Input paper: [[1]](#footnote-1) VTS58-7.2.6

Input paper for the following Committee(s): check as appropriate Purpose of paper:

**□** ARM **□** ENG **□** PAP **☑** Input

**□** DTEC **X** VTS **□** Information

Agenda item **7.2**

Technical Domain / Task Number N/A

Author(s) / Submitter(s) China Maritime Safety Administration

Proposal on Adding an Intelligent Management Information System to the Future VTS Discussion Paper

# Summary

Intelligent management information system (IMIS) is an indispensable component for future VTS, integrating storage, management, interaction, sharing, analysis and display, having obvious advantages in computing power, algorithms and data, being able to provide a foundation for intelligent ship verification, digital communication, maritime connectivity platform (MCP), interaction between VTS and various levels of maritime autonomous surface ships (MASS) as well as VTS upgrade and iteration, etc., and offering comprehensive and multi-dimensional services to facilitate the realization of VTS functions and goals.

## Purpose of the document

The purpose of this document is:

* Transfer the new practice of the IMIS to the future VTS Discussion working group, which includes applications such as intelligent ship verification, voiceprint recognition, locating ships by sound recognition, intelligent data and information interaction.
* Recommend that the VTS Committee consider the impact of IMIS and its functional modules on future VTS and incorporate corresponding content in the attachment of the future VTS discussion paper.

## Related document

Resolution A.1158(32) GUIDELINES FOR VESSEL TRAFFIC SERVICES.

G1178 An introduction to the Artificial Intelligence (AI) from an IALA perspective.

VTS53-6.3.5 Proposal for the Development of an Independent G1111 Sub-guideline for VTS-MIS.

VTS56-9.2.1 DRAFTED REVISION TO G1111-1 PRODUCING REQUIREMENTS FOR THE CORE VTS SYSTEM.

C02-19.1 Report of the 2nd session of the IALA Council.

# BACKGROUND

With the development of technologies such as big data, large models and artificial intelligence, many countries, including China, have begun to attempt to combine technologies and demands such as artificial intelligence (AI), voiceprint recognition, locating ships by sound recognition, intelligent ship verification, intelligent data and information interaction with IMIS, and explore their applications in the current and future VTS.

At the 57th VTS meeting, China MSA submitted a proposal *VTS57-9.2.2 Proposed Revision to G1111-1 Producing Requirements for The Core VTS System* and a draft guideline *VTS57-12.3.5 VTS57-9.2.2.1 Revised Guideline G1111-1 Producing Requirements for Core VTS Systems* to VTS Committee, and proposed to consider the application of new practices such as voiceprint recognition, locating ships by sound recognition, as well as IMIS, in the future development of VTS. The technology working group adopted the above suggestions and believed that these suggestions should be transferred to the future VTS discussion paper.

# discussion

In the future development of VTS, the application of technologies such as intelligent ship verification, voiceprint recognition, locating ships by sound recognition, intelligent data and information interaction can effectively enhance the efficiency of VTS, relieve the work pressure on VTS personnel and promote the intelligent development of VTS. IMIS can integrate multiple applications including voiceprint recognition, locating ships by sound recognition, intelligent ship verification, intelligent data and information interaction, and support functional expansion. Its functions will not only support the daily decision-making and data management of VTS personnel, but also serve as a key hub for information exchange and traffic management, leveraging its advantages in computing power, algorithms and data to provide a foundation for digital communication, MCP, interaction between VTS and various levels of MASS, and VTS upgrade and iteration, providing comprehensive and multi-dimensional services for the functions and goals realization of the current and future VTS.

## Potential Impacts

The relevant standards, recommendations, guidelines and model courses of IALA need to be revised or updated. The new documents should ensure that they include the global harmonised delivery of IMIS with applications such as voiceprint recognition, locating ships by sound recognition, intelligent ship verification, intelligent data and information interaction, as well as the coordination with the operation of VTS systems, including but not limited to functional design, performance requirements, operation procedures, data and information management, and personnel training.

The application, expansion of functions and iteration of intelligent management information systems require VTS providers to be equipped with corresponding software and hardware facilities, and to continuously update them. It is also necessary to ensure that VTS personnel have received appropriate training and possess the necessary capabilities.

## Challenges

Based on the existing management information system, to establish or optimize the overall architecture, technical standards, data formats, and data protocols for voiceprint recognition, locating ships by sound recognition, intelligent ship verification, intelligent data and information interaction

Clarify the obligations and legal responsibilities that VTS providers, VTS authorities, and VTS personnel should undertake under the new rule framework.

## Opportunities

Intelligent ship verification is a functional module integrated with multiple technologies such as maritime multi-modal communication, intelligent risk assessment, and big data in the IMIS. This module can replace traditional manual operations through automated and digital means, enabling the verification of the identities of various ships within the VTS coverage area, checking their status, providing safety information alerts, collecting navigation information, and conducting dynamic supervision. It effectively reduces the workload of VTS personnel and improves the efficiency of VTS dynamic supervision.

The basic principle of locating ships by sound recognition is that with the support of AI, big data and large model technologies, IMIS converts VHF voice communication into text, to identify and locate the ships according to the communication. This reduces the workload of VTS personnel, especially in areas with a high density of ships, where VTS personnel can focus more on the management of abnormal situations of ships.

Voiceprint recognition aims to identify or verify the identity of speakers through biometric technology. It can be applied to the identification of VTS personnel and ships. By improving the efficiency of ship identification and reducing the error rate in voice communication, it can enhance the pertinence and effectiveness of VTS traffic services and management. At the same time, it can be used to confirm the duty status of VTS personnel, and to enhance the assessment and management of VTS personnel.

Intelligent data and information interaction supports real-time mutual translation for ship-to-shore communication, and on this basis, it accumulates data, establishes a corpus database, and conducts multimodal fusion with data from CCTV, AIS, radar, etc., to achieve data and information interaction with traditional ships and various levels of MASS, and to establish a "dynamic perception of ships - voice command interaction - dynamic tracking" working loop. In addition, through voice semantic analysis, structured data can be extracted and standardized work logs can be generated, providing a basis for assessment of the duty process.

# REFERENCES

1. Vessel Traffic Services Manual (Edition 8.3)
2. IMO Resolutions A.1158(32) GUIDELINES FOR VESSEL TRAFFIC SERVICES
3. Future VTS Discussion Paper
4. G1178 An introduction to the Artificial Intelligence (AI) from an IALA perspective.

# Action requested of the Committee

The Committee is requested to consider the above proposals and include the attachment to the "Future VTS" discussion document.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)