International Association of Marine Aids to Navigation and Lighthouse Authorities

IALA

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On

The Implementation of Vessel Traffic Services

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Document Revisions

Revisions to the IALA Document are to be noted in the table prior to the issue of a revised document.

Date	Page / Section Revised	Requirement for Revision
July 2005	Entire document reformatted	Reformatting to meet IALA documentation standards
December 2009	Revised	Update document to reflect changes in VTS

IALA Recommendation on the Implementation of Vessel Traffic Services

(Recommendation V-119)

THE COUNCIL:

NOTING the function of the Council with respect to Safety of Navigation, the efficiency of maritime traffic flow and the protection of the environment;

NOTING ALSO the International Maritime Organization resolution A.857(20) on Guidelines for Vessel Traffic Services (VTS), in particular paragraph 2.5.1;

NOTING FURTHER:

- the work program of the VTS Committee, in particular the item Risk Analysis and Feasibility Studies prior to implementing a VTS; IALA Recommendation O-134 on the IALA Risk Management Tool for Ports and Restricted Waterways;
- IALA Guideline 1018 on Risk Management;

HAVING CONSIDERED the proposals made by the VTS Committee:

ADOPTS the guidance on the implementation of Vessel Traffic Services as set out in the annex of this recommendation; and

RECOMMENDS that National Members and other appropriate Authorities providing, or intending to provide, vessel traffic services use the guidance as set forth in the Annex.

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IALA Recommendation on the Implementation of Vessel Traffic Services

1 INTRODUCTION

The purpose of VTS is to improve the safety and efficiency of navigation, safety of life at sea and the protection of the marine environment and/or the adjacent shore area, worksites and offshore installations from possible adverse effects of maritime traffic. Implementation of a new VTS or the re-assessment of an existing VTS should be undertaken where there is concern about the levels of safety and if, as a result of reviewing the existing safety measures, these are found to not fully meet the requirements.

A VTS is a considerable investment. However, if it is not effective, the purposes of the VTS will not be achieved. Thus, the local needs and requirements should form a starting point in order to establish whether the investment is justified. Considerable insight is required to be able to judge the scope of activities and capabilities of a future VTS. It is especially important to check that the required authority of the VTS is supported by the local or national legal framework or to assess the likelihood of this being adjusted as deemed necessary. Conversely, it is important for the VTS authority to be ever mindful of its duty of care to ensure its operations fulfil its obligations.

In implementing a Vessel Traffic Service different stages make up the development of a VTS as follows:

- Needs Analysis (divided into four phases):
  - Preliminary Assessment;
  - Feasibility and Design;
  - Formal Risk Assessment;
  - Cost and Benefit Analysis.
- Implementation;
- Evaluation.

In all phases, various aspects of risk assessment and mitigation are to be considered. In any case, within the Preliminary Assessment, Feasibility and Design and Formal Risk Assessment phases IALA's Formal Risk Assessment processes are recommended.

In the Preliminary Assessment and Feasibility and Design phases the 'maritime area' is considered within a framework of whether a VTS solution is needed or not, and in the Formal Risk Assessment phase the functional requirements are refined within the framework of establishing a new VTS or modifying an existing VTS.

2 NEEDS ANALYSIS

Before considering the establishment of a new VTS or the enhancement of an existing one, a Competent Authority in conjunction with the future VTS Authority should undertake a formal study to define clearly the need, the functional requirements and to identify the costs of implementation. The following four phases should be addressed:

- Preliminary Assessment;
- Feasibility and Design;
- Formal Risk Assessment;
- Cost/Benefit Analysis.

The reports of the Preliminary Assessment and the Feasibility and Design phases should provide details of the VTS requirements to enable initial cost and performance estimations to be made. These will need to be further refined in a Formal Risk Assessment phase as the authority consolidates its requirements and firms up the design for the VTS. The Cost Benefit Analysis (CBA) should consider direct risk reduction, the less evident benefits that a future VTS might offer and the further value added services for shipping and other stakeholders in the future. A realistic cost estimate for running a VTS is important. Consideration may also be given to a reduction of the waterway infrastructure to minimise overall costs.

In the case where the Feasibility Study gives a positive result, the Competent/VTS Authority may proceed with the final design and planning work.

Sometimes the Preliminary Assessment, Feasibility and Design, Formal Risk Assessment and Cost/Benefit phases of the project are classified together as the Feasibility Study. This approach could be followed in the case where the Competent and/or the VTS Authority has carried out a separate initial investigation. This will identify all the options available to address the risk and subsequently determine that the preferred solution is to proceed with a Feasibility Study. Furthermore, the Feasibility and Design phases may be incorporated within one phase, as opposed to comprising two separate phases. In this recommendation, the Feasibility and Design has been treated as a separate phase.

2.1 Preliminary Assessment Phase

2.1.1 General

The Preliminary Assessment Phase should answer the question of whether active traffic management is the appropriate means to address the traffic problems. Active traffic management should only be used in those areas where other means are inadequate to provide the desired level of safety, efficiency of traffic flow and protection of the marine environment. This section gives guidance on how the Preliminary Assessment phase should be conducted. The reports of the Preliminary Assessment and Feasibility phases together are sometimes referred to as the Baseline document.

In the Preliminary Assessment phase, all relevant problems in the maritime area concerned should be defined and analysed. Further, as a second step in the process, operational objectives should be established with the ultimate aim of alleviating the defined problems. The last step in this phase is to identify the most appropriate traffic management tools in terms of effectiveness and costs, and to alleviate the defined problems. Implementing a VTS may be one of these solutions.

The possible traffic problems could be related to:

- interaction of maritime traffic;
- volume and composition of traffic;
- protection of the marine environment and the surrounding area;
- the local conditions such as geography, hydrological/meteorological, and tides.

In addition, future developments in the port infrastructure and the resulting changes in traffic volumes and composition, including dangerous cargoes and any other relevant future development in the area concerned should be considered in this phase.

In the specific case of a coastal VTS, future trends in traffic volume and other activities in the coastal area, such as fishing, recreation and offshore activities should be taken into account.

Further developments in VTS technology and SOLAS requirements for navigational and communication equipment onboard vessels should also be considered.

Furthermore in the case of a decision to establish a VTS, the following aspects need to be addressed the:

- organisational framework of national and local maritime authorities; and

- present regulatory or legislative framework, including local by-laws, rules and recommendations. Special attention should be devoted to ascertain any requirement for adjusting the framework to ensure effective implementation of a VTS.

2.1.2 List of items to be addressed

Clear and unambiguous answers should be prepared to respond to all issues identified below:

2.1.2.1 Traffic data to be obtained:

- traffic safety record in general;
- complexity of the traffic pattern;
- vessel traffic density in the area concerned, including trends;
- any interference by vessel traffic with other marine-based activities;
- information on recent traffic surveys and evaluation of these surveys;
- breakdown of all vessel traffic in terms of type and size of vessels and categories of cargoes carried;
- vessels with hazardous cargoes as defined in IMO Res. A.857(20), Annex 1

2.1.2.2 Accident and incident data to be obtained:

- an up-to-date and complete record on maritime accidents/incidents in the area, including information on the economic consequences;
- areas with a high frequency of accidents/incidents;
- results of accident/incident investigations;
  - the recorded main causes of the accidents/incidents;
  - any recommendations contained in reports on accidents/incidents, and implementation status of these recommendations;
  - the competency of the crew manning vessels entering the area.
- any information available on stakeholders' opinions regarding traffic safety in the area concerned;

2.1.2.3 Data on traffic delays to be obtained:

- efficiency of maritime traffic flow;
- any history of traffic delays;
- the main causes of delays;
- any specific locations in the area concerned where congestion occurs regularly;
- the views of maritime stakeholders regarding the efficiency of traffic;
- any complaints and how these were resolved;
- the additional costs to the maritime industry as a result of delays;
- any other relevant data available.

2.1.2.4 The geography of the area:

- define the maritime area concerned;
- describe the area in terms of geography as indicated below. All information on the geography of the area concerned should be considered;
  - narrow and/or winding fairways,
  - basins, piers and quays along the fairway,
  - shallows, shifting shoals,
  - specific navigational hazards (including Offshore Renewable Energy Installations (OREI)),

- geology of the riverbed/seabed and shoreline,
- stability of the riverbed/seabed profile,
- dredging operations in the fairway,
- locks or bridges,
- meteorological conditions (prevailing winds, fog, ice conditions, etc),
- tidal conditions and currents
- hydrological conditions , and
- state of hydrographic surveys.

2.1.2.5 Protection of the marine environment.

When considering protection of the marine environment many elements should be addressed, including:

1 Whether the area concerned or part of it is a formally declared 'Particular Sensitive Sea Area' based on IMO Res. A.720(17), as amended, or whether there are any sensitive areas in the proximity which may be affected by pollutants as a result of shipping accidents;

2 Whether any fishing grounds and/or fish farms are involved;

3 Any other formal protection of the area based on either international, national or local rules and regulations e.g. whether the area is classified as a 'special area' under MARPOL Annex 1;

4 Any records available on marine pollution caused by shipping accidents, and the resulting damage to the economy and the environment in terms of clean-up costs, effects on wildlife, fish stocks and tourism;

5 Whether there is an established national policy on the protection of the marine environment and any criteria set regarding pollution;

6 The views of the general public on the environmental issue and the marine environment in particular;

7 The availability of an emergency response organisation to respond to a marine incident.

2.1.2.6 Security and protection of the surrounding area.

When considering security and protection of the surrounding area, the following elements may be considered:

1 Protection of human life and infrastructure;

2 Data available on damage to the surrounding area (including loss of human life), as a result of maritime accidents or incidents in the area concerned. The consequential costs should be quantified;

3 The importance of the protection of the surrounding area along the lines as set out in paragraph 2.1.8.

2.1.2.7 Traffic management tools

The availability and limitations of all traffic management tools including data and information as indicated below. The functioning of these tools should be thoroughly addressed in relation to each other and their effectiveness in addressing the possible problems with the traffic described in section 2.1.2.3.

- national or IMO-adopted ships' routeing measures;
- conventional aids to navigation;
- Global Navigation Satellite System;

- number, size and location of anchorages;
- pilotage, including pilot boarding and landing locations;
- ship reporting systems;
- availability of tug assistance;
- local navigation rules and recommendations in the area; and
- any other tools.

2.1.2.8 Future development

Any foreseeable future trends in maritime traffic (such as an increase in local ferry traffic or the construction of a new bridge) which could have an impact on the previously defined problems, should be identified together with the number of vessels, types and sizes and cargoes carried, and future developments in the area.

Further developments in VTS and navigation-related technology and the implications of future SOLAS carriage requirements for navigational and/or communication equipment onboard vessels should be considered. It should, however, be noted that there are many small vessels for which the SOLAS Convention is not applicable. Further, not all SOLAS vessels have to comply with all the relevant navigational and/or communication carriage requirements in this Convention.

2.1.3 Identification of Maritime Area

Establish where and under what conditions the safe and efficient flow of traffic is being impaired because of:

- the defined waterway constraints;
- any limitations in the present traffic management tools, including data/information availability;
- the meteorological and hydrological conditions;
- the traffic composition; and
- other relevant conditions.

Any areas so identified are the potential critical sections of the waterway and should be studied in detail e.g. where only one-way traffic is possible under certain conditions in parts of the fairway.

Furthermore, it is necessary to establish the extent to which traffic is being impaired and the effect of this impairment, not only on the traffic in the immediate vicinity, but also the resultant effect, if any, on traffic in other parts of the waterway and on port operations.

The effects in terms of economic consequences for the maritime industry and the local authorities should be quantified.

The importance of these effects should be categorised along the lines set out in 2.1.8, finalising the Preliminary Assessment phase.

2.1.4 Risk

Increasing pressure is being placed on marine aids to navigation and lighthouse authorities to clearly address risk elements, using Formal Safety Assessment techniques. IALA is continuing to develop Recommendations and Guidelines on Risk Management, to provide its members with a broad outline on the use of risk assessment tools and risk management techniques which may be consistently used by its members to manage effectively navigation risk. Guidance may be found in the following publications:

- Recommendation O-134 on the IALA Risk Management tool for ports and restricted waterways;
- Guideline No. 1018 on Risk Management;

- The current edition of the VTS Manual.

IALA Recommendation O-134 considers the specific risk assessment and safety management issues which need to be addressed when giving consideration to either the establishment of a new VTS or the re-assessment of an existing VTS.

A product of the Risk Assessment is the Waterway Risk Model which provides for six categories of hazard (see IALA Recommendation O-134) and the consequences that might result from each category. This will enable the authority to populate its risk model to determine the mitigating action or actions that should be considered. Such an exercise provides the base data to support decision about selecting the type and functions of VTS to be established. Refer to Appendix 1 Criteria for Determining Type of VTS Services.

2.1.5 Organisational framework

In countries where VTS is non-existent, the organisational framework on a national and local level may need to be amended before implementing a VTS. Some tasks being carried out by local agencies would be transferred to the future VTS organisation. Any changes in the organisational framework and competencies of agencies and/or personnel should be carefully prepared and implemented. In the Preliminary Assessment phase, the existing maritime organisation should be described and the feasibility of possible adjustments assessed.

2.1.6 Legislative framework

The national legislative framework, including local by-laws, rules and recommendations should be amended in such a way that the relevant requirements of the SOLAS Convention, IMO Resolution A.857(20) and any other applicable international rules, regulations and recommendations are incorporated. The need for such amendments should be assessed in the preliminary study. Qualified maritime legal experts should be made available by the Competent Authority to co-operate with any consultant that they may appoint in describing and analysing the present framework, and in outlining the necessary legislative framework.

2.1.7 Funding

Consideration should be given to the issue of how the future VTS should be funded. It is recommended during the project that a consistent policy is developed on VTS funding, as this service is an integral part of the local navigation infrastructure. Preferably the funding should be in accordance with the IALA Recommendation V-102 on Guidelines on the Application of 'User Pays' Principle to VTS. The intention when introducing a VTS is to enhance the existing situation, therefore, the previous infrastructure should be reassessed to identify those parts that may be retained and those that might become obsolete upon introduction of the future system.

2.1.8 Finalising the Preliminary Assessment Phase

From all the actions described above in paragraphs 2.1.2 to 2.1.7, a substantial amount of data has been gathered. One of the prime purposes of the Preliminary Assessment phase is to allow whoever is undertaking the study to become fully conversant with all known potential hazards, as well as the existing organisational infrastructure, operations and procedures. The recognition of potential hazards that have not been previously identified, as indeed is the recognition of those that may have been ignored, is of equal importance. Weighting factors could be applied to further the process towards operational objectives and traffic situation assessment.

The following passive traffic management options should be considered as alternative or risk mitigation measures:

- enhancement of the existing legal framework to allow for a safer and more effective traffic;
- enhancement of the existing organisational framework;
- adjustments in local by-laws, rules and recommendations;

- space allocation policy for distinctive maritime user functions; to be incorporated, if necessary, in local by-laws, etc.;
- ships' routeing measures, on the basis of SOLAS V/10 and its associated IMO resolution A.572(14) as amended (submitting a proposal to IMO may be necessary);
- ship reporting on the basis of SOLAS V/11 and its associated IMO resolutions and guidelines as amended (submitting a proposal to IMO may be necessary - refer to IMO MSC/Circ.1060);
- improvements to visual and radio aids to navigation;
- expanded pilotage for all or certain categories of vessels;
- removal to a safe clearance depth of navigational hazards, e.g. dangerous wrecks;
- implementation of an emergency response organisation;
- other passive measures to enhance the safety and efficiency of the maritime traffic;
- dredging.

The optimum combination of these passive maritime traffic management measures in terms of effectiveness should be defined, and the resulting enhancement of traffic safety and efficiency should be estimated.

The report of the Preliminary Assessment phase, which should contain all fact finding activities, analyses, assessments, weightings, considerations and conclusions of the possible enhancement of the traffic situation by introduction of passive techniques, should be presented to the Competent Authority.

If the achievable gains by passive techniques are considered inadequate, the option of assessing the possibility of active traffic management by means of a VTS should be recommended in the final Preliminary Assessment report. The Competent/VTS Authority should make a decision to proceed to the Feasibility and Design phase taking into consideration the results of the report. Conversely, the Competent/VTS Authority may require further analysis if they consider the findings unsatisfactory.

2.2 Feasibility and Design Phase

If the previous Preliminary Assessment phase has indicated that passive measures alone are inadequate to attain the desired level of safety and efficiency of the maritime traffic in the area under consideration, the effect of establishing a VTS should be tested.

The foundation for the work in the Feasibility and Design Study phase is the approved report on the Preliminary Assessment phase which includes the expected functions and benefits of a future VTS. This input may also give an indication of the desired type of service to be provided by the VTS.

The first task in this phase is to establish the functional requirements addressing:

- co-operation between authorities, allied services and the port community, including Government agencies such as Immigration, Customs, Coastguard etc.;
- delineating the VTS area and, if appropriate, VTS sub-areas or sectors;
- system users and user requirements;
- responsibilities of involved parties. Where appropriate, responsibilities should at a later date be clearly defined and incorporated in the relevant legislation;
- type of services to be provided. Refer to Appendix 1 'Criteria for Determining Type of VTS Services';
- the operating hours of the VTS;
- types and sizes of vessels which are required or expected to participate in the VTS;
- tasks to be performed by VTS personnel;

- legal framework including, if appropriate, liability issues and a policy with respect to violations of VTS regulatory requirements. Such policy should be consistent with national law;
- the VTS general set-up, including staffing, health and safety issues and human factors;
- basic functional design, as well as a policy on back-up facilities, including the required redundancy/overlap of e.g. surveillance and communications coverage, to sustain and maintain the desired level of reliability and availability, which means that it is critical that levels of reliability and availability are defined for all elements of the basic functional design (see IALA Recommendation V-128 'Operational and Technical Performance Requirements for VTS Equipment');
- operational requirements, including a structure of information flows;
- physical security of the VTS centre and remote sites;
- general outline for a VTS database; and, if appropriate, a general outline for means to retain and retrieve the traffic image, radio and other communication methods and other relevant information;
- a general outline of operational procedures should be prepared;
- if appropriate, co-ordination and co-operation with adjacent VTS systems (in particular uniform procedures and operations); and/or with adjacent ship reporting systems;
- funding: investments, operating costs and, if appropriate, a policy on VTS fees;
- managerial requirements;
- outline requirements for recruitment, qualifications, training and certification of VTS personnel in accordance with IALA Recommendation V-103 Standards on VTS Training;
- VTS equipment life cycle, warranty and maintenance (including training for operational use and maintenance management of the technical part of system);
- any other relevant functional requirements.

It is very important in this Feasibility and Design phase that the functional requirements to be developed do not lead to unnecessary expenses in the proposed VTS. Furthermore, in this phase the design should not be influenced by the availability of the existing VTS equipment. Any consultants appointed by the Competent Authority should be independent from any VTS equipment manufacturers.

The report of the Feasibility and Design phase should contain all functional requirements as set out previously in this section and proposals for the organisational, legislative, and funding framework. The report should be presented to the Competent Authority for appropriate action. Additional actions may be considered necessary if the findings of the report are unsatisfactory.

The acceptance of this document by the Competent Authority is an important milestone in the entire project. It is of utmost importance that all the involved parties should concur with the findings in this document before conducting a Formal Risk Assessment.

2.3 Formal Risk Assessment Phase

The navigational risks of the original baseline situation should be assessed, based on the recorded marine accidents/incidents of the types that are manageable by a VTS, such as collisions and groundings; see section 2.1.2.2. However, one of the main difficulties faced in undertaking any form of risk assessment is that, in many cases, the true financial consequences of recorded casualties are not available. Instead they must be estimated by expert judgement where possible. It must also take into consideration that the future is not a simple extension of history, so more refined methods must be applied to assess the estimated costs of accidents/incidents and other consequences, such as taking into account foreseeable trends. Risk estimation and evaluation provide vital inputs to any risk assessment.

Following completion of the risk estimation and evaluation, the established risk assessment tools have to be applied to test the possible enhancement by means of the alternative risk mitigation measures taken into consideration when finalising the Preliminary Assessment phase (see section 2.1.8), taking into account trends in the traffic volume and composition. This gives an estimate of the annual cost without a VTS.

Finally, the risk assessment methodology has to be applied to the future situation with a VTS. The most important problem here is to be able to estimate the reduction of accidents/incidents through interaction of a VTS. The actual figure is, however, dependent on local circumstances and many other factors that can only be estimated after careful application of risk assessment methods. The use of IALA Guideline 1018 on Risk Management is recommended.

2.4 Cost Benefit Analysis (CBA) Phase

After the completion of the Feasibility and Design and Risk Assessment phases, a Cost Benefit Analysis should be conducted to determine whether the expected reduction in risk would be justified in terms of the level of investment required. The investment and life cycle operating costs can be easily determined after the design is complete. It is especially important not to underestimate the annual running cost of the service. However, the monetary value of the risk reduction is more difficult to estimate and predict over the life of the system.

Both the additional direct and indirect benefits (e.g. additional value- added services for the traffic in the future, the benefits to shore based port operations, etc.) that a VTS might offer should be taken into consideration. Indirect benefits should include an estimation of costs that would otherwise have been incurred in the event of an accident/incident, based on the projected difference between the frequency of occurrence of such accidents/incidents before and after implementation of any changes.

An additional benefit to be taken into consideration could be the reduction in other waterway infrastructure costs that may arise from implementation of the changes.

Finally, the estimated accident/incident level reduction may be assessed to justify or not the cost of establishing and running a proposed VTS. The acceptance of the CBA by the Competent/VTS Authority is an important milestone before proceeding to the Implementation phase.

3 IMPLEMENTATION

A new or re-assessed VTS should be implemented in accordance with the appropriate international general provisions, guidelines and criteria or recommendations.

New or amended VTS legislation, including local by-laws, should be in force before the new or re-assessed VTS is fully operational.

Implementing the VTS should be carried out on the basis of completion of the approved Feasibility and Design report detailed in section 2.2. Guidelines for planning and implementing a VTS can be found in IMO Resolution A.857(20) Annex 1 and 2 and in relevant IALA Recommendations and Guidelines.

Consideration should be given to the availability of the requisite technology and expertise. This is of particular importance for the required regular maintenance and to remedy defects and other trouble-shooting.

4 EVALUATION

It is important for the Competent/VTS Authority to carry out an evaluation after introduction of the new or re-assessed VTS, to ensure that the VTS operational objectives have been met, and the problems identified and defined in the Preliminary Assessment phase have been either alleviated or at least reduced to an acceptable level.

The Evaluation phase should be a concise repeat of the previous phases, following the technical and operational performance of the implemented or re-assessed VTS. Also the evaluation should ensure that the VTS operational objectives are met.

The Evaluation phase can be divided into the following subjects:

1 Technical performance of the VTS equipment.

2 An operational evaluation of the VTS.

3 An evaluation of the operational objectives and the list of problems requiring attention.

5 CONCLUSIONS

While different mathematical models can be used for assessing the need for a VTS, any such models or statistical methods should take into account human factors and practical considerations. Neither the costs nor the benefits to be gained can be precisely and solely deduced from historical data. Therefore, when seeking to enhance the maritime traffic safety and efficiency in a given area, the Competent Authority should consider the anticipated future developments in the area as a whole and the expert opinion of the professional mariners that use the system.

6 ADDITIONAL INFORMATION

Further details can be found in the current edition of the IALA VTS Manual.

There may be a need for tools such as simulation tools and methods to be found in IALA Guideline 1058 On the Use of Simulation as a Tool for Waterway Design and AtoN Planning.

7 REFERENCES

[1] The current IALA VTS Manual.

[2] IMO Resolution A.857(20) Guidance on Vessel Traffic Services.

[3] IMO Resolution A.572(14) General Provisions on Ships' Routeing, as amended.

[4] Guidance Note on the Preparation of Proposals on Ship's Routeing Systems and Ship Reporting Systems for Submission to the Sub-Committee on Safety of Navigation, (IMO MSC/Circ.1060).

[5] General principles for Ship Reporting Systems and Ships Reporting Requirements, including Guidelines for reporting Incidents Involving Dangerous Goods, Harmful Substances and/or Marine Pollutants and (IMO Resolution A.851(20)).

[6] IMO Guidelines and Criteria for Ship Reporting Systems (IMO Resolution MSC.43(64)), and the adoption of Amendments IMO Resolution MSC.111(73IMO Resolution MSC.189(79).

[7] SOLAS Chapter V Regulations 10, 11 and 12.

[8] IALA Recommendation V-102 on Guidelines on the Application of 'User Pays' Principle to VTS.

[9] IALA Recommendation O-134 on the IALA Risk Management tool for ports and restricted waterways.

[10] IALA Guideline No. 1058 On the Use of Simulation as a Tool for Waterway Design and AtoN Planning.

[11] IALA Guideline No. 1018 on Risk Management.

[12] IALA Recommendation V-103 Standards on VTS Training.

[13] IALA Recommendation V-128 Operational and Technical Performance Requirements for VTS Equipment.

[14] IMO Resolution A.950(23) on Maritime Assistance Services (MAS).

[15] IMO Resolution A.950(23) on Maritime Assistance Services (MAS).

[16] IALA Guideline No. 1068 on the Provision of a Navigational Assistance Service by Vessel Traffic Service.

APPENDIX 1 CRITERIA FOR DETERMINING TYPE OF VTS SERVICES

The following criteria should be considered in determining the appropriate type of service(s) to be provided when establishing a VTS.

1 Rules for vessel traffic (may apply to certain vessels, such as those carrying hazardous substances, during certain environmental conditions) – may require TOS. Examples are:

- One-way traffic zones for certain vessels;
- Limitations for vessels carrying hazardous cargo during restricted visibility.

2 Need for allocation of waterway space or usage of infrastructure (locks, bridge or narrow waterway passage) – may require TOS. Examples are:

- Restricted zone around LNG vessel;
- Lock procession order;
- One-way traffic through bridges for certain size vessels;
- Co-ordination of vessel traffic with drawbridge openings.

3 Depending on local conditions, configurations, or hazards, the need for NAS should be considered. Examples are:

- Navigational safety of vessels below pilotage threshold in a port approach channel;
- Vessel in a strait missing a turn in a Traffic Separation Scheme (TSS).

4 Type of VTS (port, coastal or river). Examples are:

- Coastal: may provide just information (INS) on other traffic in a TSS;
- Port: may involve INS and TOS in the co-ordination of port services – berth, tugs, etc. and NAS in maintaining navigational safety in approach channels;
- River: may involve INS for the provision of data on tidal windows and TOS for the co-ordination of transits at high water/swift current.

5 Special or changed circumstances - possible need for additional types of VTS services (NAS, TOS) and or increased information (INS). Examples are:

- Maritime incident (SAR, casualty, oil spill);
- Loss of other navigation aids;
- Higher level of security measures;
- Unforeseen changes to port infrastructure or increase in vessel traffic volume;
- Limitations on vessel manoeuvrability.

6 Existence of areas that may affect navigation – possible need for INS or TOS. Examples are:

- Environmentally sensitive areas, such as endangered whale locations (INS);
- Navigation hazards, such as shallow water or reefs (INS);
- Protection of infrastructure, such as bridges (TOS);
- Existence of traffic routeing measures, such as TSS, recommended routes, areas to be avoided (INS).

7 Equipment available to the VTS (sensors and communications) will determine the specific services the VTS can provide. The type of VTS service(s) may also determine the equipment that is required. As new capabilities become available the potential services that may be provided should be assessed. An example is:

- Improved radar coverage may assist in providing more information to vessels (NAS);

8 Communications and access to data outside the VTS - will determine the extent of INS a VTS can provide. An example is:

- Port operations information, such as tug arrangements, lock passage planning, berth availability.

9 The authority that the VTS has been granted by local or national regulations, legislation and policies - can affect what type and the extent of services the VTS may provide. An example is:

- A VTS may not be authorised to provide certain types of service;

10 Resources available can affect the services provided. An example is:

- Operator capabilities – training, experience, procedures.