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Authors

Name	Organisation
Claire Pekcan	Warsash Maritime Academy
Scott MacKinnon	Chalmers
Katie Aylward	Chalmers
Reto Weber	Chalmers

Review

Name	Organisation
Reto Weber	Chalmers

Approval

Name	Organisation	Signature	Date

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Abbreviations

Abbreviations used in this document

ATM Air Traffic Management

CoC Certificate of Competency

DIS Distributed Interactive Simulations

EMSN European Maritime Simulator Network

HF Human Factors

projectplace web-site used in the STM Validation project to store documents

SC Shore Center

STM Sea Traffic Management



1 Introduction

1.1 Background

The aim of the Sea Traffic Management (STM) concept is to use more of a Need-to-Share attitude instead of Need-to-Know approach, as is mostly practiced today. With greater use of System-wide Information Management at sea, the maritime domain can move closer to the air traffic control concept of sharing voyage plans among parties both in tactical and executional situations. STM can provide captains with the optimal available voyage plans for their ships in terms of minimal fuel consumption, shortest route, or other criteria chosen by captains. The voyage plans will be optimized, calculating with real-time data, such as info from met-providers, ports, biodiversity areas, and MSI, etc. all in order to gain the optimal way to go. The routes will be shared and available among other vessels in order to increase the on-board situational awareness as vessels approach potential collision points.

Sea Traffic Management (STM) – a methodology similar to Air Traffic Management, (ATM) – can offer, suggest and monitor alternative routes that will increase overall vessel performance. Likewise, this will be achieved by the introduction of a new service facility: a Shore Center (SC), similar to Air Traffic Control Centers, providing new processes and methodologies of exchanging data between ship and shore, and ship-to-ship.

1.2 Scope and Purpose

The primary purpose of the simulations held in the European Simulator Network (EMSN) is to gain experience with STM features and services to understand how involved persons and institutions deal with its capabilities. This is done in a simulated environment, which saves large amounts of time, costs and environmental impact.

The scope and purpose of this document is to provide general guidelines on how the test persons and data collection are managed in the STM EMSN simulations.

2 Test Person and Data Collection Management

2.1 General

Since the focus of the simulation is to gather data (e.g. a Formal Safety Assessment or to evaluate a hypothesis), the aim of the data collection is to gather purposeful data which can later be analysed. The data is both collected and analysed from a “quantitative/numerical perspective”, e.g. reduction of close quarter situations, and a “qualitative perspective”, e.g. HF data based on the test participants, collected mostly from web-based questionnaires and open-ended debriefings. Other data collected may pertain to the usability of the services envisaged in the STM. The EMSN Scientific Coordinator together with the EMSN Technical Coordinator and the EMSN Simulations Manager need to ascertain which data needs to be collected or measured, how this is to be done in the local simulator centres and finally how the data will be evaluated.

2.2 Data collection in EMSN simulations

2.2.1 Numerical data: Centralized data tracking and storage

Document STM_D3.2.1 EMSN Technical Description provides details as to which parameters are tracked for each DIS entity and how this data is stored on a server located at CML Fraunhofer. After each simulation campaign, this data is made available for project members on projectplace for further, mainly numerical analysis.



2.2.2 Qualitative data collection

2.2.2.1 Questionnaires

Web-based questionnaires are prepared and made available by the EMSN Scientific Coordinator on Qualtrics' using online survey software <https://www.qualtrics.com/research-core/survey-software/>. This software allows for multiple users at the same time, since the experimental design requires the test persons to answer the questionnaires at the same time after each simulation. Qualtrics also allows for easy access to the data collected from multiple data users, which allows the analysers of the data to be distributed geographically.

The questionnaires are written in basic level English, which must be easy to understand by non-native English speakers.

When preparing the computers/iPads on which the questionnaires will be filled in, it is important to ensure that there will be a stable internet connection throughout the entire duration of data collection. The EMSN Scientific Coordinator must also prepare a "Shortcut" link on each of the computers/iPads so that the questionnaires are easily accessible by test persons.

The questionnaires gather the following type of information:

- Demographic data of the test persons, including background information both with regard to their previous experience from navigating ships and simulators, as well as their experience with non-technical skills. The latter may include questions related to computer gaming, computer and smart phone habits and other such matters. This questionnaire should be completed prior to participation in simulation exercise, and also includes test persons electronic Informed consent.
- A workload analysis, designed based on the NASA TLX (a subjective assessment tool that rates perceived workload in order to assess a task). This type of questionnaire should be completed by test persons throughout the simulations at pre-determined intervals.
- Test persons assessment of EMSN services including; likeness, usefulness, usability and similar questions. These questionnaires should be filled in by the test persons immediately after the simulations are finished.

2.2.2.2 Open ended debriefings

The purpose of the group debriefings at the end of the day is for the test participants to provide an account of their experiences with the STM services, both positive and negative in a non-bias environment. The participants should be encouraged to explain the motivation of their response. The structure for the debriefings is to be consistent for all simulation centres and is defined by the EMSN Scientific Coordinator. The debriefings should either be recorded or several project members should be assigned to take notes on the test persons responses.

2.2.2.3 Qualitative Data Tracking and Storage

Each participant is assigned a unique identification number (ID) prior to arrival, which is used for all data collection throughout the study to maintain confidentiality. Based on this system, the test persons are no longer identifiable and are therefore not personally linked to any data. The qualitative data is uploaded to projectplace for project members to access.

All written informed consent forms are stored in a locked cabinet designated by the EMSN Scientific Coordinator.

Any personal data (e.g. contact details, current position, etc.) collected by each simulation centre is to be destroyed at the end of the STM project in December 2018.



2.3 Bridge manning

2.3.1 Qualifications of test persons

The simulator bridges are to be manned by two deck officers forming a navigator/co-navigator team. One of the officers is required to have experience in a senior position on board and preferably have a Master Mariner CoC. The other officer may be a junior officer with a 3rd Mate's license, or a senior student of the Master Mariner program. Language prerequisite is English as several nationalities are a part of the EMSN.

2.3.2 Research ethics

Participants are to be fully informed of the procedures and risks of the experiment and must sign electronic and written Informed Consent prior to the start of the simulations. The experiment complies with the requirements of article 28 of the EU General Data Protection Regulation (2016/679) regarding protection for physical persons in the processing of personal data. Each participant is assigned a unique identification number (ID) prior to arrival, which is used for all the questionnaires throughout the study to maintain confidentiality. The format of such unique ID number is defined by the EMSN Scientific Coordinator.

2.4 Practical things

2.4.1 Involved and non-involved personnel and others on the bridges

It is anticipated that the simulation tests will create some interest from staff and others who are not normally working with the EMSN simulations. However, since the exercise focuses on gathering data based on human behaviour, it is absolutely crucial that the test persons are allowed to operate the simulated vessels on their own on the bridges and that NO other people are on the bridges during the simulations. Data gathered where persons other than the test persons are present (simulator personnel handling technical problems are excluded) cannot be used and thus the participation of the simulator centre deemed void.

Also, from experience it is strongly recommended that non-involved personnel and non-involved others are not allowed to disturb work during the simulations, including the morning brief and the evening debrief. It is crucial that personnel working with the simulations are allowed to fully concentrate on the simulations and the collection of data.

Thus, during the simulations, the following applies regarding involved and non-involved personnel and others on the bridges.

- **NO other persons should be allowed to enter the bridges during the simulations.**
- Only the test persons should be on the bridges during the simulation tests.
- If the test persons have a problem with the equipment, the problem should be resolved by the simulator staff, who shall leave as soon as possible after the problem is resolved.
- Avoid allowing other non-involved personnel and others into the simulator area.
- Photo opportunities, presentations to externals, etc. should be handled at other times than during the simulations.



3 Reference Material

The following documents are found on <https://service.projectplace.com>:

- STMVal_D3.14 EMSN Management and Coordination Plan (this document)
- STM_ID3.2.1 EMSN Technical Description
- STM_ID3.1.1 EMSN Test Plan and General Exercise Specification
- STMVal_D3.15 EMSN- Integration Test Report
- STM_ID3.2.2 EMSN Integration and Maintenance Tests
- STM_ID3.2.3 EMSN-DIS Interface and Allocation
- STM_ID3.2.4 EMSN-Pilot Test Plan and Exercise Specification
- EMSN STM-ECDIS Technical Manuals
- Shore Centre - Technical Manuals
- STM Services - Technical Documentation, manuals, quick guides, videos
- Specific Exercise Scenarios and Schedules
- STM Operational Procedures and Guidelines



4 Annex

4.1 Informed Consent Form

Risks/Discomforts: The risks are minimal for involvement in this study. You may experience periods of high concentration when you are in the simulator, but there should be no after-effects of participating in the project.

Benefits: There are no direct benefits for participants. However, it is hoped that through your participation, we will learn more about what how to make the maritime sector safe, efficient and environmentally friendly.

Confidentiality

All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). Your responses are anonymized, and no individual will be identifiable, nor will any ship be identifiable. Furthermore, it will not be possible to identify any individual responses in any analysis or report.

All questionnaires will be concealed and no one other than the STM Project Staff will have access to the data. The data collected will be stored in the Qualtrics-secure database until it has been deleted. Only the Human Factors and Scientific Coordinators from the project staff will have access to this database. All data will be held on a password protected server, compliant with the requirements of article 28 of the EU General Data Protection Regulation (GDPR, 2016/679) regarding protection for physical persons in the processing of personal data.

Participation

Participation in the STM Project is completely voluntary. Participation in the STM Project involves completing this questionnaire, taking part in bridge simulator exercises on one or more days, and completing exercises during and after the simulator sessions.

You have the right to withdraw at any time or refuse to participate entirely without jeopardy to your employment status or your standing with your employer. If you desire to withdraw after you have completed this survey, please notify me at this email address scottm@chalmers.se. You do not have to give a reason.

How will my privacy be protected?

Your personal data will be handled in compliance with the EU General Data Protection Regulation and in a manner that does not infringe your personal integrity. To withdraw your application to EMSN simulations and hence the data gathered send an e-mail to ulf.siwe@sjofartsverket.se.

Any information held on computer or in a database identifying project participants will be separated from the data sets and will be destroyed at the end of the data gathering phase of the research in December 2018 and will never be passed to your company or any third parties. Following completion of the data gathering phase, contact details will be destroyed.



Questions about the research: If you have questions regarding this study, you may contact me, Professor Scott MacKinnon +46 (0) 73 1542592 or email: scottm@chalmers.se

Questions about your rights as project participants: If you have questions you do not feel comfortable asking me, you may contact the Project Lead Coordinator: Per.Setterberg@Sjofartsverket.se

I have read and understood the above consent form and desire of my own free will to participate in this study.

Signature:

Place and Date:

Print Name:



4.2 Participating Simulator Centers

Simulator Center	Available Bridges (OS)	Sim Manufacturer	Location
Chalmers	2 (3)	Transas	Gothenburg, Sweden
SMA	3	Transas	Gothenburg, Sweden
Centro Jovellanos	4	Kongsberg	Gijón, Spain
Fraunhofer CML	3	Rheinmetall / Transas	Hamburg, Germany
Aboa Mare	3	Transas	Turku, Finland
SSPA	1	SSPA	Gothenburg, Sweden
Warsash Maritime Academy	2	Kongsberg	Warsash, England
FH Flensburg	3	Transas	Flensburg, Germany
Willem Barentsz	2	Kongsberg	Terschelling, Netherlands
SS Rörvik	5	Transas	Rörvik, Norway
UPC Barcelona	2	Transas	Barcelona, Spain
Associate Partners			
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NORDLAB	1	Kongsberg	Bodö/Norway





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