestone 4, 5 and 6: Assigned Systems Installed**

The Supplier shall carry out the installation on the recruited ships accordingly to the partition assigned to each milestone. After completion of each tested and verified installation, the Installation Test Protocol shall be sent to SMA for approval.

#### **Milestone 7: Final Acceptance**

Upon the Supplier's successful completion of all the contractual obligations, including the Supplier's operational and functional availability and support obligations, SMA will issue a Final Acceptance for the STM Ship Systems to the Supplier.

#### **Delivery and Payment Schedule**

The Supplier shall deliver the STM Ship Systems in accordance with the Delivery Schedule as specified below.

After successfully achieving the Contractual Milestones, the Supplier shall receive payment as specified below.

<b>Contractual Milestones</b>	<b>Description</b>	<b>Acceptance date (calendar months)</b>	<b>Percentage of Contract Price</b>
Milestone 1	System Design Review	T0 + 3	20%
Milestone 2	FAT - system functions demonstrated and validated	T0 + 7	5 %
Milestone 3	SAT - two (2) systems installed, tested and approved	T0 + 9	20 %
Milestone 4	50 % of assigned systems installed	T0 + 12	30 %
Milestone 5	100% of assigned systems installed	T0 + 17	15 %
Milestone 6	Final Acceptance	T0 + 22	10 %

T<sub>0</sub> = Effective Date of Main Contract

### **6.3 Actual acceptance date**

Provided that SMA does not reject the System or part thereof, the Actual Acceptance Date shall be deemed to be the day the System or part thereof (as the case may be) is accepted by SMA. SMA's issuance of a written acceptance will serve as evidence of SMA's acceptance.

### **6.4 Ownership after acceptance**

After final acceptance the ownership of the System will remain with the Supplier.

### **6.5 Delay**

If the Supplier does not keep a milestone agreed upon, no payment will be made from SMA until the Supplier has fulfilled the delivery stipulated in the milestone. This payment postponement shall be SMA's only remedy for delay.

---

## 7 Licenses

The Supplier shall supply all required software licenses if needed for full functionality to meet the requirements in this document and specified in this Contract.

All licenses for the development, test, and training will be included in the delivery. The licensing also includes any third party software if needed for the System.

## 8 Price

Prices are given in the Tender from the supplier.

All local taxes and duties, if any, are included in the prices as listed in the Contract. VAT is excluded.

## 9 Invoicing and terms of payment

### 9.1 Invoicing

Payment shall be made in Swedish Kronor (SEK) or Euro (EUR) upon invoicing as stipulated in the Contract, payment in accordance with the payment schedule in this contract. Unless provided otherwise in the Contract or otherwise agreed in each instance, the Supplier shall not present invoices to SMA and SMA shall have no liability to make payment under the Contract.

Invoices from the Supplier shall be accompanied by relevant and detailed specifications clearly identifying on an item-by-item basis the purpose and scope of the delivery including the description, delivered quantity, agreed price and delivery time of each product and service.

Invoices shall always specify SMA's Contract reference number.

Terms unilaterally included in invoices by the Supplier are not binding on SMA.

### 9.2 Invoicing address

Invoices in SEK shall be sent to:

Sjöfartsverket  
Box 344  
737 26 Fagersta, Sweden

Invoices in EUR shall be sent to:

Sjöfartsverket  
601 78 Norrköping, Sweden

### 9.3 Payment schedule

After successfully achieving the Contractual Milestones and other acceptance requirements stipulated in the contract, the Supplier shall receive payment according to the payment schedules specified above in *contractual milestones*.

### 9.4 Payment terms and amendments, changes and additions

Interest on arrears in accordance with the Interest Act is accepted if the Swedish Maritime Administration is in arrears without objective cause. Collection measures shall, however, be preceded by a payment-reminder in order to be accepted. In delays of payment caused by insufficient invoicing, the Swedish Maritime Administration will dispute all demands concerning the delay.

The Swedish Maritime Administration does not accept any service or invoicing charges.



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Payment for amendments to the Contract that may be viewed as independent of the System may be subject to negotiation between the Parties and a separate payment schedule.

## 9.5 Payment period

The Supplier is entitled to receive payment within thirty (30) days of receipt of Supplier's invoice by SMA, provided that the Supplier has invoiced SMA in accordance with the provisions of this Clause.

## 9.6 Delayed payment

For late payments, the Supplier shall be entitled to charge default interest at a rate applicable in accordance with the Interest Act of Sweden.

# 10 Project organization

## 10.1 Project management

Each Party shall appoint a primary contact person whose responsibilities and obligations during the Term of the Contract are defined in this contract.

At signing here of the primary contact persons will be:

For SMA: Håkan Heurlin

For the Supplier: XXXXX

# 11 Title, right of use, personal data, etc.

## 11.1 Title

All technical data of whatever kind, including all software and source codes with documentation necessary for operation, correction, modification and expansion produced by the Supplier or its subcontractor during the performance of this Contract shall be the property of the Supplier unless otherwise stipulated in the Grant Agreement...

## 11.2 Non-Disclosure

If not stipulated otherwise in the Grant Agreement all Data and information relating to a Party's business and activities that is disclosed by one Party to the other Party under this Contract shall be treated as confidential and proprietary by the other Party. Neither Party shall disclose such Data or information to any subcontractor, consultant or other third party unless such subcontractor, consultant or other third party has executed a confidentiality agreement with the Party for the direct benefit of the other Party protecting such Data and information.

The foregoing shall not apply to any information

- in the public domain; or
- which has been legally acquired from sources other than the other Party without confidentiality restrictions; or
- which is required to be disclosed under applicable mandatory law, final and legally enforceable order of any competent court or regulatory body or similar provisions.

### 11.3 Infringement of intellectual property rights

If not stipulated otherwise in the Grant Agreement the Supplier shall indemnify and hold SMA harmless in respect of any damages, costs and other expenses, which may arise for SMA as a result of any claim due to any alleged infringement of intellectual property rights as a consequence of manufacture or use of the System.

The Supplier shall not be liable for infringement pursuant to the preceding paragraph to the extent that such infringement is directly attributable to materiel supplied by SMA or to solutions or procedures prescribed by SMA contrary to the Supplier's written objection.

The Supplier and SMA shall keep each other informed of claims arising from intellectual property rights.

If infringement occurs, the Supplier shall, in addition to what is stated in the first paragraph, at its own expense either modify the System so that infringement no longer occurs, or reach an agreement with the holder of the infringed upon intellectual property rights.

If the System is modified, the Supplier shall be responsible for ensuring that its agreed function, performance and utility remains unaffected and that there will be no cost increase for its future use.

If a claim is made against SMA in respect of an alleged infringement of any third party's intellectual property rights, the Supplier shall at its own expense participate in any court proceedings where an action is brought against SMA and for such purpose, as well as otherwise, assist SMA to the best of its ability in the case of alleged infringement of any intellectual property rights.

Supplier will have no obligation to indemnify SMA with respect to any infringement claim based upon any use of the System in combination with other products, equipment, software, or data not supplied by Supplier, unless the infringement is attributable to the System itself and not the act of combination stated above.

## 12 Liability

Unless otherwise provided by other paragraphs in this contract, each Party shall be liable for loss or damage to its property, injury to or death of any of its employees or other person for whom the Party is responsible.

Each Party shall be liable for direct damage to property of third parties or personal injury, including death, in accordance with the applicable law, if caused by the Party, its personnel and/or its subcontractor(s) engaged in carrying out this Contract and shall indemnify and hold harmless the other Party accordingly.

If claim for damages pursuant to this Clause is made by a third party against either of the parties, said party shall immediately so notify the other party in writing.

Neither Party shall be liable to pay any compensation to the other Party either for loss of profit, production drop-out or any other consequential or indirect loss.

The Supplier's maximum liability under this Contract shall be limited to the Contract Price.

## 13 Insurance

The Supplier shall hold adequate liability insurance for its operations throughout the agreement.

## 14 Term and termination

### 14.1 Term

The Term of this Contract and all agreements (Appendix 1-6) shall commence on the date hereof and shall continue in force until Milestone 7 Final acceptance is reached and achieved, unless earlier terminated pursuant to the terms of this Contract.

## 14.2 Termination for default

SMA shall be entitled to terminate all or part of this Contract with immediate effect if:

- a) The acceptance of the Milestones occurs later than the agreed dates and the delay for an individual Contractual Milestone has lasted more than three (3) months or the aggregate delay has lasted more than six (6) months and this is not due to Force Majeure, SMA or circumstances for which SMA is responsible and if such delay is attributable to the Supplier, or.
- b) enforcement by a legal authority of a judgement or an enforceable decision of any other kind has shown the Supplier to be lacking the means of making full payment of a claim which is the subject of the judgement or decision, has suspended payments, an application has been made to a court or a public authority for corporation restructuring regarding the Supplier pursuant to a legislation act or the Supplier has been declared bankrupt, or
- c) the Supplier fails to comply with any other obligation of this Contract and this may be regarded as constituting a substantial breach of Contract.

In case of termination for default, SMA shall be entitled to claim damage compensation in accordance with this contract and to a refund of payments made prior to the termination for default.

The Supplier may terminate this Contract in whole or in part if SMA substantially fails to perform its obligations under the Contract. Any Supplier termination for default shall become effective 90 (ninety) days following written notice of the event, unless the event has been cured within such notice period.

In case of termination for default, the Supplier shall be entitled to claim damage compensation in accordance with this Contract.

Any Party claiming breach of Contract shall take all measures necessary to limit the loss or damage arising insofar as this is possible without incurring unreasonable expense and inconvenience.

## 15 Force majeure

The following circumstances shall be deemed to constitute grounds for discharge from performing the Supplier's obligations under this Contract if they occur after the Contract has been entered into and the due performance of the Contract is thereby prevented and it may not be considered that the Supplier ought to have taken such circumstances into account at the time of entering into the Contract and whose consequences could not reasonably have been avoided or circumvented by the Supplier: general labour conflict and any other circumstances, such as fire, war, mobilization or unforeseen military call-up of corresponding extent, requisition, seizure, insurrection and riot, general shortage of qualified labour, general scarcity of means of transport, general shortage of goods, general and enduring restrictions on the supply of motive power, as well as delay in deliveries from Subcontractors as a consequence of circumstances falling within the scope of this Clause, where the Supplier or subcontractor has not caused or contributed to such obstacle.

The aforesaid shall also apply in respect of undertakings, which it is SMA's duty to perform.

In the event that a Force Majeure event described above prevents a Party from performing its obligations under this Contract for a period exceeding three (3) months, each Party shall be entitled to terminate the Contract and the following shall apply: SMA shall pay to the Supplier the Contract price for work completed as well as the costs of material and labour used for work uncompleted at the time of such termination, less any payments received for such work; and the Contract or shall deliver to SMA upon request any work so paid for.

## 16 Notices and requests

Notices required to be given by one Party to another shall be in the English language unless expressly agreed otherwise and shall be deemed properly given if reduced to writing and personally delivered or sent by registered or certified post to the address below, postage prepaid, or by fax or e-mail with confirmation of receipt in the same manner and shall be effective upon receipt.

Unless specified elsewhere in the Contract, all notices and requests shall be addressed as follows:

To SMA:

Address:	Sjöfartsverket 601 78 Norrköping Sweden	POC:	Håkan Heurlin
		Phone:	+46 104785273
		E-mail:	<a href="mailto:Hakan.Heurlin@sjofartsverket.se">Hakan.Heurlin@sjofartsverket.se</a>

To the Supplier:

Address:	xxx	POC:	xxx
	xxx	Phone:	xxx
	xxx	E-mail:	xxx
	xxx		

## 17 Modifications and improvements

If during the Contract period or later on the Supplier becomes aware of special conditions or develops modifications or improvements that affect or might affect the operation, performance, maintenance, or training of the System delivered under this Contract, the Supplier shall without delay inform SMA thereof.

Notifications of improvements and modifications and the proposals for changes resulting from such improvements and modifications shall be made by the Supplier in writing. In case introduction of any improvements and/or modifications entails additional cost for the Supplier, the Supplier shall invoice SMA for such changes, provided that any changes entailing additional costs have been preapproved by SMA

The Supplier undertakes to notify SMA of modifications proposed to other customers and to offer these to SMA in accordance with the procedure described in this Clause.

## 18 Amendments, changes and additions

No amendments, changes, additions, revisions or discharges of the Contract shall have any effect unless set forth in writing and duly signed by the authorized representatives of SMA and the Supplier.

Either Party shall be entitled to propose changes and additions to the System (a "Change Request"). A Change Request shall be made in writing to the other Party.

During the development there might be a need to make corrections and alterations (change request). Change requests will be communicated with the entire group of vendors and an amount of hours, according to hourly rate for development will be agreed. The logic behind this is to treat all vendors equal.

If SMA makes a Change Request, the Supplier shall within 15 working days from the receipt of the Change Request notify SMA of the following:

- a) the time needed to make the change or addition;
- b) any effect on the System, such as altered performance, in relation to what is stated in the Requirement Specification;
- c) any effect on the Delivery Schedule;
- d) any reasons to modify the Acceptance Tests;

- e) the way in which the change will affect the possibility of upgrading the System in the future, if any; and
- f) the price asked by the Supplier, if any, to carry out the change.

If the Supplier makes a Change Request, the same information as above shall be provided by the Supplier to SMA not later than 15 working days after the Change Request was received by SMA. On the basis of what has been stated in the Change Request and following negotiations between the Parties, SMA shall make a decision, within 15 working days from the receipt of the information as above, about whether the Change Request shall be accepted or not and inform the Supplier in writing. Through SMA's written confirmation, the Contract shall be regarded as having been amended accordingly.

The Supplier shall use its reasonable commercial endeavors to ensure that the impact on costs and time-schedules is as favorable as possible for SMA.

## 19 Applicable law

### 19.1 Applicable law

This Contract shall be governed by and interpreted in accordance with the laws of Sweden.

### 19.2 Dispute

Any dispute, controversy or claim arising out of or in connection with this Contract shall be settled by a Swedish court of law in accordance with the laws of Sweden.

### 19.3 Assignment

Neither Party shall be entitled without the other Party's written consent to put another party in its place, with the proviso, however, that SMA shall be entitled to assign all or part of the Contract to its legal successor(s) or an authority, agency, state enterprise or company wholly or partly owned by the Swedish State.

## 20 Signing

This Contract is executed in two (2) originals, whereof each Party shall keep one.

Norrköping, 2017 - \_\_\_\_ - \_\_\_\_

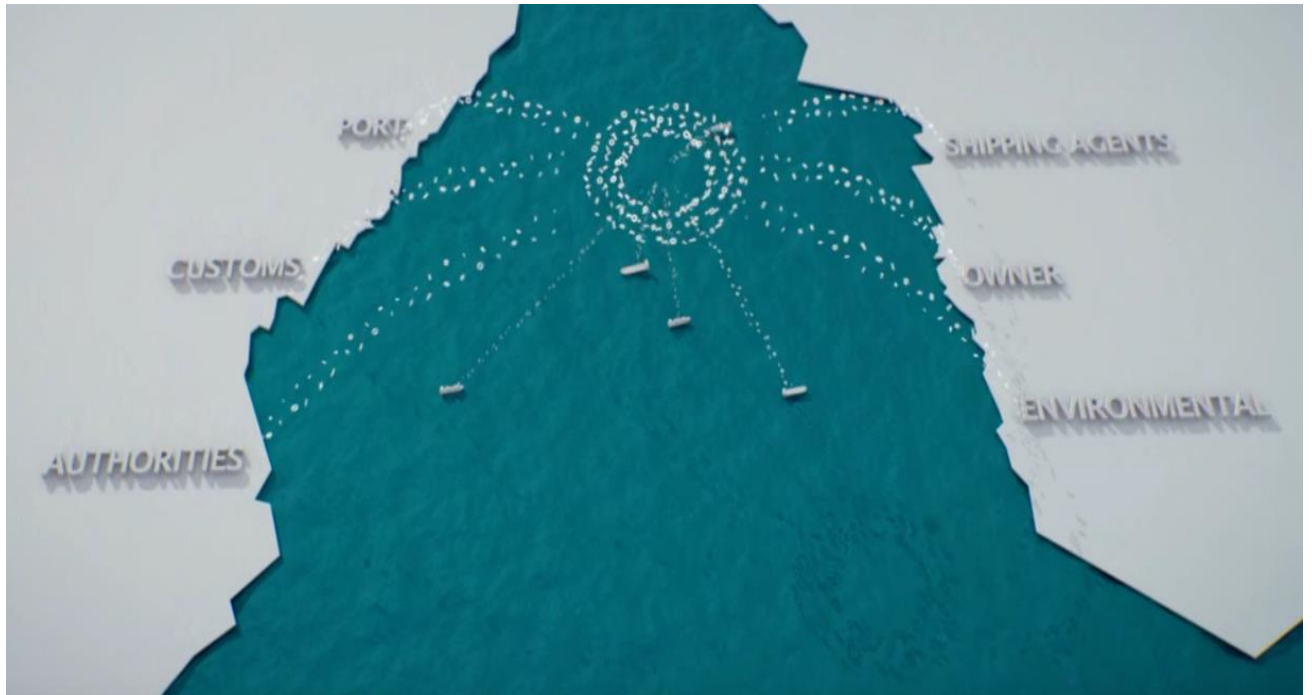
\_\_\_\_\_, 2017- \_\_\_\_ - \_\_\_\_

For and on behalf of  
Swedish Maritime Administration

For and on behalf of  
[Supplier]

\_\_\_\_\_  
Ann-Catrine Zetterdahl  
Director General

\_\_\_\_\_



*Title: STM Act2 SeaSWIM Testbed Specification  
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# 1. Introduction

This appendix document is intended to provide information on what is required to integrate with STM's maritime digital infrastructure "Sea System Wide Information Management" (SeaSWIM). This document is solely focused on the STM Activity 2 testbed implementation of SeaSWIM, which represents a subset of services and functionality intended for the full STM concept scope.

The document provides two perspectives; one for interacting with SeaSWIM through a support interface, which hides the full complexity of the different support services (Section 2), and one for building and integrating SeaSWIM compliant services in house (Section 3). General prerequisites and standards that have to be adhered to is described in Section 4, Section 5 and the Data Models Reference List.

## 1.1 Sea System Wide Information Management (SeaSWIM)

Unifying the way maritime stakeholders communicate, enables a shared understanding and a new level of potential interaction and integration. The fundamental goal for SeaSWIM is to provide and maintain a harmonized way of communicating within the maritime industry. This implies that open and accessible standards are promoted.

The **SeaSWIM environment** enables maritime stakeholders to share certain data and information, in real time and without interpretation over organizational boundaries. In order to achieve this level of interoperability while including a wide range of stakeholders, the scope of what can be communicated is limited to what complies with the SeaSWIM concept. The SeaSWIM concept recognizes that new and customized exchanges of information between certain actors are necessary. However, customization and testing will happen outside of the stable SeaSWIM environment. The focus of the SeaSWIM environment is primarily to ensure semantic interoperability for the most critical and purposeful communication.

To achieve the inclusive scope of the SeaSWIM environment entry barriers to develop, produce and consume data and information in the environment should be as low as possible. **The SeaSWIM Connector (SSC)** is implemented for this purpose – to assist developers by instantiating generic functionality that is needed by most services in the SeaSWIM environment.

The use of the SSC is voluntary; compliance with the functionality that the SSC exemplifies is *not*. Any industry stakeholder is free to develop its own equivalent version as long as it follows the SeaSWIM technical specification it is based on. It should be noted that while the SSC assists developers to access the SeaSWIM environment in a compliant way there are more requirements, beyond the SSC, to become compliant with the SeaSWIM environment (e.g. accepted standards, identities, interface specifications, etc.).



During the STM Activity 2 testbed the provided support services will be limited to the core functionality described in this document. For example, access management is recognized as a common need that should be defined with a SeaSWIM reference implementation. However, as the specific needs and potential implementation alternatives for this support service is currently unclear it will not be provided as part of the STM Activity 2 testbed. Instead, application service-providers are encouraged to evaluate their needs by testing alternative solutions.

## 1.2 SeaSWIM Principles and Architecture

SeaSWIM consists of specific support services that will ensure interoperability of the STM application services by facilitating data sharing in a common information environment and structure. The specification of SeaSWIM is developed to adhere to some important STM principles:

1. Only authenticated actors can provide and consume STM services, where authentication is the process of determining whether someone or something is, in fact, who or what it is declared to be.
2. The owner of data is the actor responsible for the original creation and provision. The owner has full control over the access management for this data.
3. STM strives after a service oriented and highly decentralized architecture.
4. Usage of open and widely accepted industry standards wherever these exist.

The various maritime actors extract specific data or information and translate it to the appropriate STM standard format (see Appendix: Reference List).

To simplify the run time connection with the SeaSWIM environment the SeaSWIM Connector (SSC) is provided. The SSC is developed as a reference service that handles the interaction with the core SeaSWIM support services according to the SeaSWIM specification. There exists two potential ways to incorporate the SeaSWIM Connector functionality.

- The first option is to host the reference service as is and use its interface to reach the SeaSWIM environment and its connected actors and services.
- The second option is to integrate the functions of the SeaSWIM connector service to replicate its functionality. All function calls to the core SeaSWIM support services will be accepted as long as they adhere to the same standard as the SeaSWIM reference connector. It should be noted that only very limited support can be given if a vendor chooses to build their own SeaSWIM connector functionality. Both options will be described in Section 2 (Using the SeaSWIM Connector) and Section 3 (Building the SeaSWIM Connector) respectively.

The SSC or its integrated equivalent is hosted both by the providing and consuming Application Service (cf. Figure 1). This way the SSC or its equivalent support communication according to the STM principles with minimal development and implementation efforts.



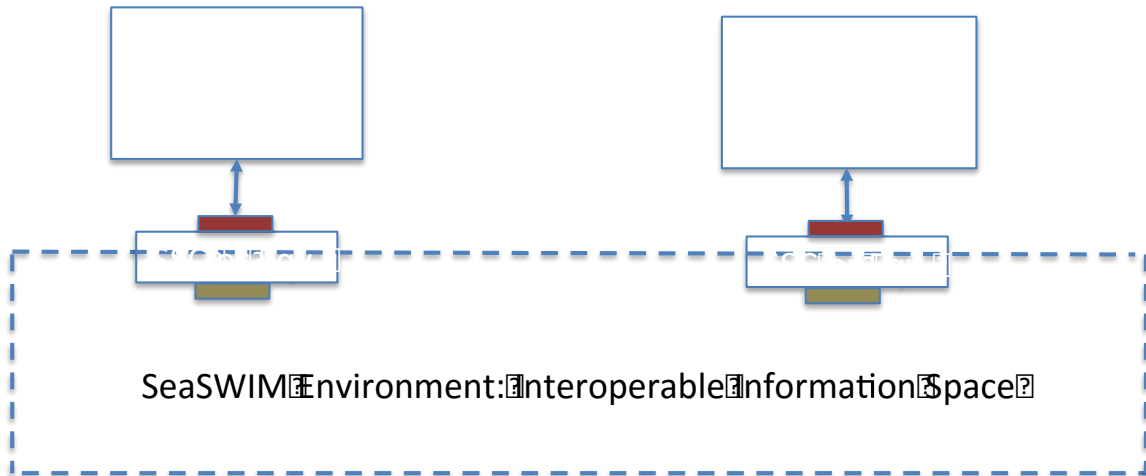


Figure 1: The SeaSWIM Connector (SSC) or equivalent as a standardized interface between the application services, the interoperable information space and a shared security domain

Behind the connector, SeaSWIM consists of two central components; the **Identity Registry** and the **Service Registry** (cf. Figure 2). The Identity Registry enables identity management and authentication mechanisms, while the Service Registry provides functionality to publish and find services, including their functionality and endpoints. Both services will be further detailed in sections 2 and 3.

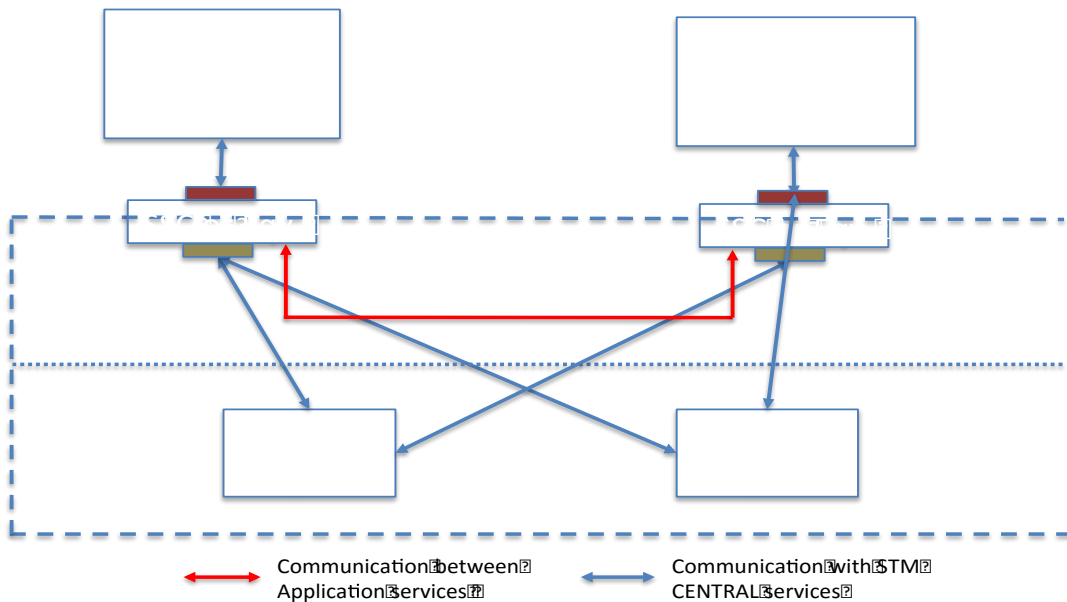


Figure 2: Communication to the central components Identity Registry and Service Registry within SeaSWIM

Unique identifiers play a crucial role in SeaSWIM and are mandatory for avoiding conflicts and provide unique references.



## 1.3 Interacting with SeaSWIM

This section will give an overview of the interaction with the SeaSWIM Support Services; the SeaSWIM Connector, the Identity Registry and the Service Registry. To understand how the SeaSWIM registers will interact with the connector a generic scenario description is provided. More details and descriptions about the technical interfaces and standards will be provided in the subsequent chapters in this document.

### 1.3.1 Setup and Discovery

To provide a service the data or information provider register with the STM identity registry, which is shown as Step 1 (Figure 3) and explained more in depth in Section 4.1. The identity registry ensures unique identities that can be authenticated. Without a valid STM user identity, a user will not be able to provide or consume data within STM.

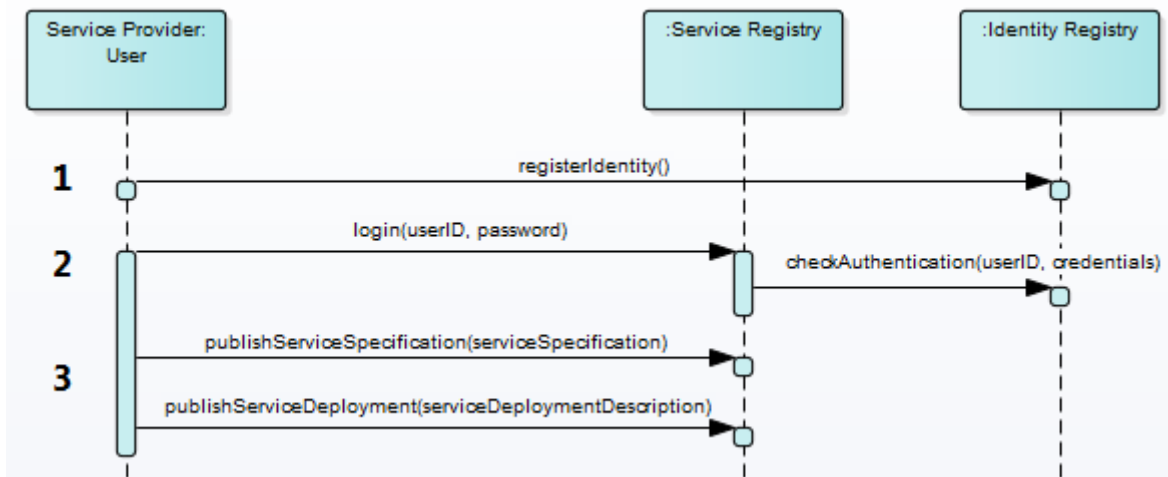


Figure 3: Setup a service specification and deployment description in the service registry

With a STM user identity the service provider can be authenticated as such and register a service in the service registry, shown in Step 2 (Figure 3). Registering a service entails publishing metadata of a service specification and then registering deployed instances of that service (Step 3 in Figure 3). This registration process can be done by separate parties and one service specification can have several deployed instances registered. The service specification and deployment description can subsequently be used by other STM users to interact with the service. It is important to note that published services can be simple data provision services, aggregated information services that consist of several sources of data or data consumer endpoints where data can be sent for processing.

Registering to become a STM member is also required to search and consume services, which is shown in Step 1 (Figure 4). With a STM identity the user can be authenticated by the service registry and search the published service specifications and/or deployed instances (Step 2 in Figure 4).



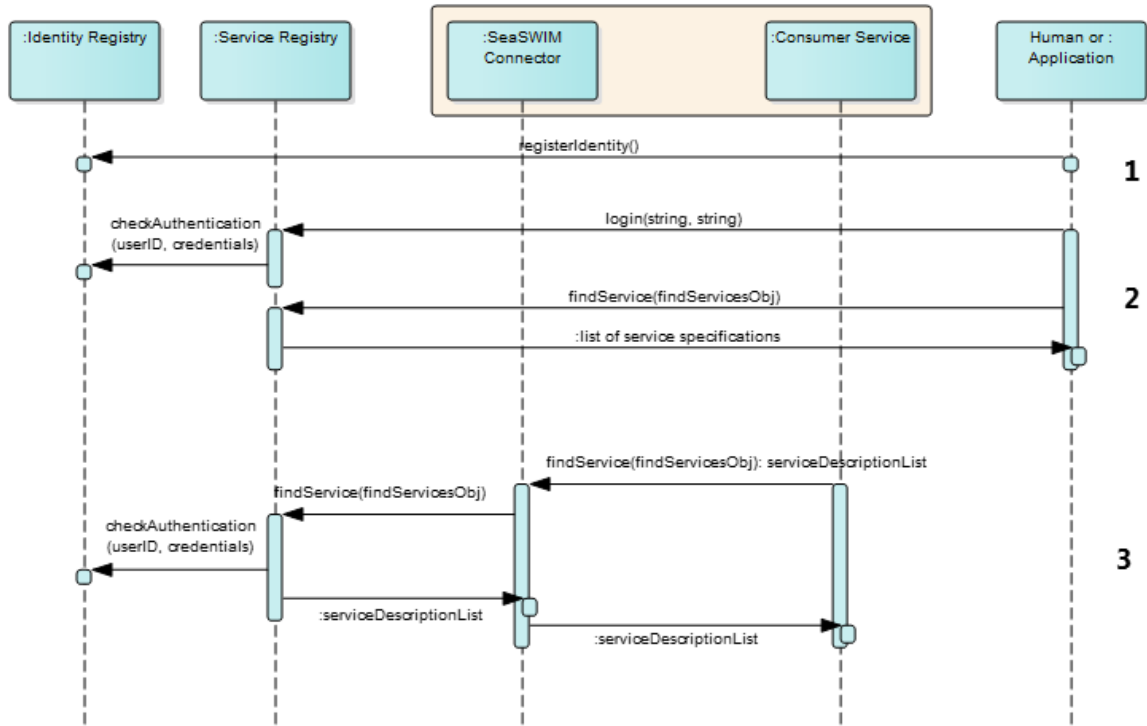


Figure 4: Discover a service specification for development or a service deployment for consumption

Developers find the appropriate functionality among service specifications through the initial search in Step 2. When a match has been found and an appropriate service has been built to interact with the specified service it is only relevant to search within its deployed instances. Step 3 (Figure 4) shows the interaction to search to list and choose between deployed service instances and how it is supported by the SSC. The service registry responds to the request with a list of deployed instances that matches the service deployment attributes (e.g. closest in proximity or current license).

### 1.3.2 Interaction

The user locates the service, its description and how to make use of it. For example, this could be a link to a graphical user interface that can be opened in a web browser or it could be a specification of the API that can be used to request a data point, machine to machine without user interaction. In any case, the consumer uses the metadata to establish a connection to the service producer directly.

The interaction requires that STM identities are used and are valid. By uploading the user credentials to the SeaSWIM connector, it provides support to ensure that tokens and certificates can be authenticated (Step 1 in Figure 5).





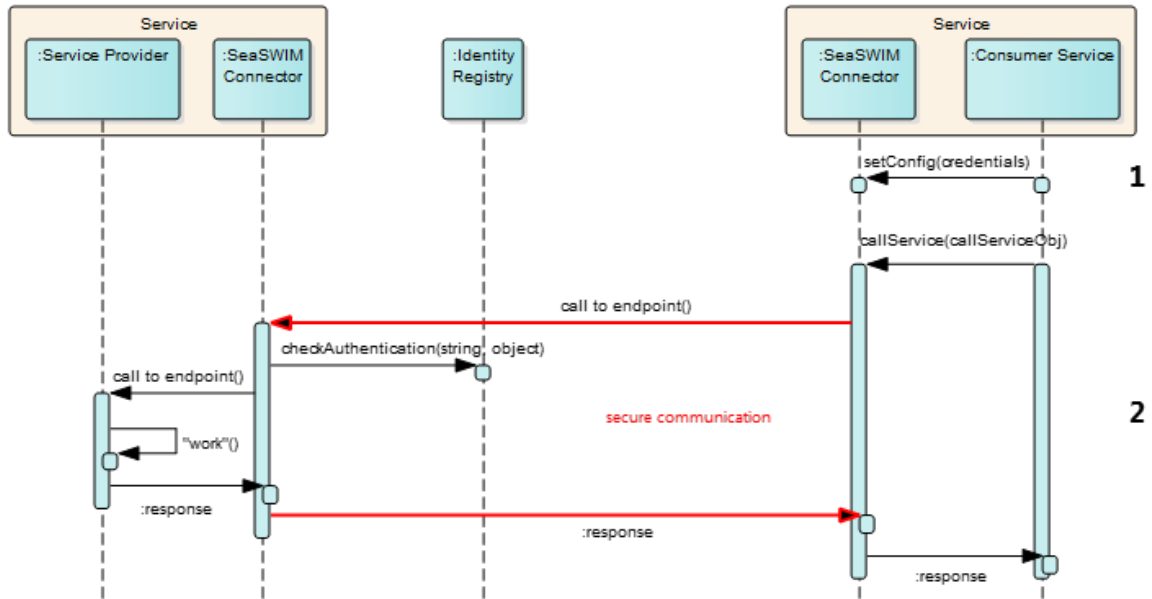


Figure 5: Request and response with a deployed service

Based on the service description and the found deployed instance the service endpoint can then be called. The request is compiled with the user identity and credentials (supported by the SSC) and sends it to the receiving connector. The Provider SeaSWIM connector (on the left in Figure 5) authenticates the request and “works” on it (e.g. checks authorization, performs optimization) and responds as shown in Step 2 (Figure 5). Depending on the service and the completeness of the request this response could be the requested payload, a notification callback or an error message.



## 2. Using the SeaSWIM Connector

This section describes the reference implementation of the SeaSWIM connector that links the internal system to the STM registers and provides general support services. The SeaSWIM reference connector is developed as a stand alone service that should be hosted by the service provider and service consumer. It provides a unified interface and ensures compliancy. The internal functionality of the SeaSWIM reference connector will be described in Section 3 to provide the option to develop SeaSWIM compliant services without using a reference instance.

### 2.1 SeaSWIM Setup, Deployment and Configuration

A general overview of the reference connector interfaces will be described below.

#### Architecture

The picture below depicts the Application Service and the SeaSWIM Connector (SSC) architecture.

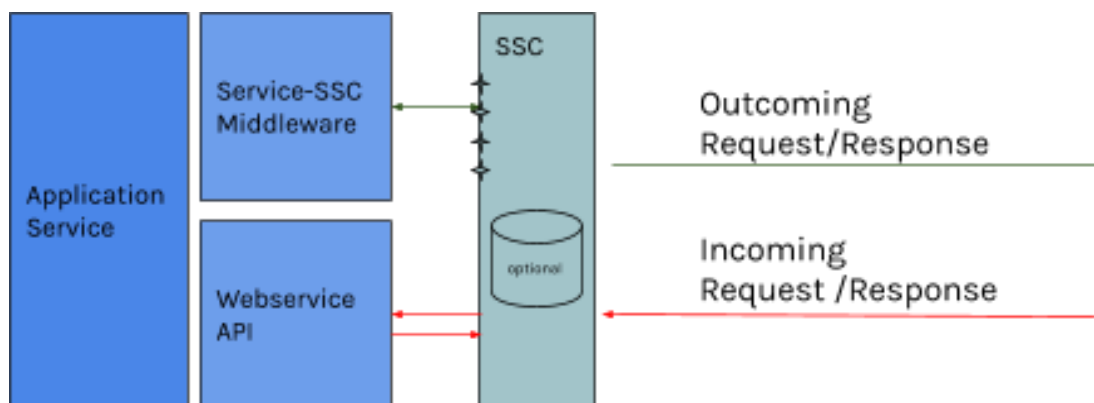


Figure 6: General architectural description of outgoing and incoming calls through the SSC

- The reference SSC service component will forward all the outgoing connections requested by the Application Service (labeled SERVICE in the Figures 6 and 7).
- The reference SSC service will intercept the incoming call, check and forward to web service API exposed by the service
- Service-SSC middleware module will be in charge of the communication with the SSC.
- A web service API will be exposed by the service receive the incoming call.



## Deployment and configuration

The reference SSC will be developed as a service instance running on the same private network of the service application.

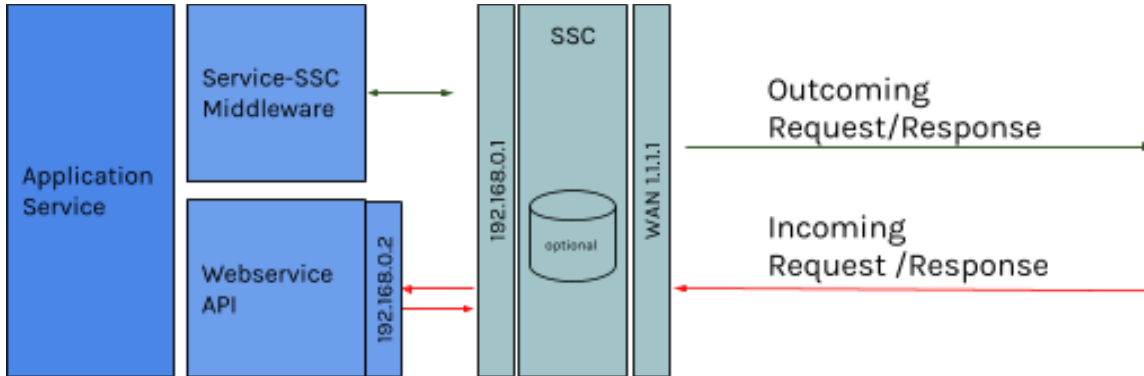


Figure 7: Single private network setup of Application Service and SSC

The reference SSC service exposes a set of private functions running on the private network (for example 192.168.0.1).

The reference SSC service will run a server on the WAN network on a public IP described in the application service description.

The reference SSC can be deployed in a single server instance or on separated servers, as pictured in Figure 7 and 8.

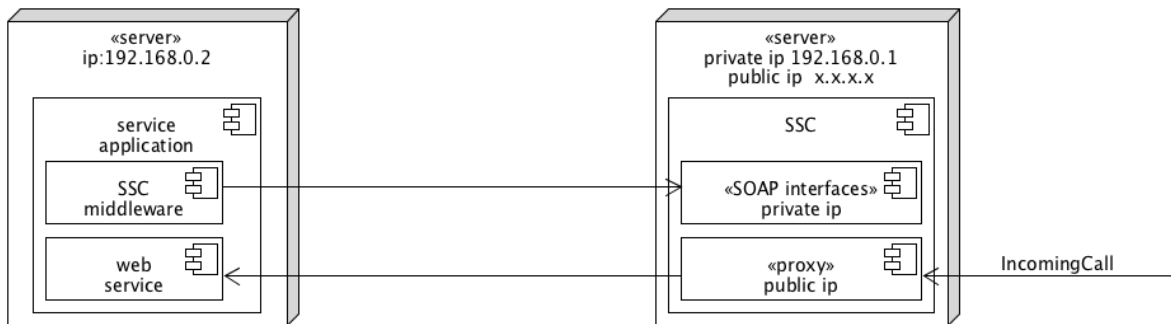


Figure 8: Multiple server deployment of Application Service and SSC





In the separated server deployment the reference SSC will expose a private interface on the private network in order to be used by the application service running in another server in the safe private network.

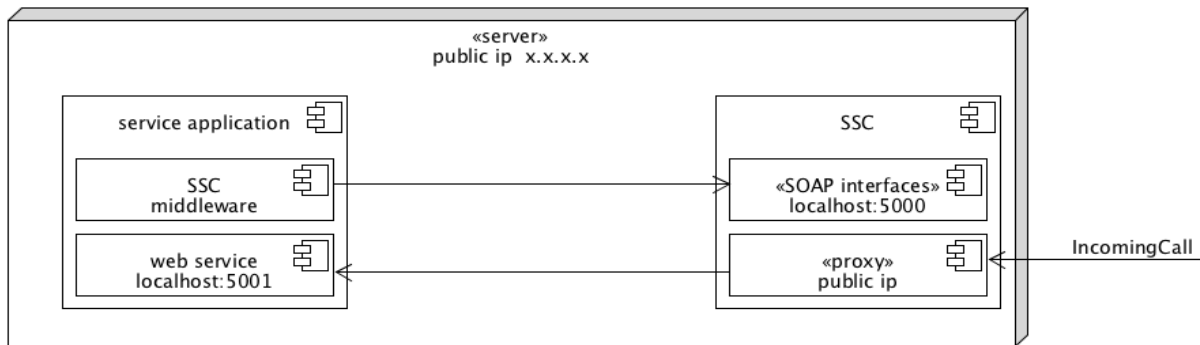


Figure 9: Single server deployment of Application Service and SSC

In the single server deployment there will be an instance of the SSC listening on the public ip of the server to intercept the incoming call.

The public ip must be the same as defined the endpoint in the service registry.

## 2.2 Identity Management, Authentication and Encryption

Establishing connections with a SeaSWIM connector will be based on either digital certificates based on the global X.509 standard, or 'single sign on' to a web service based on the OpenID Connect standard, which is based on OAuth2.

Service providers or other actors, that need the ability to be authenticated in the testbed of the STM project, will be registered in the Identity Registry. The actors participating in the testbed can contact the Swedish Maritime Administration, who will assist in completing the registration in the Portal for the Identity and Service registries, for the STM testbed. Please consult Section 4 of this document.

The SeaSWIM connector will assist its parent service or consumer application in establishing secure and authenticated connections, allowing only interactions with actors who are registered users or service providers with an identity that can be authenticated. The connector will only allow outbound connections to endpoints at services with a valid certificate. Inbound connections will be accepted from other SeaSWIM connectors, that also hold a valid certificate, or where logon can be authenticated based on a trusted identity provider.

If a service provider on land uses the SeaSWIM connector, a certificate for a service should be issued from the STM Identity Registry. For a SeaSWIM connector to represent a particular ship, that ship must have an individual certificate issued. Each entity that need to be authenticated (e.g. a service, a ship) must have its own certificate, multiple



entities cannot be tied to the same certificate. The attributes of this certificate is further detailed here <http://developers.maritimecloud.net/identity/>.

The SeaSWIM connector will be able to provide the parent application or service with the attributes associated with the actor involved in an external connection, based on the content of the certificate or the attributes stored for a user in the Identity Registry, such as name, organizational belonging, etc. For more detail, consult Section 3.1.2.

Once the 'owner' of the SeaSWIM connector has downloaded the digital certificate and the private key, they must be stored in a predestined place in the installation of the SeaSWIM connector, together with the root certificate(s) of the certificate provider(s) that the SeaSWIM connector should trust.

Once the certificate is securely stored the SeaSWIM connector will use it whenever it attempts to securely connect to remote hosts, or present it to any remote host trying to connect to the SeaSWIM connector. It could also be used for digitally signing documents and messages being transferred to other SeaSWIM compliant actors, using a SeaSWIM compliant connector.

## 2.3 Service Management and Utilization

The SeaSWIM Connector interface with the application service is implemented using SOAP protocols. The methods interfaces described all contains a parameters object that is specified in detail in the "SeaSWIM Connector Specification" document<sup>1</sup>. The method object parameter contains the information need by the method to interact with the SeaSWIM.

# 3. Building a SeaSWIM Connector

The reference SeaSWIM Connector (SSC) presented in Section 2 is intended to hide the complexity of interacting and complying with the STM support services. This section, instead, provides the detail how the central registers and common support services function. The purpose is to provide transparency and to enable potential integration of SeaSWIM support services with the application services. A final version of the technical specification and a reference SSC will be available at the latest before contract signing.

## 3.1 Identity Registry Integration

In SeaSWIM, the Resource Provider does not need to implement its own workflow to support identification of Clients. It can be assumed that Clients are registered via the Identity Registry, and that a PKI (Public Key Infrastructure) infrastructure supporting certificate validation or that the Authentication request can be facilitated by a trusted Identity Manager via the Maritime Clouds Identity Registry.

---

<sup>1</sup> <http://stmvalidation.eu/service-catalogue/>



Registration in the Identity Registry and issuing of certificates in the STM testbed is conducted through a workflow that does not involve the SeaSWIM connector.

When deciding to construct a SeaSWIM connector, those of the functions described in section 2.2. that are relevant to the parent service or application must be considered. The technical details on implementing interactions between the SeaSWIM connector and another SeaSWIM connector or the central functions related to Identity management and authentication are described below.

An instance of the Identity Registry is online for testing. See Developer Forum for more details, <http://stmvalidation.eu/identity-registry/>.

### **3.1.1 Conceptual Description**

Once the 'owner' of the SeaSWIM connector has downloaded the digital certificate and the private key they must be stored in a predestined place in the installation of the SeaSWIM connector. For added security the SeaSWIM connector should store them accordingly to the PKCS#8 standard or using a hardware security module (HSM).

The main interaction with the Identity Registry are related to validation of certificates and lookup of public keys of other actors based on the global X.509 standard or execution of an online authentication process based on OpenID Connect.

### **3.1.2 Technical Description**

The authentication mechanism in the Maritime Cloud is based on open and proven standards, and their usages will be described below.

#### ***X.509 Certificates - Machine to Machine***

For the machine-to-machine (M2M) communication primarily used in the STM setup the Maritime Cloud provides the ability to issue X.509 certificates for entities (users, vessels and devices). These certificates will enable entities to authenticate within the Public Key Infrastructure (PKI) provided by the Maritime Cloud. For services to be a part of this PKI they will need to be registered in the Maritime Cloud and obtain a certificate.

If an entity connects to a SeaSWIM service (via a SeaSWIM Connector) using a X.509 Certificate, the standard protocol for secure connection creation, automatically authenticates the entity, and therefore validates the information embedded in the certificate.

Besides authentication the X.509 certificates can be used for encrypting the communication between SeaSWIM Connectors, using standard SSL/TLS.

The X.509 certificate that is issued will contain basic information about the entity it is issued to. Each entity belongs to an Organization which is identified by an Organization Id. The Organization Id is also referred to as "shortname" of the organization, which consists of a minimum of 3 lowercase characters. Examples of an organization's



shortname could be "dma" (for the Danish Maritime Authority), "dmi" (for the Danish Meteorological Institute) or "maersk" (for Maersk Line).

The standard information that we currently envision to be included in the X.509 certificates for each entity category can be seen in the table below.

Field	User	Vessel	Device	Service	Organization
CN (CommonName)	Full name	Vessel name	Device name	Service Domain Name	Organization Name
O (Organization)	Organization MRN				
OU (Organizational Unit)	"user"	"vessel"	"device"	"service"	"organization"
E (Email)	User email				Organization email
C (Country)	Organization country code				
UID	Entity MRN				Organization MRN

An example of the fields for a vessel could look like this:

```
C=DK, O=urn:mrn:stm:org:dma, OU=vessel, CN=JENS SØRENSEN,
UID=urn:mrn:stm:vessel:dma:jens-soerensen
```

Besides the information stored in the standard X.509 attributes listed above, the X509v3 extension SubjectAlternativeName (SAN) extension is used to store extra information. There already exists some predefined fields for the SAN extension, but they do not match the need we have for maritime related fields. Therefore the "otherName" field is used, which allows for using an Object Identifier (OID) to define custom fields. The OIDs currently used are not registered at ITU, but is randomly generated using a tool provided by ITU (see <http://www.itu.int/en/ITU-T/asn1/Pages/UUID/uuids.aspx>). See the table below for the fields currently defined, the OID of the fields and which kind of entity that uses the fields.

Name	OID	Used by
Flagstate	2.25.323100633285601570573910217875371967771	Vessels
Callsign	2.25.208070283325144527098121348946972755227	Vessels
IMO number	2.25.291283622413876360871493815653100799259	Vessels
MMSI number	2.25.328433707816814908768060331477217690907	Vessels
AIS shiptype	2.25.107857171638679641902842130101018412315	Vessels
Port of register	2.25.285632790821948647314354670918887798603	Vessels



Name	OID	Used by
MRN	2.25.271477598449775373676560215839310464283	Vessels, Users, Devices, Services
Permissions	2.25.174437629172304915481663724171734402331	Vessels, Users, Devices, Services

The first 6 fields mentioned in the table are all vessel specific, and should be self explanatory in the maritime context, but the last 2 are specific to the Maritime Cloud domain:

- "permissions": A comma separated list of permissions or roles assigned to the entity by the organization it belongs to. Also see the section on Authorization below.
- "mrn": A comma separated lists of Maritime Resource Names of the entity, in prioritized order, the highest priority first.

The Maritime Resource Name (MRN) is a unique identifier for users, vessels, etc. in the maritime domain. In the Maritime Cloud during the test phase a MRN will look like below

```
urn:mrn:stm:identity:<entity type>:<Organization Id>:<entity id>
```

Examples could be:

```
urn:mrn:stm:identity:user:DMA:tgc
```

```
urn:mrn:stm:identity:vessel:DMA:JENS_SOERENSEN
```

See Chapter 5 for more information regarding the Maritime Resource Name.

### **OpenID Connect - browser based**

For browser based authentication the Maritime Cloud Identity Registry offers an OpenID Connect based solution with federated identity management. A central Maritime Cloud Identity Broker will point to organizations registered as Identity Providers in the Maritime Cloud. For the STM testbed a special STM Identity Provider will be set up to administrate STM testbed users.

When using OpenID Connect authentication the user is identified by a JWT ID token that contains various attributes that describes the users. The current attributes used in the Maritime Cloud are listed in the table below.

Attribute	Description
preferred_username	The username of the user in the parent organization.
email	The email of the user.





Attribute	Description
given_name	Firstname of the user.
family_name	Lastname of the user.
name	Full name of the user.
org	The full Maritime Resource Name of the organization the user is a member of.
permissions	List of permissions for this user assigned by the organization the user is a member of.
mrn	The Maritime Resource Name of the user.

See the section on Certificates above for a description for the “mrn”, “org” and “permissions” attributes.

### ***Interface for the Identity Registry***

Besides a browser based interface, where entities can be managed, the Maritime Cloud Identity Registry will also offer a web based API that will make it possible for the SeaSWIM Connector to:

- Create/update/delete entities.
- Issue X.509 certificates for entities.
- Revoke entity certificates.
- Check for revoked certificates.

## **3.2 Service Registry Integration**

### **3.2.1 Conceptual Description**

This chapter below describes a sample implementation of a service registry. It is a resource that aims to provide controlled access to data necessary for governance of SOA (service-oriented architecture) projects, like the Maritime Cloud development. In effect, it is a constantly evolving catalogue of information about the available services in a SOA implementation (for the moment only some basic means to search for services are included in this chapter; it is intended to complement this list considering the needs of the services implementers later on). A 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.

Services themselves and the service-based economy are a central part of the Maritime Cloud and SeaSWIM. 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 governs and controls its usage.

The service registry contains service specifications according to a Service Specification Standard and provisioned service instances implemented according to these service specifications. The service registry improves 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.

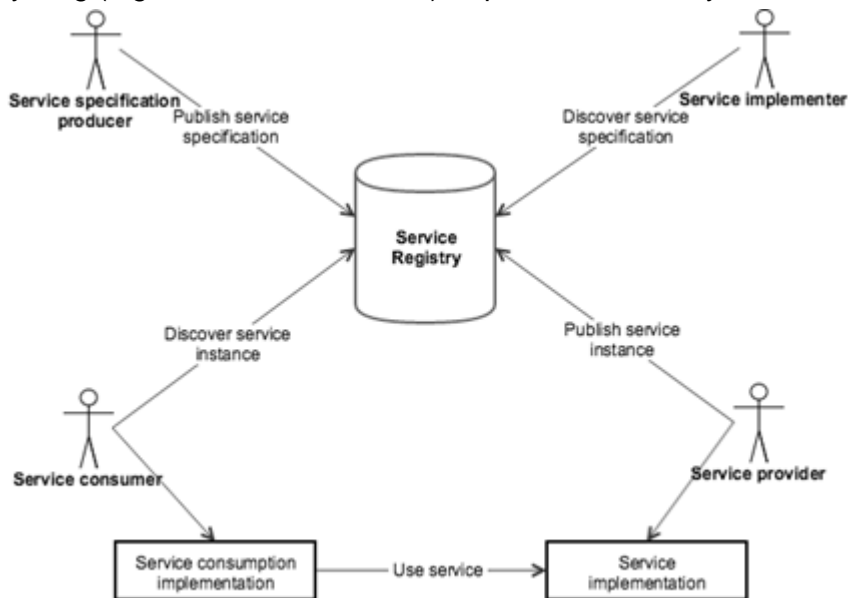


Figure 14: General architecture of the service registry

Role	Description
<b>Service Consumers</b>	Consumer uses service instances provided by service providers. All users within the maritime domain can be service consumers, e.g., ships and their crew, authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.
<b>Service Providers</b>	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 crew, authorities, VTS stations, organizations (e.g., meteorological), commercial service providers, etc.
<b>Service Specification Implementers</b>	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.
<b>Service Specification Producers</b>	Producers of service specifications in accordance with STM Governance procedures.

The service registry is intended to facilitate or implement the Maritime Service Portfolio (MSP) concept by providing a repository for the specification of operational and technical services and provisioned service instances. The service registry is intended to comprise all maritime services, not only digital services, thereby making it a single reference point for provisioning and discovery.

When documenting services it has to be distinguished between service specification, service technical design and service implementation (see figure below).

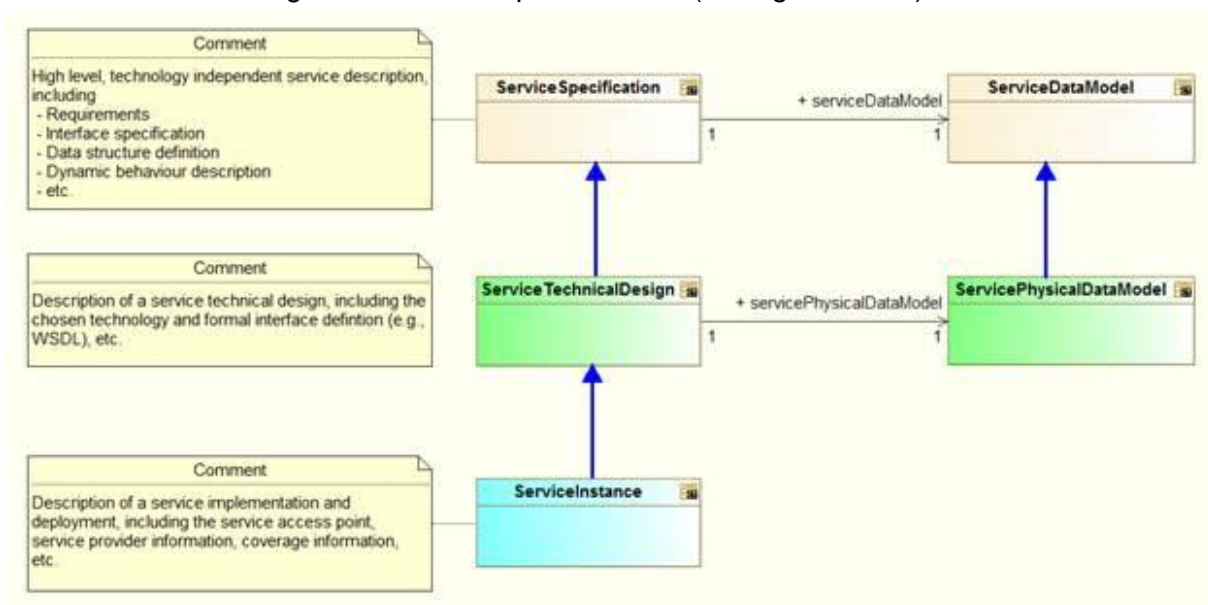


Figure 15: Distinction between Service Specification, Service Technical Design and Service Instance

The Service Specification describes one dedicated service at logical level in a technology-agnostic manner. On the other hand, the Service Technical Design describes the details about the actual realisation of a specific service with a dedicated technology.





It is possible to provide different technical designs, all being compliant with the same service specification. It is also possible to provide one technical design that conforms to several versions of the same service specification, for example, to allow backward compatibility to older versions of a certain specification.

A service implementation (implemented according to a given technical design) may be deployed at different locations by different service providers.

For further details about the process to be followed for describing services in a standardized way, please refer to the STM-Service-Documentation-Guidelines and individual templates<sup>2</sup>.

### 3.2.1 Technical Description

This section describes the operations for interacting with the runtime part of the Service Registry. The technical interface to the registry is based on the IETF RFC 5222 titled “LoST: A Location-to-Service Translation Protocol” (<https://tools.ietf.org/html/rfc5222>), which describes a means to map the endpoint URI for a service (or services) within a given geographic region.

The standard above, that serves as baseline for the technical interface specification, has been developed for the public safety domain where a correlation of the availability of services to certain locations is essential and therefore this (temporary) mapping is reflected in the interface definition. Nevertheless, it is not mandatory to use this functionality and one (a service designer/implementer) can define services, which are not restricted to a certain region. From that perspective, the registry responds to queries with the required means to access one or more active services matching the query and operating in the specified region or at the specified position. This geographic mapping of services to locations is subject to timed expiration so as to reflect updates of service activity due to time of life cycle considerations.

A query may return one or more such mappings, if multiple services of the same type operate in overlapping regions. It is possible to define a default mapping which is returned in case specific service was found for a given point or area.

The queries are implemented as REST API calls via HTTP. The ability of a client to query the registry may be subject to authentication.

#### **Core Operations**

LoST defines several operations<sup>3</sup>, two that are of particular relevance are exemplified in the table below (observe that the precise syntax might have changed).

LoST Client Request	LoST Server Response	Description
---------------------	----------------------	-------------

<sup>2</sup> <http://stmvalidation.eu/service-registry/>

<sup>3</sup> The requests and responses are further specified in RFC5222



findService	findServiceResponse	Returns a service (endpoint URI, additional info) for a given geographic region
listServicesByLocation	listServicesByLocationResponse	Lists services available for a given geographic region

### Core Attributes for findService

Attribute	Type
Location	GML (Point/Polygon/Circle/Ellipse/ArcBand)
Service URN	String

### Example findService XML

```
<?xml version="1.0" encoding="UTF-8"?>
<findService
  xmlns="urn:ietf:params:xml:ns:lost1"
  xmlns:p2=http://www.opengis.net/gml
  serviceBoundary="value"
  recursive="false">
  <location id="6020688f1ce1896d" profile="geodetic-2d">
  <p2:Point id="point1" srsName="urn:ogc:def:crs:EPSG::4326">
    <p2:pos>37.775 -122.422</p2:pos>
  </p2:Point>
  </location>
  <service>urn:service:sos.coastguard</service>
</findService>
```

### Core Attributes of a mapping for findServiceResponse (extract from RFC5222 - not all attributes are listed)

Attribute	Type
Service Name	String
Service Boundary	GML (Point/Polygon/Circle/Ellipse/ArcBand)
Service URI (1..n)	String



<b>Mapping expiration</b>	Date
<b>Mapping Last Update Time</b>	Date
<b>Mapping information source</b>	String

### Example findServiceResponse XML

```

<?xml version="1.0" encoding="UTF-8"?>
<findServiceResponse xmlns="urn:ietf:params:xml:ns:lost1"
  xmlns:p2="http://www.opengis.net/gml">
  <mapping
    expires="2007-01-01T01:44:33Z"
    lastUpdated="2006-11-01T01:00:00Z"
    source="authoritative.example"
    sourceId="7e3f40b098c711dbb6060800200c9a66">
    <displayName xml:lang="en">
      Forsvaret Coast Guard
    </displayName>
    <service>urn:service:sos.coastguard</service>
    <serviceBoundary profile="geodetic-2d">
      <p2:Polygon srsName="urn:ogc:def::crs:EPSG::4326">
        <p2:exterior>
          <p2:LinearRing>
            <p2:pos>37.775 -122.4194</p2:pos>
            <p2:pos>37.555 -122.4194</p2:pos>
            <p2:pos>37.555 -122.4264</p2:pos>
            <p2:pos>37.775 -122.4264</p2:pos>
            <p2:pos>37.775 -122.4194</p2:pos>
          </p2:LinearRing>
        </p2:exterior>
      </p2:Polygon>
    </serviceBoundary>
    <uri>http://example.com/service/path</uri>
  </mapping>
  <locationUsed id="6020688f1ce1896d"/>
</findServiceResponse>

```

### Core Attributes for listServicesByLocation

Attribute	Type
-----------	------



<b>Location</b>	GML (Point/Polygon/Circle/Ellipse/ArcBand)
<b>Service URN</b>	String

### **Example *listServicesByLocation* XML**

```
<?xml version="1.0" encoding="UTF-8"?>
<listServicesByLocation
  xmlns="urn:ietf:params:xml:ns:lost1"
  xmlns:p2=http://www.opengis.net/gml
  recursive="false">
  <location id="3e19dfb3b9828c3" profile="geodetic-2d">
    <p2:Point srsName="urn:ogc:def:crs:EPSG::4326">
      <p2:pos>-34.407 150.883</p2:pos>
    </p2:Point>
  </location>
  <service>urn:service:sos</service>
</listServicesByLocation>
```

### **Core Attributes for *listServicesByLocationResponse***

Attribute	Type
<b>Service List</b>	String

### **Example *findServiceResponse* XML**

```
<?xml version="1.0" encoding="UTF-8"?>
<listServicesByLocationResponse
  xmlns="urn:ietf:params:xml:ns:lost1">
  <serviceList>
    urn:service:sos.gmdss
    urn:service:sos.coastguard
  </serviceList>
  <locationUsed id="3e19dfb3b9828c3"/>
</listServicesByLocationResponse>
```



## 4. STM Registration Processes

### 4.1 Registering Users With the Identity Registry

In the STM testbed the registration of entities (users, vessels and devices) will be done using a browser based interface for Identity Registry. This interface is also called the “Maritime Cloud Portal”.

Organizations can be registered in the Identity Registry by contacting the STM administrator at SMA, who will register the organization and provide credentials for an administrative login in the Identity Registry.

Once an organization is created, the organization will be able to create and maintain entities and create the X.509 certificates needed for authenticating using the SeaSWIM Connector.

It is also provided as a REST based API that will make it possible to maintain entities and do bulk updates of users and vessels.

### 4.2 Registering Services with the Service Registry

In the STM testbed the registration of service instances in the Service Registry is done by the STM administrator at SMA.

## 5. Unique Identification

This section describes how unique identifiers are constructed for the STM validation project.

The syntax described in this section can be expected to be applied to identification of ships voyages (UVID – Unique Voyage ID) and Port Calls (UPCID – Unique Port Call ID), as well as Actor and Service instances in STM.

### *Unique Voyage Identifier*

The MONALISA 2.0 project identified the unique voyage identifier (UVID) as necessary for an efficient and STM compliant information exchange among the different actors and the ship during a given voyage.





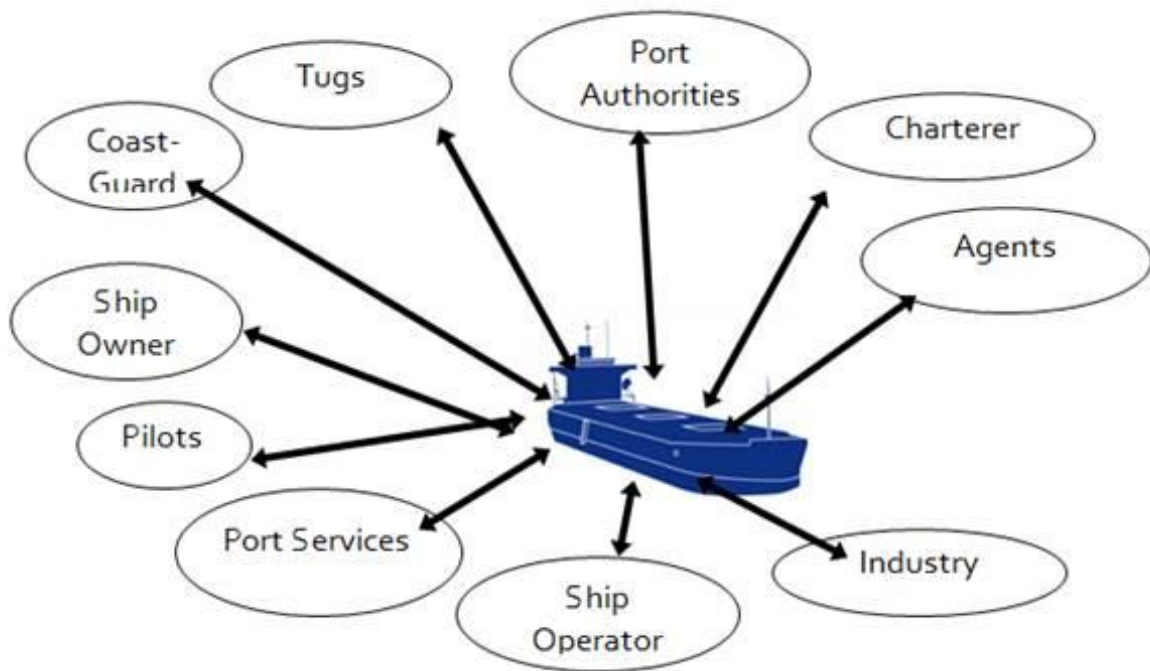


Figure 16: Current situation of information exchange during a voyage

### **Unique Port Call Identifier**

The concept of Port Collaborative Decision Making (PortCDM) has identified that the synchronization of a Port Call requires a unique identification of the a particular Port Call, i.e. the sequence of events that needs to be coordinated, when a particular Vessel arrive at the port, visit the port, and departs from the port.



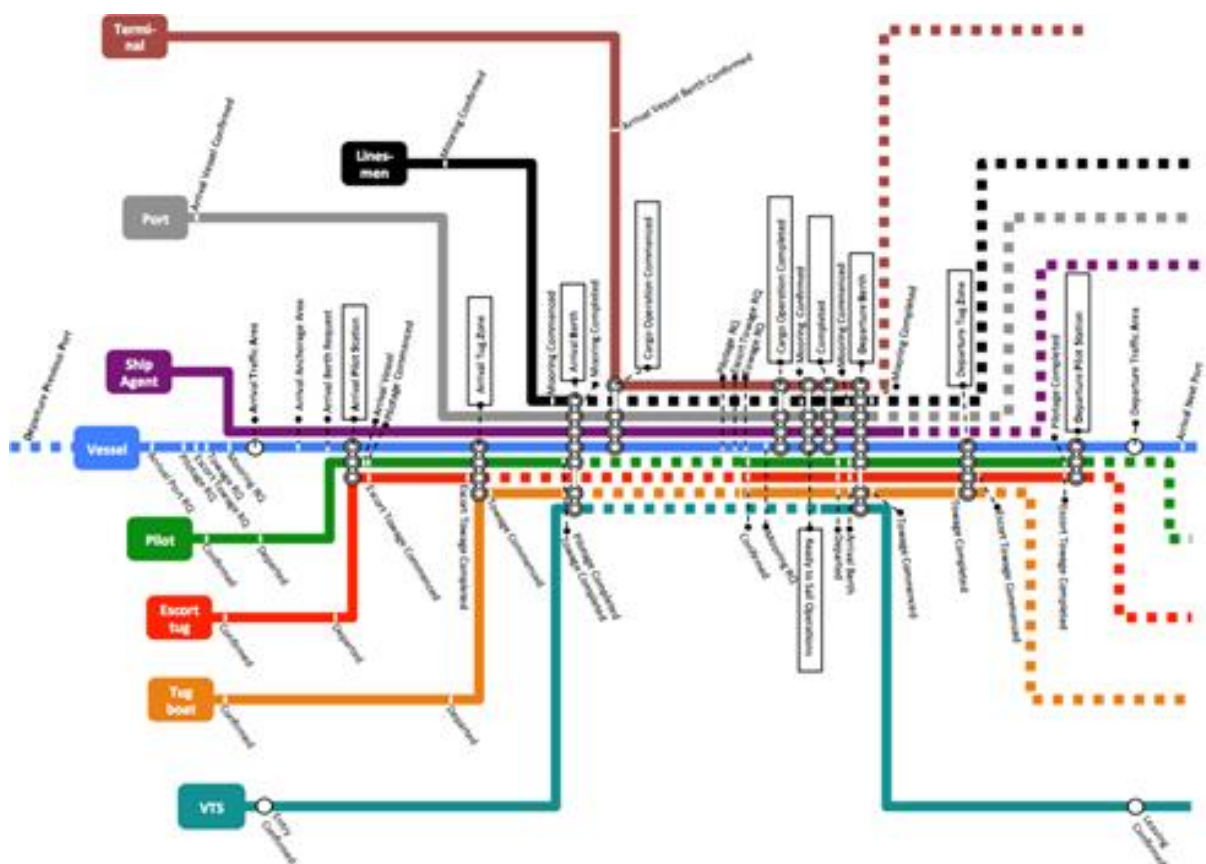


Figure 17: A port call also consists of many stakeholder interactions.

The maritime actors involved in a ship voyage (some of them are shown in Figure 3) or a Port Call (some are shown in Figure 4) need to commit their changes to the voyage or Port Call and get informed about the changes made by others, based on the authorization they have.

The unique identifiers identifying a voyage – or a port call – during its lifetime should satisfy following requirements:

1. It should serve as a unique identifier for binding related information being exchanged in STM. Each information object<sup>4</sup> exchanged in STM that related to a Voyage or Port Call should contain the relevant identifier as reference.
2. Actors or systems who/which create or hold a Voyage or Port Call information object, should be able to decentrally generate a unique ID without requiring online access to a central function.
3. Life cycle or time dependency of the id's uniqueness should be clear and unambiguous.
4. The syntax of the ID should not reveal actor specific information if they don't approve. The syntax may however provide reference to where actors can seek

<sup>4</sup> [Data model, data object or payload format](#)



specific information about a Voyage or Port Call, if authorized to access the information.

### ***The syntax of identifiers using ‘Maritime Resource Name’***

The (draft) IALA guideline on ‘Unique Identifiers for Maritime Resources’ currently underway defines the syntax for Maritime Resource Names like this:

*Uniform Resource Names (URNs) as defined by the IETF (Internet Engineering Task Force) are intended to serve as persistent, location-independent, resource identifiers and are designed to make it easy to map other namespaces (which share the properties of URNs) into URN-space. Therefore, the URN syntax provides a mean to encode character data in a form that can be sent in existing protocols (like ASCII), transcribed on most keyboards, etc.*

The URN syntax provides a mechanism to ensure the uniqueness of the name of a resource, which is already widely used in different domains such as supply chain management, unique identification of books or laws. Furthermore, this structure (syntax) approach enables delegation of the authority and gives a very large contribution in decentralization as one of the main principles of STM and SeaSWIM.

The Syntax of a Maritime Resource Name (MRN) is based on [RFC 2141](#) published by the Internet Engineering Task Force (IETF). The basic syntax of a MRN identifier is a string with a hierarchical structure as follows:

*"urn:mrn:"<NSS>*

The “urn” identifies this to be a special case of a Universal Resource Name (URN), while the “mrn” identify a unique namespace within the URN. Efforts to register the “urn:mrn:” namespace with the [Internet Assigned Numbers Authority \(IANA\)](#) are ongoing. <NSS> is the Namespace Specific String composed as follows:

*<NSS>::=<governing-organization>":"<type>":"<type-specific-part>*

### ***Delegation of authority***

The Maritime Resource Name is intended to be an extendable mechanism allowing delegation of authority to issue unique identifiers, yet making sure that these identifiers are unique right across the maritime domain, simply by adding a structured prefix to a unique identifier inside any system.

In other words – if two different ports use simple serial numbers to identify port calls in their own system, then putting a prefix that identifies the port in front of the serial number when referencing a particular port call outside the context of the port’s own system, will ensure that the identifier of any port call becomes globally unique.





### ***Purpose and construction of identifiers***

The primary purpose of 'identifiers' is to (uniquely) identify something. Sometimes identifiers are constructed in a way, which embeds information directly into the identifier. For instance, a phone number, 72196000 may represent the main phone number of the Danish Maritime Authority, when used in a Danish context, but the number may be identical to the phone number of another organization or individual in another country. Internationally it is represented using an international dialing code in front of the national number (+45 72196000), to ensure universal uniqueness. This international dialing code constitutes an embedded piece of information, revealing the (national) belonging of the (national) identifier. Exceptions to the rule may apply, as for instance when buying a satellite phone: the 'international dialing code' will identify the satellite system, rather than a national telephone exchange. Similarly, it may be possible to derive certain information from an IP address or web address in the internet domain. Embedding information into the construction of a unique identifier, may serve two purposes:

- A. It may achieve a simple way to *delegate authority* to issue identifiers that only need to be unique within your own domain (like national telephone numbers), providing a way to represent your identifier in a globally unique way
- B. It may enable *transfer of information needed* to discover or route information to the 'owner' of the entity, which the identifier is intended to identify.

For option B to be useful, it requires the ability to decipher the information embedded in the identifier, which in turn requires a stable (standardized) definition of the identifier structure (a well defined way to decode the international dialing code). Otherwise it would be more safe, to embed the information to be transferred, in the *payloads* being exchanged between identities, rather than the identifier.

The STM validation project will apply a prefix structure for issuing identifiers, that separates responsibility of defining and utilizing identifiers in a project centric way (option A above), but also apply option B to embed information that promotes discoverability of the origin of an identifier, and thus validate the appropriateness of these approaches as part of the project. This structure is based on the resource name approach presented above.

### ***Use of 'Maritime Resource Name' in STM***

The STM validation project will apply the Maritime Resource Name methodology to validate the concepts of Unique Voyage ID and Unique Port Call ID in the maritime context, before bringing them to relevant standardization bodies. The project has requested IALA to be registered as <governing-organization> for namespace:

`"urn:mrn:stm:"`

The intention is to subdivide this namespace into four categories:

*ID's related to PortCDM (STM Activity 1)*



urn:mrn:stm:portcdm:<someID\_type\_relating\_to\_PortCDM>

*ID's related to Voyage Management (STM Activity 2)*

urn:mrn:stm:voyage:<someID\_type\_relating\_to\_Voyage\_Management>

*ID's related to Actor Identity Management and Service Management (STM Activity 4) will use a similar syntax:*

urn:mrn:stm:org:<someID\_type\_relating\_to\_Actor\_Identity\_Management>

and

urn:mrn:stm:service:<someID\_type\_relating\_to\_Service\_Management>

*(or a similar URN construction with a different prefix, noting that the actor and service identity concepts are being developed in collaboration with other projects, but ultimately based on the same URN based syntax.)*

The division of the namespace urn:mrn:stm into these subspaces enables a higher degree of freedom in generating unique identifiers and supporting decentralization.

### **Unique Voyage\_ID (UVID)**

The update of IEC 61174 test standard for ECDIS in 2015, introduced a standardized data format for representation of a ship's voyage plan (the RTZ format).

This format includes an identifier field, which can be used to uniquely identify an instance of a ship's planned voyage, during the lifecycle of the voyage from strategic planning, through the dynamic updates underway, until completion. For unique identification of this instance of the voyage, when communicating updates between any group of stakeholders, a globally unique identifier is needed, and methods to manage the version history of changes applied.

The STM project will establish the concept of a 'Voyage Information Service' as the point of contact to enable authorized parties (authorized collaborators such as agents, pilots, ports, VTSs etc.) to interact electronically with information related to a ship's voyage. The definition of the UVID is closely related to the definition of the Voyage Information Service by Activity 2 of the STM project, and thus Activity 2 'owns' this definition.

It has been observed that centralized methods for issuing unique identifiers (such as Global Unique Flight Identifiers in the aviation industry) demand connectivity at the time of creation. This is seen as an undesirable requirement and possible point of failure. Instead a delegated approach is desired, where each registered provider of a Voyage Information Service is delegates the ability to issue their own identifiers is desired.



The following definition of the UVID has been proposed, and is provided for explanation of the syntax. The final definition of the UVID is part of the documentation of the Voyage Information Service:

```
"urn:mrn:stm:voyage:id:"<org>":"<localid>"
```

Where "urn:mrn:stm:voyage:id:" is the prefix, that identifies a UVID in the Voyage Management activity of the STM validation project.

<org> denotes a Voyage Information Service Provider and/or owner of the voyage id, and it's purpose is to help discover the service endpoint (the address of the technical interface) of the *Voyage Information Service* where information related to this UVID can be found, via the Service Registry.

<localid> is a locally generated ID (syntax: a string of alphanumeric values (a-z, A-Z, 0-9), possibly characters '-' or '\_', but no space or other special characters). It could be a serial number, UUID or something else. It is generated by the provider of the Voyage Information Service, and must be unique within the context of this particular instance of a Voyage Information Service.

### Example

This is provided as an explanatory example, not stating additional requirements.

Shipping company A (operating Ship A) has internally established their own Voyage Information Service to manage its voyages, and it is registered in the Service Registry as Voyage Information Service "urn:mrn:stm:voyage:id:**a:134**".

"urn:mrn:stm:voyage:id:**a:134**" denotes voyage number "**134**" held at Voyage Information Service Provider "**a**".

The example above may also apply if shipping company A employs a third-party service to host its Voyage Information Service instance, since the naming of the unique identifier is rather a contractual matter between the parties than a consequence of the technical implementation.

Shipping Company B and C (operating Ships B and C) have both made a deal with Service Provider D to take care of representing their voyages electronically. Service Provider D operate the "urn:mrn:stm:voyage:id:**stm-d**" Voyage Information Service.

"urn:mrn:stm:voyage:id:**stm-d:346**" may denote the voyage number "**346**" of ship B held at Voyage Information Service Provider "**stm-d**". Similarly "urn:mrn:stm:voyage:id:**stm-d:134**" may denote the latest version of voyage number "**134**" (could be ship B or C), but you don't know the ship involved, unless you ask the Voyage Information Service – and



you must be nominated as a collaborator of this voyage – or request nomination - to retrieve *any* information about this voyage.

Holding the authority over the “urn:mrn:stm:voyage:id:**stm-d**” namespace allows the service provider, if so decided in the agreement with the client, to sub-divide the namespace into client-specific namespaces, which allows the clients to manage the issuing of UVIDs under the sub-namespace on their own.

The examples above illustrate how the precise usage of the “urn:mrn:stm:voyage:id” namespace is flexible and allow for different technical and contractual arrangements between shipping companies and service providers.

### **Unique Port Call ID (UPCID)**

Issuing unique identifiers to identify a Port Call is very similar to issuing identifiers for a Voyage. The Port Call ID is owned by Activity 1 of the STM Validation project and described in the documentation of the Port Information Service. The following is provided to explain the similar syntax :

```
“urn:mrn:stm:portcdm:port_call:”<portCode>”:”<portspecificId>
```

Thus, the software developed for the STM testbeds, should accept both the prefix “urn:x-mrn”, “urn:mrnx” and “urn:mrn” as equivalent prefixes of testbed data. The prefix of future production data is to be determined depending on standardization, however the syntax of the URN notation will apply.

<portCode> denotes a Port Information Service of a particular port, identified through the UNLOCODE of a particular port – or another unique identification of the provider of a Port CDM service (syntax: a string of alphanumeric values (a-z, A-Z, 0-9), possibly characters ‘-’ or ‘\_’, but no space or other special characters).

<portspecificid> is a locally generated ID (syntax: a string of alphanumeric values (a-z, A-Z, 0-9), possibly characters ‘-’ or ‘\_’, but no space or other special characters). It could be a serial number, UUID or something else. It is generated by the Port system and must be unique within the context of this particular instance of a Voyage Information Service.

### **Example**

“urn:mrn:stm:portcdm:port\_call:SEGOT:b44928d8-0e93-46be-baf9-b824e0fdb9e90” will denote a port call in the Port of Gothenburg (UNLOCODE: SEGOT) with a UUDI as a local reference.

### **Post project considerations for utilization of the UVID and UPCID identifiers**

Assuming that the STM validation project successfully validates this way of handling UVIDs, UPCIDs - and associated Actor and Service Provider IDs, the construction of these



identifiers will be brought forward as a proposal for a standard to be published by some relevant standardization organization.

Regardless of which standardization organization is identified as the relevant host of such a standard, the intention is to replace the prefix of the identifier construction (“urn:mrn:stm:”) with another prefix, identifying the relevant host organization. Possible results could be:

- “urn:gs1:” if the STM project ends up proposing the STM services to become GS1 standards
- Either way, the technical implementations of STM Services in the testbeds may be prepared through configuration to accept the “urn:mrn:stm:” prefix for the testbeds, but another prefix (To Be Determined) should be anticipated as the ‘production’ prefix of STM services for STM related identifiers and type definitions in the future.





## Reference List

All data model schemas currently supported in STM can be found at the STM Validation Developer's forum webpage <http://stmvalidation.eu/schemas/>. The current listed STM standard formats are:

Format	Link
Port Call Message Format (PCMF)	<a href="http://stmvalidation.eu/schemas/">http://stmvalidation.eu/schemas/</a> -Port Call Message Format
Route Exchange Plan Format (RTZ)	<a href="http://stmvalidation.eu/schemas/">http://stmvalidation.eu/schemas/</a> -RTZ Format
Text Message	<a href="http://stmvalidation.eu/schemas/">http://stmvalidation.eu/schemas/</a> -Text Message Format
Area Exchange Format	<a href="http://stmvalidation.eu/schemas/">http://stmvalidation.eu/schemas/</a> -Area Exchange Format

The documentation of the project (reference) SeaSWIM Connector can be found at STM Validation Developer's forum webpage.

Document	Link
SeaSWIM Connector Specification	<a href="http://stmvalidation.eu/service-catalogue/">http://stmvalidation.eu/service-catalogue/</a> -SSC
SeaSWIM Connector Design	<a href="http://stmvalidation.eu/service-catalogue/">http://stmvalidation.eu/service-catalogue/</a> -SSC





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*Document No: Appendix 4*  
*Title: Voyage Information Service Specification*  
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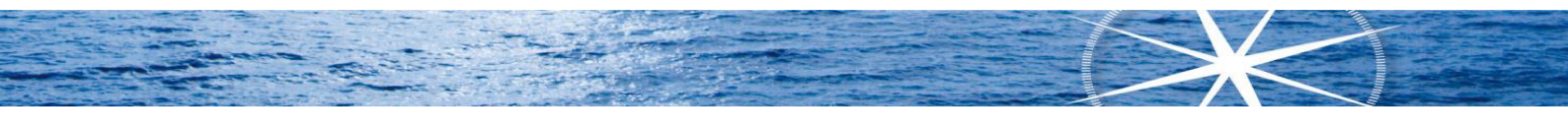
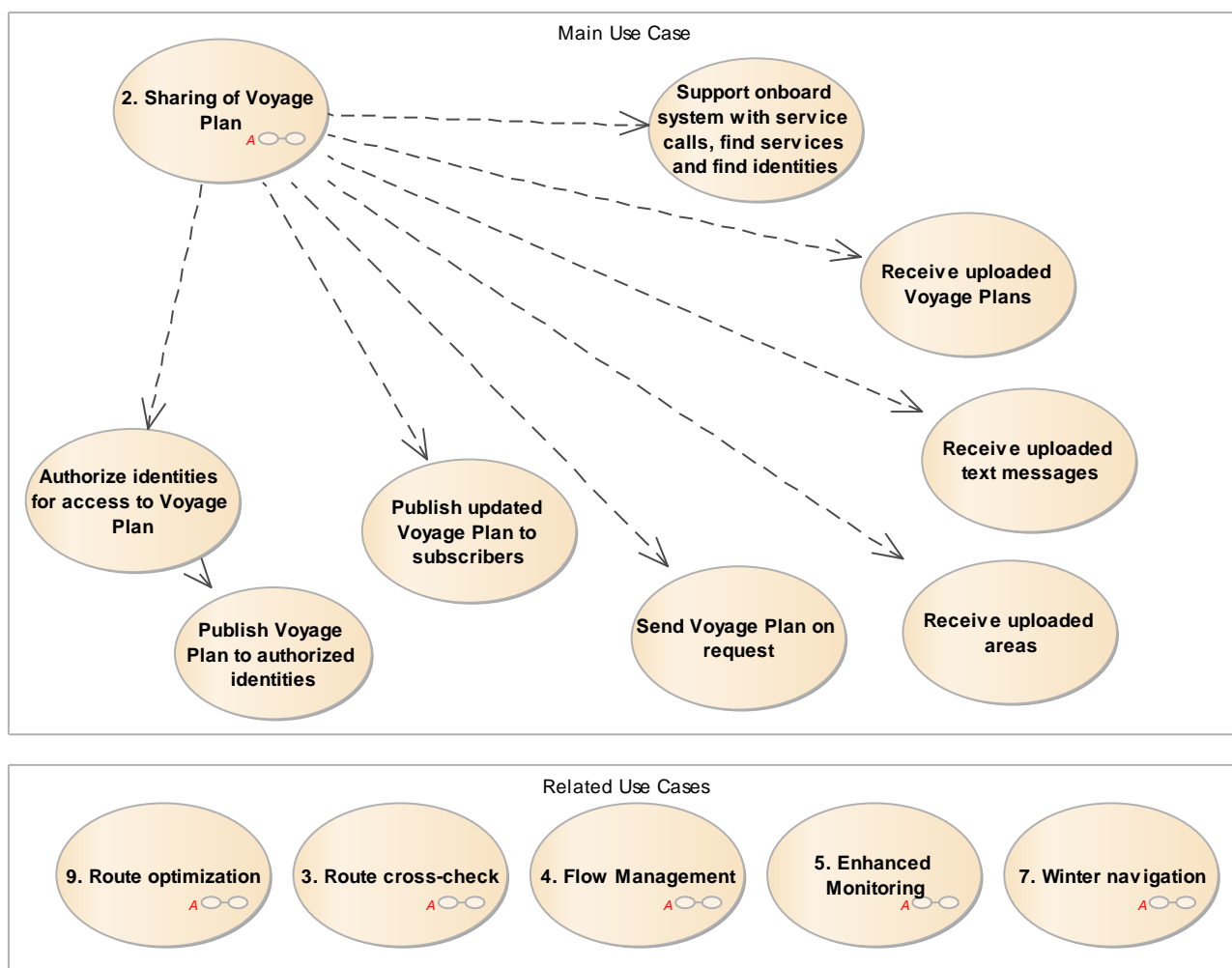


# 1 Introduction

The main purpose with Voyage Information Service is to support sharing of voyage plans to authorized actors within STM. Sharing of voyage plan is primarily initiated by the ship by authorizing the voyage plan to concerned actors and by direct accessing e.g. route optimization or route check, but sharing can also be on request by other service providers such as enhanced monitoring.

The Voyage Information Service is the link between the ships onboard navigation systems and service providers and consumers on SeaSWIM. The Voyage Information Service is however specified in such way that by using VIS on all consumers and providers that intend to share/exchange voyage plans, interoperability can be reached. That enables new services to arise in Service Registry based on VIS Design for voyage plan exchange to be used without new implementation on consumer side.

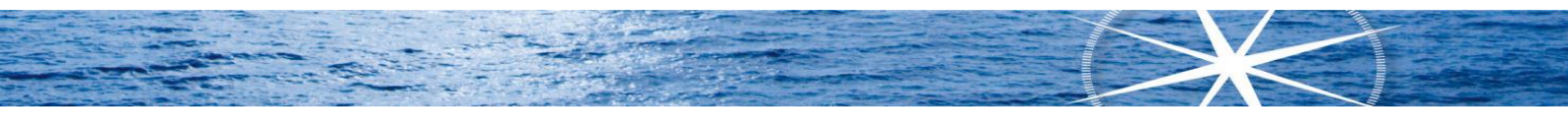
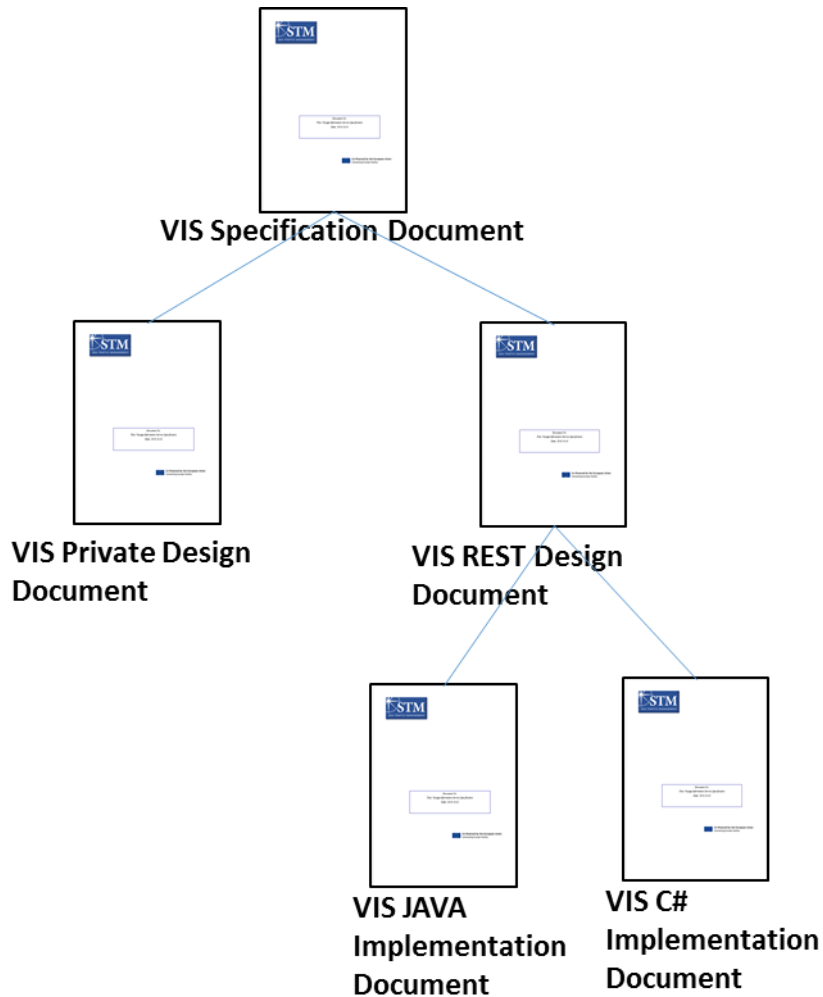
Each Voyage Plan shall refer to a UVID (Unique Voyage Identity) generated by the service provider.



## 2 Document structure

The Ship-Port Information Service is documented according to Service Guidelines attached to the Service Registry used in STM.

The Service Specification is technology agnostic, a logical description of the service. The Service Design describes the service with chosen technology or architectural style, in our case REST as decided in STM Validation project. The private design refers to the STM Module side, and the public refers to the description from SeaSWIM perspective. The STM Validation Project will implement the VIS REST Design for optional use in the testbed.



### 3 References

More information can be found in the following documents.

Document	Link
VIS Specification	<a href="http://stmvalidation.eu/service-catalogue/">http://stmvalidation.eu/service-catalogue/</a> -SPIS
VIS Private REST Design	<a href="http://stmvalidation.eu/service-catalogue/">http://stmvalidation.eu/service-catalogue/</a> -SPIS
VIS Public REST Design	<a href="http://stmvalidation.eu/service-catalogue/">http://stmvalidation.eu/service-catalogue/</a> -SPIS
Route Exchange Format	<a href="http://stmvalidation.eu/schemas/">http://stmvalidation.eu/schemas/</a> -RTZ
Text Message	<a href="http://stmvalidation.eu/schemas/">http://stmvalidation.eu/schemas/</a> -Text Message
Area format	<a href="http://stmvalidation.eu/schemas/">http://stmvalidation.eu/schemas/</a> -Area





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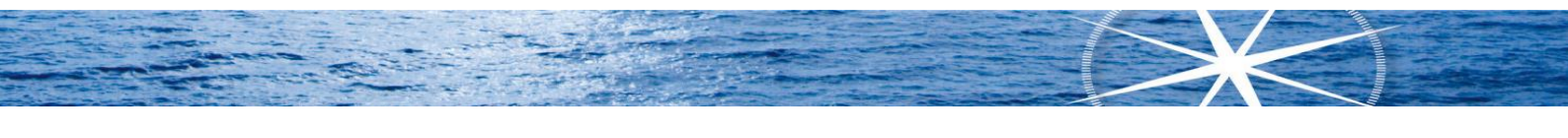
### **SAFETY - ENVIRONMENT - EFFICIENCY**

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# STM Voyage- management use cases and F.A.T. Procedure handbook

*Document No: XX.XX*

*Title: Appendix 5 - STM Voyage management  
use cases and F.A.T. Procedure handbook*

*Date:2016-11-17*



## DOCUMENT STATUS

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1.0	2016-11-09		HH	Used for specifying F.A.T.
2.0	2016-11-17		HH	Used for specifying F.A.T. and as usecases for STM Testbed. Updated with Ship-Port Synch., Non Functional Requirements

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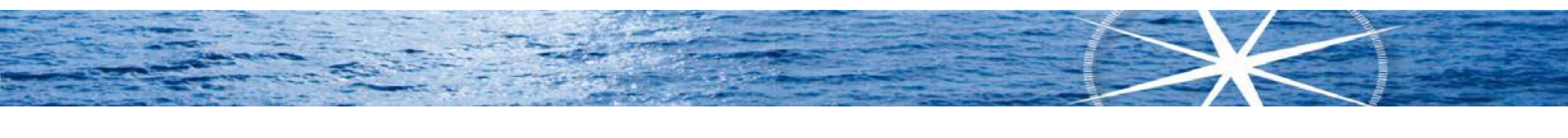
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## Purpose of this Document:

- To assist suppliers when preparing for Factory Acceptance Test (FAT)
- This document shall be filled in as complete as possible and submitted amongst other relevant documentation (see below), for the SDR, a final version shall be submitted 14 days before FAT
- To be used during FAT
- To be used as Use Cases for STM Testbed (For Procurement this document is only meant to describe the use cases, **it does NOT have to be filled in for tendering documentation**)

## Design

- The design that was chosen builds upon the “*STM Voyage Management use cases*” - (*Appendix 5*) and the “*STM Ship system technical specification and tendering form*” - (*Appendix 1*), provided for the procurement.
- The Document (in Final version) will be used at FAT.

## Remarks

- Use case #4 Flow Management is not complete, it will be updated by SMA during November, so there is no need for suppliers to complete these use cases yet. When they are updated, suppliers will be informed.
- The Pass & Fail Comments in the Tables are for SMA, to be used at FAT.
- See red and blue text for instructions how to fill in the tables.
- The “greyed out” (e.g. Event 4.3) Tables shall not be filled in.



# 1. Route exchange ship-ship

## 1.1.1. Description

Introducing route exchange ship-ship, will give the intentions of other ships. Nothing in the current “navigational process” will be changed and the master is still responsible. The route exchange will solely introduce a new tool which helps the OOW to plan ahead, foresee possible dangerous situations and reduce route detours due to traffic conditions.

The route exchange should be used to avoid collision situations and close quarter situations. When in close quarter situations COLREGs are always in force.

## 1.1.2. Information needs/prerequisites

- New route message (AIS-ASM)
- Information from AIS (POS, Speed etc)

## 1.1.3. Use case/functions to be supported

1. Route Exchange Ship-Ship Ship-Shore via AIS ASM				
Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
1.1. Indication what ship is part of STM test bed to separate them	A graphical symbol (colour/text/flag/log) should mark STM ships on STM compatible onboard system	3.2.3	<i>To be filled in by Supplier (Specific Page and Bullet)</i>  <i>For examples see blue text in Use case event 1.2, 1.11 and 2.14</i>	<i>To be filled in by Supplier (Specific Page and Bullet, when applicable)</i>

from non STM ships				For examples see blue text in Use case event 1.2, 1.11 and 2.14
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<i>To be filled in by Supplier. A short description of the purpose of the Test Case. For examples see blue text in Use case event 1.2, 1.11 and 2.14</i>	<i>To be filled in by Supplier, e.g. Inspection, Demonstration, Analysis, Measurement. For examples see blue text in Use case event 1.2, 1.11 and 2.14</i>	<i>To be filled in by Supplier, e.g. Preconditions for this test case (if any), additional information to run the tests are stated here. If necessary, also state essential equipment (e.g. modules, interfaces, etc.) here. For examples see blue text in Use case event 1.2, 1.11 and 2.14</i>		
<b>Test Procedure</b>				
Step	Action (operator)	Expected Result	Pass/Fail	Comment
<i>1 To be filled in by Supplier. Each step is numbered consecutively. For examples see blue text in Use case event 1.2, 1.11 and 2.14</i>	<i>To be filled in by Supplier. The action of this step is described here. For examples see blue text in Use case event 1.2, 1.11 and 2.14</i>	<i>To be filled in by Supplier. The expected reaction/result of the system is stated here. For examples see blue text in Use case</i>	<i>To be filled in during test. System was reacting as described or not. For examples see blue text in Use case event 1.2, 1.11 and 2.14</i>	<i>To be filled in during test. Additional comments to this test step can be stated here. For examples see blue text in Use case event 1.2, 1.11 and 2.14</i>



		<i>event 1.2, 1.11 and 2.14</i>		
2	<i>e.g. Choose "Show STM Targets" For examples see blue text in Use case event 1.2, 1.11 and 2.14</i>			
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>1.2. A choice is made to allow others (vessels and shore centres) to see new route message (AIS ASM).</b>	It should be possible to choose, made once as a default setting, to show or not to show own route message. The idea to have it as a default is to not add an extra work step that can be missed out unintentionally.	3.2.2	e.g. See page 11 bullet 2.3.2	e.g. See page 10 bullet 3.2.2
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
e.g. It shall be possible to make a general choice if route message should be broadcasted or not	e.g. Demonstration	e.g. Will be done in STM module in the ECDIS		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1	e.g. Select "On"	e.g. On receiving STM		



		Module the route segments will be visible		
2	e.g. Select "Off"	e.g. On receiving STM Module the route segments will not be visible		
3				





Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>1.3. Voyage is loaded for monitoring</b>	Standard ECDIS voyage planning procedure			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>1.4. Ship broadcasts route message</b>	If 1.2 and 1.3 is yes route message is transmitted with defined updating frequency/when passing waypoint	3.2.1		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
1.5. Own ship route message should be visualized on other ships ECDIS/ STM module	NA	3.2.1		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>1.6. Other ship acquires own ships route and displays it on ECDIS/ STM module</b>	It should be possible to select which ships routes to display and also to hide them again. The routes should not be showed automatically (If not triggered by certain events/limits e.g. CPA)			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>1.7. Not Use Case Event driven functionality</b>	STM ship systems should be able to calculate CPA and intersection points between own/other-ships route segments (including leg speed), even if the routes are not crossing each other	3.2.4		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>1.8. Not Use Case Event driven functionality</b>	It Should be possible to do some kind of "Trial Manoeuvre" including own and other ships routes (including leg speed)	3.2.6		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>1.9. Ship Passes a waypoint</b>	Updated route is broadcasted (i.e. one more waypoint is added in the end of the broadcasted route)	From Route Message standard		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





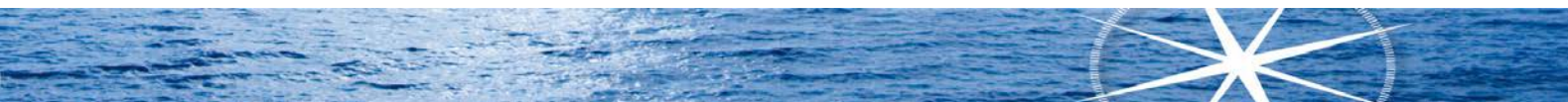
Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>1.10. Ship sailing between two waypoints (long distance between these waypoints)</b>	In order for ship “arriving” into AIS coverage area to receive own ships route it should be broadcasted according to updating frequency in route message format	From Route Message standard		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>1.11. Other ship is deviating from its voyage plan (in time or geographically)</b>	Ownship's ECDIS STM Module should be able to adjust settings that triggers "notification" about that another ship is not following it's voyage plan (e.g. other ships route changes colour)	3.2.5	e.g See page 14 bullet 5.5.5	e.g. See page 15 bullet 3.2.4
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
e.g. Test if user is made aware if other ship is not following it's route (in time and geographically)	e.g. Demonstration	e.g. Two STM modules will be used, no AIS will be used message will be sent via IP., XTD setting=1.0M, dTime=+/- 7min)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1	e.g. Set dTime limit to +/- 7min	e.g. dTime limit=+/- 7min		



2	e.g. Simulate “other” ship slowing down	e.g. When “other” ship is more than 7 min late to next WP, user will be notified by route segments changes colour		
3	e.g. Set XTD limit=1.0M	e.g. XTD limit=1.0M		
4	e.g. Simulate “other” ship leaving the route more then set XTD limit	e.g. When “other” ship is more than 1.0M off route, user will be notified by route segments changes colour		



## 2. Sharing of Voyage Plan

### 2.1.1. Description.

Ships in test bed will share Voyage Plans (VP) with Shore Centres (SC), ports and service providers. The ship/shipping company is the information owner of the VP and as such chooses which actors that should be granted access to the voyage plan. This is part of the access management functionality in Sea SWIM. Another prerequisite is that ships voyage plans can be identified and that the identification is unique, therefore the Unique Voyage ID (UVID) concept is a cornerstone in STM and the future usage is to act as a pointer to other information that is related to a voyage such as cargo, crew reporting information etc.

### 2.1.2. Information needs

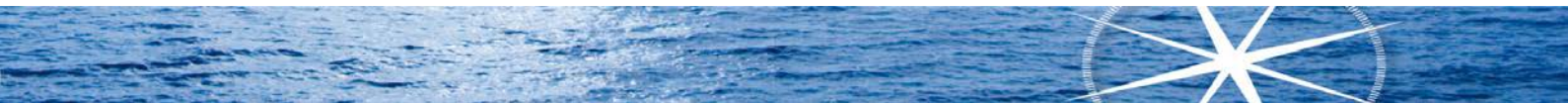
- Rtz.
- UVID
- ID registry
- VIS
- Access management functionality

### 2.1.3. Use case/functions to be supported

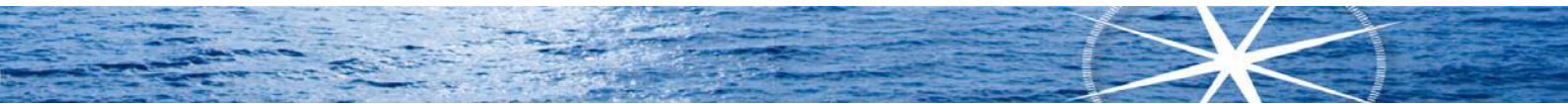


## 2. Sharing of Voyage Plan

Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.1. Ship prepare voyage plan i.e. Route and Schedule.</b>	Sending the Route to/Receiving from the STM module  STM ship system should support route status (part of .rtz)	2.1.3, 3.2.7, 3.4.9		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.2. Not Use Case Event driven functionality</b>	The communication between the STM Module and ECDIS Shall have Information consistency (e.g. ship receives a VP in the STM module, accepts it, then the operator shall be able to choose it for monitoring in ECDIS, it shall then be identical to the one in the STM module).	3.3.1		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				



3				
Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.3. Not Use Case Event driven functionality</b>	Events in the system <b>shall</b> be stored and logged for later evaluation. Events could include, but are not limited to: system downtime (excluding communication), operator actions such as: Number of STM Module - VIS/PIS exchanges.	3.4.8		
Test Case				
Pass Criteria	Test Mode	Note(s)		
Test Procedure				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				





3				
Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.4. Not Use Case Event driven functionality</b>	The STM ship system shall be able to log outgoing and incoming "STM data traffic" (Bytes).	3.5.1		
Test Case				
Pass Criteria	Test Mode	Note(s)		
Test Procedure				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.5. Not Use Case Event driven functionality</b>	Online access point shall hold a VIS instance that is the internet connected representation of the ship, the VIS shall represent the ships VP towards other actors via a SSC	3.6.1		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.6. Not Use Case Event driven functionality</b>	Online access point should hold a SPIS instance that is the internet connected representation of the ship, the PIS shall represent the ship in port-call synchronization interactions towards other actors via a SSC	3.6.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



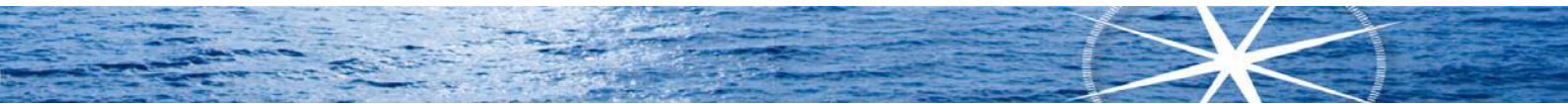
Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.7. Not Use Case Event driven functionality</b>	Online access point shall be able to expose and consume (to other STM actors) rtz-format, PCM-format, S124-format and text format using VIS/SPIS,	3.6.3		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.8. Not Use Case Event driven functionality</b>	The STM ship system should log availability to online access point (the time when it's possible to communicate)	3.5.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.9. Ship assigns access rights to VP</b>	STM Module shall have a functionality for assign access rights to a VP	2.1.3, 3.4.12		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.10. Not Use Case Event driven functionality</b>	<p>The STM ship system shall be able to give the VP an Unique Voyage ID (UVID) using the maritime resource name (mrn) structure, e.g. "urn:mrn:stm:voyage:id:&lt;short org&gt;:&lt;local-id&gt;" according to STM_D4.1.2-1 and STM Act2 SeaSWIM Testbed Specification</p> <p>The functionality to create UVID based on a local ID shall be integrated into any component provided by tenderer.</p>	3.6.4		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				





Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.11. Not Use Case Event driven functionality</b>	Operator shall on the STM module be able to assign/remove access rights on VP to actors according to VIS specification	3.4.13		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.12. Not Use Case Event driven functionality</b>	STM module shall be able to inform operator of which actors that have been given access rights to VP	3.4.14		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



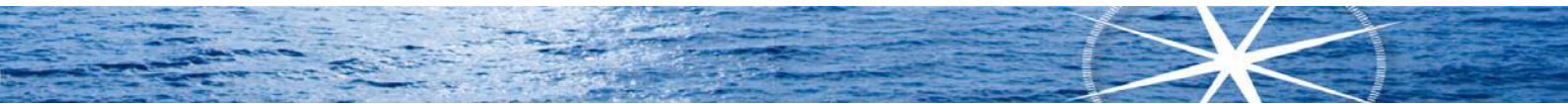
Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.13. Not Use Case Event driven functionality</b>	Operator shall be able to search for services in STM module acc. to VIS spec. Based on attributes available in service registry	3.4.10	e.g See page 33 bullet 12.5.5	e.g. See page 25 bullet 12.2.4
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
e.g. Test if operator can search for services	e.g. Demonstration	e.g. Search will be done in STM Module in ECDIS, VIS and SSC are prerequisites		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1	e.g. Login to STM Module	e.g. Access Granted		
2	e.g. Go to "service search page"	e.g. Search window will open		
3	e.g. Search for Route Optimizing services	e.g. List of Route Optimizing		



		services will be displayed		
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Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.14. Not Use Case Event driven functionality</b>	STM module shall be able to store lists of services (for offline purposes)	3.4.11		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>2.15. Voyage plan is made available for authorised stakeholders</b>	Voyage Information Service (VIS) and SeaSWIM Connector (SSC)	2.1.3, 3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





## **3. Route Cross-check**

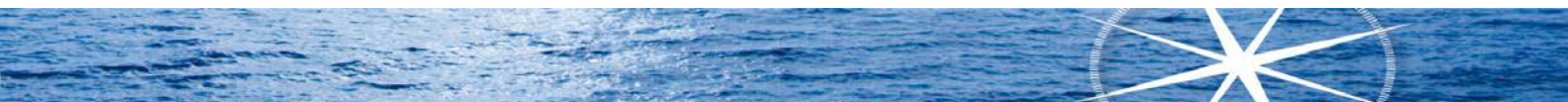
### **3.1.1. Description**

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

### **3.1.2. Information needs**

- Rtz.
- AIS

### **3.1.3. Use case/functions to be supported**



### 3. Route cross-check

Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
3.1. Voyage Plan is shared according to Sharing of VP (use-case 2)		3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>3.2. Ship requests a route Cross-Check</b>	Shore centres check route and send back confirmation by text message or new proposal	3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>3.3. SC checks the route and want to suggest a different route</b>	SC should be able to confirm to the ship that the route is checked and is ok or have errors (alternatively send a route suggestion). SC should get (automatic) acknowledgement when the suggested VP is available at the STM Module	3.4.2 SC Functionality		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>3.4. Ship accepts or rejects suggested route</b>	When/If the route suggestion is loaded for monitoring all actors with access rights shall be notified	3.4.4		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



## 4. Flow Management

### 4.1.1. Description

*To be updated by SMA during November, this use case will not pose any additional requirements on STM Ship systems.*

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

### 4.1.2. Information needs

- Rtz
- AIS
- Flow points

### 4.1.3. Use case/functions to be supported



## 4. Flow Management

Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
4.1. Voyage Plan is shared according to Sharing of VP (use-case 2)		3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>4.2. Necessary flow points along the VP to be inserted</b>	Shore centres check route for FPT and send back confirmation or new proposal including FPT (Might include text message)	3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>4.3. Ship enters SC-monitored area and enhanced monitoring<sup>1</sup> is commenced used for flow management</b>	When SC detects a STM ship (AIS symbol) on AIS it should be possible to automatically connect AIS signal to ships .rtz route in order to conduct enhanced monitoring including ships FPT schedule	Shore Centre Functionality		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				

<sup>1</sup> See chapter "Enhanced Monitoring"



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>4.4. VTS/SC want to suggest a different route schedule using FPT</b>	VTS/SC should be able to send a RTA to a FPT by means of a text message or a VP schedule	Shore Centre Functionality		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



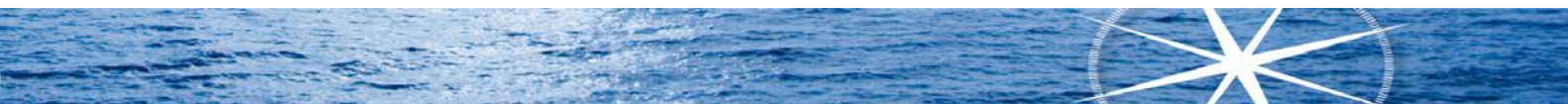
Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>4.5. Ship accepts or rejects suggested route</b>	When/If VP (with new FPT schedule) is loaded for monitoring all actors with access rights shall be notified	3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>4.6. Not Use Case Event driven functionality</b>	The STM ship systems should handle real time calculation (including schedule) of ETA and or STG (Speed To Go to reach a WP at a given time) to one or more selected WP(s) (e.g. arrival traffic area or Pilot Boarding Position) along the route, a Flow Point (FP), not necessarily the last waypoint in the route	3.4.16		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				



3				
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## 5. Enhanced Monitoring

### 5.1.1. Description

Enhanced monitoring will be supported by adding route information and a monitoring service can be provided in previously unmonitored areas. SC will be able to detect if planned schedule is not kept or if ship deviates from planned route. Thus SC can monitor that ships are following their planned route and also foresee possible dangerous situations and suggest route modifications (geographic and/or speed) due to traffic or other impeding conditions. These tools can also enhance current VTS services.

### 5.1.2. Information needs/prerequisites

- AIS
- rtz.
- Info on what ships are STM compatible
- Connection to SeaSWIM by means of SSC

### 5.1.3. Use case/functions to be supported





## 5. Enhanced Monitoring

Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
5.1. Voyage Plan is shared according to Sharing of VP (use-case 2)		3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>5.2. Ship requests Enhanced monitoring (in service registry)</b>	Enhanced monitoring functionality in the SC			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>5.3. Ship enters SC monitored area and enhanced monitoring is commenced</b>	When SC detects a STM ship (AIS symbol) on AIS it should be possible to automatically connect AIS signal to ships .rtz route in order to conduct enhanced monitoring	3.4.2, Shore Centre Functionality		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>5.4. Ship deviates from VP (in time or geographically)</b>	SC operator should be supported and alerted by existing alarm engines (schedule and geographical deviation from route) in SC software (after that it is SC SOP how to act)	Shore Centre Functionality		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>5.5. SC suggests a changed route by sending route proposal</b>	SC should be able to send a route proposal where part of route geometry or schedule is changed SC should get (automatic) acknowledgement when the suggested VP is available at the STM Module	3.4.3 and Shore Centre Functionality		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>5.6. Ship receives route proposal</b>	The changed part of the route should be clearly marked/distinguished to make it clear what is the difference from currently monitored route	3.4.3		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>5.7. Ship accepts or rejects suggested route</b>	When/If the route suggestion is loaded for monitoring all actors with access rights shall be notified	3.4.12, 3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>5.8. Ship leaves enhanced monitored area and/or enters another SC area</b>	Enhanced monitoring of ship should be deactivated in SC software	Shore Centre Functionality		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



## 6. Ship-Port Synchronisation

### 6.1.1. Description

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

### 6.1.2. Information needs

- Port Call message format
- AIS
- rtz

### 6.1.3. Use case/functions to be supported



## 6. Port Synchronisation (Ship to Port)

Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.1. Arrival port identified and authorized to time updates by sharing a PortCall Message</b>	<i>Service lookup and Authentication. Port call message with PTA to a certain PortCDM location (e.g. Pilot boarding position) to be created in STM Module</i>			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.2. PTA and ETA are shared frequently with port during ship's voyage</b>	<p>STM module should be able to communicate states with Ship Port Information Service (SPIS)</p> <p><i>The distribution of PTA (i.e. TTA) and ETA to the port is done whenever it's updated for/at the vessel (depending on the ships connectivity).</i></p>	3.4.5		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				



3				
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Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.3. Ship is delayed and cannot reach port in planned time</b>	Ship sends Requested Time of Arrival ( <i>AT_PortVisit_Requested, according to PCMF</i> )	3.4.6		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.4. Designated actor in port (could be Port Control etc.) accepts ship's requested time of arrival and confirms back to ship</b>	The accepted Requested Time of Arrival is confirmed back to the ship ( <i>AT_PortVisit_Confirmed (according to PCMF)</i> )	3.4.5, 3.4.6		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.5. Ship receives ports confirmation of requested time of arrival and updates its PTA accordingly.</b>	Make updated PTA, available for authorized stakeholders SPIS	3.4.5, 3.4.6		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.6. New PTA is used for monitoring and speed settings</b>	ETA in VP (rtz) to be updated (if significant difference) accordingly to inform actors that subscribe to VP that there has been a change in arrival time			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				

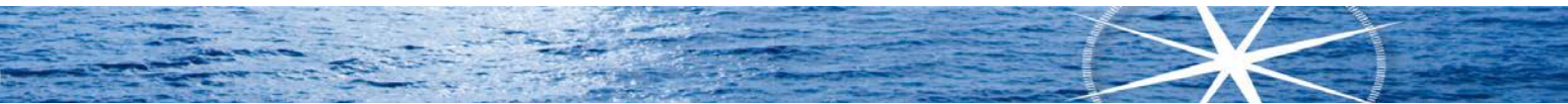


Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.7. Ship arrives typically to PILOT_BOARDING_AREA and seapassage ends, the port is informed of the ships ATA at this time</b>	STM Module need to report ATA	3.4.5		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



## 6. Port Synchronisation (Port to Ship)

Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
6.8. Berth will not be available if ship arrives at current PTA				
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.9. Port sends recommended time of arrival to ship</b>	Port send recommended time of arrival (RTA according to PCMF)	3.4.5, 3.4.6		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.10. Ship updates its PTA accordingly</b>	Make updated PTA, available for authorized stakeholders, SPIS (Confirmation of recommended time of arrival from port by ship)	3.4.5, 3.4.6		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.11. New PTA is used for monitoring and speed settings</b>	ETA in VP (rtz) to be updated (if significant difference) accordingly to inform actors that subscribe to VP that there has been a change in arrival time	3.4.5, 3.4.6		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>6.12. Ship arrives to PILOT_BOARDING_AREA and seapassage ends, the port is informed of the ships ATA at this time</b>	STM Module need to report ATA	3.4.5		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



## 7. Winter Navigation

### 7.1.1. Description

Information regarding best route, waiting positions, preparations for assistance, position in convoy, time for departures from port is important for the Icebreaking services. The information should preferably be transmitted directly to ships navigation system.

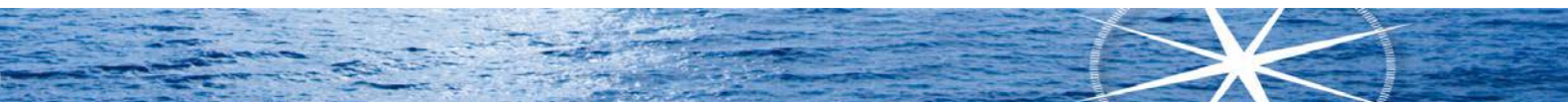
Introducing route exchange will give both Icebreaker services and assisted ships better information in more automated procedures reducing workload and risk for misunderstandings.

### 7.1.2. Information needs

- rtz.
- Text message

### 7.1.3. Use case/functions to be supported

Note. The ability to send and receive messages is related to several services but the use case and functionality for this is included in the winter navigation table.



## 7. Winter Navigation

Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>7.1. Voyage Plan is shared according to Sharing of VP (use-case 2)</b>	See Use Case 2	See Above UseCases regarding sharing of voyage plan.		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>7.2. Icebreaker (IB) need to get the ship about to be assisted to a certain position at a certain time</b>	Send text message regarding arrival time to the ship to be assisted	3.4.1, 3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>7.3. Ship about to be assisted updates VP acc. To IB's text message regarding arrival time</b>	Ship about to be assisted updates VP, all actors with access rights shall be notified	3.4.1		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
7.4. IB need to get the ship about to be assisted to follow a recommended route from the IB (e.g. Open waters acc. to latest Ice information that IB has)	IB to Send suggested VP to the ship about to be assisted	3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				



3				
Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>7.5. Not Use Case Event driven functionality</b>	There shall be a functionality in the STM Module to correlate transaction sequences irrespective payload format e.g. a text message shall be correlated to a VP	3.4.15		
Test Case				
Pass Criteria	Test Mode	Note(s)		
Test Procedure				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>7.6. Ice-Breaker (IB) need to relay information to ship regarding IB-Assistance, such as Towing arrangement , convoy information</b>	Text about such information should be possible to send to ship from Ice-Breaker and vice versa (Including automatic confirmation of that messages is received). Ship and IceBreaker should be able to reply to incoming message, in a "communication-thread"	3.4.1, 3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>7.7. Ship being assisted by IB need to send Updated PTA to port (received via text from IB)</b>	IB to send PTA via text to assisted ship  Ship to Update VP, all actors with access rights shall be notified	3.4.1, 3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



## 8. Area management

### 8.1.1. Description

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

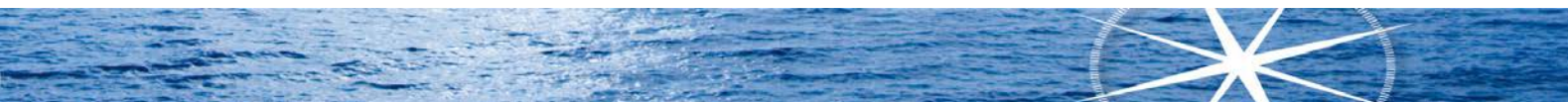
### 8.1.2. Information needs

New area exchange format. (S-124)

- Date/time of enforcement
- Date/time of expiry
- Text Information regarding the area

### 8.1.3. Use case/functions to be supported

Note. Areas of interest is not limited to sail race. This is just an example given. Other areas of interest could be SAR Areas, MSI Areas, MSP Areas, Protected Areas. All of these areas could be used as clarification when SC needs to inform ships about situations/events that concerns safe passage in the area alternatively be a clarification to a proposal if SC chooses to send a route proposal to the ship.



## 8. Area Management

Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
8.1. Sail Race taking place in an Area between 2 dates	NA			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
8.2. SC creates area	An area with attributes describing activity in area, geography and validity period should be possible to create and display	Shore Centre Functionality		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>8.3. Shore Centre send out the Area including attributes to ships</b>	Send areas	Shore Centre Functionality		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>8.4. Ship receives area</b>	Automatic Confirmation from STM Module that Area is received	3.4.2, 3.4.7		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>8.5. Area displayed onboard</b>	Ship to be able to display area in STM Module	3.6.3		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>8.6. Area deleted</b>	Area should be deleted automatically when it's obsolete	3.6.3, 2.1.3		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



## 9. Route Optimisation

### 9.1.1. Description

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

### 9.1.2. Information needs

- Ships identification/UVID
- rtz
- Ship specific information, different attributes needed for different services. (No standard exists.)

### 9.1.3. Use case/functions to be supported



## 9. Route Optimisation

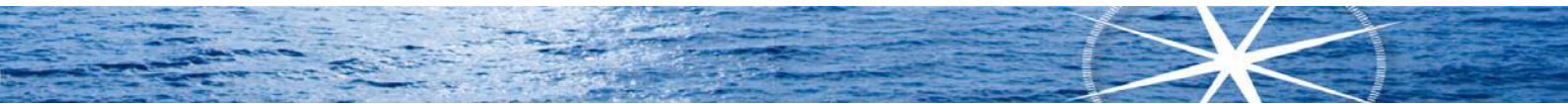
Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>9.1. Voyage Plan is shared according to Sharing of VP (use-case 2)</b>	See use case 2	See Above UseCases regarding sharing of voyage plan.		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
9.2. Vessel request optimization (this can happen daily during long voyage)				
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>9.3. Service provider receives VP to be optimised</b>		3.4.1, 3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>9.4. Optimized voyage plan is returned to ship</b>	Sending the VP to ship.	3.4.2		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





Event	Functionality needed	Related Requirements	Reference to System Description	Operator Action Reference
<b>9.5. If ship accepts voyage plan and it is set for monitoring.</b>	All actors with access rights shall be notified	3.4.4		
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





## 10. Non Functional Requirements

### 10.1.1. Description

The official definition of ‘a functional requirement’ is that it essentially specifies something the system should do. Typically, functional requirements will specify a behaviour or function, for example: “Display the name, total size, available space and format of a flash drive connected to the USB port.” Other examples are “add customer” and “print invoice”. Non-functional requirements describe how the system works, while functional requirements describe what the system should do. The definition for a non-functional requirement is that it essentially specifies how the system should behave and that it is a constraint upon the systems behaviour. One could also think of non-functional requirements as quality attributes for of a system.

### 10.1.2. Information needs

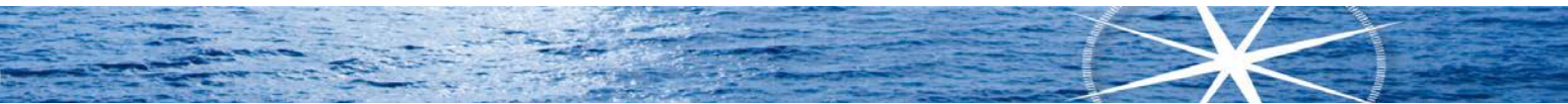
NA

### 10.1.3. Events to be supported



## 10. Non Functional Requirements

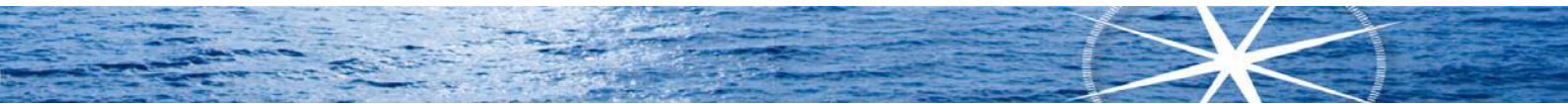
Event	Description	Reference to System Description	Operator Action Reference	
<b>10.1. Recoverability</b>	Verify the possibility to recover application configuration and data consistency following a power outage (shore and shipside)			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Description	Reference to System Description	Operator Action Reference	
<b>10.2. Accessibility</b>	Verify the ability to access the functionality of the application.			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Description	Reference to System Description	Operator Action Reference	
<b>10.3. Audit and control</b>	Verify how easily it's possible to check the historic workflow and audit trail. (logging), (according to "Technical Requirement" R-3.4:8 in "Appendix 1 - STM Ship system technical specification and tendering form")			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Description	Reference to System Description	Operator Action Reference	
<b>10.4. Availability</b>	Verify how the STM Ship system will meet the uptime as stipulated in the “Technical Requirement” R-2.1:10 in “Appendix 1 - STM Ship system technical specification and tendering form”)			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Description	Reference to System Description	Operator Action Reference	
<b>10.5. Interoperability</b>	Verify if STM Ship system will be able to import and read a VP (in RTZ-format) from another supplier of STM Ship system and/or from other STM service providers.			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





Event	Description	Reference to System Description	Operator Action Reference	
<b>10.6. Load/Volume</b>	Verify if the application processes a certain number of transactions/volume in a reasonable time.			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Description	Reference to System Description	Operator Action Reference
<b>10.7. Performance</b>	Verify if criteria like reasonable response time, throughput, concurrency. With regards to STM module internally, VIS and SeaSWIM environment (SR, ID).		
<b>Test Case</b>			
Pass Criteria	Test Mode	Note(s)	
<b>Test Procedure</b>			
Step	Action	Expected Result	Pass/Fail Comment
1			
2			
3			



Event	Description	Reference to System Description	Operator Action Reference	
<b>10.8. Reliability</b>	Verify that the application works if stressed in production-like environment. (resending, communication failure)			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Description	Reference to System Description	Operator Action Reference	
<b>10.9. Security</b>	Verify if the STM Ship System has enough security to protect information.			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				



Event	Description	Reference to System Description	Operator Action Reference	
<b>10.10. Usability</b>	Verify that the application is usable from an end-user perspective.			
<b>Test Case</b>				
Pass Criteria	Test Mode	Note(s)		
<b>Test Procedure</b>				
Step	Action	Expected Result	Pass/Fail	Comment
1				
2				
3				





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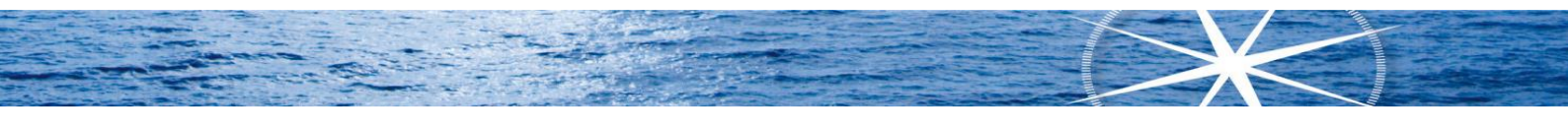


# 1 Sharing and receiving Monitored Routes

This document describes a method for sharing route data between vessels, with an STM capable system using VDES or AIS equipment for communication.

The Route Message Broadcast is used as a means to indicate intended navigation to nearby vessels, allowing vessels to avoid ending up in a close quarter where the involved ships have to use the regulations in COLREG. The current and a fixed number of coming route legs of the monitored route is shared with other vessels.

The use of this message requires that both the receiving and transmitting side has the appropriate communication equipment as well as presentation and navigation systems.



## 2 System components

### 2.1 HMI and operational equipment

The Route Message sharing system presentation and is done through an ECDIS or similar system. The ECDIS is also responsible for assembly, disassembly, and interpretation of Route Message data.

*Note: ECDIS in all parts of this document may also be INS or other systems with the STM functional module integrated.*

### 2.2 Communication Device

The ECDIS shall be connected to a VDES unit supporting both AIS and ASM-channel communication\*. This communication device will function only as a modem in this system. The VDES unit shall employ a carrier sense technique to avoid VHF broadcast at the same time and channel as coastal VHF stations.

The maximum length of one broadcast shall not exceed three AIS TDMA slots (<80 ms), to ensure compliance to AIS and VDES equipment standards.

*\*Note: Standalone AIS may be used where VDES is not available. Loss of route message data fidelity will occur (fewer legs and no leg XTD values).*

### 2.3 Interfaces

The ECDIS shall communicate with the Communication Device using IEC 61162-2 or IEC 61162-450 compliant interfaces.

#### 2.3.1 Data formats

Incoming Data will be presented to the ECDIS using standard VDM messages as defined in above referenced interface standards.

Data sent from ECDIS to the communication device unit shall be using ABM and BBM messages, as defined in the same interface standards.



## 3 Route Messages

### 3.1 Onboard message flow

The ECDIS is responsible for initiating any Route Message broadcast to be transmitted by the Communication Device, as well as any Route Message interrogations. The ECDIS will compile the Route Message data payload, or interrogation message payload, as defined in section 4, and send a BBM or ABM message with the payload to the Communication Device.

The Communication Device will provide the ECDIS with VDM-message data as they are received on the VHF data links.

VDM message payloads may be:

- Remote AIS target dynamic, static and voyage data (AIS Msg 1,2,3,5,9,18,19,24A,24B)
- Remote vessel route message data (AIS msg 8 or VDES ASM msgs)
- Route Message interrogation messages (AIS msg 6 or VDES ASM msgs)

### 3.2 Message broadcast trigger events

The message shall be broadcast so that vessels in receiving range has accurate information at a reasonable delay, without creating unnecessary load on the VHF datalinks.

A new Route Message broadcast shall be initiated by ECDIS when any of the below events occurs:

- Six minutes have passed since last Route Message broadcast
- A Route Message interrogation was received and over one minute has passed since last Route Message broadcast on that channel
- Any of the data in the last Route Message broadcast has been changed
- When passing a waypoint
- The Monitored Route has been deactivated
- A Monitored Route is activated

The Route Message broadcast shall be initiated by the ECDIS as soon as possible after any of the above broadcast triggers.

There shall be no autonomous Route Message broadcasts when there is no Monitored Route active in ECDIS, except for one additional Route Message transmission after stopping a Monitored Route. The system shall however respond to interrogations.

### 3.3 Route segmentation for AIS broadcasts

The Route Message-payload is defined such that the current leg as well as up to six additional legs can be shared. If any of the waypoints within the next four legs is over 200 NM from previous waypoint, this will be treated as the last WP in the currently shared monitored route segment.

### 3.4 Route segmentation for VDES ASM broadcasts

The Route Message-payload is defined such that the current leg as well as up to twelve additional legs can be shared, with Cross Track Distance (XTD) parameters for each leg.



## 4 Route Message structure

The Route Message structures are defined in the following tables.

When no Monitored Route is active, the Route Message shall have an empty payload.

Two Route Messages are defined, depending on the communication system used. VDES ASM channel communication allows for a higher bitrate, and more data within the three timeslot limit.

Leg parameters (planned speed, XTD, geometry) are for the leg ending at the waypoint following those parameters. Turn radius is for the next waypoint.

### 4.1 AIS Route Message

The first and last waypoints are fully qualified, while intermediate waypoints are defined as the difference from the previous waypoint in the route. This way of defining intermediate waypoints saves bits but limits the maximum length of those legs. In cases where representable length is insufficient, the total route segment reported in a message is cut short and the “intermediate” waypoint becomes the last waypoint in the message

Parameter	Bits	Description	Comment
Message ID	6	Identifier for Message 8; always 8	
Repeat indicator	2	Used by the repeater to indicate how many times a message has been repeated.	
Source ID	30	MMSI number of source station	
Spare	2	Not used. Should be set to zero. Reserved for future use	
DAC	10	DAC = $265_{10} = 0100001001_2$	
FI	6	Function identifier = $1_{10} = 000001_2$	
<i>If no monitored route is available the message ends here</i>			
First waypoint type	1	0 = First waypoint (below) is FROM waypoint 1 = Navigating towards first waypoint (start of route)	
First waypoint longitude	28	Longitude in 1/10 000 min ( $\pm 180^\circ$ , East = positive (as per 2's complement), West = negative (as per 2's complement). $181^\circ = (6791AC0h) = \text{not available} = \text{default}$ )	Standard AIS format
First waypoint latitude	27	Latitude in 1/10 000 min ( $\pm 90^\circ$ , North = positive (as per 2's complement), South = negative (as per 2's complement). $91^\circ (3412140h) = \text{not available} = \text{default}$ )	Standard AIS format
<b>Intermediate legs</b>	<b>(64)</b>	<b>Repeats 0 ... 6 times depending on total number of legs</b>	
Leg geometry	1	0 = Loxodrome (Rhumb line) 1 = Orthodrome (Great circle)	
Planned speed	10	Planned speed over ground in 1/10 knot steps (0-102.2 knots) 1 023 = not available, 1 022 = 102.2 knots or higher	Standard AIS format
Turn radius	9	Turn radius in 1/100 NM. 0 = not available	Max 5.11 NM
Longitude delta	22	Longitude difference from previous waypoint in 1/10 000 min. East = positive, West = negative (as per 2's complement).	Max $\pm 209.7151'$
Latitude delta	22	Latitude difference from previous waypoint in 1/10 000 min. East = positive, West = negative (as per 2's complement).	Max $\pm 209.7151'$
<b>Final reported leg</b>	<b>(66)</b>		
Leg geometry	1	0 = Loxodrome (Rhumb line) 1 = Orthodrome (Great circle)	
Planned speed	10	Planned speed over ground in 1/10 knot steps (0-102.2 knots) 1 023 = not available, 1 022 = 102.2 knots or higher	Standard AIS format



Parameter	Bits	Description	Comment
Last waypoint longitude	28	Longitude in 1/10 000 min ( $\pm 180^\circ$ , East = positive (as per 2's complement), West = negative (as per 2's complement). 181° = (6791AC0h) = not available = default)	Standard AIS format
Last waypoint latitude	27	Latitude in 1/10 000 min ( $\pm 90^\circ$ , North = positive (as per 2's complement), South = negative (as per 2's complement). 91° (3412140h) = not available = default)	Standard AIS format
Steering mode	2	0 = Manual (default) 1 = Heading control 2 = Track control 3 = Reserved for future use	
Spare	4	Padding to bring total message length to a byte boundary. Always 0	Required for AIS

## 4.2 VDES ASM Route Message

Parameter	Bits	Description	Comment
Message ID	6	Identifier for Message 8; always 8	To be defined by VDES standard
Repeat indicator	2	Used by the repeater to indicate how many times a message has been repeated.	
Source ID	30	MMSI number of source station	
Spare	2	Not used. Should be set to zero. Reserved for future use	
DAC	10	TO BE DETERMINED	
FI	6	TO BE DETERMINED	
<i>If no monitored route is available the message ends here</i>			
First waypoint type	1	0 = First waypoint (below) is FROM waypoint 1 = Navigating towards first waypoint (start of route)	
First waypoint longitude	28	Longitude in 1/10 000 min ( $\pm 180^\circ$ , East = positive (as per 2's complement), West = negative (as per 2's complement). 181° = (6791AC0h) = not available = default)	Standard AIS format
First waypoint latitude	27	Latitude in 1/10 000 min ( $\pm 90^\circ$ , North = positive (as per 2's complement), South = negative (as per 2's complement). 91° (3412140h) = not available = default)	Standard AIS format
<b>Intermediate legs</b>	<b>(97)</b>	<b>Repeats 0 ... 12 times depending on total number of legs</b>	
XTD port side	11	XTD port side in 1/1000 NM. 0 = not available	Max 2.047 NM
XTD starboard	11	XTD starboard in 1/1000 NM. 0 = not available	Max 2.047 NM
Leg geometry	1	0 = Loxodrome (Rhumb line) 1 = Orthodrome (Great circle)	
Planned speed	10	Planned speed over ground in 1/10 knot steps (0-102.2 knots) 1 023 = not available, 1 022 = 102.2 knots or higher	Standard AIS format
Turn radius	9	Turn radius in 1/100 NM. 0 = not available	Max 5.11 NM
Waypoint longitude	28	Longitude in 1/10 000 min ( $\pm 180^\circ$ , East = positive (as per 2's complement), West = negative (as per 2's complement). 181° = (6791AC0h) = not available = default)	Standard AIS format
Waypoint latitude	27	Latitude in 1/10 000 min ( $\pm 90^\circ$ , North = positive (as per 2's complement), South = negative (as per 2's complement). 91° (3412140h) = not available = default)	Standard AIS format
<b>Final reported leg</b>	<b>(88)</b>		





Parameter	Bits	Description	Comment
XTD port side	11	XTD port side in 1/1000 NM. 0 = not available	Max 2.047 NM
XTD starboard	11	XTD starboard in 1/1000 NM. 0 = not available	Max 2.047 NM
Leg geometry	1	0 = Loxodrome (Rhumb line) 1 = Orthodrome (Great circle)	
Planned speed	10	Planned speed over ground in 1/10 knot steps (0-102.2 knots) 1 023 = not available, 1 022 = 102.2 knots or higher	Standard AIS format
Last waypoint longitude	28	Longitude in 1/10 000 min ( $\pm 180^\circ$ , East = positive (as per 2's complement), West = negative (as per 2's complement). 181° = (6791AC0h) = not available = default)	Standard AIS format
Last waypoint latitude	27	Latitude in 1/10 000 min ( $\pm 90^\circ$ , North = positive (as per 2's complement), South = negative (as per 2's complement). 91° (3412140h) = not available = default)	Standard AIS format
Steering mode	2	0 = Manual (default) 1 = Heading control 2 = Track control 3 = Reserved for future use	
Spare	0..7	Padding to bring total message length to a byte boundary. Always 0	For byte alignment

### 4.3 Interrogation

Standard AIS/VDES interrogation for a specific functional message shall be used to initiate a request of a Route Message from a remote vessel. The reply shall always be as defined above (broadcast), to allow all ships within range to receive the message. The reply should be sent with empty content when there is no monitored route in use.

Parameter	Bits	Description
Message ID	6	Identifier for Message 6; always 6
Repeat indicator	2	Used by the repeater to indicate how many times a message has been repeated.
Source ID	30	MMSI number of source station
Sequence number	2	0-3
Destination ID	30	MMSI number of destination station
Retransmit flag	1	Retransmit flag should be set upon retransmission: 0 = no retransmission = default; 1 = retransmitted
Spare	1	Not used. Should be zero
DAC	10	International DAC = $1_{10} = 0000000001_2$
FI	6	Function identifier = $2_{10} = 000010_2$
Requested DAC code	10	DAC = $265_{10} = 0100001001_2$
Requested FI code	6	Function identifier = $1_{10} = 000001_2$
Total length	104	The resulting Message 6 occupies 1 slot.



## 5 HMI Requirements

<Insert information on route message data representation on ECDIS, based on discussion with ECDIS manufacturers>

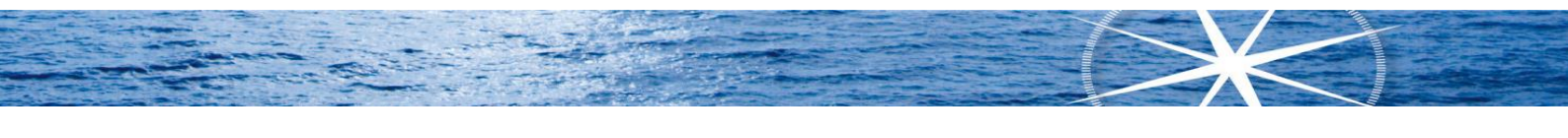
- Be able to switch on and off presentation of remote vessel route data?
  - Per vessel setting
- Default behaviour for new vessels?
- Have an indication that they have route data available?
- Have an indication that the monitored route message broadcast is activated?
  - Requirement to share route to receive routes!
- Interpretation of vessel route data
  - Planned speed/ current speed for ETA calculation
  - Etc..





## **6 ANNEX A - Use cases and operational aspects**

See SMAs USE Case Document





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*Document No: Appendix 7*  
*Title: Ship Port Information Service*  
*Specification (Procurement)*  
*Date:2016-11-17*



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## Document status

### Authors

Name	Organisation
Mikael Olofsson	SMA

### Document History

Version	Date	Initials	Description
00.01	20161117	MOL	Initial version

### Review

Name	Organisation
Håkan Heurlin	SMA

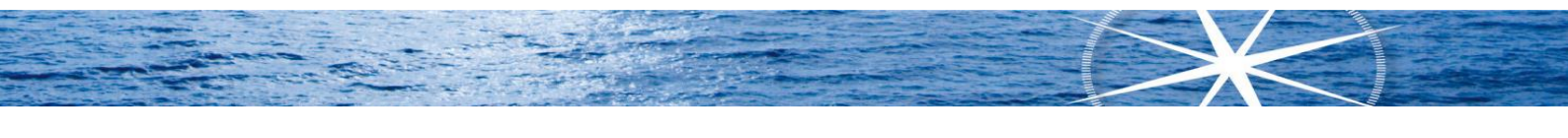
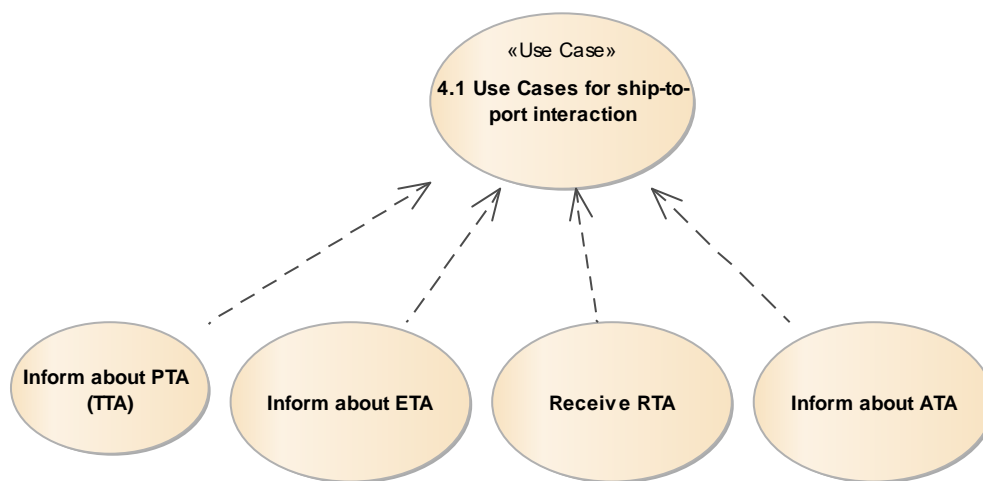


# 1 Introduction

The main purpose with Ship-Port Information Service (SPIS) is to support ship system with communication with PortCDM services in port. The service may be integrated in the onboard system or at shore, depending on the situation.

The main functionality of the service is to send updates on times at locations (e.g. PTA/TTA, ETA, ATA) and receive recommendations. The purpose is to support a collaborative decision making process with port.

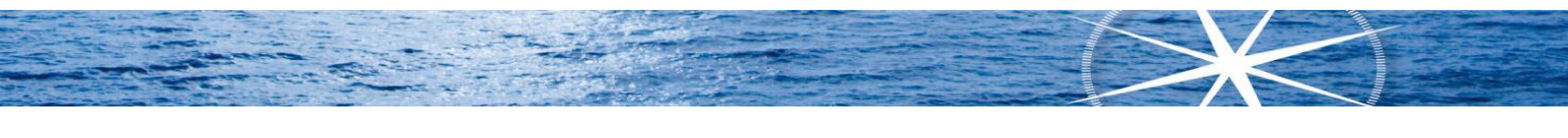
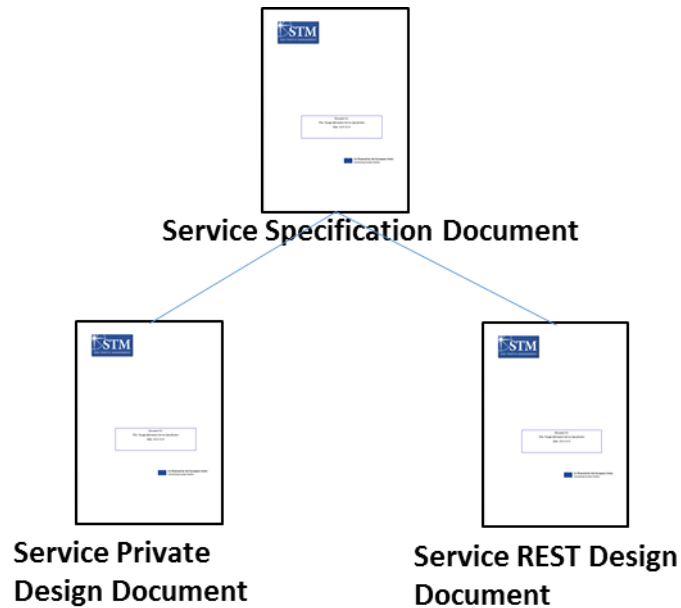
The diagram below show the primary use case for the STM Validation project voyage management validation.



## 2 Document structure

The Ship-Port Information Service is documented according to Service Documentation Guidelines attached to the Service Registry used in STM.

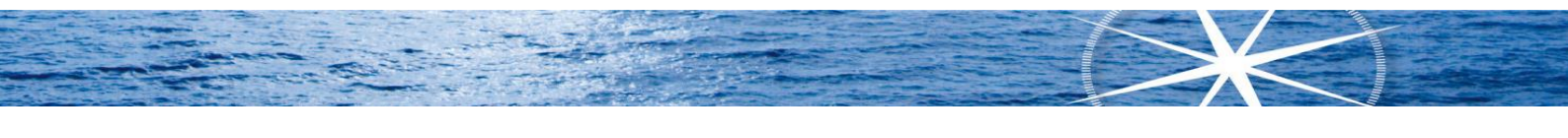
The Service Specification is technology agnostic, a logical description of the service. The Service Design describes the service with chosen technology or architectural style, in our case REST as decided in STM Validation project. The private design refers to the STM Module side, and the public refers to the description from SeaSWIM perspective. The STM Validation Project will implement the SPIS REST Design for optional use in the testbed.



### 3 References

More information can be found in the following documents.

Document	Link
SPIS Specification	<a href="http://stmvalidation.eu/service-catalogue/">http://stmvalidation.eu/service-catalogue/</a> -SPIS
SPIS Private REST Design	<a href="http://stmvalidation.eu/service-catalogue/">http://stmvalidation.eu/service-catalogue/</a> -SPIS
SPIS Public REST Design	<a href="http://stmvalidation.eu/service-catalogue/">http://stmvalidation.eu/service-catalogue/</a> -SPIS
Port Call Message Format	<a href="http://stmvalidation.eu/schemas/">http://stmvalidation.eu/schemas/</a> -PCM





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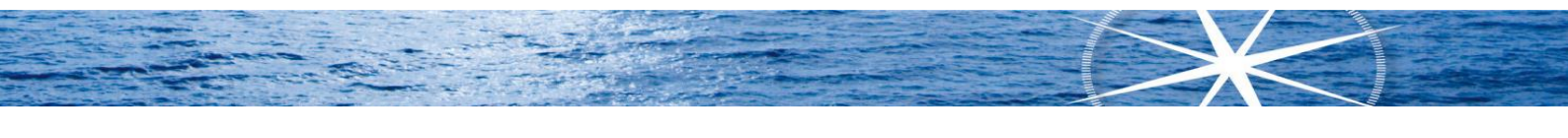
### **SAFETY - ENVIRONMENT - EFFICIENCY**

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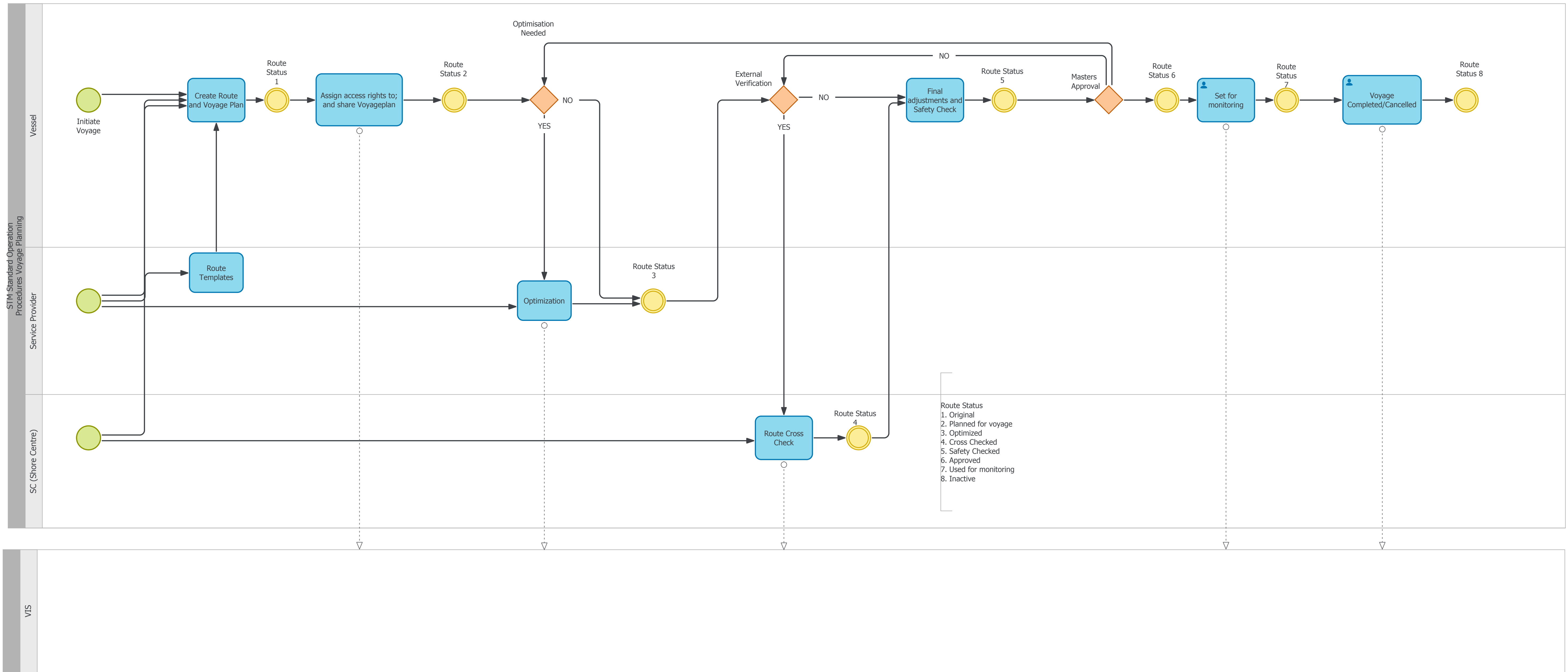
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# System Design Description Template

*Document No:*

*Title: Appendix 9 - System Design Description  
Template*

*Date:2016-11-17*



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## DOCUMENT STATUS

### Authors

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### Review

Name	Organisation
Mikael Olofsson (MO)	SMA
Per Löfbom (PL)	SMA
Björn Andreasson (BA)	SMA
Torbjörn Grape (TG)	SMA

### Approval

Name	Organisation	Signature	Date

### Document History

Version	Date	Status	Initials	Description
1.0	2016-11-17		HH	Used for specifying System Description

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# Table of Contents

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- 2. Proposed Content ..... 5

## **1. Purpose of this Document:**

- To assist suppliers when preparing the System Description

## 2. Proposed Content

1. Revision History
2. Block Diagram of STM Ship System
3. Schematic Diagram
4. Scope of supply
5. Description of the STM Ship System (based on below 5 bullets)
  - ECDIS functionality
  - Com. to ECDIS
  - STM Module
  - Communication between the STM Module and Online access point
  - Online access point
6. Project Management – Contract, FAT, SAT Plan

1. General Description of the STM Ship system and its functions, including but not limited to, STM Module, Online Access point, ECDIS functionality.

No	Name of function/part of system	Readiness Date	Requirement reference	Comments
		<b>To correlate with Project timeplan</b>	<b>In this column all technical requirements shall have been mentioned, one requirement might occur at several times</b>	
1	<p>e.g.</p> <ul style="list-style-type: none"> <li>● VIS – Voyage Information Service               <ul style="list-style-type: none"> <li>○ Publish VP to VIS</li> <li>○ SeaSWIM connector - Retrieve VP proposals from VIS - Send and receive VP, Text msg, Area via VIS</li> <li>○ Graphical notifications for VP updates (e.g. route suggestions)</li> <li>○ VP statuses by operator via RTZ format</li> </ul> </li> </ul>		<p>e.g. R-2.1:3</p> <p>e.g. R-3.4:2</p> <p>e.g. R-3.4:3</p> <p>e.g. R-3.4:4</p> <p>e.g. R-3.4:15</p> <p>e.g. R-3.6:4</p>	<p>e.g.</p> <p>ETA &amp; TTG status update by the deviation from VP, The STM ship system shall be able to give the VP and Unique Voyage ID (UVID)</p>
2	<p>e.g.</p> <ul style="list-style-type: none"> <li>● AIS ASM Msg 8 messages</li> </ul>		<p>e.g.</p> <p>R-3.2:1</p>	<p>e.g.</p> <p>Ship-to-Ship</p>

	<ul style="list-style-type: none"> <li>○ Route Rx/Tx. Appendix 6 –Route message format</li> <li>○ Including Route interrogation function over AIS</li> <li>○ Route sharing (Including ON-OFF setting)</li> <li>○ AIS target route segment presentation on charts</li> <li>○ STM AIS targets identification</li> </ul>		R-3.2:2 R-3.2:3	
Etc.	Etc.	Etc.	Etc.	Etc.

## **Procurement report**

This report is a summary of the Swedish Maritime Administration's (SMA) procurement of installations of Sea Traffic Management (STM) ship system prototypes for the STM Validation Project.

### **1. Introduction**

The SMA has previously conducted a procurement of STM ship system within the STM-project. The procurement resulted in contracts with three suppliers and they are currently working with a System Design Review as the first contractual milestone.

However, the SMA has recognized that for a full utilization of the project and to ensure the final goal of making a standard it would be a great advantage to add additional systems from other suppliers.

SMA has therefore made the decision to carry out an additional procurement of STM ship systems. This procurement is to be regarded as a separate process but together with the previous and finalized procurement it makes up to a whole.

SMA will sign a contract with one (1) supplier.

### **2. Procurement form**

This procurement was conducted in accordance with the Swedish Public Procurement Act (2007:1091) as an open procedure.

However, due to the initial condition where an open procedure did not permit any negotiation and moreover due to the circumstances, which arose during the procurement stage, the SMA has, decided to carry out this particular procurement as a negotiated procedure without prior publication.

### **3. Procurement notice and publication**

The procurement notice was made public through TendSign 21<sup>st</sup> of November 2016 and the latest date for submission of tenders was 9<sup>th</sup> of January 2017.

### **4. Tender Submission**

The company submitted a tender: Furuno Finland OY. The SMA has solely received one (1) tender.

### **5. Examination of tender**

Tender was examined for fulfilment of mandatory shall-requirements, both regarding requirements placed on the Supplier and on the scope of the deliveries.



At this stage, the tenderer and its tender fulfilled all the mandatory shall requirements as specified in the procurement documents. Nevertheless, the submitted tender did not clarify the fulfilment of a few should-requirements in regards of technical reason, in addition the offered price was considered to be unreasonably high and thus did not meet the procurement target for the number of systems that could be delivered within the project budget.

Therefore, the SMA required to conduct a negotiation without any substantial changes. Due to the initial condition and for the fact of the absence of competition, the SMA has, the procurement procedure pursuant to article 4 paragraph 5, the Swedish Public Procurement Act (2007:1091) to negotiated procedure without prior publication.

**6. Negotiations**

Subsequently, the SMA invited the tenderer to negotiation. The main objective of the negotiations was to ensure that both parties had the same view of the fulfilment of the requirements, to meet the project budget and to clarify any eventual technical issues without any substantial changes of requirements. The result of the negotiation was that Furuno could lower their price from 9 850 Euros to 6 950 Euros per system. This was possible due to clarifications regarding which ships that should be part of the testbed and the resulting simplified logistics.

**7. Evaluation of tenders**

The Evaluation of tender was performed according to the method “most economically advantageous”, i.e. both quality and price are considered, using the evaluation model described in the invitation to tender.

The evaluation would be performed according to a Value of Quality (VoQ) model (the value of fulfilled should-requirements), as per below:

**6. Tender sum**

Item	Price
Installation and configuration of STM ship system. All costs shall be included	6 950 Euro per ship system exclusive VAT
Hourly rate for development, adjustment to the System or other needs. Only applies to projects separately ordered by the Purchaser.	120 Euro per hour exclusive VAT

Tender sum – (minus) deductions for VoQ = Comparative value

In the below chart the should-requirements for VoQ are listed.

Please note that if a tender fulfils a should-requirement and the tender was given an additional value in the evaluation, the Tenderer is bound to fulfil the should-requirement when delivering.

Item	Quantity that was evaluated

Deployment of the abilities for one ship according to the scope in section 1.6. All costs shall be included	1 ship system
Hourly rate for development, adjustment to the System or other needs. Only applies to changes/amendments separately ordered by the Purchaser.	1 hour
<b>Criterias</b>	<b>VoQ if fulfilled (Euro)</b>
The offered STM-system is not already part in the project	1000
R-2.1:12	270
R-3.2:4	210
R-3.2:5	180
R-3.2:6	210
R-3.4:5, R-3.4:6 and R-3.6:2 <sup>1</sup>	240
R-3.4:16	240
R-3.5:2	180
R-3.5:5	240
<b>Maximum VoQ</b>	<b>2 770 Euro</b>

## 8. Result of the evaluation

The result of the evaluation after the negotiation is that tenderer fulfilled all VOQ and therefore was given maximum VoQ.

The comparative value for the tender resulted s below:

$$6\,950 \text{ Euro} + 120 \text{ Euro} - 2\,770 \text{ Euro} = \underline{\underline{4\,300 \text{ Euro}}}$$

However the below criterias will be fulfilled latest 2017-12-01. This does not change the VoQ.

- R-3.2:4 CPA calculation
- R-3.2:5 Deviation from intended route
- R-3.2:6 Trial Manoeuvre

## 9. Contract Award

Based on the examination of shall-requirements and the evaluation of above criteria's, it is recommended that the contract and final allocation to the tenderer is awarded to the following:

- Furuno Finland OY with corporate ID - 17546608

The final allocation of 43 systems with the total budget of 298 850 euro is made accordingly for this procurement.

For and on the behalf of the Swedish Maritime Administration (SMA)

25th of January 2017

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<sup>1</sup> All 3 requirements must be fulfilled to give VoQ

Per Kyhle



## Furuno delivers 43 STM systems

One of the leading ECDIS-suppliers, Furuno, will provide 43 ships with Sea Traffic Management-compatible on-board systems. Test Manager Björn Andreasson of Swedish Maritime Administration is content: “To have a fourth supplier delivering systems proves the general interest in the STM concept. The future developments of STM will be driven by commercial actors like Furuno.”

Tero Airissalo, Sales & Marketing Manager at Furuno explains: “Furuno is striving to be among the first with new technology and solutions. We recognise the long-term benefits of STM in the form of higher security and safety, increased efficiency and a good impact on the environment. But STM is also beneficial in the near future. In the current test, customers using our system will save a lot of fuel through better optimised routes and better timing of the port call arrival.”

The detailed specification of the requirements and interfaces is a major step towards making the vision of the open standard connected ship real. The Sea Traffic Management test introduces an infrastructure supporting maritime actors in providing and consuming services as well as information machine-to-machine, with more automated procedures than can be achieved today. The development of Sea Traffic Management is open, and all interested parties are invited to join as associate partners and take part in the development of the future.

Supplied services during the test include route optimisation, enhanced monitoring, port call synchronisation, ship-to-ship route exchange and many more. Fuel can be saved, port call efficiency increased and accident risk reduced.

The STM test beds will include 300 ships, 13 ports and several shore centres.

### **Seaing is believing!**

#### ***For more information, contact:***

Ulf Siwe, Communications Manager, Swedish Maritime Administration +46 10 478 56 29, or

Björn Andreasson, Test Manager, Swedish Maritime Administration +46 10 478 46 30

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Wärtsilä SAM Electronics ◦ University of Flensburg ◦ Airbus ◦ Maritiem Instituut Willem  
Barentsz ◦ SAAB TransponderTech AB ◦ University of Oldenburg ◦ Magellan ◦ Furuno  
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