Report of the IALA Workshop
on the
Portrayal of Data and Information at a VTS

Executive Summary

A workshop on the subject of Portrayal of Data and Information at a VTS was held at Bremen University and Jacobs University in Bremen, Germany between 6 and 9 May 2013. The workshop was kindly sponsored by SIGNALIS and Schnoor – INS GmbH & KG.

The workshop was attended by twenty-five delegates representing ten countries and one Sister Organisation (see Annex A).

The workshop objectives were to:

- identify emerging issues;
- document the needs for international guidance;
- review existing documentation;
- recommend improvements to IALA documents;
- provide an output on what needs to be done.

Two presentations were given:

- e-Navigation and the IHO (GI S-100) registry (section 2.3);
- Human machine interfaces for a route exchange service (section 4.2).

The workshop broke into three Working Groups to progress the objectives:

1	Types of service	Leader Kevin Gregory, IHMA.
2	Working environment	Leader Dirk Eckhoff, WSV, Germany.
3	Future needs of VTS, including e-Navigation	Leader René Hogendoorn, Saab, The Netherlands.

There were technical visits to Bremen MRCC, Bremen VTS and Hochschule Bremen's Bridge Simulator.

The social programme consisted of a welcome reception on the first evening and a workshop dinner on the second evening.

The conclusions reached by the workshop are at ANNEX E.

Besides issues of portrayal, the workshop identified additional issues related to decision support, risk assessment, ergonomics and handover procedures.

The portrayal and other issues identified by the workshop will be considered for the VTS Committee's 2014 – 2018 Work Programme at VTS37 (September 2013).

Table of Contents

IALA WORKSHOP ON PORTRAYAL OF DATA AND INFORMATION AT A VTS

1 INTRODUCTION

A workshop on the subject of Portrayal of Data and Information at a VTS was held at Hochscule Bremen and Jacobs University, Bremen between 6 and 9 June 2013. Twenty-five delegates, representing ten countries and one sister organisation, attended the workshop.

A list of participants is at ANNEX A.

All presentations form part of the output of the workshop and are posted to the IALA FTP server, which together with other workshop information which can be accessed via ftp://194.51.37.52, with user name ftpworkshop and password supercell. IALA members can access the ftp server in the normal way.

2 SESSION 1 – OPENING OF THE WORKSHOP

The session was chaired by Captain Tuncay Çehreli, DGCS and Chairman of the IALA VTS Committee.

The workshop's programme is at ANNEX C.

2.1 Introduction

Tuncay Çehreli opened the workshop by welcoming everyone, noting the number of familiar faces from the 'IALA family'. His speaking notes for the opening session are at ANNEX F

2.2 Welcome from Wasser-und Schifffahrtsverwaltung des Bundes (WSV)

Christian Forst, WSV, welcomed the delegates to Bremen and the workshop. The text of his remarks is at ANNEX G.

2.3 Presentation

René Hogendoorn, Saab, The Netherlands and Chairman of the IALA VTS Committee's technical Working Group, gave a presentation on 'e-Navigation and the IHO Registry' The presentation had been prepared jointly with Dr Nick Ward, Vice Chairman of the IALA e-Navigation Committee. The presentation gave some background to show the way the IHO Registry fits in with e-Navigation, how it will be implemented and what that will involve for IALA.

From the definition of e-Navigation significance was given to the words 'harmonised' and 'integration'. It was indicated that key objectives of e-Navigation include facilitation of data exchange between vessels and shore, integration and presentation of information onboard and ashore, with consistent standards and interoperability. The IMO process for developing its implementation plan was shown, noting the close co-operation that exists between IMO, IHO and IALA. This was followed by details of the composition of the e-NAV Committee.

The current e-Navigation roadmap was shown before the presentation turned to focus on the development of data exchange tools. This was followed by an overview of the e-Navigation architecture, the Common Maritime Data Structure and data exchange formats, which will be specified in a standardized way.

It was explained that S-100 provides the data framework for the development of the next generation of ENC products, as well as other related digital products required by the hydrographic, maritime and GIS communities

An S-100 online registry has been established by IHO for the registration, management and maintenance of the items recognised under the S-100 framework; the components of the registry were shown. It was pointed out that the registry contains subordinate registers, including Product Specifications, which provide standardised methods for exchanging information.

The presentation then turned to the need for a Common Information Structure and a Common Data Model.

René Hogendoorn then went on to explain that there are many stakeholders in the maritime process. They are involved in the planning of a ship's voyage, dealing in the safe and efficient passage of a ship from berth to berth and many are dealing with the cargo logistic processes. However, there is at least one thing that they have in common: the fact that they are dependent on each other. By sharing data, these stakeholders can make the process, as a whole, safer and more efficient.

Looking at the need for data sharing, the following points were made:

- Improve safety and efficiency:
  - Provide information when needed and where needed.
- Overall cost reduction:
  - Sharing of infrastructure, such as sensors and data processing, e.g. for VTS.
- Improve the surveillance picture:
  - Data from adjacent VTSs to speed up track initiation and identification.
- Allow longer term tactical planning:
  - Extension of the area of interest.
- Lessen the administrative burden.

Linking this to e-Navigation

- The **harmonised collection**, integration, **exchange**, presentation and analysis of maritime information on-board and ashore by electronic means to enhance berth to berth navigation and related services, for safety and security at sea and protection of the marine environment
- Development of the Common Maritime Data Model is instrumental

The practical implications were explained and the question 'Why do we need to do this now?' The answer was that the e-Navigation Strategy Implementation Plan should be approved by IMO in 2014 and the process of developing the Maritime Service Portfolios that will form the core of e-Navigation will take place over the period 2014-18. The Product Specifications that are the engines of the Maritime Service Portfolios will need to develop in parallel, so that all are ready to implement from 2018 onwards.

There was brief look at the anticipated benefits before the following conclusions were drawn:

1 A Common Maritime Data Structure is essential to e-Navigation; the IHO registry has been adopted as a common baseline;

2 IALA is leading the way, other organisations will follow; management & resourcing can be handled, but must be done in the right way;

3 Technical input for Product Specification development is significant; procedures need to be flexible, as experience is gained; but there should be real benefits in terms of harmonization & effectiveness.

2.4 Workshop aim & objectives

Tuncay Çehreli outlined the workshop's aim and objectives, which were to:

- identify emerging issues regarding VTS portrayal;
- document the need/s for international guidance for the portrayal of information and data commonly used in VTS;
- identify the gaps between IALA Recommendation V-125 on VTS Symbology, V-128 on the Operational and Technical Performance Requirements for VTS Equipment, current and developing Geographic Information Systems and emerging e-Navigation portrayal guidance (i.e. IHO S-52, IEC 62288 (Ed. 2), ISO 19117);
- recommend improvements to IALA documentation;
- provide information to IALA about what needs to be done with regard to VTS portrayal that is not being done today.

3 SESSIONS 2 TO 4 – TECHNICAL VISIT

Three technical visits were organised on the first day of the workshop, all within easy walking distance of the MENSA building of Hochschule Bremen (Bremen University of Applied Science). These were to:

1 Bremen MRCC, courtesy of Captain Helge Fox.

2 Bremen VTS, courtesy of Captain Sebastian Frenzel.

3 Hochschule Bremen's simulation centre, courtesy of Captain W Wittig.

End of Day 1

On day 2, the workshop moved to Jacobs University and remained based there until the workshop closed.

4 SESSION 5 – SETTING UP THE WORKING GROUPS (WG)

The session was chaired by Neil Trainor, AMSA and Vice Chairman of the IALA VTS Committee.

4.1 Welcome

4.1.1 David Gordon, Transnet, South Africa and President of IALA

David Gordon, who overcame some significant IT challenges, joined the workshop from his boardroom in Cape Town and welcomed the delegates and wished them well in their endeavours.

By way of setting the scene and hopefully stimulating subsequent discussion in the Working Groups, David Gordon showed some slides of the situation for VTS in cape Town, covering provision made for disaster control if VTS information is disrupted and the integration of CCTV information.

He concluded by thanking Professor Froese for hosting the final three days of the workshop and helping to put together the workshop programme.

4.1.2 Professor Jens Froese, Distinguished Professor of Maritime Logistics, Jacobs University, Bremen, Germany

Professor Jens Froese gave a welcome, on behalf of the two presidents of Jacobs University. Having acknowledged the newly arrived Spring weather, he noted that given the dominance of female voices in in-car navigation systems, it would be no bad thing if there were more female VTSOs, providing guidance to ships.

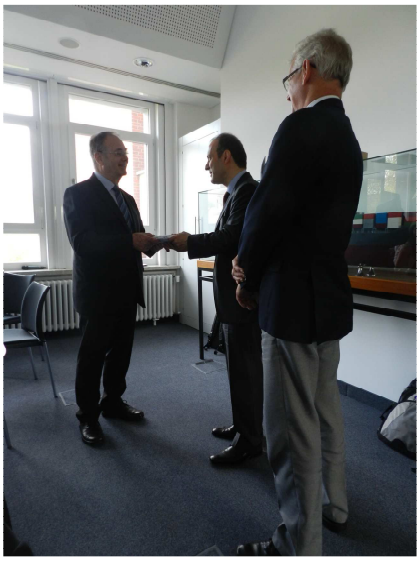
He explained that Jacobs University is a residential university and so constrained in the size of its student population to 1300. However, this population comes from 108 countries. The university offers no specific maritime courses but does specialise in international logistics, thus embracing maritime logistics. This gives rise to an interest in maritime traffic systems, including VTS.

Instancing the port of Hamburg, which is some 90 nautical miles up river from the North Sea, he said that there have always been problems with encounters / opportunities to pass in the many bends of the river Elbe, which is now an increasing challenge with the increasing number and size of ships visiting the port. Professor Froese went on to say that the increasing width of ships is of grater significance than the length, dictating, as it does, the options available for turning ships and enabling them to meet their slot times. In fact ETA is, in reality, become ATA (Actual Time of Arrival). He noted that all runs smoothly until timings change, after which chaos can ensue.

IALA's interest in e-Navigation is recognised and much appreciated but the university is concentrating on the EU concept of e-Maritime and the need for unimpeded traffic information flows, the avoidance of confusion and information overload.

Professor Froese concluded by paying tribute to the efforts of Ilknur Erdogan, remarking that his most significant task had been the selection of venue for the workshop dinner! He wished the workshop well and said that he hoped that the university would provide an environment conducive to the work that lay ahead.

Captain Tuncay Çehreli then thanked Professor Froese for his thought provoking remarks and then made a presentation of an IALA plaque.



4.2 Presentation

Thomas Porathe, Chalmers University but representing the Danish Maritime Administration, gave a presentation on 'Human Machine Interfaces for a route exchange service'. This represented work done in the MONA LISA and ACCSEAS projects

The presentation began with a slide from the ACCSEAS project showing the prediction of traffic flows in the North Sea, from which it was readily apparent that the plans for wind farms were going to have a significant effect, the beginning of which are already becoming apparent. Larger and increasing numbers of ships are going to be concentrated into narrow sea channels and instances of the effect on the route of the Zeebrugge – Hull ferry route, where unexpected turns by the ferry are known to cause confusion, and a combination of separate planning bodies off the approach to Rotterdam was a potential source of confusion.

The solution was presented as tactical route exchange and VTS route suggestion, which had been trialled in the EfficenSea project and was to be further developed in the ACCSEAS project. In this context, the collision of two vessels off the island of Bornholm, both of which had fully electronic passage plans and which, if exchanged, would have indicated a predictable collision.

Taking the concept further forward in the MONA LISA project, it is proposed to establish two-dimensional and dynamic, safe havens for vessel, which can adapt to navigation and time constraints.

Work is currently underway on the Human Machine Interface (HMI) required to operate such a co-operative route exchange system. It is envisaged that the system would be operated from a Ship Traffic Co-ordination Centre (STCC), rather than a VTS and it calls for new symbology.

The need for the system to cope with anomalous route requests was discussed, and the anticipated procedure for handling of planning requests, including the use of text messaging, was also covered. Work is proceeding towards testing the system (later in the month (May 2013)) using three scenarios:

- a requested route change due to heavy weather;
- a request to change the timing on an approved route;
- Deviation around a temporary no-go are, suddenly appearing in a previously agreed route.

On completion of the presentation and having said that he would welcome feedback from the delegates, a lively discussion took place, from which the following points emerged:

- how to cope with the criticism laid against AIS of the system enabling private arrangements being made between ships that contravene the COLREGS;
- liability issues involving a STCC;
- how to make best use of intentional information;
- might there need to make an amendment to SOLAS?
- limitations due to the size and variety of participating ships leading to an incomplete coverage of the traffic picture;
- the possible need for exempted areas, such as pilot boarding grounds;
- could a VTS and STCC be collocated or even the same thing?
- the potential impact of the different portrayal of the same data on ship / shore for;
- is there a time limit for route negotiation?
- the need to discover the unintended consequences of the proposed system;
- the need to establish a more efficient and robust communication means, other than AIS, for the system operation;
- confirmation of route changes is ensured – it is a closed loop system;
- will the inevitable reduction in anchoring areas mean increased slow moving traffic in port approaches and channels between windfarms?

  The answer to this was that from time to time, it may be necessary to prevent shipping from entering the narrow channels between wind farms.

4.3 Setting the scene

By means of a presentation, Neil Trainor gave an introduction to the planned tasks and an overview of how he saw them being undertaken. He then asked the leaders of the three Working Groups to outline the approach that would be taken to their separate tasks.

The Working Groups established were:

WG 1 - Types of service.

WG 2 - Working environment.

WG 3 - Future needs of VTS, including e-Navigation.

The list of participants in the WGs is at ANNEX B.

In conclusion, Neil Trainor asked participants to note any overarching principles arose, during WG discussions, which should be considered in developing guidance on VTS portrayal

5 SESSIONS 6 - 8 – IN WORKING GROUPS

Overall co-ordination of the WGs was undertaken by Tuncay Çehreli and Neil Trainor.

End of Day 2

6 SESSIONS 9 - 12 – IN WORKING GROUPS

The WG continued with their tasks throughout the day, finishing by providing their output to the workshop secretary.

End of Day 3

7 SESSION 13 – REPORT FROM WORKING GROUP LEADERS

The session was chaired by Neil Trainor.

The Working Group Leaders reported on the outcome of the work within their groups.

7.1 Working Group 1 (WG1) – Types of service

The Working Group Leader was Kevin Gregory, IHMA

On reflection, it was felt that a better name for this Working Group would have been 'Operational delivery of VTS'.

The WG utilised several overarching, different themes to stimulate general discussion on key VTS portrayal issues. The outcomes of the discussions have been formulated in general statements that may be used to influence the workshop conclusions and next steps.

7.1.1 Session 1 – Introduction – Portrayal in the operational context

The members of the WG were introduced to each other. The WG consisted of a balance of operational, technical and training/educational expertise.

The scope of the group's task was agreed to be the examination of all elements that make up the wider traffic image to include systems such as radar, AIS, CCTV, VHF and VTMIS. Each element would be analysed against IALA Recommendation V-125 in the form of a gap analysis. The WG then held a detailed discussion on the general principles of portrayal to establish some initial guiding principles for further development in future sessions.

From the discussion the following points and queries emerged:

1 It was identified that there are no clear answers to portrayal issues; currently each manufacturer has different symbology.

2 It was suggested that there are different portrayal requirements for different categories of VTS personnel such as VTS Operators and Supervisors. From this it was agreed that any standards on the portrayal of VTS data should not be overly restrictive, guidelines may be appropriate so as not to restrict the innovation of equipment manufacturers and unnecessarily interfere with the individual operational and risk based requirements of individual VTS Authorities.

VTS Operators also have differing operational requirements as to how they configure their individual workstations. There is increased risk of VTS Operators setting up their equipment in inconsistent ways.

3 Consideration needs to be given to ergonomic factors with regards to portrayal to optimise technology-based workflow and mitigate the risks of VTS Operator fatigue and distraction. The human element and associated human factors must be in the centre with the technology working for the VTS Operator and not the other way around. This led to the suggestion that VTS systems should be developed so as to enable the efficient and intelligent portrayal of information as and when it is necessary. This will ensure that VTS Operators can make fact-based decisions to ensure the safety and efficiency of navigation.

4 There is already a risk of information overload with the varying sources of data available in a VTS Centre and the risk is expected to increase.

5 Is there a need to harmonise the portrayal of data worldwide?

6 Should portrayal be standardised across VTS Authorities? If, so, VTS Operators changing Authorities would require less training.

7 Consideration needs to be given to the development of future systems / concepts. IALA should be mindful of the potential risk of distraction to VTS Operators as a potential consequence of the adoption of new systems such as e-Navigation.

8 Minimum standards for data portrayal for specific types of service may be advantageous with respect to safety critical data.

9 VTS Operators generally have a better tactical view of the prevailing traffic situation than on-board personnel.

10 VTS equipment should facilitate the portrayal of the right information at the right time to assist in the on-board decision making process; the need to negotiate extensive menu systems to reach relevant data must be minimised.

11 There is an operational risk if traffic management decisions are made on-board that exclude the VTS.

12 When considering symbology, the background of VTS Operators needs to be considered; in some VTS Authorities VTSOs no longer come from a maritime background.

13 VTS data should be portrayed in such a manner as to facilitate effective decision-making on the part of a VTSO.

14 The adoption of on-board maritime symbology may not necessarily be the most appropriate for the specific role of a VTS.

15 VTS Operators need to be able to readily comprehend which tracking sources are being portrayed and the status of equipment performance.

7.1.2 Session 2 – Portrayal issues related to charting, track fusion/correlation and operational warnings and alarms

The WG held a discussion about general factors that may be relevant in an open water / coastal context. The key themes covered were:

- charting;
- track fusion and correlation;
- operational warnings and alarms.

The following points emerged:

1 VTS Authorities should assess what features of charted data are required using a risk based approach.

2 VTS Authorities should ensure that an auditable process for updating chart data is in place.

3 VTS Authorities should ensure that the operation and management of chart functions is adequately covered within their respective IALA V-103/3 training programmes.

4 Normally, when using a fused traffic image VTS Operators should be presented with a single track. The primary tracking source should be readily identifiable to the VTS Operator.

5 The issue of track correlation and fusion is complicated and the solutions differ between equipment manufacturers. The issue of best operational practice in radar and AIS portrayal in VTS may benefit from further review.

6 A basic understanding of manual track fusion and correlation should be included by VTS Authorities in their respective IALA V-103/3 model course, noting the complexity of the algorithms involved in automatic track fusion and correlation, which is a specialist area.

7 If all warnings and alarms are highlighted by means of an audible and / or visual alarm they could lose their impact with a likely risk of complacency. The draft guideline on decision support should address this issue through the provision of greater clarity on the availability and subsequent choice of operational decision support tools.

8 VTS equipment should be able to differentiate between operational alarms (related to navigation safety) and system alarms (related to technical deficiencies with the operating system).

9 Operational warnings and alarms should be conspicuously displayed on the traffic image. A log of warnings and alarms should be maintained for future reference and audit purposes.

10 System warnings and alarms should be configured and displayed in an appropriate manner to ensure that they are relevant to VTS Operators.

11 The configuration of operational and system warnings and alarms should be specified by the VTS Authority using a risk based approach.

7.1.3 Session 3 – Portrayal issues in port approaches / areas of traffic congestion

From this session the following points emerged:

1 The information presented in a track label depends on the context of the situation – the geography, operational procedures and the needs of the users.

2 The type of service declared will influence the type of data displayed. An INS may require only relatively simple data to be portrayed, such as an identity and positional information, whereas a NAS may require additional data portrayal, such as course over the ground, speed over the ground, heading and rate of turn information.

3 It is recommended that guidance is developed to reflect the minimum information required to be portrayed to a VTS Operator to enable them to effectively deliver the declared service type.

4 It is recommended that guidance is reviewed / formulated on the appropriate deployment of VTS equipment as it relates to each type of service. This will establish a baseline for each type of service that VTS Authorities can use to influence their final choices by means of a formal risk assessment process.

5 Areas of radar / AIS masking and / or areas where automatic / manual tracking may not be possible should be portrayed on the traffic image displayed to a VTSO.

6 There is a need to enhance the situational awareness of the VTS Operator when managing congested waterways. This may be achieved by means of a dynamic risk assessment system / decision support tools using defined criteria embedded within an operational system or by means of a manual basis, such as colour coding vessels of interest.

7 A means of vessel profiling, such as an assessment of a vessel's historical port state control record, accident history or other relevant factors, in advance of their arrival may be beneficial to VTS Authorities. This may be included within the draft IALA Guideline on decision support.

7.1.4 Session 4 – Portrayal issues in narrow / constrained waterways

From this session the following points emerged:

1 Whilst a large amount of information is readily available to VTS Operators there is a requirement to ensure that only essential and relevant information is routinely displayed through means of portrayal. Consideration should be given to the use of other systems such as VTMIS to display amplifying and scalable information in support of the portrayal.

2 The presentation of a ship's identity requires careful consideration by a VTS Authority to ensure the swift, accurate and reliable identification of a vessel.

3 VTS Authorities should be mindful of the risk of shortening vessel names; if vessel names are to be shortened an operational procedure should be developed and reflected in the Authority's IALA V-103/3 VTS model courses.

4 VTS Authorities should minimise the risk of an accidental / unintentional change / alteration of data; the possibilities of data comparison tools, such as AIS and VTMIS validation, should be explored.

7.1.5 Session 5 – Portrayal issues in emergency scenarios/navigation incidents and identification of issues related to resilience/redundancy

From this session the following points emerged:

1 Use of Closest Point of Approach (CPA) and Time to Closest Point of Approach (TCPA) are valid tools in the context of VTS. If other tools are used they should be accurately described so that VTS Operators are aware of their functionality and limitations.

2 VTS Authorities should consider the orientation of traffic images to ensure that VTS Operators can maintain full situational awareness without the risk of confusion.

3 The use of an 'S' or 'standardised' mode within VTS Centres may be considered as a means of restoring traffic image equipment to a default setting without requiring the need to log off or restart equipment.

4 VTS Authorities should ensure avoidance of the risk of loss of data resulting from a VTSO logging off or restarting equipment.

5 IALA Recommendation V-127 on operational procedures for VTS was reviewed and it was identified that further detail may be beneficial to enable VTS Authorities to establish and maintain effective handover procedures; VTS Authorities should be encouraged to comply with IALA Recommendation V-127, with respect to watch and vessel handovers.

6 VTS Operators should be aware of the vessels within their own specific area for which they have a responsibility to provide VTS and with which positive communication has been established.

7 The traffic image portrayed should differentiate between vessels participating in a VTS and those not participating.

7.1.6 Session 6 – Portrayal issues related to recording / analysis and associated training requirements identified in earlier sessions

From this session the following points emerged:

1 VTS Authorities should ensure that appropriate recording facilities are in place with relevant procedures to ensure that recordings of incidents can be secured.

2 If not required by national legislation, it would be beneficial to provide advice / guidance on minimum recommended data retention periods.

3 Appropriate measures should be in place to preserve the security and integrity of the data and controls deployed to prevent its release to unauthorised persons.

4 There is a risk of confusion during emergencies / incidents, especially if multiple VHF channels or differing languages are in use.

5 VTS Authorities are encouraged to utilise the capabilities of chart annotation and configuration tools to identify special operations or occurrences within a VTS area. Such chart annotation and configuration tools should be simple to use and quick to deploy.

6 In an emergency or incident situation accurate record keeping of key events and decisions is important for future analysis and to facilitate an effective handover.

7 IALA Recommendation V-127 may benefit from clarification within section 3.2 (emergency procedures) to cover the principles of record keeping.

8 VTS Authorities and equipment suppliers should consider measures to alert a VTS Operator to potential significant defects with their equipment. For example, a 'frozen' workstation may be indicated by the provision of an HH:MM:SS display or another dynamic indication to indicate to the VTS Operator that the system is running as intended.

9 There should be a sufficient level of resilience / business continuity within a VTS system to ensure that an acceptable level of portrayal of data is maintained with regard to navigation safety.

10 The principles of VTS portrayal of data should be included within relevant IALA Model Courses.

7.1.7 Session 7 – Review of matters discussed, summary of draft report and agreement of conclusions and recommendations

The WG reviewed its draft report

7.2 Working Group 2 – Working environment

The Working Group Leader was Dirk Eckhoff, WSV, Germany

He explained that the group recognized the importance of taking into consideration the ergonomic aspects in the design of a VTS's working environment. Therefore it was suggested how IALA address these aspects in future work, including expansion of IALA recommendations V-125 & V-128. This contribution can be used as a starting point for further work in the 2014 – 2018 Work Programme.

The core of all ergonomic design is human factors. All other aspects related to ergonomic design are considered as shells surrounding human factors. Figure 1 visualizes this 'Onion-Principle'.

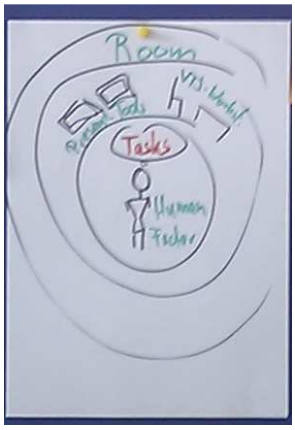
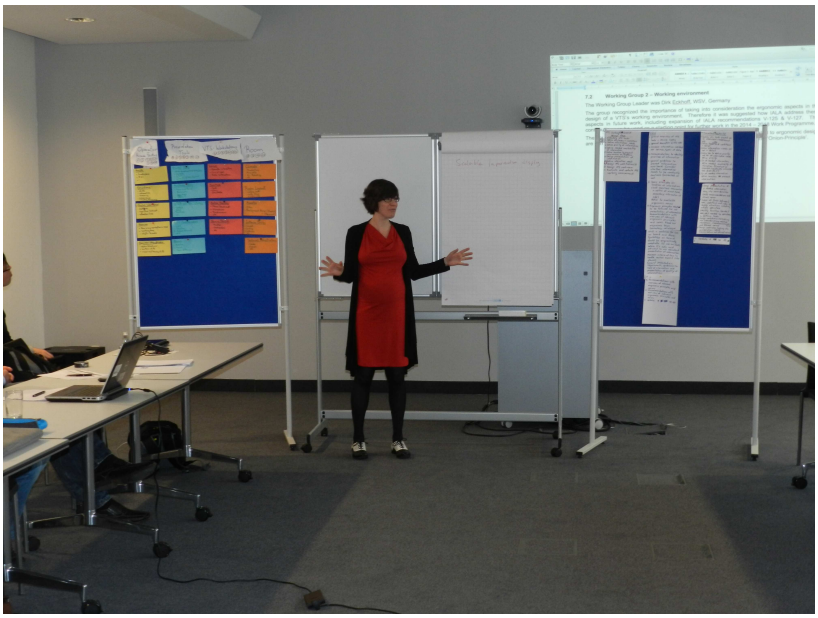


Figure 1 'Onion-Principle'

Ellemieke van Doorn, the creator of Figure 1, then took the workshop through the results of WG2's task, in a virtuoso performance that attracted much applause.



The group worked from two different perspectives relevant to VTS:

1. List of ergonomic aspects
2. Working Environment Design-Steps

The list of ergonomic aspects gives an introduction of subjects to be taken into consideration whilst dealing with the working environment design-steps. Certain aspects are more related to particular design-steps than others. This is indicated by the number related to the design-step that is included in the list of ergonomic aspects.

The working environment design-steps show a process to facilitate a well-designed working environment. The first design-steps focus on understanding the VTS tasks and related Information needs. This insight is needed in order to be able to design a safe and efficient working environment. To help VTS Authorities improve the working environment in a VTS, the group identified topics for further work by IALA. The suggested work starts with identifying those topics that are sufficiently addressed in current IALA Recommendations and Guidelines, followed by suggestions for studying existing standards on ergonomics and refer to them in IALA documentation. For this task both VTS operations and technical knowledge and ergonomic expertise are needed.

Link between table of ergonomic aspects and the list with overview of subjects to take into account and also the chart of the design steps

Operator, human factors	1,2,5,6,7,8,9,10,11
Presentation tools	5,6,7,8,9,10,11
VTS workstations	6,7,8,9,10,11
Room	8,9,10,11

7.2.1 List of ergonomic aspects

7.2.1.1 Operator human factors

1	Health	Headaches, Repetitive strange injuries (muscles)
2	Operator characteristics	Colour blindness, motor skills, visual and hearing skills
3	Cognitive Aspects	Mental workload, fatigue, cognitive lock-up, attention loss
4	Competence	Skill, education, training, experience, situation awareness
5	Manning	Numbers of personnel, working hours, shifts/breaks

7.2.1.2 Presentation tools

1	Digital Graphical user interface	Symbols, colours, typology, etc.
2	Audio Communication	VHF, Telephone, HF, Audio Alarms
3	Alarms	Auditive, visual, types of alarms
4	Analogue Tools	Paper and pencil, calculator, paper logbook, paper chart
5	Digital Tools	Digital logbook, SOP, ENC-Chart, CCTV, E-Mail

7.2.1.3 Workstation

1	Layout	Operation interaction, line of sight, audio interaction
2	Furniture	Desk, chair, chart table
3	Active devices	Mouse/keyboard, Microphone, touch screen
4	Passive devices	Display, loudspeaker, etc.

7.2.1.4 Room

1	Climate	Temperature, humidity, air refreshing, etc.
2	Acoustic,	Background, equipment
3	Interior Design	Carpets, ceiling, colours
4	Technical infrastructure	Cables, energy etc.
5	Room layout	Walking path, visitor zone, window side

7.2.2 Working Environment Design-Steps

Design Steps		IALA		VTS	
1	Identify VTS task	1	General overview of VTS tasks + service types	1	Identify VTS tasks based on the risk assessment + additional tasks.
2	Define VTS tasks + workflow	2	General description of VTS roles.	2	Define in detail VTS tasks, roles + workflow
3	Define information needs	3	Minimum information needed per service that is provided, types of data	3	Define information needs in per task in detail.
4	Define priority of information	4	Recommendation to identify prioritized information	4	Define how to define priority and for all information needs define priority.
5	Define necessary availablity of information	5	General guidelines to prevent information overload. Consider whether information needs to be constantly available /presented or not.	5	For all necessary information, define needed availability of information (constantly presented/constantly accessible task dependent)
6	Define location to present information on displays	6	Basic principles on location of information (most important information in centre of visual field, secondary information at side) Refer to available ergonomic	6	For all needed information, define location to present information.
7	Design presentation of information			7	Design presentation of all needed information,
8	Define interaction needs between operators				
9	Design VTS workstation(s)				
10	Design VTS work room				
11	Evaluate and update VTS working environment				

		norms.	taking into consideration (IALA) recommendations and relevant norms.
	7	Ergonomic principles need to be followed for all presentation of information. Recommendations with overview of relevant ergonomic principles and norms. Need for ergonomic basic symbology catalogue that is consistent. Symbology should be ergonomically acceptable, before it is safe and efficient to use consistent presentation of information. Minimum criteria of how to handle certain aspect (like alarms) general presentation, requirements, guidelines for types of information and presentation of quality of information.	8 Analyse all (links between) tasks, workflows and roles to identify situations including multiple operators. Identify facilities (printer/desk etc.) needed by operators to perform tasks. 9 Design workstation (s) taking into consideration needed interactions, (IALA) recommendations and relevant norms 10 Design workroom taking into consideration (IALA) recommendations and relevant norms. 11 Update 1 to 10
	8	NIL.	
	9	Recommendations with overview of relevant ergonomic principles and norms.	
	10	Recommendations with overview of relevant ergonomic principles and norms	
	11	Update 1 to 10.	

7.3 Working Group 3 – Future needs of VTS, including e-Navigation

The Working Group Leader was René Hogendoorn, Saab, The Netherlands.

Recognising that this is not an exhaustive list, the issues, discussed in the working group were related to the following

- Symbology: real-time data vs. tactical data;
- Representing the quality of sensor information;
- Decision support tools;
- Data sharing between VTS and stakeholders;
- VTS to facilitate information exchange ship / ship and ship / shore;
- Possible mitigation of language issues.

7.3.1 Real-time data vs. tactical data

In addition to sensors such as radar and AIS, other systems may provide data to a VTS, such as LRIT and satellite AIS. These latter two do not provide real-time data but tactical data that may have been collected up to several hours ago. Still, this data may be useful in contexts such as environmental monitoring and incident response.

The question could be raised if simultaneous display of real-time and tactical data is needed? If so, data from the different time frames should be presented in overlays that may be turned on and off selectively. In any case, the symbology for tactical data presentation should be different from the existing real-time symbology, although no specific portrayal advice can be given at this stage.

7.3.2 Representing the quality of sensor information

Different sensors have different measurement characteristics and combining the data during processing may increase the quality of the traffic image beyond that of the individual contributing sensors. It is expected that, in the near future, VTS sensors will become available that differ from the traditional radar and AIS, such LIDAR (light detection and ranging) and multi-lateration sensors that triangulate the response from ship transponders. Also, camera systems may provide target position information in the near future.

At present, the VTSO mostly decides on quality of the traffic image, based on the origin of data (radar or AIS). With the addition of new types of sensors, this may become difficult and a better solution would be that the surveillance system will provide quality measures in addition to items such as position and the ground vector.

The question is, how to realise a quality-based representation? Obviously, if data quality is according to expectations (based on operational requirements), there is no need for extra indications. However, if the data quality is not according to expectations, this should be indicated. As an example, consider the circle of confidence around a GPS position as used by the Google maps application.

Independent of the quality representation and, as a general principle, it should always be possible to query all information that is related to a track.

Another general principle is that VTS authorities should monitor the quality of the sensor data on a continuous basis and take appropriate action on:

- equipment failure or maintenance;
- temporary or permanent obstructions (large ship covering the view of the sensor; new buildings).

When relevant, shipping should be informed of the actual situation.

7.3.3 Decision Support Tools

Decision support tools may not be used to best effect, due to:

- time-consuming, bothersome activation;
- relatively high level of false alarms

As a general principle, a decision support tool should decrease the workload of the VTSO and/or improve the quality of the service. A lot of existing tools do not satisfy this principle and more research is needed to improve the sophistication of the algorithms.

Some examples of decision support were discussed. For example, a tool that may help a VTSO to provide information tailored to the ship type when delivering an INS.

Other examples that were discussed are route deconflicting tools:

- longer term tactical tool (from the presentation of T. Porathe, based on the ‘vessel safe haven’ principle);

- a possible tactical tool that could be used to create conflict-free passages.

  Ideally, the information, provided by this tool, should go to the involved ships as well.

The level of sophistication may vary to:

- only show potential problem areas to the VTSO;
- propose route adaptations to avoid conflict.

Related to routing is a tool that would give a (graphical) indication of intended route to a certain waypoint, which may be useful for:

- improving the safety of navigation by indicating e.g. crossing of TSSs;
- (Berth) planning purposes.

It was also noted that routing tools may be used for purposes other than safety of navigation.

7.3.4 Data Sharing

Data sharing at the level of port stakeholders may reduce overall costs and improve the port efficiency by allowing better allocation of resources and improved quality of planning. It is recognised that many factors may influence planning and those factors may not always be obvious (e.g. hidden agendas). As a principle, data sharing should be on the basis mutual agreements and mutual benefits.

Additionally, VTSs may be required to provide data to national authorities and/or regional coordination bodies for e.g. security. Such data exchanges are usually done on the basis of legal requirements.

If data sharing is used, data may have different origins and reliability may be different. This may need to be taken into account when presenting the data. In any case, the origin of data items should be recorded and made available when needed.

7.3.5 VTS to facilitate information exchange ship / ship and ship / shore

This issue is exactly the issue that is addressed by the IMO e-Navigation programme. At present, the information position of ships is relatively weak, as compared to VTS. In order to improve the on-board processes, more information needs to be made available, both from other ships and from shore. Careful consideration is needed to decide what information is most useful:

- traffic image; or
- intent data or way points.

The traffic image is relatively easy to disseminate, although bandwidth requirements can be high. A disadvantage is that the traffic image needs to be interpreted correctly to derive the necessary information from it. Therefore, it is recommended to disseminate intent data or data, such as waypoints, that can be interpreted more readily.

Providing real-time / predicted route information to the stakeholders in port may improve the safety and efficiency (e.g. by guaranteeing a free passage from / to berth).

7.3.6 Language issues

Although IMO requires knowledge of the SMCP, voice communication can be problematic due to language issues. Automatic translation tools are available nowadays and these could help, in case of misunderstanding, by translation of, for instance, SMCP.

Additionally, it may help to have such devices available on-board.

Note: other means of conveying the information, such as by electronic messaging, may be a better solution.

The Chairmen thanked each of the members of their WG for their contributions.

Neil Trainor then thanked the WG Chairmen and their WG members.

8 SESSION 14 – CONCLUSIONS AND CLOSING

The session was chaired by Tuncay Çehreli.

8.1 Discussion and workshop debrief

The Chairman explained how the conclusions had been derived. Neil Trainor then walked the participants through the draft conclusions, which were reviewed and revised. The results are at ANNEX E.

8.2 Any other business

The Chairman offered the delegates the chance to make any final comment and there were none.

8.3 Closing of the workshop

On behalf of WSV, Dirk Eckhoff thanked Jacobs University for hosting the final three days of the workshop and the excellent facilities that had been made available. He also thanked IALA for the overall organisation of the workshop.

The Chairman thanked everyone for attending and working so hard and productively, adding that the results from the workshop would be reflected in the 2014 – 2018 Work Programme. He then thanked Neil Trainor and Mike Hadley for their support, before adding his thanks to Jacobs University and, in particular the active role played by Ilknur Erdogan.

Mike Hadley then made a small presentation to Tuncay Çehreli and Neil Trainor.

There being no further business, the Chairman then declared the workshop closed.

End of Workshop

9 SOCIAL PROGRAMME

On Monday 6 May there was welcome reception, kindly sponsored by Schnoor – INS GmbH & KG, at the MENSA building of Bremen University.

On Tuesday 7 May there was a workshop dinner, kindly sponsored by SIGNALIS, at Jürgenshof.

10 ACKNOWLEDGEMENTS

Thanks are due to WSV, especially to Captain Henning Sauer, for the significant part played in organizing the workshop.

Similarly, thanks are due to Jacobs University, especially to Ilknur Erdogan, for the significant part played in organizing and hosting the workshop

Thanks are also due to Captain W Wittig, Hochscule Bremen, for hosting the first day of the workshop and for arranging the technical visit to the Hochscule's simulator, Captain H Fox for organising the technical visit to the Bremen MRCC and Captain S Frenzel for organising the technical visit to the Bremen VTS.

Finally but not least, thanks are due to SIGNALIS and Schnoor – INS GmbH & KG for their generous sponsorship of the workshop.

ANNEX A LIST OF DELEGATES

Australia **Specialist - Vessel Traffic Services, Australian Maritime Safety Authority**

Mr. Neil TRAINOR
GPO Box 10790
Brisbane, QLD 4000
Australia

Fax	+61 (0)2 6279 5966
Mobile phone:	+61 (0)408 559 849
e-mail (main):	neil.trainor@amsa.gov.au

Austria **Frequentis AG**

Mr Florian GRUBER
Innovationstrasse 1
1100 Vienna
Austria

Phone	+43 664 67181 2172
e-mail (main):	florian.gruber@frequentis.com

Denmark **Danish Maritime Authority**

Dr Thomas PORATHE
Chalmers Technical University
SE-412 96 Gothenburg
Sweden

Phone	+46 31 7722679
Mobile phone:	+46 70 668 1819
e-mail (main):	thomas.porathe@chalmers.se

Germany **Federal Waterway and Shipping Administration**

Mr Christian HERRLICH
Wasser-und Schifffartsamt Brunsbüttel
Alte Zentrale 4
25541 Brunsbüttel
Germany

Phone	+49 4852 885 497
Fax	+49 4852 885 408
Mobile phone:	+49 160 9091 2436
e-mail (main):	christian.herrlich@wsv.bund.de

Jacobs University

Ms Ilknur ERDOGAN
Campus Ring 1
28759 Bremen
Germany

Phone:	+49 4212003084
Mobile phone:	+49 15147392205
e-mail (main):	i.erdogan@jacobs-university.de
e-mail (alternative):	

Signalis GmbH

Mr Georg MICHELITSCH
Hanna-Kunath-Strasse 3
28199 Bremen
Germany

Phone	+49 421 457 3530
Fax	+49 421 457 4215
e-mail (main):	georg.michelitsch@signalis.com

Waterways and Shipping Administration

Mr. Dirk ECKHOFF
Waterways and Shipping Directorates
Hindenburgufer 247
24106 Kiel
Germany

Phone	+ 49 431 3394 5702
Fax	+ 49 431 3394 6399
e-mail (main):	dirk.eckhoff@wsv.bund.de

IALA **IALA Technical Co-ordination Manager**

Dr. Mike HADLEY
10 rue des Gaudines
78100 Saint Germain en Laye
France

Phone	+33 1 34 51 70 01
Fax	+33 1 34 51 82 05
Mobile phone:	+44 7887 548 227
e-mail (main):	mike.hadley@iala-aism.org
e-mail (alternative):	advnav@btinternet.com

IMPA **International Maritime Pilots' Association**

Captain Michael HARTMANN
c/o Bundeslotsen Kammer
Theodor Strasse 62
Hamburg
Germany

Phone	+49 4852 9692 14
e-mail (main):	hartmann@pilotservices.de
e-mail (alternative):	office@impahq.org

Japan **Japan Coast Guard**

Mr Shinya SUZUKI
1-3, Kasumigaseki 2-chome
Chiyoda-ku
Tokyo 100-8918
Japan

Phone	+81 3 3591 5650 ext
e-mail (main):	suzuki-g6sib@kaiho.mlit.go.jp

Malaysia **Marine Department**

Mr Nordin Bin MOHAMADIN
Jalan Limbungan
42000 Port Klang
Selangor
Malaysia

Phone	+603 3346 77 77
Fax	+603 3167 1334
Mobile phone:	+603 619 352 47 23
e-mail (main):	nordin@marine.gov.my

Netherlands **Rotterdam Pilots and Rotterdam VTS**

Captain J SPRONG
Berghaven 16
Hoek van Holland
Netherlands

Phone:	+31 889003003
Mobile phone:	+31 653239392
e-mail (main):	j.sprong@loodswezen.nl

Ministry of Infrastructure and The Environment

Mrs Ellemieke van DOORN
Functioneel Beheer Verkeerssystemen Verkeer-en Watermanagement
Schoemakerstraat 97 Delft Kamer S4-C
Postbus 50244
Netherlands

Mobile phone:	+31 6 21 64 98 09
e-mail (main):	ellemieke.van.doorn@rws.nl

Ministry of Infrastruture and Environment

Mrs Gerardine DELANOYE
Rijkswaterstaat Zeeland
Commandoweg 50
4381 BH Vlissingen
The Netherlands

Phone	+31 118 424730
Mobile phone:	+31 6 5076045
e-mail (main):	gerardine.delanoye@rws.nl

SAAB

Mr Johan WEITENBERG
P O Box 717
7300 AS Apeldoorn
Netherlands

Mobile phone:	+31 6 15 95 13 77
e-mail (main):	weitenberg@hitt.nl

SAAB

Mr Luuk KUIPER
P O Box 717
7300 AS Apeldoorn
Netherlands

Phone +31 621 166 439
e-mail (main): Kuiper@hitt.nl

SAAB

Mr René HOGENDOORN
PO Box 717
7300 AS Apeldoorn
The Netherlands

Phone +31 555 432 501
Mobile phone: +31 610 925 412
e-mail (main): rene.hogendoon@hitt.nl

Norway

Kongsberg Norcontrol

Mr Øystein JØERGENSEN
P O Box 1024
NO-3194 Horten
Norway

Phone +47 33 08 48 30
Fax +47 33 04 57 35
Mobile phone: +47 95 20 25 74
e-mail (main): oystein.joergensen@kongsberg.com

Norwegian Coastal Administration

Ms Malin DREIJER
P.O 466
5501 Haugesund
Norway

Phone +47 52 73 32 47
Mobile phone: +47 52 19 05 75
e-mail (main): malin.dreijer@kystverket.no

Poland

Sprint Ltd.

Mr Michal WAWOREK
Ul. Budowlanych 64E
80-298 Gdansk
Poland

Phone +48 58 340 78 23
Mobile phone: +48 507 464 057
e-mail (main): michal.waworek@sprint.pl

Sweden

Swedish Maritime Administration

Mr Christian PETERSSON
Box 855
S-201 80 Malmoe
Sweden

Mobile phone: +46 707 565577
e-mail (main): christian.petersson@sjofartsverket.se

Swedish Maritime Administration

Mr Marco SVANTESSON
Box 855
S-201 80 Malmoo
Sweden

Phone +46 10 4784796
Mobile phone: +46 709 647 742
e-mail (main): marco.svantesson@sjofartsverket.se

Turkey

Directorate General of Coastal Safety

Capt. Tuncay CEHRELI
Meclisi Mebusan cad.
No. 14 Salipazari
34433 Beyoglu
Turkey

Fax +90 212 249 3691
Mobile phone: +90 505 296 78 75
e-mail (main): tcehreli@kegm.gov.tr
e-mail (alternative): tcehreli@hotmail.com

UK

GeoVS

Mr Rafal GORALSKI
CBJC
Senghenyod Road
Cardiff CF24 4AY
UK

Phone +44 2920 647 001
Mobile phone: +44 7846 331 510
e-mail (main): rg@geovs.com

IHMA & Port of London Authority

Mr Kevin GREGORY
London River House
Royal Pier Road
Gravesend DA12 2BG
UK

Phone +44 1474 56 22 42
Fax +44 1474 56 22 81
e-mail (main): kevin.gregory@pla.co.uk

ANNEX B WORKING GROUP PARTICIPANTS

Working Group 1 Types of service

	Name	Organisation / Country
1	Kevin Gregory (Chairman)	IHMA
2	Tuncay Çehreli	DGCS / Turkey
3	Gerardine Delanoye	Rijkswaterstaat / The Netherlands
4	Rafal Goralski	GeoVS / UK
5	Florian Gruber	Frequentis / Austria
6	Michael Hartmann	IMPA
7	Luuk Kuiper	SAAB / The Netherlands
8	Mohamadin Nordin	Marine department / Malaysia
9	Marco Santesson	SMA / Sweden
10	Shinya Suzuki	Japan Coast Guard
11	Neil Trainor	AMSA / Australia
12	Michal Waworek	Sprint SA / Poland
13	Johan Weitenberg	SAAB / The Netherlands

Working Group 2 Working environment

	Name	Organisation / Country
1	Dirk Eckhoff (Chairman)	WSV / Germany
2	Tuncay Çehreli	DGCS / Turkey
3	Malin Dreijer	NCA / Norway
4	Ellemieke van Doorn	Rijkwaterstaat / The Netherlands
5	Christian Herrlich	WVS / Germany
6	Christian Petersen	SMA/ Sweden
7	Neil Trainor	AMSA / Australia

Working Group 3 Future needs of VTS, including e-Navigation

	Name	Organisation / Country
1	René Hogendoorn (Chairman)	Saab / The Netherlands
2	Tuncay Çehreli	DGCS / Turkey
3	Ilknur Erdogan	Jacobs University / Germany
4	Kevin Gregory	IHMA
5	Øystein Jørgensen	Kongsberg Norcontrol IT / Norway
6	Georg Michelitsch	SIGNALIS / Germany
7	Thomas Porathe	Chalmers University / Sweden
8	Sjaak Sprong	Loodswezen / The Netherlands
9	Neil Trainor	AMSA / Australia

ANNEX C IALA WORKSHOP ON PORTRAYAL OF DATA AND INFORMATION AT A VTS

Date
6 – 9 May 2013

Venue
Hochschule Bremen
Werderstrasse 73
28199 Bremen
&
Jacobs University Bremen GmbH
Campus Ring 1
28759 Bremen
Germany

Workshop Programme

DAY 1 - MONDAY 6 MAY 2013

Time	Activity	
0930 - 1030	**Co-ordinator / WG Chair / Steering Group meeting**	**Arrangements: Captain Henning Sauer, WSV, Germany**
0930 - 1030	**Registration / Welcome tea or coffee**	Venue MENSA facilities, Hochschule Bremen
1030 - 1130	**Session 1 - Opening of the Workshop**	**Chair: Tuncay Çehreli, DGCS, Turkey & Chairman of the IALA VTS Committee**
1030 - 1040	Welcome from host	Christian Forst, WSV, Germany
1040 - 1110	S-100	René Hogendoorn, Saab, The Netherlands
1110 - 1130	Workshop aim & objectives	Tuncay Çehreli
1130 - 1230	**Lunch at Hochschule-Mensa (between 11:30 & 12:30)**	
1230 - 1730	**Session 2 - 4 Technical visit – 3 groups (coffee during second visit)**	**Co-ordinator: Henning Sauer**
	Bremen MRCC	Point of contact Captain Helge Fox
	Bremen VTS	Point of contact Captain Sebastian Frenzel
	Bremen University (Simulation)	Point of contact Captain Willi Wittig

1800 - 1930 Welcome reception at MENSA facilities, University of Bremen
then a free evening
Dress code: business attire

DAY 2 - TUESDAY 7 MAY 2013

Time	Activity	
0830 - 0900	**Co-ordinator / WG Chair view facilities**	**Jacobs University**
0900 - 1030	**Session 5 – Working groups**	**Co-ordinator: Neil Trainor, AMSA, Australia & Vice Chairman of the IALA VTS Committee**
	Welcome from Jacobs University	Professor Jens Froese, Jacobs University
	Welcome from IALA	David Gordon, President IALA (via video conference)
0915 - 0950	Human Machine Interfaces for a route exchange service	Thomas Porathe, Chalmers University, Sweden & DMA, Denmark
0950 - 1000	Setting the scene	Neil Trainor
1000 - 1010	Approach of WG1 Types of service	Leader: Kevin Gregory, IHMA
1010 - 1020	Approach of WG2 Working environment	Leader: Dirk Eckoff, WSV, Germany
1020 - 1030	Approach of WG3 Future needs of VTS, including e-Navigation	Leader: René Hogendoorn, Saab, The Netherlands
1030 - 1100	**Break**	
1100 - 1230	**Session 6 – Working groups**	**Co-ordinator: Tuncay Çehreli / Neil Trainor**
1230 - 1400	**Lunch & Workshop Group Photograph**	
1400 - 1530	**Session 7 – Working Groups**	**Co-ordinator: Tuncay Çehreli / Neil Trainor**
1530 - 1600	**Break**	
1600 - 1730	**Session 8 – Working Groups**	**Co-ordinator: Tuncay Çehreli / Neil Trainor**

2000 Workshop dinner

Jürgenshof (http://www.juergenshof.com)

Dress code: Smart casual

DAY 3 - WEDNESDAY 8 MAY 2013

Time	Activity	
0900 - 1030	**Session 9 – Working Groups**	**Co-ordinator: Tuncay Çehreli / Neil Trainor**
1030 - 1100	**Break**	
1100 - 1230	**Session 10 – Working Groups**	**Co-ordinator: Tuncay Çehreli / Neil Trainor**
1230 - 1400	**Lunch**	
1400-1530	**Session 11 – Working Groups**	**Co-ordinator: Tuncay Çehreli / Neil Trainor**
1230 - 1400	**Lunch**	
1600 - 1730	**Session 12 – Working Groups**	**Co-ordinator: Tuncay Çehreli / Neil Trainor**
1730- 1800	Working group reports to TCM	

Free evening

DAY 4 - THURSDAY 9 MAY 2013

Time	Activity	
	Administrative Details (as required)	Mike Hadley
0900 -1030	**Session 13 – Reports from Working Group Leaders**	**Chair: Neil Trainor**
0900 - 0945	WG 1	Kevin Gregory
0945 - 1030	WG2	Dirk Eckhoff
1030 – 1100	**Break**	
1100 - 1130	WG3	René Hogendoorn
1130 - 1230	**Session 14 – Conclusions & Closing**	**Chair: Tuncay Çehreli**
1130 - 1215	Discussion & Workshop Debrief	Neil Trainor
1215 - 1230	Closing of the workshop	Tuncay Çehreli

ANNEX D WORKSHOP INPUT PAPERS

Together with the presentations made during sessions 2 – 5, the following papers were input to the workshop.

1 INPUT PAPERS

1 IALA Recommendation V-125 on VTS Symbology.

2 IALA V-128 on the Operational and Technical Performance Requirements for VTS Equipment (latest draft revised version).

3 IHO S-52.

4 IEC 62288 (Edition 2).

5 ISO 19117.

ANNEX E WORKSHOP CONCLUSIONS

	Portrayal issues
1	There is an increasing focus on the delivery of efficiency through VTS in addition to safety and protection of the environment.
2	There is an increasing use of additional data sources and meta data to compliment traditional sensor data sources used within a VTS centre.
3	VTS centres are increasingly becoming an 'information hub' with the adoption of emerging technologies.
4	VTS real time risk assessment tools can assist with the situational awareness of the VTSO and identifying the risk profile of vessels. Note: These tools need to be well designed and managed to mitigate 'out of the loop' problems.
5	How to identify and represent data quality in a meaningful way to the VTSO and allied services with ever increasing data and information sources is an issue that may be best addressed via portrayal.
6	The development of a 'quality measure' for key data parameters (e.g. position (temporal and spatial accuracy)) should be evaluated as a means to provide greater situational awareness for the VTSO.
7	VTS Authorities face an increasing challenge to ensure the validity, clarity and conciseness of information and data portrayed is meaningful and useful to the VTSO rather than simply overload or perhaps even distracting.
8	There is a need to investigate the requirement for harmonisation of the portrayal of information and data aboard and ashore, with a view to facilitating a common understanding of what is being portrayed and communicated.
9	The adoption of increasingly sophisticated decision support tools and the portrayal of associated automated alarms and alerts highlights a need for guidance and international standards for the development and deployment of such tools to ensure maximum benefit to the VTSO; the developing draft IALA Guideline on decision support requires greater clarity on the use of audible / visual alarms associated with operational decision support tools.
10	Portrayal should ensure that the right information at the right time is available to assist in both the shore and on-board decision-making process.
11	Guidance should be developed to enable to define the minimum information required to be portrayed to a VTS Operator to enable them to effectively deliver the declared service type in a given area.
12	The data and information input components to VTS portrayal should pass through appropriate validation checks to minimise the risk of an accidental / unintentional change / alteration of data.
13	In some VTSs, such as in inland waters, VTS Authorities should consider the orientation of traffic images to ensure that VTS Operators can maintain full situational awareness without the risk of confusion when interacting with the vessel traffic.

14	An IALA Guideline should be developed to assist VTS Authorities to determine consistent requirement for the portrayal of data and information at a VTS.

Conclusions with regard to non-portrayal issues

	Non-portrayal issues
1	There is a need to develop an IALA Guideline on the ergonomics in a VTS Centre.
2	There is a need to develop an IALA Guideline for the development of real times risk assessment tools
3	IALA Recommendation V-127 should be reviewed with regard to greater guidance for handover procedures
4	IALA should be mindful of the potential risk of distraction to VTS Operators as a consequence of the adoption of new systems or concepts.
5	VTS Operators generally have a better tactical view of the prevailing traffic situation than on-board personnel.
6	There is an operational risk if traffic management decisions are made on-board that exclude the VTS.
7	There is a need to be aware of data ownership, responsibility and legal / liability issue involved in using and sharing data.
8	There is a need for operational guidance about business continuity planning.

	Principles
1	Guidance on the portrayal of VTS data should not be prescriptive. Guidelines may be appropriate in order not to restrict the innovation of equipment manufacturers and unnecessarily interfere with the individual operational and risk based requirements of individual VTS Authorities.
2	VTS Authorities should seek to avoid the loss of data resulting from a VTSO logging off or restarting equipment.
3	VTS data should be portrayed in such a manner as to facilitate the cognitive process to assist effective decision-making on the part of a VTSO.
4	It should always be possible for the VTSO to query all relevant information related to a track.
5	The quality of sensor data and associated equipment should be monitored on a continuous basis and its portrayal be available to the VTSO to assist situation awareness.
6	A decision support tool, used properly, should decrease the workload of the VTSO, increase situation awareness and improve the delivery of the service.
7	Data sharing should be on the basis of mutual agreements and mutual benefits and operate within legislation head of power.

ANNEX F OPENING REMARKS BY CAPTAIN TUNCAY ÇEHRELI

Welcome to IALA Workshop on Portrayal of Data and Information at a VTS Centre, which is being organized in conjunction with Federal Waterways and Shipping Administration and Jacobs University.

Portrayal has been defined by ISO as the 'presentation of information to humans'. This may include visual, sound and even sense of touch but I think it is better to skip sense of touch during this workshop because we don't have enough experience and expertise in this area, otherwise our conclusion or recommendation could be dangerous or uncomfortable for VTS operators.

Emerging technology and increasing needs make portrayal more important for all computer based systems and services. But it has particular importance for VTS because you know VTS should have the capability to respond to traffic situations developing in the VTS area. I want to draw your attention to one word in this sentence, which is an excerpt from IMO's definition of VTS. This word is developing, not developed, which means that a VTS response should also be in timely manner. Timely manner..., what is that? 10 min, 3 min or 1 minute, of course it depends on the geography, the type of situation developing and some others. But believe me, in many cases 15 seconds could be too long if you are operating a VTS in a narrow waterway like the Istanbul Strait.

Providing VTS services INS, NAS and TOS, responding to situation developing and more... necessitate also a proper situation awareness to be established by VTS operator. And VTS portrayal is one of the important elements to improve a VTSO's situation awareness and thus the quality of services provided. Of course the benefits of VTS portrayal are not limited by improving situation awareness and service quality; we have sufficient time this week to discuss that.

VTS Portrayal has two main aspects, technical and operational, which have to supplement each other. In this first session we have a presentation on IHO S-100 Registry and product specification and I invite René Hogendoorn from Saab to make this presentation.

Much work has been done, so far, that can be associated with VTS Portrayal, such as 'use and presentation of symbology used at a VTS centre', but today, portrayal itself stands as a new and emerging issue both within VTS and e-Navigation. Because, as parts of ongoing VTS development, the emerging technologies and compelling needs urge us to focus particularly on the VTS portrayal issue.

As you know, a conclusion of the 2012 VTS Symposium, amongst others, was that 'VTS will play a critical role in maximising the benefits of e-Navigation'. So, besides future development of VTS, the possible impacts of e-Navigation on VTS technologies and operations also need to be taken into account while thinking about the VTS portrayal.

So, in this workshop, we will focus on the importance, different needs and different aspects of Portrayal of data and information at a VTS Centre by means of a case study. We review existing documents also and draw on them to provide a new guidance for the portrayal at VTS Centres.

Maximizing the benefits of e-Navigation is one of our aims and you know VTS is a very important part of maritime service portfolio of e-Navigation.

The other aim is to improve co-ordination between related parties such as maritime data owners, manufacturers and users.

And of course improving VTS capability is one of the aims of this workshop.

And so what of our objectives?

First, we have to identify emerging issues regarding VTS portrayal by considering three different aspects; types of service, working environment and future needs of VTS including e-Navigation.

I'm sure all participants have enough knowledge about operational and technical aspects of VTS and could identify emerging issues regarding portrayal.

We are establishing three new VTSs in three different regions in Turkey. Two weeks ago the preliminary site acceptance tests for one of these VTSs was completed. However, this test took

four months although it should take normally five to ten days. Because, amongst others, there were many portrayal related issues needing to be changed, modified even renewed. I realized during this long test period that, portrayal related requirements in your technical specifications could easily be misunderstood by contractor due to absence of any recognized document or standards. Let me give you an example. One of our requests was the indication of AIS Class of the vessels in the tactical picture and that was the solution of the contractor.

1 We document the needs for international guidance for the portrayal of information and data commonly used in VTS by considering same aspects.

The other interesting and important issue which I faced during our tests was related to alarm functions.

2 We review the existing documentation to identify the gaps between;

   a IALA Recommendation V-125 on the use and presentation of symbology at a VTS Centre.

   b IALA Recommendation V-128 on the Operational and Technical Performance Requirements for VTS Equipment (new one).

   c Current and developing Geographic Information Systems.

   d Emerging e-Navigation Portrayal Guidance.

3 We also recommend improvements to IALA documentations. This may related to either reviewed documents or other known documents,

4 And provide an output on what needs to be done with regard to VTS portrayal that is not being done today.

There are also some benefits for the participants;

- you are participating in a workshop environment with expertise in the operation, management and the technology of VTS systems;
- you may have greater understanding of the emerging role of portrayal in VTS by means of practical examples,
- improve your knowledge and familiarity with developments in e-Navigation portrayal,
- and of course you participate in the development of IALA Guidance with regard to VTS Portrayal.

  Because IALA VTS Committee will develop an IALA Guideline on VTS Portrayal in its 2014-2018 work period and this workshop will be our starting point.

I want to emphasise that, our expectation of this workshop is not produce an IALA Guideline or any other IALA document on VTS Portrayal we just expect an output on what needs to be done with regard to VTS portrayal that is not being done today.

ANNEX G OPENING REMARKS BY MR CHRISTIAN FORST, WSV

Good morning and a very warm welcome to Germany and the Free Hanseatic City of Bremen. It is a great pleasure for me to welcome all of you on behalf of the Federal Waterways and Shipping Administration, Germany, to the IALA Workshop on Portrayal of Data and Information at a VTS.

Bremen, the Hanseatic city on the banks of the Weser river can look back on 1,200 years of history:

- the grand old buildings around the market square;
- Bremen's former docklands, transformed into vibrant quarter for the 21st century;
- the Maritime Mile in Vegesack;
- the Science centre at Universum Bremen.

Bremen offers Hanseatic heritage as well as cosmopolitan appeal.

Bremen is a perfect place for an IALA workshop.

Bremen has a long maritime tradition. About 20% of all people in regular employment in the city are depending on the ports and elated maritime industry. More than 7000 entries by seagoing vessels per year and almost the same number of in-land barges, up to 90 cruise vessels, with up to 125,000 passengers and more than 2 million vehicles are handled each year. The ports of Bremen and Bremerhaven are a key economic factor.

The responsibility of the Federal Waterways and Shipping Administration, Germany, is to ensure that all vessels, under almost all condition can approach ports of Bremen and Bremerhaven safely and efficiently. This includes maintaining the fairways to the ports, as well as the provision of visual Aids to Navigation. In addition the Administration operates two VTS Centres, one in Bremerhaven and one in Bremen. Both centres comply with the relevant IMO standards, as well as IALA Recommendations and Guidelines.

In total, the Federal Waterways and Shipping Administration operates nine VTS Centres along the German cost. A network of forty-seven radar stations, a coast wide AIS network, combined with a coastal wide VHF and DSC network, form the basis for the services provided to shipping.

The Administration operates a VTS simulator for training purposes, in co-operation with the Maritime Simulation Centre in Warnemünde. The VTS operators, well educated and experienced masters of seagoing vessels, are trained regularly to comply withy the relevant training standards developed by IALA. Currently, until 2017, the Administration is undertaking a €120M re-engineering programme to modernise the coast wide network of VTS centres and related infrastructure.

The portrayal of data is a critical factor for the operation of a VTS. It is essential to provide an ergonomic environment for the VTS operators. Information overflow must be avoided but it has to be ensured that all relevant data are displayed unambiguously, to support the operators and not to confuse them. These are only a few aspects to be considered.

A conclusion of the 2012 VTS Symposium in Istanbul, amongst others, was that 'VTS will play a critical role in maximising the benefits of e-Navigation'. e-Navigation is starting to become a reality and it is highly appreciated that IALA took the initiative to develop Guidelines on the portrayal in at a VTS in an e-Navigation environment.

This workshop has been organised by IALA, in conjunction with the Federal Waterways and Shipping Administration and Jacobs University, Bremen.

Jacobs University advertises itself as a 'highly selective, international, residential university. Excellence and transdisciplinary, diversity and community, leadership and values are the pillars of a Jacobs education.'

The University commits itself, amongst other things, to:

- academic excellence and the creation of knowledge;

- transdisciplinary research and teaching;
- intercultural respect and global citizenship;
- creating a worldwide community of lifelong learners.

IALA and Jacobs University: I am sure that you will experience a perfect partnership during the coming days.

Many thanks to Professor Jens Froese and his team, in particular Ilknur Erdogan, for their willingness and efforts in supporting the workshop.

A technical visit is one highlight of an IALA workshop and today we will experience three!

1 The shiphandling simulator at the University of Applied Sciences, Bremen. Thank you very much Captain Wittig for your significant support.

2 Captain Fox, from the German Search and Rescue Service kindly offered a visit to the MRCC Bremen, thank you very much.

3 Finally, the VTS Centre, Bremen, welcomes the participants of the IALA workshop. Many thanks to the district office Bremen, in particular Captain Henning Sauer, for supporting the organising team.

These three locations are located within 5 minutes walking distance of each other.

Finally, please let me thank Dr Mike Hadley, the IALA technical co-ordination Manager. Mike, it is always a pleasure to work with you! Thank you very much indeed.

Ladies and gentlemen, you are facing a challenging work programme during the coming days. I wish you a fruitful and productive workshop and some enjoyable days here in Bremen and at Jacobs University.

Thank you very much for your attention.