



Co-funded by the European Union

DigiMar Project Presentation: Compiling Authentic Routine VHF Maritime Communication Database

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Objectives of DigiMar Project

to **enhance navigational safety**, measured through statistically significant **differences (gap analysis) in the maritime communication skills of shore service (VTS) operators and higher education students before and after the implementation of the digital educational pilot study** enacted through instructional videos and chatbots, and potentially to contribute to a reduction of human, environmental, societal, and/or economic losses resulting from maritime accidents.





Outline

- Introduction
- The aim of DigiMar Project Work Package (WP) 2.3
- Methodology
- Results
- Conclusion

Introduction

- Language of maritime VHF communications is considered a special subtype of maritime English.
- The various risks associated with the navigation of ships, the development of technology and the increasing number of multinational and multilingual crews require the language of maritime VHF communications to be standardized.
- For this purpose, the *Standard Marine Communication Phrases* (SMCP, 2001) were developed by the International Maritime Organization (IMO) to contribute to safety of navigation, i.e., to standardize the language used in communications at sea, in port approaches, fairways, ports, and on ships with multilingual crews.
- The application of Standard Marine Communication Phrases in external communication (ship-to-ship and ship-to-shore) must be strictly harmonized with the applicable radio-telephone procedures, as prescribed in the International Radio Regulations of the International Telecommunication Union (2016) and IALA *G1132 Guideline: VTS VHF voice communication* (2022).
- The following slides describe the process of assembling the Authentic Routine VHF Maritime Communication Database and results of the analysis.



The aim of DigiMar WP 2.3

- to create authentic routine VHF maritime communication database encompassing shore service operators' communication with ships across several geographical areas in order to conduct a pre-educational pilot study
- to extract typical samples of routine VHF maritime communication exchanges for each geographical area under investigation and align them with the standard protocol of routine VHF maritime communication
- analysis carried out to determine to which extent the authentic VHF exchanges adhered to the standard recommendations and guidelines.



Methodology

The compilation of a database of authentic VHF maritime communication exchanges included the following stages:

- collection and preparation of authentic exchanges,
- transcription and marking the variables,
- analysis,
- identification of typical authentic routine maritime communication exchanges,
- alignment of selected samples of authentic routine maritime communication exchanges with the standard protocol of routine maritime communication (defined in WP 2.1)

Methodology

- In order to compile a spoken specialized pre-educational pilot-study database of authentic routine maritime VHF communications, higher education institutions (HEI) collected authentic routine VHF maritime communication exchanges from maritime safety authorities (MSA) in their respective geographical areas.
- The recordings were sent in audio/video file formats (.wav, .mp3, .mp4 or similar) to the corresponding HEIs, who transcribed the audio files according to the predefined template.
- In the preparation stage, the lead partner defined and described the guidelines and the format for transcription, analysis and alignment to achieve the comparability of results from different geographical areas.

Methodology

	MSA		HEI
1.	Fintraffic Vessel Traffic Services ltd (E10330679 - FI)	▶	AB YRKESHOGSKOLAN VID ABO AKADEMI (E10166177 – FI)
2.	UPRAVA POMORSKE SIGURNOSTI I UPRAVLJANJA LUKAMA (E10329943 - ME)	▶	University of Montenegro, Maritime faculty Kotor (E10027767 – ME)
3.	Ministarstvo za infrastrukturo, Uprava republike Slovenije za pomorstvo (E10330447 - SI)	▶	UNIVERZA V LJUBLJANI (E10209243 – SI)
4.	Swedish Maritime Administration (E10329737 -SE) Norwegian Coastal Administration (E10330365 - NO)	▶	CHALMERS TEKNISKA HOEGSKOLA AB (E10209418-SE)
5.	Ministry of the Sea, Transport and Infrastructure (Republic of Croatia)	▶	University of Rijeka

Methodology (transcription guidelines)

- In the transcription stage, exclude all exchanges in the local language, pauses and stutters from the written transcript (except when local language is used in the middle of the conversation in English; then it is placed in brackets).
- Transcribe unintelligible words according to previously agreed transcription rules.
- In case of pauses of significant length, transcribe them as (...)
- Any entry, extralinguistic information (such as noise, interference, etc.) to be transcribed within double brackets (()).
- Transcribe numbers as words.
- Anonymize the transcripts (according to the General Data Protection Regulation) by removing the names of vessels (replace with Vessel/Tug/Pilot according to the situation), names of places (replace with Place/Name) and shore services (replace with Station).
- Segment the transcribed text into moves and turns.
- Place the parts spoken by VTS operators in a separate column from the parts spoken by other participants (bridge crew, pilots, tugs).
- Number each communication exchange and mark its purpose
- Assign a value 0 or 1 to the variables in all turns; all variables will be evaluated at the level of the turn, except the variable entitled "completeness of conversation" which will be evaluated at the level of the entire conversation exchange.
- Place the communication exchange in the appropriate tab in the excel sheet, add a tab if necessary
- Communication exchanges should be grouped according to the dominant topic of the conversation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2	EXCHANGE 1												
3	PURPOSE: MARITIME REPORT			<i>STATE ADDRESSEE</i>		<i>IDENTIFY CALLING STATION</i>		<i>IDENTIFY (NAME)</i>		<i>USE OF OVER</i>			
4						(This is)		(station's name)				QUESTION	
5	MOVES	VESSEL	VTS	Expected	Observed	Expected	Observed	Expected	Observed	Expected	Observed	Expected	Observed
6	<i>CONTACT</i>	VTS Station, VTS Station. Vessel	Vessel. VTS Station	1	1	1	0	1	1	1	0	0	0
7		Yes, Sir. Good morning. I am about now to pass reporting point. Over.	Good morning, Vessel. What is your cargo on board?	1	0	1	0	1	0	1	0	1	1
8		My cargo on board is MTBE.	MTBE. Please, give me quantity of cargo	1	0	1	0	1	0	1	0	1	1
9		Quantity is four nine nine zero decimal zero five two metric tons. Class three cargo. Over.	OK, copy that. Your maximum draft on arrival	1	0	1	0	1	0	1	0	1	1
10		Maximum draft on arrival is seven decimal zero five metres. Over.	B() figures for arrival, fuel oil, diesel oil, lub oil quantity on board. Over.	1	0	1	0	1	0	1	1	1	1
11	<i>EXCHANGE</i>	Diesel oil is ninety decimal eight one, lub oil eight zero zero five litres and fuel oil is one three five decimal six eight tons. Over.	Ok, that. Total persons on board, over.	1	0	1	0	1	0	1	1	1	1
12		Total persons on board is fourteen, including master. Over.	Vessel, your ETA to PlaceName. Over.	1	1	1	0	1	0	1	1	1	1
13		ETA to PlaceName Pilot is zero five zero zero. Over.	Vessel, thank you for your call. And please contact PlaceName Traffic one, one and a half hour before arrival for berthing prospects, channel zero-nine. Now keep watch on one four one six. Have a good watch. VTS Station out.	1	1	1	0	1	0	0	0	0	0

Analysis

HEIs collected and transcribed authentic VHF exchanges from their respective areas, resulting in a specialized spoken pre-educational pilot-study database of authentic routine maritime VHF messages. The database contains a total of 1654 exchanges.

- Analysis of variables related to organisation of turns ('this is', 'over', 'out')
- Analysis of variables related to message markers (Information, Advice, Warning, etc.)
- Analysis of variables related to syntactic ellipsis 'Fully worded question', 'Fully worded answer', 'Use of S+V+O structure' and 'Simple sentence'
- Analysis of variables related to letters, digits, modal verbs and abbreviated forms
- Analysis of variables related to prowords ('copy', 'received', 'stand by')

Results and Conclusion

Authentic VHF maritime conversations show deviations from the standard protocol especially in some elements, e.g. addressing and identifying, the use of over and out, fully formed questions, modal verbs, etc.

The omissions seem to be for reasons of language economy, while the repetitions, although sometimes necessary, take a lot of time.

The expressions which are not recommended by the relevant documents (e.g., modal verbs or prowords such as *copy* or *roger*) are used and clearly understood by the other speakers.

Therefore, this analysis of authentic recordings implies that it would be necessary to reconsider some parts of the standard VHF maritime protocol and to (re)define them.