



Co-funded by
the European Union

DIGIMAR

KA220-HED-0002/2023

Recommendations for a Revision of the Standard Protocol of Communication

Authors: DigiMar Consortium

September 2026

Table of Contents

1. List of abbreviations.....	1
2. Executive summary	3
2.1. Purpose of this document.....	3
2.2. Why the study was undertaken	3
2.3. Research evidence collected.....	4
2.4. Major findings	4
2.5. Benefits for the maritime community	4
3. About the Digimar project	5
3.1. Project overview	5
3.2. Main objectives.....	6
3.3. Data and research evidence collected.....	6
4. Recommendations for the Revision of the Maritime Communication Standard.....	8
4.1. Greater emphasis on closed-loop communication.....	9
4.2. Use of message markers in VTS communications	9
4.3. Alignment and clarification of procedural words	10
4.4. Standardisation of syntax and vocabulary.....	11
4.4.1. Syntax.....	11
4.4.2. Vocabulary	12
4.5. Communication structure and station identification	12
4.5.1. Station identification	12
4.5.2. Turn-taking procedures	13
4.6. Modality and ambiguity	13
4.7. VTS Operators' competencies, training and assessment	13
4.7.1. Recurrent training and continuous professional development	14
4.7.2. Authentic and region-specific training scenarios	14

4.8. Maritime English framework and harmonisation.....	15
4.8.1. Recognition of VTS communication.....	15
4.8.2. Standardised performance indicators	15
5. Conclusion	17
6. References	18
7. Annexes.....	20

1. List of abbreviations

Abbreviation	Full term
AI	Artificial Intelligence
AIS	Automatic Identification System
COLREG	Convention on the International Regulations for Preventing Collisions at Sea
CPD	Continuous Professional Development
DigiMar	Digital Education for Maritime Communication
EMSA	European Maritime Safety Agency
ESP	English for Specific Purposes
GMDSS	Global Maritime Distress and Safety System
HEI	Higher Education Institution
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organization
ITU	International Telecommunication Union
MET	Maritime Education and Training
MSA	Maritime Safety Administration
OOW	Officer of the Watch

SMCP	Standard Marine Communication Phrases
SOLAS	International Convention for the Safety of Life at Sea
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
VHF	Very High Frequency
VTs	Vessel Traffic Service

2. Executive summary

This document presents the key recommendations developed within the Erasmus+ KA220-HED Digital Education for Maritime Communication (DigiMar) project. Based on comprehensive research and collaboration between HEIs and MSAs, the document proposes evidence-based recommendations for the future revision and harmonization of international maritime communication standards. The recommendations are intended to support safer, clearer, and more consistent maritime communication and to contribute to the continuous improvement of international maritime communication practices.

2.1. Purpose of this document

The purpose of this document is to present evidence-based recommendations for the future revision and harmonization of international maritime communication standards. The recommendations are intended to support international organizations and standard-setting bodies in strengthening communication procedures, improving navigational safety, and promoting greater consistency in maritime communication practices.

2.2. Why the study was undertaken

The study was undertaken in response to the increasing importance of effective and standardised maritime communication in ensuring navigational safety. Although comprehensive international communication standards and guidance documents are available, previous research and operational practice have revealed differences in terminology and communication procedures and highlighted the need of aligning the IALA, ITU and IMO guidelines on VTS communications. The DigiMar project therefore sought to identify communication practices that may benefit from further clarification, harmonisation, and standardisation through evidence-based research.

The project brought together HEIs, following communication standards “by the book”, and MSAs, providing valuable feedback from operational experience. These combined perspectives highlighted the interaction between theory and practice and provided valuable recommendations for their better harmonisation and alignment.

The post-intervention courses, where the project results were delivered to a wider audience and subsequently tested, significantly improved participants’ (HEIs and MSAs) use of procedural words and the overall structure of communication, while supporting knowledge refreshment among MSA operators, particularly regarding address and identification procedures, and message markers.

MSAs provided valuable feedback, emphasising the need to reserve the right to adapt or shorten communication when their operational experience and the specific communicative situation, particularly in safety-critical contexts, dictate so.

2.3. Research evidence collected

The recommendations presented in this document are based on evidence collected throughout the DigiMar project using multiple complementary research approaches. These include the review of international maritime regulations and guidance documents, corpus-based analyses of authentic VTS communications and student simulations, accident investigation reports, benchmarking activities, surveys and interviews with maritime professionals, the development and evaluation of digital educational tools, and educational pilot studies. The continuous involvement of MSAs ensured that the findings reflect both regulatory requirements and contemporary operational practice.

2.4. Major findings

The research identified several communication elements that continue to present operational challenges due to inconsistent application, ambiguity, or differences among existing international standards. The findings particularly highlight the need for greater standardisation of communication procedures, message markers, procedural words, communication repair strategies, station identification, communication structure, and VTS communication competencies. The study also demonstrated the importance of closer harmonisation between the principal international maritime communication documents.

2.5. Benefits for the maritime community

The recommendations presented in this document are intended to support international organisations, MSAs, VTS providers, training institutions, and maritime professionals in strengthening communication practices and improving navigational safety. These recommendations are intended primarily for policymakers and international regulatory and standard-setting bodies, particularly IMO, ITU, and IALA, which are in a position to support greater alignment and harmonisation of the key international documents governing maritime communication. Particular attention should be given to the IMO SMCP as a central reference framework connecting the principal actors involved in maritime VHF communication, including both seafarers and VTS operators.

3. About the Digimar project

Digital Education for Maritime Communication (DigiMar) is an Erasmus+ KA220-HED – Cooperation Partnerships in Higher Education project, coordinated by the University of Ljubljana, Faculty of Maritime Studies and Transport, Slovenia. The project runs from 1 October 2023 to 30 September 2026 (36 months).

The DigiMar project is implemented by a consortium of HEIs and MSAs from five European countries. Together, the project partners contribute complementary academic, operational, and technical expertise, ensuring the successful implementation of the project activities and the achievement of its objectives. The participating organisations are listed below.

1. HEIs:

1. Applicant - UNIVERZA V LJUBLJANI (Slovenia)
2. AB YRKESHOOGSKOLAN VID ABO AKADEMI (Finland)
3. CHALMERS TEKNISKA HOEGSKOLA AB (Sweden)
4. Sveučilište u Rijeci (Croatia)
5. University of Montenegro, Maritime faculty Kotor (Montenegro)

2. MSAs:

6. Fintraffic Vessel Traffic Services Ltd (Finland)
7. Ministrstvo za infrastrukturo, Uprava Republike Slovenije za pomorstvo (Slovenia)
8. Norwegian Coastal Administration (Norway)
9. Swedish Maritime Administration (Sweden)
10. UPRAVA POMORSKE SIGURNOSTI I UPRAVLJANJA LUKAMA (Montenegro)

The project consisted of five work packages: WP1 Project Management; WP2 Maritime Communication Standard- and Data-based Content Development; WP3 Digital Educational Tool Development, Deployment and Evaluation; WP4 Maritime Communication Standard- and Data-based Benchmarking; and WP5 Exploitation and Dissemination.

3.1. Project overview

Digital Education for Maritime Communication (DigiMar) is an Erasmus+ KA220-HED Cooperation Partnership in Higher Education implemented from 1 October 2023 to 30 September 2026 and coordinated by the University of Ljubljana, Faculty of Maritime Studies and Transport. The project brings together HEIs and MSAs from several European countries, combining academic expertise with operational maritime experience.

DigiMar was developed in response to the need to improve routine maritime communication and reduce communication-related risks to navigational safety. The project focuses on strengthening the maritime

communication skills of maritime students and shore-based maritime service operators through research-based and innovative digital learning solutions.

A central feature of the project is the use of authentic maritime communication data as the basis for research, education, and training. The project combines the analysis of international maritime communication standards and accident reports with authentic ship–shore communication data and student simulations. These complementary sources provide the research basis for the development and evaluation of digital educational tools, the benchmarking of maritime communication performance, and the formulation of research-based recommendations for the revision of the standard protocol of maritime communication.

Through its five interconnected work packages, DigiMar moves from the analysis of communication standards and authentic communication practices, through the production of open-access instructional videos and the development of educational chatbots, both available at digimar.si and designed to support the practice of VHF communication across a range of operational communicative situations, to the evaluation of these digital educational tools, the benchmarking of communication performance, and the development of these research-based recommendations for the revision of the standard protocol of maritime communication.

3.2. Main objectives

The DigiMar project aims to improve the quality, consistency, and effectiveness of maritime communication through research, digital education, and international cooperation. Its main objectives are to analyse authentic maritime communication practices, identify communication elements affecting navigational safety, develop innovative digital learning resources, strengthen communication competencies among maritime professionals, and formulate evidence-based recommendations for the future revision and harmonisation of international maritime communication standards.

3.3. Data and research evidence collected

The recommendations presented in this document are based on comprehensive evidence collected throughout the DigiMar project. The research combined multiple complementary methods, including the review of international regulations, standards, and guidance documents, analyses of authentic VTS communication corpora, accident investigation reports, benchmarking activities, surveys and interviews with maritime professionals, as well as the development, implementation, and evaluation of digital educational tools through pilot studies.

The evidence was collected and analysed through several interconnected work packages, integrating qualitative and quantitative research approaches. The continuous involvement of HEIs and MSAs ensured that the findings reflect both scientific evidence and contemporary operational practice, providing a robust basis for the recommendations presented in this document.

The analysis and project activities generated the following research evidence:

- **57 marine accident and incident reports** retrieved from nine international marine accident databases, covering the period **2011–2023**;
- **16 spoken corpora** collected from HEIs and MSAs in **Slovenia, Croatia, Finland, Sweden, Norway, and Montenegro**, comprising:
 - **12,551 communication turns** in total, including **4,449 turns** from student simulations and **8,102 turns** from authentic VTS communications;
 - **3,486 communication exchanges** in total, including **1,654 pre-educational exchanges** and **1,832 post-educational exchanges**;
 - **46,966 words** of transcribed authentic VTS communications;
 - **45 hours and 59 minutes** of transcribed authentic VTS communications;
 - authentic VTS communication data collected from **five European geographical areas**;
- **58 maritime communication simulation scenarios**, comprising **26 pre-educational scenarios** and **32 post-educational scenarios**;
- **85 students** who participated in the **post-educational pilot study**;
- evaluation of the developed **digital educational tools through 11 multiplier events**, involving **more than 500 participants**.

Open-access digital educational resources involved 30 instructional videos (20 Basic Training and 10 Advanced Case-Based Training) published on the DigiMar project website (www.digimar.si).

4. Recommendations for the Revision of the Maritime Communication Standard

This document presents the policy recommendations arising from the DigiMar project. More detailed information about the DigiMar project, including its methodology, analyses, work package activities, and supporting empirical evidence, is provided in the accompanying Activity Report derived from WP 4.5 (Annex 1).

The quantitative and qualitative statistical analyses conducted within the project identified several communication elements that consistently exhibited low compliance rates in both authentic VTS communications and student simulations. These elements represent high-risk areas because their omission, inconsistent application, or incorrect interpretation may lead to misunderstandings, delayed responses, improper execution of navigational instructions, and ultimately compromise navigational safety.

The following recommendations are therefore aimed at strengthening these critical communication elements, improving the consistency and standardisation of maritime communication practices, and supporting future revisions of international maritime communication standards. Particular consideration is given to areas where new or revised international guidance may be needed, as well as to those already adequately addressed by existing standards, guidelines, or training frameworks, but where more consistent implementation, training, supervision, and follow-up by VTS providers and MET institutions could further strengthen communication practices.

1. Greater Emphasis on Closed-Loop Communication
2. Use of Message Markers
3. Alignment and Clarification of Procedural Words
4. Standardisation of Syntax and Vocabulary
5. Strengthening Standardised Communication Structure
6. Modality and Ambiguity
7. VTS operators' Competencies, Training and Assessment
8. Maritime English Framework and VTS Communication

4.1. Greater emphasis on closed-loop communication

According to IALA VTS Communication and Phraseology “Closed-loop communication is a technique used to avoid misunderstandings. The sender gives a message, the receiver repeats a received message, or an appropriate part thereof, back to the sender to obtain confirmation of correct reception” (IALA, 2022, 19).

Closed-loop communication procedures should be strongly emphasised for all communications involving navigational instructions, traffic organisation, pilotage, berthing, emergency response, and other safety-critical operations.

- It is recommended to promote the appropriate use of closed-loop communication according to the nature, complexity, and safety significance of the message.
- Clear guidance and practical examples should be provided to assist VTS operators and other users in identifying situations where acknowledgement, read-back, and confirmation are particularly important for safe and effective communication.
- The use of closed-loop communication should be adapted to specific operational situations, particularly in heavy vessel traffic and confined waters, where its extensive use could compromise language economy and communication efficiency.
- Greater awareness should be raised among both seafarers and VTS operators of the importance of responsiveness in maritime communication, particularly in safety-critical situations.

4.2. Use of message markers in VTS communications

Eight message markers are defined in the IMO SMCP, seven of which are frequently used by VTS, and IALA (2022) guidance recommends that the appropriate message marker be spoken before the message

- Message markers should precede all operationally relevant transmissions to clearly indicate communicative intent, facilitate prioritisation of information, and reduce ambiguity in multilingual communication environments.
- The use and meaning of message markers are already addressed in existing IALA guidance (2022). Due to observed instances of inconsistent use of certain message markers, the relevant IALA guideline and IMO SMCP could be further reviewed and expanded with additional explanations and authentic operational examples. This would support both VTS operators and maritime education and training institutions in applying and teaching them more consistently.
- When it comes to the potentially interchangeable use of message markers, clear guidance on their use should be provided, as message markers such as *Instruction*, *Warning*, and *Request* may be used differently depending on the operational context.
- IALA (2022, 9) provides a more detailed explanation of the message marker *Instruction*, specifying that it indicates the sender’s intention to direct the action of others. In the VTS context, IALA further emphasises that ships should comply with instructions issued by a VTS, unless there are contradictory safety or marine environmental protection reasons, and highlights the need for the

VTS issuing an instruction to have the appropriate regulatory status and authority. The IMO SMCP (2002, 47) provides a more general framework for its communicative use. In light of this, the distinction between the communicative function of the message marker and the operational or regulatory authority associated with its use could be made more explicit and harmonised across the relevant guidance documents.

- Also, the distinction between Advice/Information may be clarified as Advice may be interpreted either as a recommendation or as an expected course of action, leading to inconsistent interpretation and response by seafarers.
- Future revisions of the standard may consider whether the message marker Advice should be used consistently in place of the verbal form Advise (e.g. Advice. Recover your fishing gear. instead of Advise you to recover your fishing gear.). As the two forms differ only slightly in pronunciation (/s/ vs. /z/), their use in voice communication may lead to confusion. The consistent use of a single standardised form could therefore improve clarity and reinforce the standardised use of message markers.

4.3. Alignment and clarification of procedural words

The use of procedural words should be adapted to communicative function and the context of the exchange.

- The revised protocol should provide precise definitions, operational explanations, and authentic examples illustrating the contextual use of procedural words under different operational conditions, including routine traffic management, restricted visibility, emergency situations, and distress communications.
- Existing IMO, ITU and IALA documents should provide aligned definitions and guidance so that the procedural words (*Over*, *Out*, *Received*, *Stand by*, *Say again*, *Read back*, *Repeat*, etc.) are understood and used consistently throughout maritime discourse.
- For self-initiated repair, the word *Mistake* needs to be followed by the word *Correction*, after which the corrected part of the message should be repeated (IMO SMCP, 2001, p. 15). The IALA Guideline (*VTS Communications and Phraseology*, 2022) prescribes using only *Correction* followed by the corrected part of the message. Consideration should therefore be given to harmonising these procedures in future revisions of the communication standard.
- Repair prowords such as *Repeat* and *Correction* occur relatively infrequently in authentic communication and could therefore receive greater emphasis in future maritime communication training. This would support both VTS operators and maritime education and training institutions in applying and teaching them more consistently.
- The operational distinction between *Repeat* and *Say again* should be explicitly clarified to prevent their interchangeable use and ensure uniform communication practices across VTS providers. According to the ITU Manual (2020a, p. 32), “I say again” is used by the sender when repeating a transmission (“I am repeating the transmission”). However, a discrepancy exists between the ITU

Manual and the complementary IMO SMCP (2001). According to the IMO SMCP and IALA 2022 phraseology, the sender should use *Repeat* when repeating a transmission (“Do not overtake – repeat – do not overtake”), whereas *Say again* is used by the receiver to request repetition of a message that has not been understood (“Say again your position for identification”).

- *Read-back* – “Repeat all, or the specified part, of this message back to me exactly as received and understood.” (IALA, 2022, 21) should be consistently applied, particularly in safety-critical VTS communications, to confirm that a message has been correctly understood and to allow other vessels monitoring the frequency to hear the safety-critical information a second time (IALA, 2017, p. 7). In this way, a communication loop is reinforced.
- A graded classification of standard phrases according to the level of communicative certainty they convey (e.g. message received → message understood → message read back and verified → intended action confirmed) would help distinguish more clearly between what has merely been received, what has actually been understood, and what has been confirmed for subsequent action, thereby reducing ambiguity and promoting consistent interpretation across maritime communication contexts.

4.4. Standardisation of syntax and vocabulary

4.4.1. Syntax

- The syntax should adhere to the *subject + verb+ object* pattern as in “I require assistance”. Truncated sentences in communication exchange must not be used as they make the message unclear as in “Towards Anchorage”, rather say “MV Horizon, proceed towards anchorage”.
- Intonation alone should not be used to indicate interrogative meaning, as it may lead to misunderstanding in radiotelephony communication. Instead, greater emphasis should be placed on encouraging interrogative structures and question words wherever possible (e.g., *what*, *where*, *when*, and *which*), and their consistent use in future standardised communication protocols.
- Each communication exchange should communicate only one topic, avoiding unnecessary information within the same transmission (IALA 2022, 10).
- Therefore, greater emphasis should therefore be placed on training and practical application to promote the use of complete and clearly structured utterances in operational communication.

4.4.2. Vocabulary

- A glossary could be included at the beginning of the document, identifying words and expressions that contribute positively to clear and effective maritime communication, while also highlighting those whose use should be avoided. It could be considered to semantically distinguish between affirmative (preferred) and non-standard or potentially ambiguous lexical items used in maritime VHF radio communications. Such a classification, included as a phrase inventory, could provide users with a clear overview of expressions recommended for operational communication.
- Affirmative or preferred expressions could include words and phrases encouraging and clarifying communication such as *this is, must, yes, correction, received, read back, say again, over, and out*. Conversely, non-preferred, negative or potentially ambiguous expressions to be strongly discouraged include modal verbs and lexical items such as *may, might, need, could, should, have to, maybe*; obsolete or scarcely used lexemes such as *jettison*; words used to address stations such as *Madam, Sir, Captain, Mate, Lady*; non-standard acknowledgement terms including *okay, copy, copied, copy that, roger, ok*, and similar expressions whose meaning is not consistently established across maritime communication standards.
- The vocabulary (IMO SMCP, 2001; IALA, 2022) should prioritise simple, high-frequency operational (active) verbs (e.g. *stand, check, take, go, make, proceed, change, follow, transfer, give, turn, sail, put, send, open, pick, wait, assist, get, meet, pass, rig, steer*); relationship verbs: *be, have, do*; reporting verbs: *report, inform*; verbs: *occur, change, increase, decrease, improve*; aspectual verbs: *keep, stop, start*.
- Future revisions of the IMO SMCP (2001) may also consider reducing the use of certain multi-word expressions that may be difficult for seafarers to memorise and use and that are rarely encountered in actual communication practice (e.g., *run into danger, make fast, make water, get underway, give a wide berth, etc*).

4.5. Communication structure and station identification

A standardised communication structure and unambiguous station identification procedures are fundamental elements of effective maritime communication, reducing ambiguity and supporting safe and efficient information exchange between communicating stations.

4.5.1. Station identification

The standard should reinforce the requirement for complete and unambiguous identification procedures at the beginning of every communication exchange. The compulsory use of the addressee, the phrase *This is*, and identification of the calling station should be explicitly prescribed for all routine and safety-related communications, as prescribed by the ITU Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services (2024).

4.5.2. Turn-taking procedures

The procedural words “over” and “out” should remain part of maritime communication training, and both seafarers and VTS operators should be encouraged to use them appropriately in operational communication.

Consistent use of the turn-taking signal “over” throughout the entire radio exchange would support orderly and clear turn-taking, maintain the continuity of communication, and reduce the risk of simultaneous transmissions or misunderstandings in simplex radiotelephony.

“Over” should signal the completion of each transmission when expecting a reply, while “out” should be used only to indicate that the communication has been completed. The combined expression “Over and out” should not be used.

4.6. Modality and ambiguity

Inconsistencies were identified across IMO, ITU and IALA guidance regarding the use of modal verbs.

Modal verbs such as *may*, *might*, *need*, *should*, and *could*, as well as polite forms (e.g. *Would you...?*), may lead to different interpretations in operational communication. IMO SMCP (2001) includes the use of both *may* (e.g. “You / MV ... may stop search and proceed with voyage”) and *can* (e.g. “I / MV ... can proceed without assistance”) and *need* (“No, you need not take tug(s)”).

IALA guidance identifies modal verbs such as *may*, *might*, *should*, and *could* as potentially ambiguous. Their use should therefore be aligned across the two documents and their communicative functions clearly defined, with particular emphasis on *can* for ability, *must* for obligation, and *must not* for prohibition in a clear and consistent manner.

The relevant IMO, ITU and IALA guidance should therefore be reviewed and further harmonised to ensure that the use and interpretation of modal verbs, terminology, and related communication procedures are presented consistently across the different documents, particularly where differences may affect clarity.

4.7. VTS Operators’ competencies, training and assessment

Internationally harmonised criteria for assessing Maritime English proficiency among VTS personnel should be developed and incorporated into relevant international training and certification frameworks.

Although the IALA V-103 model course framework (IALA, 2022) provides a common basis for VTS education and training, greater international harmonisation is still needed regarding entry requirements, prerequisite qualifications and competency standards. Differences among countries in accepted maritime qualifications (e.g. nautical education, certificates of competency and equivalent professional experience) may lead to inconsistencies in the knowledge and skills of VTS personnel. Therefore, internationally agreed minimum competencies should be more clearly defined, together with harmonised entry requirements and qualification criteria, to ensure a consistent standard of VTS personnel regardless of the country in which they are trained or certified.

Establishing common assessment criteria would promote greater consistency in VTS training, facilitate mutual recognition of competencies, and contribute to safer and more effective maritime communication.

4.7.1. Recurrent training and continuous professional development

Communication competencies should not be assessed solely during initial certification. Instead, recurrent training and periodic reassessment should be introduced.

- Continuous professional development programmes for VTS operators and maritime personnel should include dedicated modules addressing message markers, procedural words, communication repair mechanisms, and closed-loop communication procedures.
- The findings also suggest the need to expand and revise the IMO SMCP (2001) to better support and adapt the communication of intentions and manoeuvres in complex traffic situations. In this context, further standardisation of maritime communication should also take into account the ongoing transition towards digital communication and data exchange systems, ensuring that standardised communication procedures remain applicable and consistent across both voice and digital operational environments.
- Maritime education and training institutions should integrate digital learning tools, including instructional videos, AI-supported chatbots and Moodle-based learning platforms, into regular communication training programmes rather than using them solely as one-off educational activities.
- Continuous refresher training and realistic scenario-based exercises reflecting authentic VTS operational environments should be incorporated to reinforce routine communication skills and facilitate the effective transfer of learning into operational practice.

4.7.2. Authentic and region-specific training scenarios

Training materials, simulations, and digital learning tools can be developed using authentic communication scenarios that reflect the geographical and operational characteristics of the respective VTS region, thereby complementing international standards with local operational practice.

For example, authentic training scenarios should reflect local geographical features such as narrow channels, traffic separation schemes, pilot boarding areas, archipelagos, inland waterways, seasonal tourist traffic, ice navigation, or offshore operations.

4.8. Maritime English framework and harmonisation

Future revisions should explicitly identify the status of communication requirements, procedures, and phraseology across the core international maritime communication documents, clearly indicating whether individual provisions are aligned and harmonised: recommended, optional, or discouraged in safety-critical communications. Such harmonisation should be considered across the following reference documents:

- (1) Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services (ITU, 2024a, 2024b);
- (2) IALA Guideline G1132: VTS Voice Communications and Phraseology (2017; revised 2022); and
- (3) Standard Marine Communication Phrases (IMO SMCP, 2001).

Phraseology should instead be presented through clear explanations, appropriate operational contexts and examples of good practice.

A defined Maritime English proficiency level should also be established for VTS operators. The required level should reflect the communication demands and safety responsibilities associated with VTS operations.

4.8.1. Recognition of VTS communication

The analysis also demonstrated that contemporary VTS operations occupy an increasingly important role within the maritime communication system. However, existing communication standards remain largely ship-oriented, while VTS-specific communication requirements continue to be addressed primarily through IALA recommendations.

The growing operational significance of VTS providers should be reflected in future revisions of international regulatory instruments, including the STCW Convention and Code, through the explicit incorporation of VTS communication competencies and greater interconnection between IALA, IMO, and ITU documents governing external maritime communications.

4.8.2. Standardised performance indicators

The relevant maritime policymakers in the maritime industry should consider developing a harmonised framework of measurable communication performance indicators or variables that would enable the systematic monitoring and evaluation of compliance with standardised communication procedures.

A defined Maritime English proficiency level should also be established for VTS operators. The required level should reflect the communication demands and safety responsibilities associated with VTS operations. Maritime English language and its specific phraseology should be presented through clear explanations, appropriate operational contexts, and examples of good practice.

The development of a Maritime English Model Course for VTS operators and a corresponding assessment tool would be strongly supported. These could provide a common international framework that MSAs,

VTS providers, and training institutions could use when training and assessing personnel, while leaving decisions on implementation to national legislation, competent authorities, or other applicable governance arrangements.

5. Conclusion

The DigiMar project has demonstrated that effective and standardised maritime communication remains a fundamental component of navigational safety. Based on the analysis of international regulations, accident reports, authentic VTS communication, student simulations, benchmarking activities, surveys, interviews, and digital educational tools, the project identified several areas in which the existing communication framework could benefit from further clarification and harmonisation.

The findings particularly highlight areas that could benefit from further alignment or development of international guidance, especially in relation to closed-loop communication, message markers, procedural words, communication repair, message structure, station identification, and VTS communication competencies. In this context, the findings highlight the need to consider the revision and updating of the IMO SMCP (2001), together with further harmonisation of IMO, IALA, and ITU guidance relating to VTS communications.

The recommendations presented in this document are advisory in nature and should not be interpreted as questioning the effectiveness of the existing regulatory framework. Rather, they are intended to support its continuous harmonisation and modernisation while preserving its fundamental principles and operational effectiveness. Developed through research and close collaboration with MSAs, seafarers, researchers, and students, they provide a complementary contribution to the existing body of knowledge and may serve as a basis for further discussion and consideration by relevant international organisations and maritime stakeholders.

Therefore, the recommendations aim to encourage, strengthen, clarify, and harmonise good communication practices. At the same time, they recognise that the practical implementation and assessment of these practices may remain the responsibility of the relevant competent authorities, in accordance with national legislation and organisational procedures.

6. References

1. Bocanegra-Valle, A. (2011). Discursive features in speech communications. *International Journal of English Studies*, 11(1), 35–53. <https://doi.org/10.6018/ijes/2011/1/137091>
2. Boström, M. (2020). Mind the Gap! A quantitative comparison between ship-to-ship communication and intended communication protocol. *Safety Science*, 123, 1–8. <https://doi.org/10.1016/j.ssci.2019.104567>
3. Boström, M. (2021). Other-initiated repair as an indicator of critical communication in ship-to-ship interaction. *Journal of Pragmatics*, 174, 78–92. <https://doi.org/10.1016/j.pragma.2021.01.007>
4. DigiMar Consortium. (2023–2026). *Activity Reports 2.1–2.4, 3.1–3.3, 4.1–4.5*. ERASMUS+, KA220-HED – Cooperation Partnerships in Higher Education.
5. Dževerdanović-Pejović, M. (2013b). Discourse of VHF communication at sea and the intercultural aspect. *International Journal of Traffic and Transportation Engineering*, 3(4), 377–396. [https://doi.org/10.7708/ijtte.2013.3\(4\).03](https://doi.org/10.7708/ijtte.2013.3(4).03)
6. International Association of Lighthouse Authorities. (2008; revised 2022). *VTS Manual*. International Association of Lighthouse Authorities.
7. International Association of Lighthouse Authorities. (2009). *IALA Model Course V-103/1 on Vessel Traffic Services Operator Training*. Edition 2, December 2009.
8. International Association of Lighthouse Authorities. (2017). *G1132 Guideline: VTS VHF Voice Communication*. International Association of Lighthouse Authorities.
9. International Association of Lighthouse Authorities. (2022). *G1132 VTS Voice Communications and Phraseology*. International Association of Lighthouse Authorities.
10. International Association of Lighthouse Authorities. (2022). *G1149 VTS Training for Deck Officers*. International Association of Lighthouse Authorities.
11. International Association of Lighthouse Authorities. (2022). *IALA Model Course C0103-1-Ed. 3: VTS Operator Training*. Edition 3, December 2022.
12. International Maritime Organization. (2001). *Resolution A.918(22): IMO Standard Marine Communication Phrases*. International Maritime Organization.
13. International Maritime Organization. (2003). *Resolution A.954(23): Proper Use of VHF Channels at Sea*. Adopted on 5 December 2003.
14. International Maritime Organization. (2015). *Model Course 3.17: Maritime English*. 2015 edition. London: International Maritime Organization.
15. International Maritime Organization. (2017). *STCW Convention and STCW Code*. 2017 edition. London: International Maritime Organization.

16. International Maritime Organization. (2020). *SOLAS Consolidated Edition*. International Maritime Organization.
17. International Maritime Organization. (2021). *Resolution A.1158(32): Guidelines for Vessel Traffic Services*. Adopted on 15 December 2021.
18. International Telecommunication Union. (2024a). *Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services*. 20240 edition, Volume 1. International Telecommunication Union.
19. International Telecommunication Union. (2024b). *Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services*. 20240 edition, Volume 2. International Telecommunication Union.
20. John, P., Brooks, B., & Schriever, U. (2017). Profiling maritime communication by non-native speakers: A quantitative comparison between the baseline and standard marine communication phraseology. *English for Specific Purposes*, 47, 1–14. <https://doi.org/10.1016/j.esp.2017.03.002>
21. Jurkovič, V. (2022). Authentic Routine Ship-Shore Communication in the Northern Adriatic Sea Area – A corpus analysis of discourse features. *English for Specific Purposes*, 68, 47–59.

7. Annexes

Annex 1 – WP 4.5. Recommendations for a Revision of the Standard Protocol of Communication (Activity Report)

Available upon request from the Project Coordinator at violeta.jurkovic@fpp.uni-lj.si