Input paper: VTS52-7.3.4

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

**□** ARM **□** ENG **□** PAP **X** Input

**□** ENAV **X** VTS **□** Information

Agenda item 7.3

Technical Domain / Task Number …………………………………

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

Proposal for Producing Functional and Performance Requirements for Management Information System

# Summary

China MSA has submitted Task register (VTS 51-7.3.4) and draft guideline framework (VTS 51-7.3.4.1) on producing requirements on VTS-MIS system at IALA VTS51, and was included in Provisional 2023-2027 Task Plan (VTS51 -13.3.0.2). Therefore, China MSA continues to submit this proposal to further illustrate the necessity of new task, and provide draft guideline and questionnaire in the annex of this proposal for discussion.

## Purpose of the document

* Providing Draft Guideline in the annex A to the VTS Committee and other Member States for considering.
* Welcome VTS Committee and other Member States to participant in the Questionnaire survey in annex B.

## Related documents

VTS51-7.3.4 Task register proposal 2022-2026-G1111-10 producing requirement for VTS-MIS systems

VTS51-7.3.4.1 producing requirement for VTS-MIS systems (DRAFT FRAMEWORK)

VTS51-13.3.0.2 WP Provisional 2023 – 2027 Task Plan.

# Background

A scientific, unified, convenient and efficient MIS system will improve the work efficiency of the VTS personnel on duty, reduce the labour intensity, and enable the VTS personnel on duty to pay more attention to the ship traffic image, so as to improve the safety and efficiency of ship traffic.

At present, the MIS systems used in various countries and regions are established on the basis of their own needs. There are no unified standards and specifications, and the operation, rationality and scientificity of the MIS system cannot be guaranteed. There are barriers to the data interaction and sharing between different VTSs, which is not conducive to improving the efficiency of ship traffic management.

As an important part of VTS system, MIS subsystem is irreplaceable in data processing and analysis, but there is a lack of specific guidance documents on MIS system.

# Discussion

MIS is an information management system that stores, maintains and utilises the data involved in VTS. MIS fully interacts with VTS ship dynamic data by using database and its management system, and extends the information processing process by integrating VTS related task items.

The MIS system can integrate the data such as vessel data, sailing plans, cargo and passengers’ details, meteorological and hydrological information, berthing plans, pilot plans, agent information, shipping enterprise information, etc., and provide real-time or non-real-time data service according to users’ permission in an intuitive and convenient way. It also can enhance the situational awareness of VTS personnel, provide decision support, and reduce the workload of VTS personnel. As a part of the VTS system, the MIS system is an important subsystem and plays a vital role in the efficient operation of the VTS system.

# References

1. Vessel Traffic Services Manual (Edition 7)
2. IMO Resolutions A.1158(32) GUIDELINES FOR VESSEL TRAFFIC SERVICES
3. ISO/IEC 25000:2014
4. IALA Guideline 1086 -THE GLOBAL SHARING OF MARITIME DATA & INFORMATION:2012
5. ITU RADIO REGULATIONS (Edition of 2020).

# Action requested of the Committee

The Committee is requested to:

1. Consider the need to a new task in 2023 – 2027 Task Plan for developing a guideline of Producing Functional and Performance Requirements for MIS System.
2. Consider the associated annex A&B and take action, as appropriate.

Annex A DRAFT G1111-10 PRODUCING FUNCTIONAL AND PERFORMANCE REQUIREMENTS FOR MIS SYSTEM

# Introduction

Management Information System (MIS) is an information management system that stores, maintains and utilises the data involved in VTS. MIS fully interacts with VTS ship dynamic data by using database and its management system, and extends the information processing process by integrating VTS related task items.

The MIS system can integrate the data such as vessel data, sailing plans, cargo and passengers’ details, meteorological and hydrological information, berthing plans, pilot plans, agent information, shipping enterprise information, etc., and provide real-time or non-real-time data service according to users’ permission in an intuitive and convenient way. It also can enhance the situational awareness of VTS personnel, provide decision support, and reduce the workload of VTS personnel. As a part of the VTS system, the MIS system is an important subsystem and plays a vital role in the efficient operation of the VTS system.

# DEFINITIONS AND REFERENCES

## DEFINITIONS

**Management Information System (MIS)** - an information management system that stores, maintains and utilises the data involved in VTS.

**MTBF** - mean time between failures, a measure of the reliability of a device or system. Mathematical expectation of working time between two adjacent faults.

**System Availability** - the percentage of time that a computer system is in a working state during a given time interval.

## REFERENCES

1. Vessel Traffic Services Manual (Edition 7)
2. ISO/IEC 25000:2014
3. IALA Guideline 1086 -THE GLOBAL SHARING OF MARITIME DATA & INFORMATION:2012
4. ITU RADIO REGULATIONS (Edition of 2020).
5. IALA R0145- THE INTER-VTS EXCHANGE FORMAT (IVEF) SERVICE (Edition 1.1)

# Performance requirements

The performance requirements of the MIS subsystem can be determined by the requirements and system architecture of each VTS provider. This section fully takes into account the requirements of <ISO/IEC 25000> series standards and proposes the following specific content.

## Average Response Time of System

In order to operate the system more smoothly and minimize the disturbance to the VTS personnel on duty, the average response time of MIS system operation should be less than 1 second.

## Average processor occupancy rate of MIS system

The average processor occupancy rate of MIS system should be less than 60%.

## Interoperability of the Data Format

The data format of MIS system is recommended to comply with MSP data set rules of ENAV, and ship-shore data exchange complies with ISO19847/19848 standards. The AIS data interface adopts the standard IEC61162, the ship dynamic data interface adopts the IALA IVEF standard, and other data adopts the WEBSERVICE interface standards.

## Mean Time Between Failure (MTBF)

The mean time between failures of the system should not be less than 4000 hours to ensure the continuity of VTS duty.

## SYSTEM AVAILABILITY

The system availability of MIS should be greater than 99%.

## The duration of Storage

Based on the ISO19848 standards, the duration of storage of the MIS system should not be less than 30 days.

# FUNCTIONAL REQUIREMENTS

Competent Authority should design the functional requirements of the MIS system according to the function of VTS, the navigation environment of VTS area, and the complexity of traffic flow. This section proposes the basic functions and optional functions of the MIS system, among which the basic functions are the functions that the conventional MIS system should have; the optional functions are the expansion functions, which can provide a reference for each Competent Authority to design the special function requirements.

## BASIC FUNCTIONAL REQUIREMENTS

### DATABASE

#### STATIC DATABASE

The relevant information of the database is displayed in association with the traffic image unit of VTS system, and operations such as importing, editing, deleting, and adding can be performed on the database.

* Ship database: static parameters of ships, ship owners, ship management companies, etc. Ship database can be completed by automatic transcription of AIS information, import of external ship database (e.g. Lloyd's ship database, domestic ship database, etc.) and editing by VTS personnel.
* Navigation environment database: length, width, depth of channels and anchorages, positions of obstructions, passage conditions of bridges, geographic information, etc..
* Port resource information: pilots, tugs, berths, and related fees in the VTS area.
* Information on professional search and rescue forces and social search and rescue units.
* Other static information: meteorological and hydrological information, waypoints of route, etc.

#### DYNAMIC DATABASE

* Ship's real-time dynamic data: including the ship's position, course, speed, destination, etc.
* Information of cargo / passengers on board: especially for the loading condition of the cargo listed in the IMDG CODE, and the number of passengers on board ship.
* Status of port facilities: information such as the condition of fairways and anchorages, status of berths, etc.
* Meteorological and hydrological information: tide tables in the VTS area, real-time meteorological information, etc.
* Notice to Mariners and Navigational Warning
* International ship and port facility security (ISPS) information
* Other dynamic information: dynamics of aids to navigation, violations, incident records, etc.

#### DATA QUERY, STATISTICS, ANALYSIS AND DISPLAY

* VTS personnel can retrieve, query, edit, filter, and count the information in the database, and have certain analysis functions, which can realize the automatic generation of working reports and automatically store and tabulate.
* Automatically editing and generating Word, Excel or HTML web page format reports according to the existing fields, time and other conditions in the database for display and printing.

### FUNCTION OF SHIP SAILING PLAN MANAGEMENT

The sailing plan is composed by the ship's starting and destination, ETA, and various waypoint of route. Every ship should make a sailing plan before entering or leaving the port.

* Editing sailing plan: the VTS personnel can plot the sailing plan in the MIS system, or the ship or port can enter it through relevant interfaces of the MIS system.
* Execution of the sailing plan: VTS personnel can identify the actual state of the ship (e.g. dropping or picking up anchor, pilot on or off, crossing the channel or reporting line). The MIS system can also automatically compare and record the implementation of the sailing plan, and alarm the behaviours that seriously deviates from the sailing plan.
* Port resource allocation function: It can plan the allocation of port resources such as pilotage and tugboats in the port.
* Statistics function: The setting ship flow statistics line, which can automatically record the time, location, and dynamic and static data of the ship when the ship crosses the line.

### ADMINISTRATION

#### MANAGEMENT OF VTS PERSONNEL

* Roster of VTS personnel: contact information, address etc.
* Duty Schedule: The duty schedule of VTS personnel within a month.
* Information on key monitoring ships: detained ships, violation, ships assisted in investigation, etc.

#### SHIFT MANAGEMENT

Important events, on-going events, events that need to be focused, and other important matters that need to be handed over to the next shift, including key monitoring ships, ships with abnormal sailing status, etc..

#### SYSTEM LOGS

* System logs record IP address, MAC address, log content, operation time of system users.
* Alarm record: The MIS database record the alarm information triggered in VTS system for later statistical analysis.
* Accident record: editing and recording of accidents that occur within the VTS area.
* VTSO workload: dynamic operations of VTSO, etc..

### USER PERMISSIONS

In the database server, the Competent Authority should allocate and edit the corresponding database access according to the needs of VTS operational management and the management needs of different levels of VTS personnel (e.g. VTSOs/VTS supervisors/managers).

## OPTIONAL FUNCTIONAL REQUIREMENTS

### INTERNAL MANAGEMENT

#### EVALUATION AND EXAMINATION

* Duty quality evaluation: it is evaluate the timeliness and relevance of the information provided by the VTS personnel on duty, the safety and efficiency of the supervised ship, and the timeliness and scientificity of the response to the developing unsafe situation through the set parameters, so as to provide reference for the training arrangement and professional ability improvement of VTS personnel.
* Duty business assessment: according to the workload of the VTS personnel recorded in the MIS system, such as information reminder, solving unsafe situations, etc., conducting quantitative assessment on the duty quality of VTS personnel.

#### VTS DATA MINING

* Data mining of ship unsafe behaviours: MIS system can record the violations and unsafe behaviours of ships in VTS area, and support keyword retrieval, information statistical analysis and display, so as to realize the accurate identification of ships with special attention in VTS area.
* Data mining of ship dangerous situations and incidents: MIS system can record the ship dangerous situations and accidents in VTS area, support keyword retrieval, information statistical analysis and display, and master the temporal and spatial distribution law of dangerous situations and incidents, so as to realize the risks in VTS area.

### DATA FUSION

#### INTERNAL SERVICES DATA FUSION OF VTS AUTHORITY

* Ship dynamic information: integrating Radar, AIS, CCTV and other ship dynamic information sources to access the dynamic information of ship pilotage plan, port of entry and exit, berthing and unberthing.
* Ship management information: integrating PSC and FSC information and access ship dangerous goods information.
* Law enforcement information: integrating the dynamic information of law enforcement boats and personnel of the authority.
* Emergency resource information: integrating the emergency resource information such as sewage cleaning, salvage, firefighting and tugboat in VTS area and nearby waters.

#### DATA FUSION OF OTHER SERVICES IN RELATED INDUSTRIES

* Integration of businesses data: integrating industry data such as ships, shipping companies, crew members, ports, pilotage and agents.
* Integration of management data: integrating the data of management such as transportation, port and fishery administration, customs, immigration, coast guard and so on.
* Integration of social elements: integrating the data of social elements data such as city management, safety emergency, laws and regulations, standards and norms, integrity management and so on.

### DATA EXCHANGE

#### DATA EXCHANGE WITH SHIPS AND CREWMEMBER

* Data exchange with ships: providing information for ships in hydrometeorology, port services, telemedicine, anchorage and other aspects, based on MSP in E-navigation and S-100 and other data exchange standards, so as to realize standardized and large-scale ship-shore data exchange, as well as intelligent send of severe weather warning, navigational warning (notice to mariners) and traffic control information, online declaration of voyage plan.
* Data exchange with crew members: it is to provide crew members with certificate expiration reminder, safety knowledge, navigation regulations, online education and training of accident cases and other services relying on the internet and mobile phone module, realize efficient data exchange with crew members.

#### DATA EXCHANGE WITH OTHER VTS CENTERS

* Sharing ship dynamic information: realizing the data sharing and interaction of ship dynamic information of different VTS manufacturers, such as AIS data.
* Sharing of ship management information: realizing the sharing of ship report information, marking information and other ship management information of different VTS manufacturers.

#### DATA EXCHANGE WITH OTHER RELATED INDUSTRIES CROSS DIFFERENT PLATFORM

* Navigation environment data exchange: hydrological, meteorological, geographical and other navigation environment data exchange.
* Scheduling data exchange: pilot scheduling, berth arrangement, tugboat assignment, oil and sewage receiving and other port scheduling and service information exchange.
* Industry management data exchange: inspection and quarantine, port of entry and exit approval, cargo customs clearance and other industry management information exchange.

# DESIGN, INSTALLATION, OPERATION AND MAINTENANCE CONSIDERATIONS

The design, installation, operation and maintenance of MIS should consider the requirements of storage media, disaster recovery, backup, response time and other factors on the temperature, humidity, earthquake resistance and other factors of the working space.

MIS can be integrated into the VTS core system, or can be used as a separate module, should consider the convenience of the work of the VTS personnel.

The installation and design of MIS should consider the commonality, convenience of subsequent software and hardware upgrade.

## SYSTEM OPERATING ENVIRONMENT

If there are technical standards or guidelines applicable to the installation and operation of information systems in the country or region where the VTS provider located, the VTS provider should refer to them. If there are no corresponding technical standards or guidelines in the country or region where the VTS provider is located, the VTS provider may refer to the relevant international standards. In any case, a common open operating environment should be applied.

## DEMAND ANALYSIS

Competent Authority should investigate and analyze the tasks and data usage of VTS, clarify data requirements and task processing requirements around these data, including the types, scope, quantity, access of data and their communication in task activities, etc., through top-down, step by step decomposition and other analysis methods, determine the use of VTS database system requirements and various constraints, and form a VTS requirement specification.

## System Design

### CONCEPTUAL DESIGN

Through the classification, aggregation and generalization of data demand and task processing demand, a data model can be established to reflect information structure, information flow, mutual restriction between information, as well as the requirements of all levels of data demand subjects for information storage, query and processing.

### LOGICAL DESIGN

MIS developers should design logical data schemas supported by database management system that are suitable for requirements of VTS data and task, and design corresponding logical sub-schemas for various data processing applications necessarily.

### PHYSICAL DESIGN

MIS system developers should select the most appropriate physical storage structure (including file type, index structure and data storage order and bit logic, etc.), access methods and access paths, etc. for specific application tasks according to the various physical design measures that depend on the specific computer structure provided by the specific database management system.

## OPERATION AND MAINTENANCE

For the operation and maintenance of MIS, system developers should fully consider the impact of operation manageability, data standards, and compatibility with other system interfaces, system security, system reliability, operation convenience and other aspects on the system.

Annex B Questionnaire on requirements of performance and function for VTS-MIS

China Maritime Safety Administration submitted a draft of the guideline on the “PRODUCING FUNCTIONAL AND PERFORMANCE REQUIREMENTS FOR MIS SYSTEM” to the VTS52 committee meeting. In order to better understand the equipment and requirements of the MIS system in each VTS center, we specially designed this questionnaire. The information involved in the questionnaire will only be used to analyze the survey, and we will fully respect your privacy. Thank you for your support.

Liaison: Liu Wei, China Maritime Safety Administration

Please send the questionnaire to email: [liuwe@shmsa.gov.cn](mailto:liuwe@shmsa.gov.cn)

NOTE:○ is a single choice question, □ is a multiple choice question, check and tick.

|  |  |
| --- | --- |
| **QUESTIONNAIRE ON OPERATIONAL AND FUNTIONAL REQUIREMENTS OF MIS** | |
| COUNTRY : |  |
| ORGANIZATION： |  |
| NAME OF YOUR VTS: |  |
| 1. Basic information of VTS | |
|  | * 1. VTS category (multiple choices) |
|  | □A port VTS  □A inland waters VTS  □A coastal VTS  □Others (please note)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  | * 1. Whether there is a specific and independent MIS system in the VTS system ？ |
|  | ○Yes ○No |
|  | * 1. Do you think it is necessary to design MIS system independently in VTS system? |
|  | ○Yes ○No |
| 2． What standards should be considered when establishing VTS MIS subsystem? (multiple choices) | |
|  | □ISO/IEC 25000  □ISO19847/19848  □Others standards(please note)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 3． What performance requirements should be considered in MIS system?(multiple choices) | |
|  | □Average Response Time of System  □Average processor occupancy rate of MIS system  □Interoperability of the Data Format  □Mean Time Between Failure  □system availability  □The duration of Storage  □Others(please note)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 4． The functions that MIS system should have： | |
|  | 4.1 What basic functions do you think the MIS system should have? (multiple choices) |
|  | □Static database  □Dynamic database  □Data query, statistics, analysis and display  □Function of ship sailing plan management  □Others(please note)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  | 4.2 What data should a static database include?(multiple choices) |
|  | □Vessel data  □Navigation environment Database  □Port resources information  □SAR resource  □Others(please note)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  | 4.3 What data should a dynamic database include? (multiple choices) |
|  | □Dynamic data of ship  □Cargo and passengers information  □Local port information  □Meteorological and hydrological information  □Notice to mariners &navigational warning  □ISPS information  □Others(please note)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  | 4.4 What are the functions of ship plan management? (multiple choices) |
|  | □Sailing plan  □Allocate port resources  □Others(please note)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  | 4.5 What do you think VTS administrative functions should include in the MIS system? (multiple choices) |
|  | □Management of VTS personnel  □Shift management  □MIS System logs  □User permissions  □Evaluate and assess VTS personnel  □VTS data mining function  □O**thers(please note)**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 5． Assumptions about the function of MIS system | |
|  | 5.1 What data do you think the data fusion function should integrate? (multiple choices) |
|  | □Internal business data fusion of competent authority  □Data fusion of other businesses in related industries  □Others(please note)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  | 5.2 What data do you think VTS should exchange with other department? (multiple choices) |
|  | □Data exchange between VTS, ships and crew  □Data exchange between VTS and other VTS centers  □Data exchange between VTS and other entities  □Others(please note)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  | 5.3 Other functions that you think MIS system should have: **(please note)**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 6． Other information you want to provide: | |
|  | |