**VTS/WG4/intersessional/output08**

## VESSEL TRAFFIC MANAGEMENT (VTM)

**To** **Chair of the VTS Committee**
**Chair of the eNAV Committee**
**Chair of the ANM Committee**

WG4 on VTM of the IALA VTS Committee has been tasked to define and develop the global concept and the scope of Vessel Traffic Management (VTM) (Task 12).

After common understanding was reached on the work, a number of principles and the process to be followed, the members of the Working Group substantially started their work during VTS28. It was recognized that (taking into account the importance and work package for this task and the given timeframe) several intersessional meetings were and still are needed to meet the identified deadlines within the given timeframe.

It is intended to finalize the development of the concept on VTM at VTS30, where after the result will be presented to the IALA Council for approval.

WG4 is aware of the fact that the development of the VTM concept may have direct and indirect relations with other tasks or developments under the attention of the Committees or, may influence the progress on other subjects by the several Working Groups.

This document is to inform the VTS Committee, eNAV Committee and the ANM Committee on the progress of the development process and the results so far. It should be noticed that the document is a Draft Working Paper of WG4 and that the content is subject to permanent review by WG4.

At a later stage the Draft Working Paper will be transferred into a strategy document on VTM.


## Actions requested

WG4 of the VTS Committee invites the chairs of the VTS Committee, the eNAV Committee and the ANM Committee at their next sessions to incorporate the subject VTM in their agenda, to take notice of and discuss the attached document in the relevant Working groups..

WG4 welcomes every kind of substantial support and contributions to the work and therefore invites the mentioned Committees to sent their comments and/or suggestions soonest to the Chair of WG4.

# Defining the concept and scope
# of
# Vessel Traffic Management (VTM)

## SUMMARY

Executive summary: This document is to be seen as a working paper, produced by Working Group 4 on VTM of the of the IALA VTS Committee, and is intended to give an outline to define and to develop the global concept, scope and strategic approach for Vessel Traffic Management (VTM). Further more this document can give guidance to
- identify and develop the relationship between VTM and e-navigation
- the global, supranational and national discussions on VTM
- the identification of the (future) role and services of VTS of which the VTS Committee has been tasked
- the revision of IMO Resolution A.857 (20) of which the VTS Committee has been tasked
- the IALA eNavigation Committee for the further development of e-Navigation
- identify and contribute to develop the Working Program 2010-2014 of the VTS Committee

**Actions to be taken:** Actions during the development and defining process will be reflected in an Annex

**Related documents:** Identification and list of all related documents will be reflected in an Annex

## 1.    INTRODUCTION

During the last decades the international views concerning the observation and guidance of (passing) ships in (inter)national waters has changed under the influence of, among others,
- the development of new international and supranational regulations and guidelines;
- the increasing public demand for an improved monitoring and surveillance of traffic in numerous areas;
- the need for enhanced and efficient navigation and traffic handling in confined waters;
- the recognition that accumulating risks in navigable waters and the marine environment occur due to the increasing intensity, diversity and economies of scale in shipping, as well as by other utilization claims in these areas;
- the rapid development and availability of modern and more efficient technologies for navigation, communication and information exchange;
- the increasing demand for more reliable and up-to-date information for all parties involved in the maritime transport sector.

It was also recognized that, due to the technical developments/opportunities and the increasing need for advance information, physical and technical boundaries would no longer exist for those authorities involved in the management of maritime transport. For instance VTS, traditionally bounded to its own area of responsibility, could now easily exchange information with other stakeholders concerning traffic management matters outside their defined area and interact with other processes.

New technologies provided a new dimension of capabilities and are expected to contribute positively and pro-active to
- the decision making processes both on board and ashore;

- the management and monitoring of traffic in (high density) VTS areas and all other navigable waters;
- a decrease of the (administrative and operational) workload onboard and ashore;
- the development of (voyage and traffic handling) planning and risk management tools;
- the security of shipping in general, of ports and infrastructure;
- the management of maritime and nautical information for many purposes;
- the re-use of information to keep the growth of equipment and data-handling systems within acceptable proportions;
- support the logistic chain.

The development of new technology has given the opportunity for efficient en effective data exchange and multipurpose employment of the collected data between all participants and stakeholders in the maritime and nautical environment.

In recent years it became quite clear to maritime interests involved in the context of traffic management that, – as a consequence of the developments mentioned - the traditional traffic management instruments, measures and services will not be sufficient to satisfy the needs of the stakeholders in the public and private maritime domain. However, these instruments and measures – subject to further development -, should be incorporated into a new wider concept of Vessel Traffic Management (VTM).

As a result of these developments organizations and administrations on international, supranational and national level already started to anticipate in developing strategies and plans in order to establish integrated concepts, services and systems for VTM. It was noticed however that no international organisation (IMO or IALA) was co-ordinating or providing guidance yet on this global interaction with vessel traffic and the stakeholders within the maritime domain.

## 2. DEFINITION OF VTM

### 2.1 WORKING DEFINITION BY WG4 OF THE IALA VTS COMMITTEE[1]

"Vessel Traffic Management is the functional framework of harmonized measures and services to enhance the safety, security, efficiency of shipping and the protection of the marine environment in all navigable waters".

### 2.2 CLARIFICATION OF THE DEFINITION

The *functional framework* are the arrangements on a global, supranational, national and/or regional scale to set the conditions for safe, secure and efficient maritime traffic and for the enhancement of efficient and effective use of the resources engaged in order to enable the collaboration among the different public and private stakeholders involved. These arrangements should be consistent, coherent and recognized by present and future (inter)national legislation and guidelines.

**Arrangements** are agreements or understandings between two or more stakeholders within the functional VTM framework on the implementation of measures, the provision of services, the coordination of efforts, the allocation of resources and any other conditions needed to reach the aims to VTM.

*Measures within VTM* are the efforts by Competent Authorities to set the conditions to be respected and the provision of services to meet the aims of VTM and the compelling needs of stakeholders within the maritime domain.

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[1] A working definition of VTM was developed by VTS26 and approved by the IALA Council at its 42nd session after slight modification:
["Vessel Traffic Management is the strategic provision of a network of measures and services. The purpose is to enhance safety, security and efficiency of shipping, protection for the environment and functions of Vessel Traffic Services. These services and measures may be available globally".]
During the process the WG felt that this definition limited the boundaries for defining and development of the scope of VTM.
Therefore, as instructed by Council and the Chair of the VTS Committee, the WG kept the definition under constant review.

A *service within VTM* is an activity or a combination of activities, provided by one or more stakeholders within the maritime domain, for the benefit of VTM stakeholders to support their strategic, tactical and operational mission.

Note:    With regard to the above and on going in this document It should be noticed that, in respect to arrangements, measures and services, the terminology "within VTM" is used and not "VTM arrangements, measures, services ….". and so on. However, it is the vision that VTM, being a concept or a functional framework, does not provide arrangements, measures, services etc, itself. They are the results of appointments between or provided by stakeholders within the concept.

By way of clarification, in the context of VTM , *"Maritime domain"* is used as a generic term covering:
- all geographical areas (ocean, sea, coastal waters, harbour approaches, inland waters or all other navigable waterways),
- structures in, on, under  or bordering these areas
- all aspects of maritime infrastructure in mentioned geographical areas (e.g. waterways, locks, bridges, specific traffic management arrangements)
- all activities relating to and/or adjacent to safety and efficiency of shipping, security onboard and ashore  and the protection of the marine environment
- waterborne transport of people and cargo and its handling
- the human factor.

Note: During the development process of the scope and concept of VTM the working definition and clarifica-tions shall be refined further and when appropriate sent to the IALA Council for approval.


## 3.    VISION

Since the introduction of Resolution A.857(20) and the development of e.g. LRIT and AIS monitoring of and interaction with vessels has become a global activity. Safety, security and efficiency considerations now necessitate real-time monitoring and surveillance of marine sentitive areas, as well as pre-arrival information well before arrival of ships.

As a result of the effects of globalisation VTM must take under consideration the interests of stakeholders in- and outside the maritime domain. Therefore VTM has the responsibility to seek understanding between those interests.

VTM should enable all stakeholders worldwide to address their respective interests. Measures and services within VTM to be developed should take these interests into consideration and should be sustainable and part of a consistent framework.

VTS should be incorporated in an overarching concept on a higher (strategic) level: Vessel Traffic Management. VTM would therefore comprise VTS as a central instrument but also a variety of other activities. These activities shall be supported by management of information.

However, it should be recognized that VTM as a concept or as a functional framework can exist with and without the presence of one or more VTS centres in certain areas. This depends on geographical and traffic circumstances and/or organizational arrangements in these areas. In most cases, if no VTS centre is available, measures/services which are usually designated to VTS centres are executed or provided by other organizations, e.g. Coastguard Centres, monitoring stations or reporting services.

It is the responsibility of the national or regional competent authority to decide on and to organize the provision and execution of the necessary measures/services within VTM.

The development, implementation and operation of these measures and services should be done according to (inter)national agreed legislation, regulations, directives and/or guidelines. In a situation where no VTS centre is available, the availability of information and its interconnectivity for the VTM stakeholders have to be guaranteed.

VTM (by providing and exchanging reliable and current information and supported by modern tech-nology) should not only contribute to the safety and efficiency of traffic within a defined area  but also to
- the safety and efficiency of maritime traffic worldwide;
- security aspects within the maritime domain;
- protect the marine environment worldwide and
- support logistic processes (planning and connecting modes of transport) within and outside the VTS-area or areas under VTM (interlocal, interregional, national, supranational and global).

## 3.1    IDENTIFIED CHARACTERISTICS FOR VTM

Based on the results of several projects, which were concluded or are in progress globally and supranational in respect to the development of the concept of VTM, in general the following characteristics for VTM have been identified:

- the aims for VTM shall be clear, to guide the interpretation and implementation on all levels, from international to local;
- the responsibilities and competences for the competent and authorities involved shall be transparent to all (inside the organization, to other authorities and to the users);
- a clearly described package of measures and services within a functional framework, which focus on the public demands (regarding the differences between public and private tasks);
- the combination of measures and services that can be seen as a source of information for VTM having an extended value for safe and efficient flow of traffic and goods, inside as well as outside the VTM and/or VTS area;
- harmonisation of all interdependent processes in VTM; preferably those of VTM organisations and competent VTS authorities should also be established through unique and uniform guidelines;
- information management within the VTM area and between this area and all other areas (interfacing local to international) should be established according to international arrangements, resolutions, recommendations and guidelines;
- an efficient and effective organisation, use of personnel, instruments and systems (technical infrastructure) will be necessary.

## 4.    MISSION OF VTM

To create on a global and/or regional scale the conditions for safe, secure and efficient maritime traffic, to enhance the efficient and effective use of the resources engaged and to enable collaboration among the different public and private stakeholders involved.

# 5. CONCEPT OVERVIEW

## 5.1 THE OVERARCHING CONCEPT

VTM has to be seen as the overall (overarching) structured and functional framework of
- strategic, tactical and operational *efforts* in interaction with its operating environment worldwide;
- to meet stake-holders' demands for reliable and valuable information,
- to enable collaboration among public and private stakeholders, as well as
- to optimise the utilisation of the marine infrastructure.

## 5.2 CLARIFICATION

It is recognized that stakeholders within VTM operate at a strategic, tactical and/or operational level. In order to ensure coordinated efforts among these various stakeholders, it is necessary to achieve a common understanding on the definitions of these efforts.

The **efforts** encompass all measures and services that are employed in the course of berth-to-berth navigation and associated activities, including the deployment, the maintenance and the delivery of the measures and service to meet the (evolving) requirements of the end users.

### 5.2.1 STRATEGIC EFFORTS

The **strategic efforts** target the pro-active part (preparation and planning) of:
1) the conditions for safe, secure and efficient vessel traffic;
2) berth to berth navigation, and
3) the timely exchange of valuable information associated.

This includes communication at strategic level:
level and quality of relevant information needed to prepare and/or to anticipate on the execution of a task or to assess the circumstances that could lead to a hazardous or undesired occurrence.

These strategic efforts may range from policymaking to prepare sailing plans.
The time horizon may range from several years to several hours.

### 5.2.2 TACTICAL EFFORTS

The **tactical efforts** target the active part (monitoring and decision making) of
1) the safe, secure and efficient handling of vessel traffic;
2) berth-to-berth navigation;
3) the enforcement of or compliance with rules and regulations, and
4) the timely exchange of valuable information associated.

This includes communication at tactical level:
level and quality of relevant information needed to take proper action in the execution of a task.

These tactical efforts include, among others,
a) monitoring of vessel traffic;
b) supervision of navigation and vessel traffic handling, and
c) supervisory control of potential hazardous occurrences in confined waters.
This includes maritime pilotage services.

The time horizon may range from several hours to several minutes.
In addition, tactical efforts include those Vessel Traffic Services which aim to influence or correct the vessel's behaviour in order to improve safety and the efficiency of vessel traffic in interaction with its operating environment.

**5.2.3** OPERATIONAL EFFORTS

The ***operational efforts*** target the reactive part (respond to occurrences) of
1)  berth to berth navigation in interaction with its operating environment, and
2)  the 'real-time' exchange of valuable information.

This includes communication at operational level on board, on shore and between ships and shore, in order to guide real time decision making.

These operational efforts include
a)  the safe conduct of navigation,
b)  maritime pilotage on board,
c)  tugboat and linesmen assistance, and
d)  instructions from a Competent Authority.

The time horizon may range from immediate to several minutes.

# 6. SCOPE OF THE DEVELOPMENT OF VTM

The scope of VTM - based on the user driven concept above - is defined by the following:
the compelling need for VTM
- to define the aims of VTM associated;
- the constraints to the concept of VTM
- to identify its stakeholders and their compelling needs;
- to identify the measures and services within VTM on a high abstract level;
- to assess the benefits of VTM in general;
- to identify the relationships between VTM and other concepts (e.g. e-navigation)
- to identify developments within the maritime domain providing results and/or solutions which might be incorporated to meet the compelling needs of the stakeholders, to develop measures and services and to increase the benefits of the concept.
- to describe functional requirements for measures, services, processes on strategic, tactical and operational level and for instruments within VTM.

## 6.1 COMPELLING NEEDS FOR VTM

There are increasing claims by multiple users on the use of navigable waters and (other) multiple entities that manage these claims. This situation results in a compelling need from VTM stakeholders – including competent authorities and users of services within VTM - for integral management of these waters within the frameworks of IMO, UNCLOS and other international treaties.

Recognizing the above need for integrated management, there is a compelling need to design and implement proper measures and services within VTM in a harmonized manner on a global scale in accordance with existing rules, regulations, and concurrent operational practices. These measures and services should be consistent, uniform and transparent.

Measures and services within VTM should be developed in a lasting manner aligned with  the needs of the stakeholders.  Reliable, structured and up-to-date information is essential in order to accomplish the aims of VTM  and to optimise decision making processes on all levels within the maritime domain.

## 6.2 THE AIMS OF VTM

The identified aims of VTM are:

- Safety of shipping and the environment
- Efficiency of maritime transport
- Security of shipping, ports and infrastructure
- Meeting the demands of all parties concerned for reliable and current information in order to maintain and support efficient utilization of maritime water infrastructure, the effective and reliable operation of or support to other tasks, logistic and/or nautical processes.

These aims are to be achieved through the strategic provision of a functional framework of measures and services that enable stakeholders (ship-borne and shore-based authorities/organizations at local, regional, national and international levels) to interact and exchange information to enhance:

- The decision making process in matters concerning maritime safety and security, efficiency of navigation
- The prevention and control of marine pollution and emissions from vessels;
- The strategic planning of vessel movements in confined and congested waters;
- The monitoring of vessel traffic in all navigable waters worldwide;
- The assistance to safe and secure berth to berth navigation
- The efficient handling of vessels movements in all navigable waters;

- The services to maritime safety and security, efficiency of navigation and prevention and control of marine pollution from vessels;
- The operation of allied services;
- The services to vessels' routeing and waterway management;
- The optimal utilisation of the marine infrastructure and/or assets;
- The services to maritime transport and logistics;
- The services to contingency response, search and rescue, and incident and accident response.

### 6.2.1  CLARIFICATION

Note:   A common misunderstanding is that VTM is similar to VTS+ and that the aims of VTM equals those of  a (extended) VTS are the same.

VTM is an overarching global *concept* containing a functional framework of measures and services for *all navigable waters* that benefits *all stakeholders* within the *maritime domain*.

VTM (by providing and exchanging reliable and current information and supported by modern technology) should not only contribute to the safety and efficiency of traffic within a defined area  but also to
- the safety and efficiency of maritime traffic worldwide;
- security aspects within the maritime domain;
- protect the marine environment worldwide and
- support logistic processes (planning and connecting modes of transport) within and outside the VTS-area or areas under VTM (inter-local, interregional, national, supranational and global).

A VTS is *a service* implemented by a Competent Authority, designed to improve the safety of vessel traffic and to protect the environment. The service should have the capability to interact with the traffic and *respond to traffic situations* developing in the *VTS area*.

Although it is recognized that the primary services of VTS[2]  are still evolving as a result of the developments (as described in paragraph 1. Introduction) even extended VTS will not meet the compelling needs as identified for VTM.(paragraph 6.1) and VTS measures and services still will be restricted to defined areas of responsibility.

| Aims of VTS | Aims of VTM |
|---|---|
| 1) Safety of shipping and the environment<br>2) Efficiency of vessel traffic in a certain area | 1) Safety of shipping and the environment<br>2) Efficiency of maritime transport<br>3) Security of shipping, ports and infrastructure<br>4) Meeting the demands of all parties concerned for reliable and current information in order to maintain and support efficient utilization of maritime water infrastructure, the effective and reliable operation of or support to other tasks, logistic and/or nautical processes. |

Conclusions:    - The first aim of VTS is similar to the first aim of VTM.
- The second aim of VTM differs from the second aim of VTS due to the expanded scope of VTM.
- The third and fourth aims are consequences of the expanded scope of VTM, reflecting the public demands and needs and those of the stakeholders in general.

### 6.3  CONSTRAINTS TO THE CONCEPT OF VTM

VTM should be sustainable and any translation of the concept into a specific VTM regime should respect the applicable legal, social, technical and practical constraints.  These limitations may or may

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[2] IMO Resolution A.857 (20)

not be defined in regulatory instruments.  Some may be based on traditional, well understood practices, such as the role of the master or arrangements between parties within the maritime environment. Other limitations are based on international accepted conventions, recommendations and guidelines.

Legal constraints associated with VTM will predominately arise in the context of the United Nations Convention on Law of the Sea (UNCLOS) with respect to freedom of navigation and the right of innocent passage.  VTM measures and services must all operate within the legal constraints of the Convention and not interfere with the sovereign rights of vessels engaged in legitimate trade.

VTM measures and services must be proposed, approved and implemented in accordance with conventions, standards, provisions and guidelines adopted for use by the International Maritime Organization (IMO).  Additional provisions or guidelines may need to be proposed and adopted by the Organization before they can be applied to implementing a measure or service within VTM. For measures or services that extend beyond the territorial seas of an individual state, cooperative arrangements may have to be entered into with neighbouring states.

A measure or service within VTM that deals with the exchange of vessel information must be aware of the sensitive nature of certain voyage related information.  This may be commercially sensitive or security sensitive information.  There must be means in place to protect sensitive information and to prevent the misuse of data. Consideration must also be given to intellectual or organizational property rights with respect to data where appropriate.

The implementation of measures and services should be assessed on risks, costs and benefits.

The quality of measures and services within VTM will be constrained by the competency of the individuals and organizations that operate systems and deliver the services.  Training of personnel engaged in VTM must be appropriate to the level of service delivered.  It's recognized that organizations and authorities should have a pool of expertise available from which to draw to provide measures and services within VTM.

In the development and implementation of measures and services within VTM, due regard should be given to conditions set by e-navigation for the collection, integration, exchange, presentation and analysis of maritime information on board and ashore. VTM should set the functional requirements, e-Navigation is supportive to VTM to execute the measures and services.

Technical means employed to provide VTM will have to be appropriate to the services delivered and measures enacted.  Systems used to collect, process and disseminate information must be well-maintained and reliable.  Imposition of additional equipment carriage requirements on vessels must be avoided.   If additional mandatory equipment is unavoidable, carriage requirements should be universally adopted in accordance with international standards.

VTM should support search and rescue and law enforcement efforts to the extent practical.  However, the rights of vessels must be considered and fair treatment of seafarers must be ensured.  VTM must respect the traditional role of the master and should not attempt to supplant his or her authority.

VTM should not be seen as a means to generate revenues for shore-based organizations.


## 6.4    STAKEHOLDERS

The stakeholders of VTM are the individuals and constituencies (both ashore and onboard) that contribute to and are involved in, either directly or indirectly, its value-creating capacity and activities.

Therefore the stakeholders are its potential beneficiaries and/or risk bearers. Their common desire is that the VTM efforts should be carried out in such a way as to enhance safety, security and efficiency of maritime transport, protection of the environment in an efficient and effective manner.

### 6.4.1 IDENTIFICATION OF THE STAKEHOLDERS

By implication the primary actors (responsible for the implementation and operation) of VTM should attempt to identify their significant and legitimate stakeholders (including those who are non-contractual and involuntary), and listen and respond to their needs, interests and concerns. These include:
- those who mobilise social and political force for the implementation of VTM;
- those who provide the resources for VTM;
- those who are professionally employed for or otherwise engaged in VTM efforts;
- those who are or may be affected (both benefits and risks) by VTM efforts;
- those who are responsible for the performance of its measures and services;
- those who use of its measures and services; and
- those who support its measures and services.

### 6.4.1 CRITERIA AND PROCESS FOR DETERMINING STAKEHOLDERS WITHIN THE VTM FRAMEWORK

A process has been developed and designed by WG4 of the VTS Committee to determine and categorize stakeholders within the VTM and assess their role in the VTM framework[3].

From this process functional requirements for arrangements, measures, services, information exchange, etc. can be derived to give guidance to other bodies and parties in the implementation of VTM as well as to the further development of e-navigation. The intention is to ensure focus on user needs and to foster collaboration among stakeholders in order to meet the aims of VTM.

The process consists of a series of consecutive steps:

- Step 1 – Determination of stakeholders within the VTM framework
- Step 2a – Categorization of stakeholders within the VTM framework
- Step 2b – Determine extent of stakeholders' contributions

A list[4] of the so far identified ship-borne and shore-based stakeholders is basically identical to the list identifying the stakeholders for e-navigation and shall be kept under review.
In order to identify relationships between stakeholders and to assess the arrangements necessary, the results of the first steps (1, 2a, 2b) should be combined with additional steps in this process:

- Step 3 – Identification of measures and services
- Step 4 – Development of functional requirements
- Step 5 – Determination of relationships between VTM stakeholders

## 6.5 IDENTIFICATION OF MEASURES AND SERVICES WITHIN VTM ON A HIGH LEVEL

***Measures within VTM*** are the efforts by Competent Authorities to set the conditions to be respected and the provision of services to meet the aims of VTM and the compelling needs of stakeholders within the maritime domain.

A ***service within VTM*** is an activity or a combination of activities, provided by one or more stakeholders within the maritime domain, for the benefit of VTM stakeholders to support their strategic, tactical and operational mission.

Measures and services within VTM should be identified and/or developed in order
- to meet the needs of (shore based) authorities and shipping for more, reliable and current information, improvement of information management, support to other tasks and duties such as enforcement, incident management and security;

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[3] document VTS/WG4/intersessional/output06
[4] document VTS28-WG4-WP01 Identification stakeholders in VTM

- to deal with the increase of shipping intensity and diversity in a great number of areas worldwide, economies of scale shipping, the increasing claims on manoeuvrable waters others then for navigation;
- respond to the intentions and demands by a number of (supra)national authorities to come to comprehensive national/regional VTM (including VTS) in stead of local VTS;
- to anticipate on the recognition that VTM, next to the two aims "Safety" and "Efficiency of Shipping", also positively can contribute to certain logistic aspects (in harbours, in the transport chain) as a result of the proposed central role of VTS in the information exchange and the reuse of collected data.

A global functional framework reflecting the foreseen measures and (primary and supportive) services within VTM has to be developed.

### 6.5.1  HARMONIZED BUT NOT EVERYWHERE THE SAME EXECUTION

It should however be recognized that worldwide the VTM areas of interest can differ arising from
- the intensity and diversity of shipping (traffic image)
- the geographical circumstances
- the scale of economical activities
- the desired extent of safety and traffic flow (responsibility of the local/regional competent authority)
- the public and private needs for reliable and update information
- the organizational and/or technical possibilities and facilities

This means that in specific areas it may not be necessary to introduce and/or execute ALL mentioned future VTM measures and services (to be decided by the competent authority). However, as long as the existing and new added measures and services shall be arranged, organized and executed within the (harmonized and integral) framework and according to international agreed regulations, recommendations and guidelines.

Distinctions in organisational and working levels (strategic, tactical and operational)will be an elementary matter, in order to:

- achieve the optimal results of a future VTM concept and/or VTS;
- maintain an expected integration of tasks, services, (re)use and flows of data
- respond efficiently and effectively to the users and stakeholders needs.

It should also be recognized that VTM as a concept or as a functional framework can exist with and without the presence of one or more VTS centres in certain areas. In most cases, if no VTS centre is available, measures and/or services which are usually designated to VTS centres may be executed or provided by other organizations (to be decided by national, regional or local authorities) (see paragraph 3. Vision).

### 6.5.2  DEVELOPMENT OF CRITERIA FOR MEASURES AND SERVICES IN VTM

In order to identify whether measures and services may be incorporated within the functional framework of VTM and for the development of the framework itself a number of criteria and requirements[5] have to be used.

These criteria are to be used to identify existing and future measures and services that may belong to the VTM framework.  Once measures and services within VTM are identified, they should conform to the requirements listed below.

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[5] document VTS/WG4/Intersessonal/output05 Criteria and Requirements for Measures and Services in the VTM Framework

### 6.5.2.1 CRITERIA FOR MEASURES AND SERVICES IN VTM

In order to be considered a measure or service within the VTM framework, it must influence directly or indirectly:

- ***The aims of VTM** (onboard and ashore):*
  o Enhance safety
  o Enhance security
  o Enhance efficiency
  o Enhance protection of the marine environment

- ***The needs and interests of VTM stakeholders***
  o The primary activities of stakeholders within the maritime domain (measures)
  o Work done by a VTM stakeholder to benefit other stakeholders (services)

### 6.5.2.2 REQUIREMENTS FOR MEASURES AND SERVICES WITHIN VTM

Measures and services within VTM should meet the following requirements as appropriate:

- *Functionality*
  o Part of a functional framework
  o Appropriate to the functions of VTM
  o Delivers the intended results
  o Meet the needs of stakeholders in the maritime domain;
  o Involve or affect one or more VTM stakeholders

- *Harmonization:*
  o In general be able to be part of arrangement s with other measures and services and among stakeholders (subject to legislation or guidelines)
  o Be developed/implemented/provided in a manner consistent with applicable guidelines
  o Follow recognized and appropriate standards
  o Clarity of purpose and intended results to those affected by the measure or receiving the service (transparency)
  o Be developed in a collaborative manner (user driven), to address stakeholder needs and concerns and strive for consistency.

- *Assessable*
  o To evaluate its effectiveness in quantity and/or quality

- *Feasibility*
  o Applicable to VTM
  o Practicable – appropriate to the situation
  o Cost effective – the benefit is worth the effort or expense, including maintainability

- *Sustainability*
  o Continuity – able to be continued – not just one-time measures

- *Availability*
  o Made available to stakeholders as required to meet their needs

- *Reliability*
  o Consistently available to the end user

- *Efficiency*
  o Improve existing activities/measures/services
  o Decrease workload onboard and/or ashore

### 6.5.3 AREA UNDER VTM REGIME

The working definition of the VTM regime, further to be developed, for all or specific waters might be:

"The complete sets of defined agreements between competent authorities dealing with administrative, policymaking and operational responsibilities for the development and implementation of vessel traffic management. The regime should be administrated by the competent international, supranational,

national and/or regional legislator for all agreed and defined waters, comprising the aims of VTM, the responsibilities, a defined framework of harmonized measures and services, processes, procedures and the competences and obligations of the VTM actors involved".

The VTM regime is not locally bound, to be decided by the competent authority(ies), and might cover the whole or parts of the network of navigable waters or connecting
- ocean waters
- coastal waters
- harbour approach areas
- ports and
- inland waters

Regional and local VTM areas, where the VTM regime is present, at the same time may be designated as a VTS area under the responsibility of a Competent Authority. Subsequently, more than one VTS area may be part of (ruled by) one specific VTM regime.

## 6.6 BENEFITS OF VTM

It is recognised that benefits from VTM are achieved through co-operation between the providers of measures and services within VTM – either public or private – and that the long-term success of the VTM efforts requires systematic attention to the interests and concerns of all significant and legitimate stakeholders. Through them the safety, security and efficiency in shipping engaged in international trade is sustained.

The implementation of VTM creates a worldwide functional framework in which all efforts concerning maritime safety and security, efficiency of navigation and prevention and control of marine pollution from vessels are structured, as to identify all interrelations and manage their interdependencies.

This structured framework is based on functional arrangements between VTM actors and VTM users, and does not conflict with current and/or future responsibilities of the primary actors of VTM, nor does it conflict with the responsibilities of the master of a vessel.

These arrangements respond to the need for information of the VTM users and the need for the exchange of reliable, accurate and relevant information between VTM actors, and the provision of integrated systems and of new functionalities through information technology.

The benefits, derived from the aims and structured framework of VTM, include:

- the worldwide handling of vessel traffic by competent authorities in a harmonized and uniform manner, where practicable;
- transparency in interrelations between shipping and shore based organisations engaged in VTM;
- improved management and provision of accurate and relevant information on strategic, tactical and operational level;
- improved availability, accessibility and delivery of accurate and relevant information to shipping for safe, secure and efficient berth to berth navigation;
- improved availability, accessibility and delivery of accurate and relevant information to VTM actors ashore, in order to ensure that safety, security and efficiency in shipping engaged in international trade is sustained;
- enhanced rules and regulations to guide and organise vessel traffic in confined and congested waters, in order to manage maritime risks and the use of maritime infrastructure, and to protect the marine environment;
- improved coordination between services that assist in safe and efficient berth to berth navigation;
- enhanced navigation, information and communication systems and interfaces, tot improve and sustain the information position of vessels, VTS, port and waterway management authorities;
- improved efficiency in maritime transport and logistics, through authorised and effective re-use of vessel and voyage related information;

- improved efficiency in contingency response, search and rescue, and incident and accident response, through authorised and effective re-use of vessel ands voyage related information;
- improved support to the operation of allied services by optimised exchange of information;
- decreased workload onboard and/or ashore.

## 6.7 INFORMATION MANAGEMENT AS THE BACKBONE OF THE GLOBAL VTM CONCEPT

One of the key elements (backbone) towards a optimal performance of the VTM concept is the support by efficient and effective collection, integration, exchange, presentation and analysis of information to improve safety of navigation  and fluent transfer of the traffic.

In general, but recognizing that specific circumstances in the areas of responsibility may vary, the identification of the demands and needs of users and stakeholders showed that all relevant information should be made available[6]

- *on board and ashore for the safety of navigation and fluent handling of maritime traffic by*
    - functional utilization of existing and future technical means
    - coordination between and alignment of processes involved
    - central management of the information and/or data exchange ashore
- *to respond to the needs and expectations of the stakeholders as identified in the maritime domain:*
    - Supportive to the enforcement of shipping regulations
    - Supportive to other law enforcement organizations
    - Supportive to Competent Authorities dealing with the environment, Port State Control and the consignment of waste
    - Supportive to SAR and incident/accident/calamity management
    - Supportive to organizations responsible for fairway management
    - Supportive to the security of shipping, ports and infrastructure
    - Available for the Competent VTM (and VTS) Authorites associated, shipping interests, nautical service providers and stakeholders in the logistic chain.

### 6.7.1 RELATIONSHIP VTM AND E-NAVIGATION

To support the development process of VTM, for the benefit of transparency and to give guidance to the further development of supportive concepts, it will be necessary to develop a high level architecture for the functional framework of VTM.

In order to achieve the optimum results of VTM, to be able to persist the responsibilities by the organisations and/or authorities and to accomplish measures and services within VTM ashore and onboard this support comprises integrally the processes, instruments, procedures and systems under VTM.

The supportive (technical) system components should be harmonized and comply with global agreements on standards, regulations and guidelines. This includes also all interfaces (open structured) to guarantee the interconnectivity between ship-borne and shore-based systems and networks for the exchange of reliable and real-time information.

It is expected that e-navigation[7], supportive to the execution of VTM measures and services, should provide the desired guarantee in respect to the interconnectivity between ship-borne and shore-based stakeholders, systems and networks [8].

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[6]  Availability is conditioned by authorization according to regulations and good practices

[7]  IMO/NAV52 started a programme under the name e-Navigation intending to harmonize shore based infrastructure and systems on board shipping as well as procedures and data-flow. IMO requested IALA and IHO to advise in the development of the e-navigation programme. The IALA Council tasked the e-NAV Committee accordingly. At VTS24 it was concluded that the VTS Committee would include the specification of functional e-navigation needs for VTM and the provision of VTM guidance and recommendations. The e-NAV and other Committees would provide technical guidance on how those functional needs are

Consequently *VTM* as the overarching global concept will be concerned with:

- Legislation
- Responsibilities
- Organisation (both shore and ship)
- Primary, allied and supportive measures and services
- Processes associated to vessel traffic
- Processes associated to information management
- Functional instruments
- Data providing instruments
- Procedures
- (Technical) Systems

***Consequently, e-Navigation should take*** into account the functional requirements set by VTM. e-Navigation is the concept supportive to VTM by efficient and effective collection, integration, distribution, exchange, presentation and analysis of information, and is concerned with:

- Processes associated to information management
- Data providing instruments
- Procedures
- (Technical) Systems

### 6.7.2 RELATIONS WITH OTHER CONCEPTS

Developments within the maritime domain providing results and/or solutions which might be incorporated to meet the compelling needs of the stakeholders, to develop measures and services and to increase the benefits of the concept. Cooperation with relevant maritime projects should be maintained throughout the development process of VTM (e.g. MarNIS, MEH) to benefit from synergies, to validate related results, solutions and proposals which may contribute to a global VTM concept.

## 6.8 RESPONSIBILITIES

In the course of further defining the concept, scope and implementation of VTM, several responsibilities that come with the ownership and control of VTM should be clearly documented.

## 6.9 PROCESSES

Collaboration between VTM stakeholders need to be intensified and structured into transparent and where practical uniform processes, in order to collectively contribute to the benefits of VTM and create the functionalities for VTM.

Although arrangements for collaboration could differ according to local rules, regulations, scope, geographical circumstances and user needs, they all share the same focus and are likely to be supported by the same (technical) instruments[9].

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best delivered. These functional needs could include shore-to-shore and shore-to-ship information exchange. It could also influence future ship-to-ship data exchange requirements. The IMO Correspondence Group on e-Navigation, supported by IALA e-NAV Committee, has developed the concept for the e-navigation Strategy ; after discussions and slight modifications during IMO/NAV54 the concept was presented to IMO/MSC in which it was accepted and approved. A clear statement in the documents concerned was made that e-navigation supports Vessel Traffic Management (VTM).

[8] At present from a technical point of view the architecture for e-navigation is under development; in order to achieve the aims of both global concepts (VTM and e-navigation) and user needs it is essential that the functional architecture of VTM (top-down approach) will meet the technical architecture of e-navigation (bottom-up approach) one-to-one on all aspects. In order to achieve an optimal mutual support , co-operation and co-ordination WG4 on VTM developed a document reflecting the relationships with the relevant IALA Committees and Working groups (document VTS/WG4/Intersessional/output04)

[9] WG4 identified these technical instruments: VTS28-WG4-WP02 Identification of the Technical Instruments

This implicates that the current measures and services for enhancing safety, security and efficiency of shipping, protection for the environment and functions of Vessel Traffic Services should also be addressed and made functional to these functional arrangements.

- The VTM concept is functional to the organisation, guidance and support of vessel traffic, and to the provision of measures and services that assist in sustaining maritime transport globally.
- VTM measures and services should add value to safety, security and efficiency of shipping, protection for the environment and functions of Vessel Traffic Services.
- VTM functionalities appear in the strategic, tactical and operational domain, reflecting the pro-active, active and re-active efforts necessary to achieve the aims and benefits of VTM.
- In each domain, functionality unites the user requirements, the provision of the measure or service and the supportive means for transaction.
- Functionalities should be sustainable, as well as adaptive to changes in user requirements.

The functionalities within the VTM concept should be further identified and elaborated according to the objectives of VTM as described[10].

## 6.9    VTM INSTRUMENTS

For the execution of measures and services within VTM by competent authorities, organizations, users and other stakeholders instruments have been identified.

| Functional Instruments | Data providing Instruments |
|---|---|
| <ul><li>Legislation</li><li>VesseL Traffic Services (VTS)</li><li>Pilotage</li><li>Search and Rescue (SAR)</li><li>Nautical allied services</li><li>Routing measures</li><li>Reporting measures</li></ul> | <ul><li>Visual aids to navigation (in future possible virtual aids to navigation)</li><li>Satellite and terrestrial navigation systems</li><li>Information systems, networks and applications</li><li>Presentation systems and applications</li><li>Communication systems (including broadband and internet) and applications</li><li>Global Maritime Distress and Safety System (GMDSS)</li></ul> |

A special position in the range of instruments is assigned to VTS and maritime pilotage, recognizing the fact that they are the only interactive instruments capable of responding to
- changes and unforeseen developments of vessel traffic in a certain area
- the needs of individual ships and
- be able to monitor the achievements of all other (passive) information providing VTM instruments.

VTS full fills its supervisory role as the "eyes and ears" of the VTM authority, playing a central role within VTM where, next to the execution of its primary services, all collected information is available on strategic, tactical and operational level.

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[10] WG4 is studying this subject. The results shall be shared with other maritime bodies, e.g. for additional or modification of legislation and/or guidelines, the further development of e-navigation and to give guidance to national activities

## 6.10  PROCEDURES WITHIN VTM

Strategic, tactical and operation procedures for the interaction between stakeholders and users within VTM should be developed with a high degree of transparency and uniformity.

## 6.11  TECHNICAL SYSTEMS WITHIN VTM

The identification of the technical systems functional to the VTM concept is necessary to give guidance and/or support to
- further development of the scope and concept of VTM
- the development of e-navigation
- the development of a the functionalities of a high level data and technical architecture for VTM
- other relevant developments in IALA and other (inter)national bodies.

To improve the accessibility and consistency the identified systems have been categorized on a high level, taken into account the

- *type of systems*
  - o Communications systems (sensor or network systems)
  - o Monitoring / Navigation systems (sensor systems)
  - o Navigation systems (satellite and terrestrial systems)
  - o Presentation systems
  - o Information systems (maritime data and administrative data)
  - o Additional information systems
  - o Storage systems

- *use for interaction*
  - o the interaction between ships and shore
  - o the interaction between shore and shore
    (VTM to other parties within the own area of the Competent Authority[1])
  - o the interaction between shore and shore
    (VTM to other parties outside the own area of the Competent Authority[1])
  - o the interaction between and within the VTM organizations/departments

A provisional but no comprehensive list of the foreseen (technical) systems functional to VTM has been developed[11]. Due to technical developments the list may increase, decrease or might have to be modified. The list should be kept under review during the development process of VTM by the VTS Committee with support of the e-Navigation Committee and other Working Groups.

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[11] VTS28-WG4-WP02 Identification of the Technical Instruments