



**KYSTVERKET**  
NORWEGIAN COASTAL ADMINISTRATION

# E-navigation from theory to practical applications

*Jon Leon Ervik*

*Head of Department*

# Technical opportunities ?



# Opportunities in e-navigation

*E-navigation is the harmonised **collection**, **integration**, **exchange**, **presentation** and **analysis** of maritime information **onboard** 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.*



## 5 Agreed e-Navigation Solutions

<b>Solution S1</b>	Improved, harmonized and user-friendly bridge design
<b>Solution S2</b>	Means for standardized and automated reporting
<b>Solution S3</b>	Improved reliability, resilience and integrity of bridge equipment and navigation information
<b>Solution S4</b>	Integration and presentation of available information in graphical displays received via communication equipment.
<b>Solution S9</b>	Improved Communication of VTS Service Portfolio.



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<b>Solution S9</b>	<b>Improved Communication of VTS Service Portfolio.</b>



# Six identified areas for MSP

- Port areas and approaches
- Coastal waters and confined or restricted areas
- Open sea and open areas
- Areas with offshore and / or infrastructure developments
- Polar areas, and
- Other remote areas



# IHO S-100 data structure

IMO MSC 90 approved:

- The use of the IHO's S-100 standard as the baseline for creating a framework for data access and services under the scope of SOLAS.
- A way forward for developing a Common Maritime Data Structure (CMD5); and consequently
- The overarching e-navigation architecture;



# IHO S-100 data structure

MSC 90 also authorised, in consultation with other organizations,

- the establishment of an IMO/IHO Harmonization Group on Data Modeling to consider matters related to the framework for data access and information services under the scope of SOLAS and, in particular, with a view to:
  - harmonize and standardize formats for the collection, exchange and distribution of data, processes and procedures for the collection of data; and
  - the development of open standard interfaces.





# MSC and the High-level Action Plan

- All work of the MSC is subject to the “High-level Action Plan.
- e-navigation was not planned to be an Agenda item after 2015.
- It was therefore important that the High-level Action Plan was amended to continue the work on e-navigation.
- MSC 95 agreed to amend the existing the High-level Action 5.2.6 to read "Development and implementation of e-navigation" for inclusion in the High-level Action Plan for 2016-2017.



# MSC 95

- At the last meeting of the Maritime Safety Committee of IMO, MSC 95, (3-12 June 2015) a number of decisions were taken to progress the further implementation of e-navigation.
- These resulted from an input paper from a number of countries and organisations\*, MSC 95/19/8, which proposed a simplified set of six proposed new outputs that would need to be completed in line with the decisions at MSC 94.
- MSC 95 approved 5 of the 6 outputs.
- MSC also approved, in general, further work on e-navigation.

*\* Australia, Denmark, Finland, Germany, the Netherlands, Norway, the Republic of Korea, ICS, IALA, BIMCO, CLIA, InterManager and the Nautical Institute*



## Output 6 – not approved

- The proposal was:  
*Consideration of reports on development and implementation of Maritime Service Portfolios (MSPs) (and other e-navigation reports) from Member States and international organizations*
- It was hoped that this output would monitor and coordinate all other ongoing e-navigation programs.
- It was considered not to be in line with the guidelines of the committee on new work.
- Norway proposed that it would resubmit a revised proposal to MSC 96.



# Example of Maritime Service Portfolio (MSP)

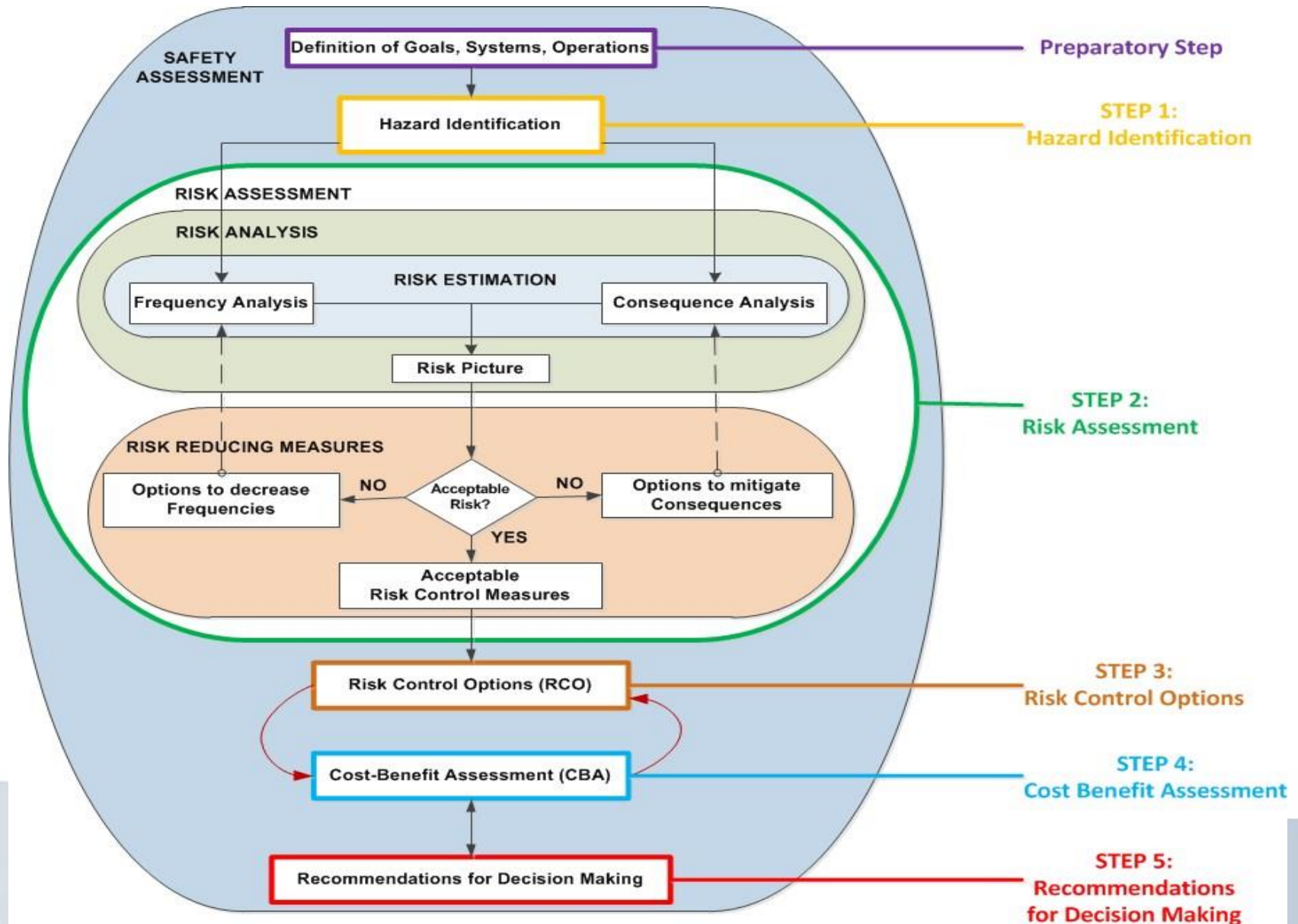
<b>MSP1</b>	VTIS Information Service (IS)
<b>MSP2</b>	Navigational Assistance Service (NAS)
<b>MSP3</b>	Traffic Organization Service (TOS)
<b>MSP4</b>	Local Port Service (LPS)
<b>MSP5</b>	Maritime Safety Information (MSI) Service
<b>MSP6</b>	Pilotage Service
<b>MSP7</b>	Tugs Service
<b>MSP8</b>	Vessel Shore Reporting

<b>MSP9</b>	Telemedical Maritime Assistance Service
<b>MSP10</b>	Maritime Assistance Service (MAS)
<b>MSP11</b>	Nautical Chart Service
<b>MSP12</b>	Nautical Publications Service
<b>MSP13</b>	Ice Navigation Service
<b>MSP14</b>	Meteorological Information Service
<b>MSP15</b>	Real-Time Hydrographic and Environmental Information Services
<b>MSP16</b>	Search and Rescue (SAR) Service

The objective of the MSP concept is to align global maritime services with the need for information and communication services in a clearly defined operational area.

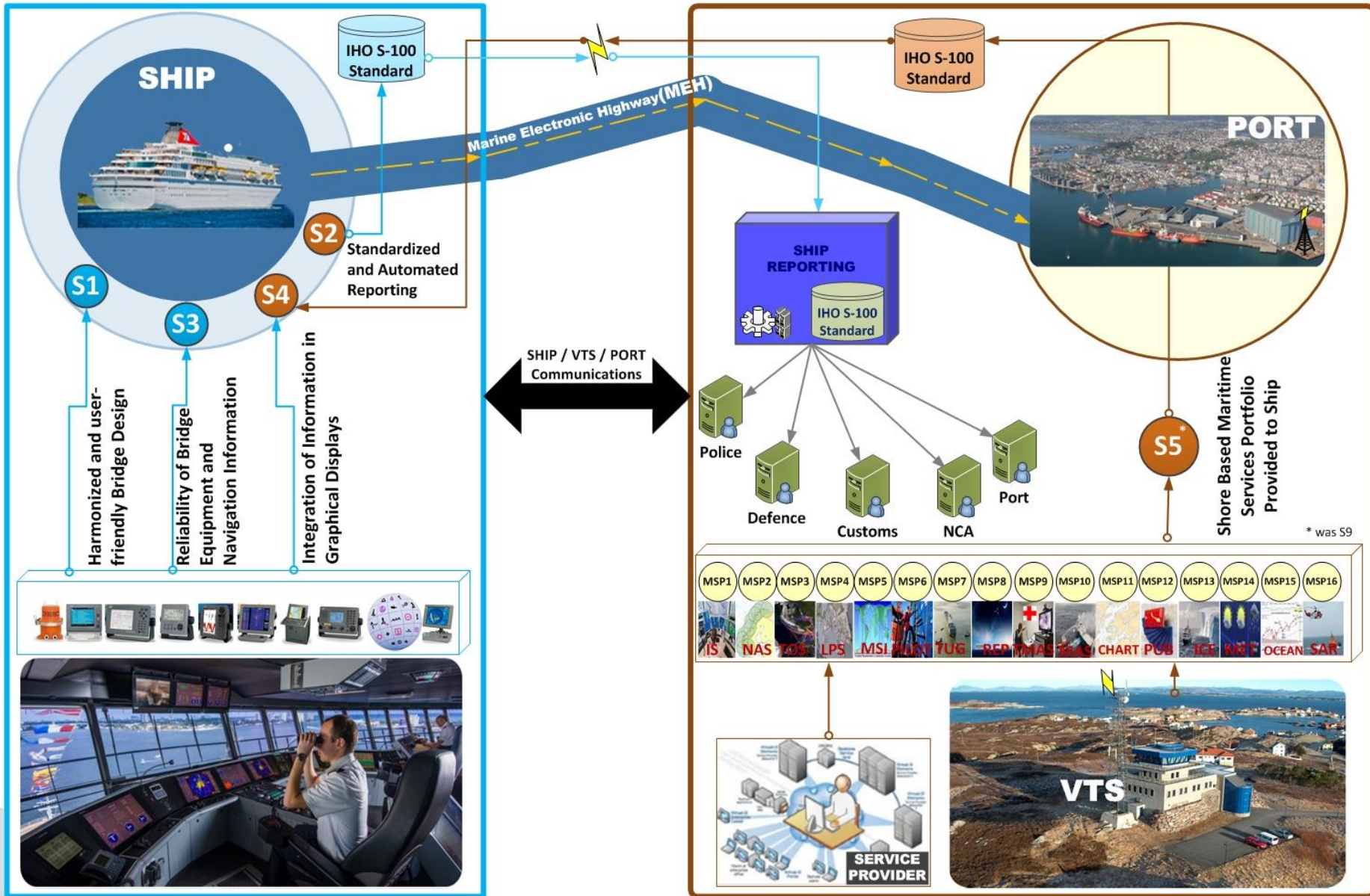


# Formal Safety Assessment (FSA)





# e-navigation Concept



\* was S9

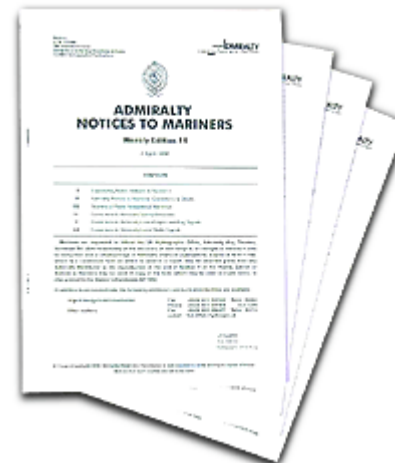
# Technical opportunities ?



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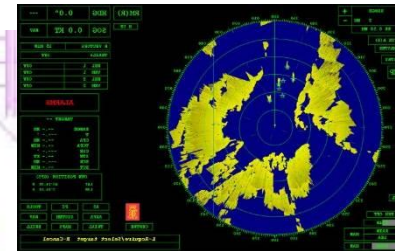
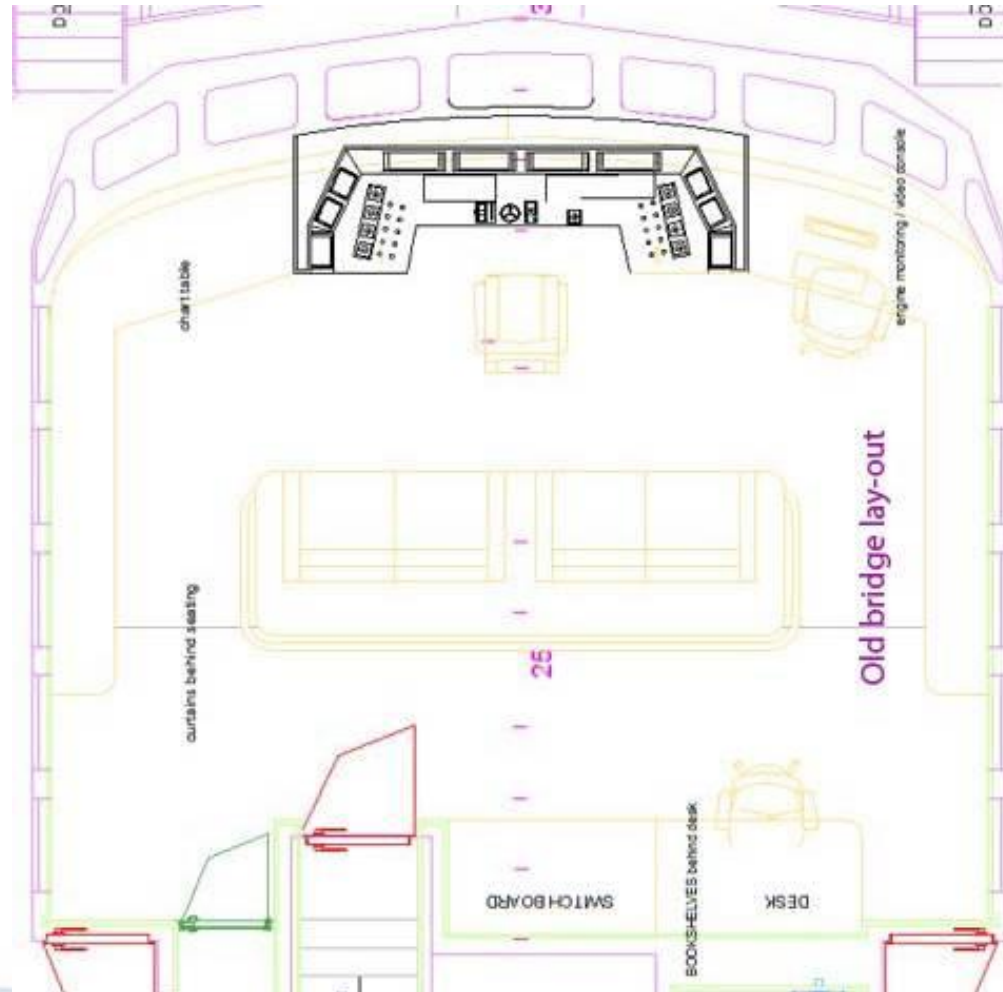
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# User friendly?





# Vessel bridge lay-out





scribes The  
On Board Ships



7 Important Points For Safe Lightering  
Operations On Ships



Preparations For Emergency Towing Of  
Ship – 10 Important Points

You are here: [Home](#) / [Marine Trends](#) / [equipment](#)

## 30 Types of Navigation Equipment and Resources Used Onboard Modern Ships

Facebook 5845 Twitter Google+ LinkedIn Pinterest

SEPTEMBER 15, 2011 BY KARANC

Gone are the days when a ship navigation officer had to take help of unconventional ways to plan and navigate a voyage at sea. Today, a ship officer has myriad of marine navigation equipment which makes his life a lot simpler, thanks to the advancement in technology. Moreover, present day seafarers are trained so as to know the functioning and operation of all modern day navigational equipment that have made the journey at sea smoother and safer.

## Machine Vision Cameras

Simple to advanced digital cameras for all machine vision applications

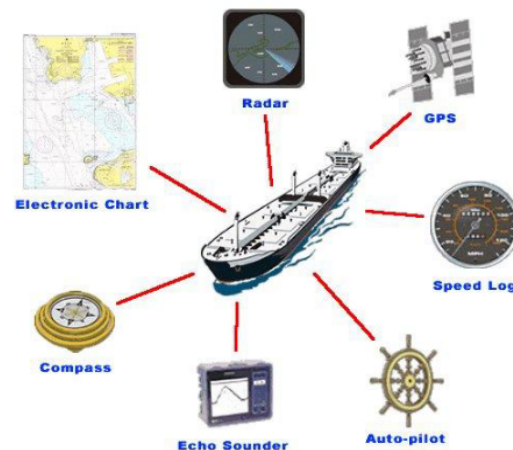
● ○



With modern day facilities and automation, a ship today has several advanced navigation equipment systems which give accurate data for the voyage.



With modern day facilities and automation, a ship today has several advanced navigation equipment systems which give accurate data for the voyage.



Herein, we have enlisted 30 types of navigational equipment, both old and new, which are present on all merchant ships.

- 1. Gyro Compass:** It is used for finding the right direction. Unlike magnetic compass, gyro compass is not hampered by external magnetic field. It is used to find correct North Position, which is also the earth's rotational axis. Its repeater system must be present in the steering platform for emergency steering. Read more [here](#)
- 2. Radar:** It is used to determine the distance of the ship from land, other ships, or any floating object out at sea. Read more [here](#)
- 3. Magnetic Compass:** The magnetic compass work in conjunction with the magnetic field of the earth. It is used to get planned direction for the voyage.







# Flight cockpit



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# Modern bridge?



## Modern day bridge

1. Fire Detection Panel
2. GPS, AIS and Speed Log Display
3. VHF radio
4. Rudder angle indicator
5. Electronic Charts Display & Information System (ECDIS)
6. Clinometer, Anemometer, Tachometer, Echo sounder
7. Radars (10cm and 3cm)
8. Engine controls
9. Switch panel (lighting etc)
10. Smoke alarm
11. Magnetic compass display
12. Search and Rescue transponder
13. Gyro compass
14. Steering stand



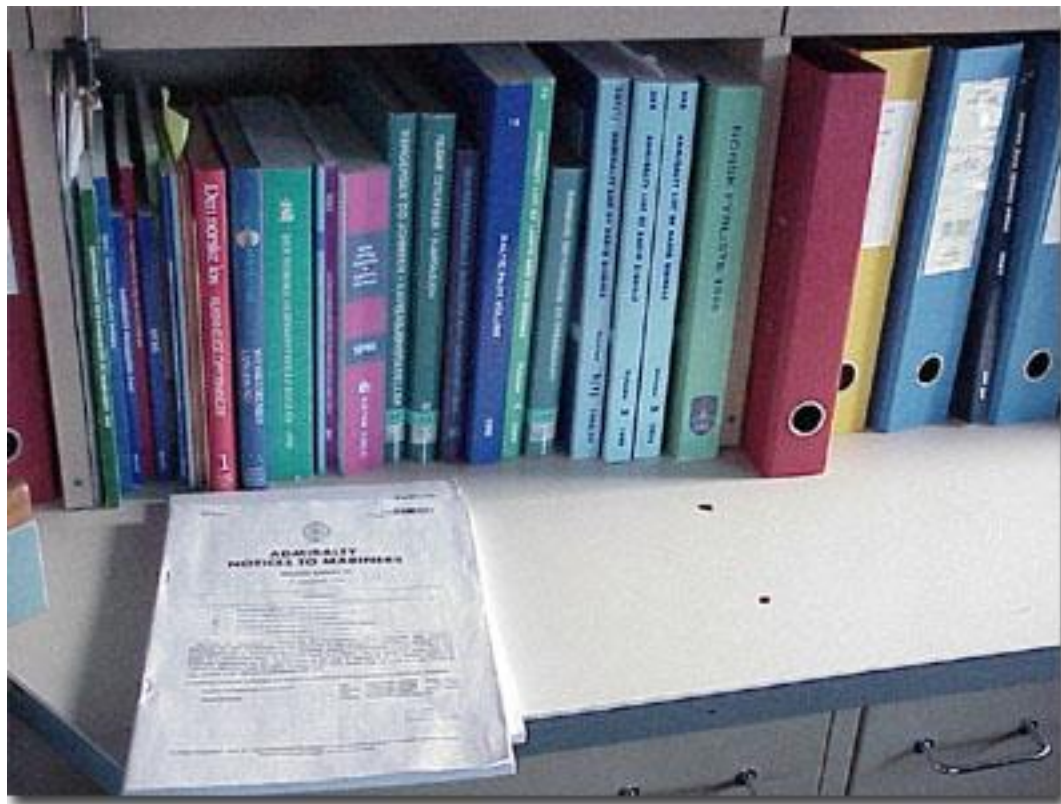
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# User-friendly?



OFFICIAL  
**MEDWAY  
T I D E  
TABLES**

ESTABLISHED OVER 44 YEARS

**2013**

WITH 32 VARIATIONS  
& ESSENTIAL NAUTICAL  
INFORMATION

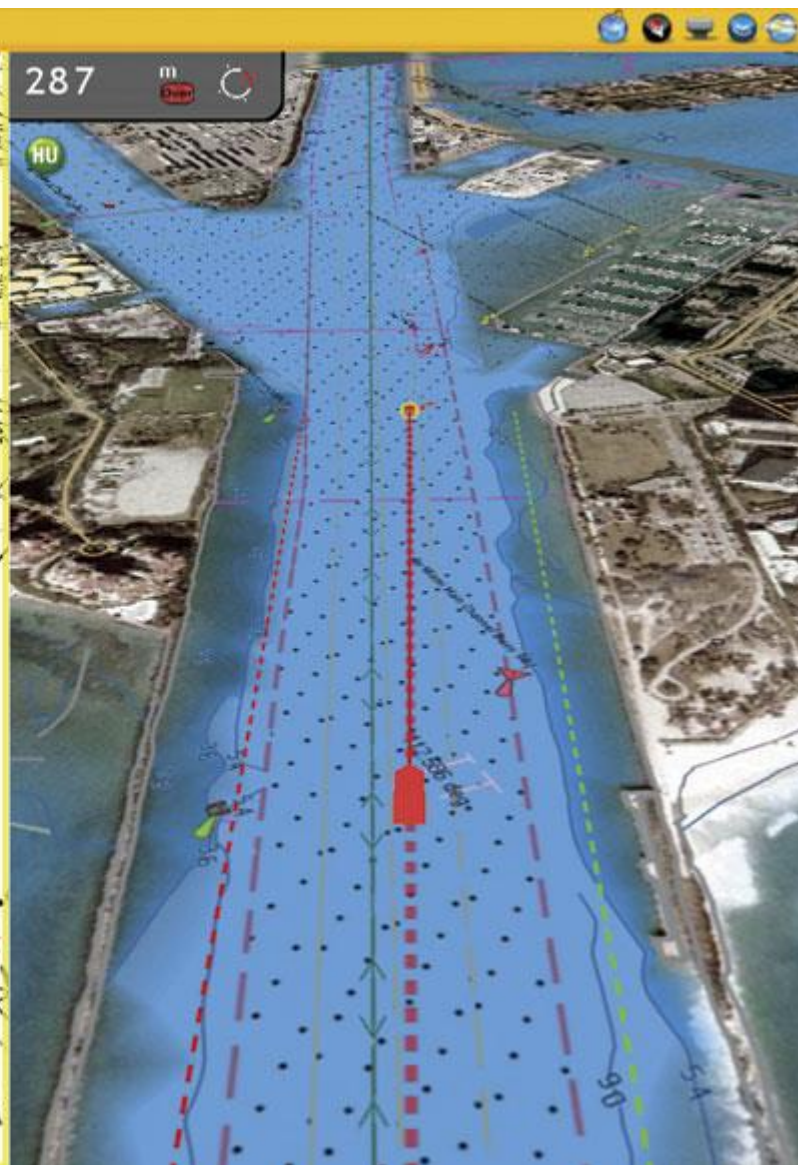
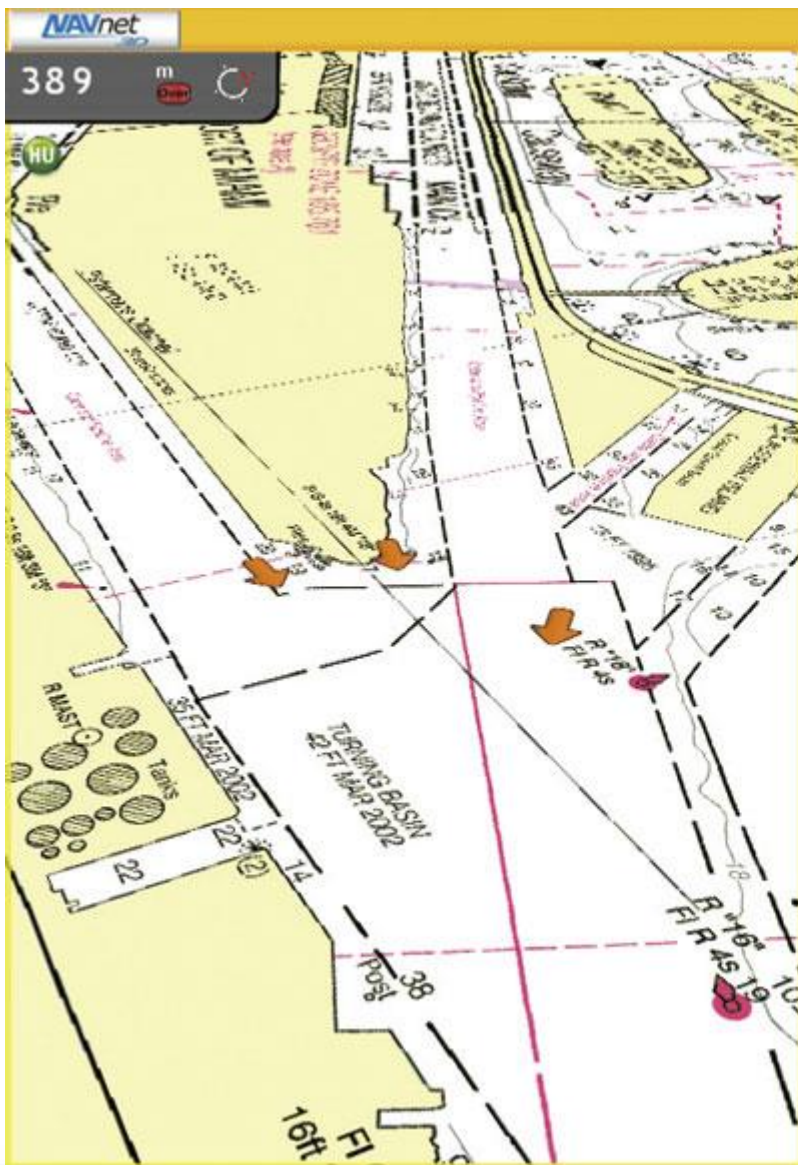
<b>19</b>	0411	1.1
	1031	4.8
	M 1629	1.4
	2242	4.9

<b>20</b>	0458	1.4
	1123	4.6
	TU 1718	1.7
	2338	4.7

<b>21</b>	0551	1.7
	1222	4.5
	W 1816	1.9

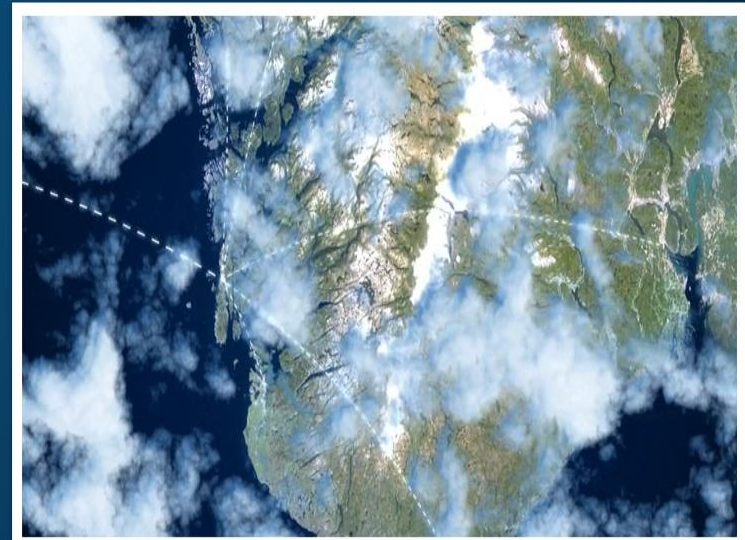
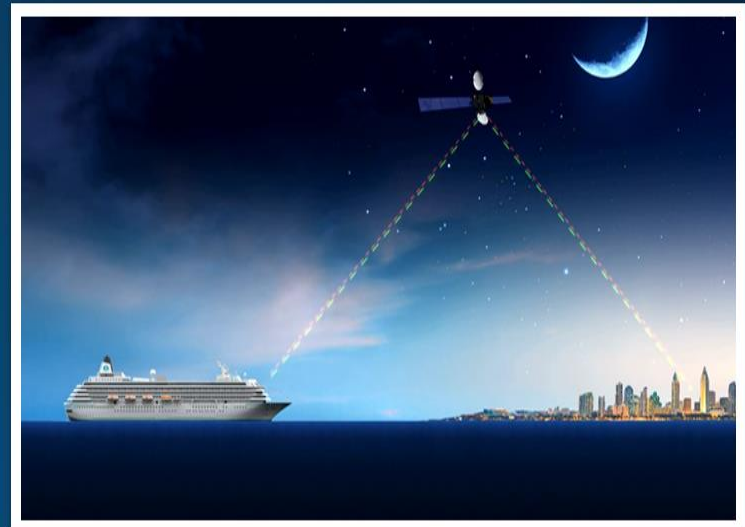






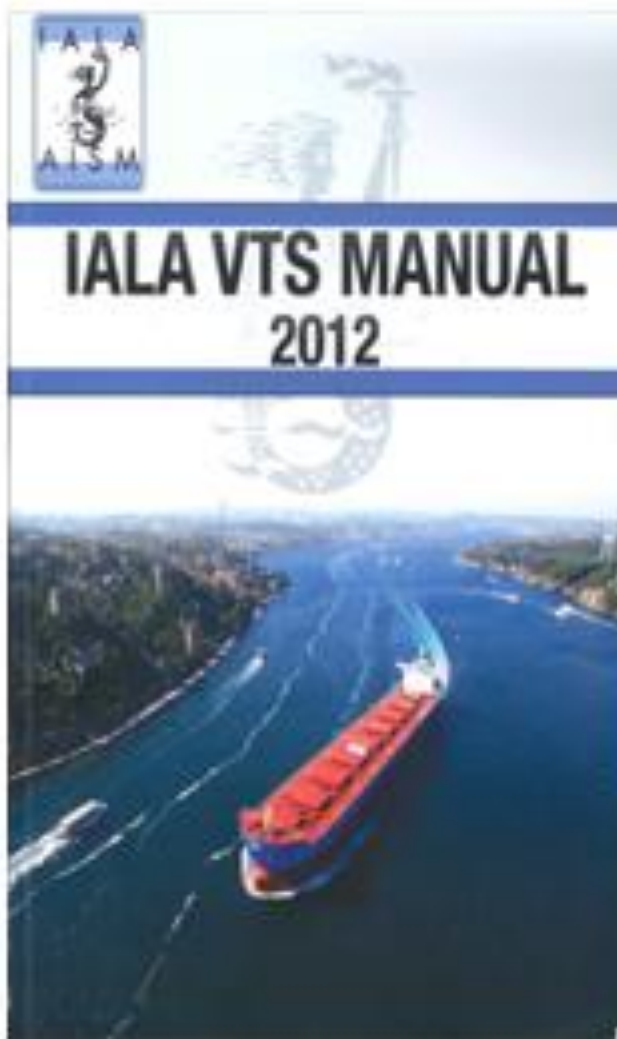
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# Interaction





# IMO Resolution A857 (20)

## 2.3 VTS services

The following guidance concerning the services that are rendered by a VTS should be taken into account:

2.3.1 The *information service* is provided by broadcasting information at fixed times and intervals or when deemed necessary by the VTS or at the request of a vessel, and may include for example reports on the position, identity and intentions of other traffic; waterway conditions; weather; hazards; or any other factors that may influence the vessel's transit.

2.3.2 The *navigational assistance service* is especially important in difficult navigational or meteorological circumstances or in case of defects or deficiencies. This service is normally rendered at the request of a vessel or by the VTS when deemed necessary.

2.3.3 The *traffic organization service* concerns the operational management of traffic and the forward planning of vessel movements to prevent congestion and dangerous situations, and is particularly relevant in times of high traffic density or when the movement of special transports may effect the flow of other traffic. The service may also include establishing and operating a system of traffic clearances or VTS sailing plans or both in relation to priority of movements, allocation of space, mandatory reporting of movements in the VTS area, routes to be followed, speed limits to be observed or other appropriate measures which are considered necessary by the VTS authority.

2.3.4 When the VTS is authorized to issue instructions to vessels, these instructions should be result-oriented only, leaving the details of execution, such as course to be steered or engine manoeuvres to be executed, to the master or pilot on board the vessel. Care should be taken that VTS operations do





# PPU as a practical example





ECDIS mode: HO ENC vector chart (norwegian pilots display WGS 1984(Global Definition) Cylindrical ( Mercator )) Monitoring (Battery 36%)

OverScale: (X2.3) 1: 5 332 02/16/2008 08:55:58(01)

#### GPS ADX PPU DATA

Lat: 59 25.171N

Lon: 005 14.033E

Offset: (0.000', 0.000')

**Hdg: 332.0 (0.000')**

**STW: N/A**

**COG: 328.7**

**SOG: 2.4 Kts**

Drift: 0.1 kts / 241°

ROT: -1.2 deg/min

Tide: 0.49m falling

Wpt: Kråkeflu

XTE: 0.01 Starboard

B/R: 330° 0.27 nm

TTG: 00:06:49

ETA: 02/16 09:02:48(01)

Nxt: 319° 1.65 nm

Kråkeflu

ETA: 02/16 09:02:48(-01)

Dist: 0.27 / 44.92

Safety contour

Specified 15 Selected 20 (T: 6m)



Acknowledge



CPA-TCPA alarm



STW alarm

N/A N/A

R/B: N/A

CPA: N/A

TCPA: N/A

S/C: N/A

Lat: 59 25.360N

Lon: 005 13.935E

SC: 0.20 nm 345.1



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# Meteorological information

WD:113.1 deg  
WSG:4.2 m/s  
WSM:4.3 m/s  
AT:-- deg C  
WT:1.8 deg C  
SL:-- m

28835A

4.2 m/s

## AIS Data

AIS

Rensa Listan &gt;

Sök ID

38 LOTS 462  
39 LOTS 774  
40 LOTS 714  
41 LOTS 140  
42 28834F  
43 833 ARKO  
44 LOTS 742  
45 LOTS 772 OLD  
46 28835A

ID: 28835A

MMSI: 2655066

Updaterad: 13:04:34

Lat: 59 17.2116 N

Lon: 018 54.7398 E

Vindriktning: 131 deg

Vindhastighet by : 5 m/s

Vindhastighet medel : 4 m/s

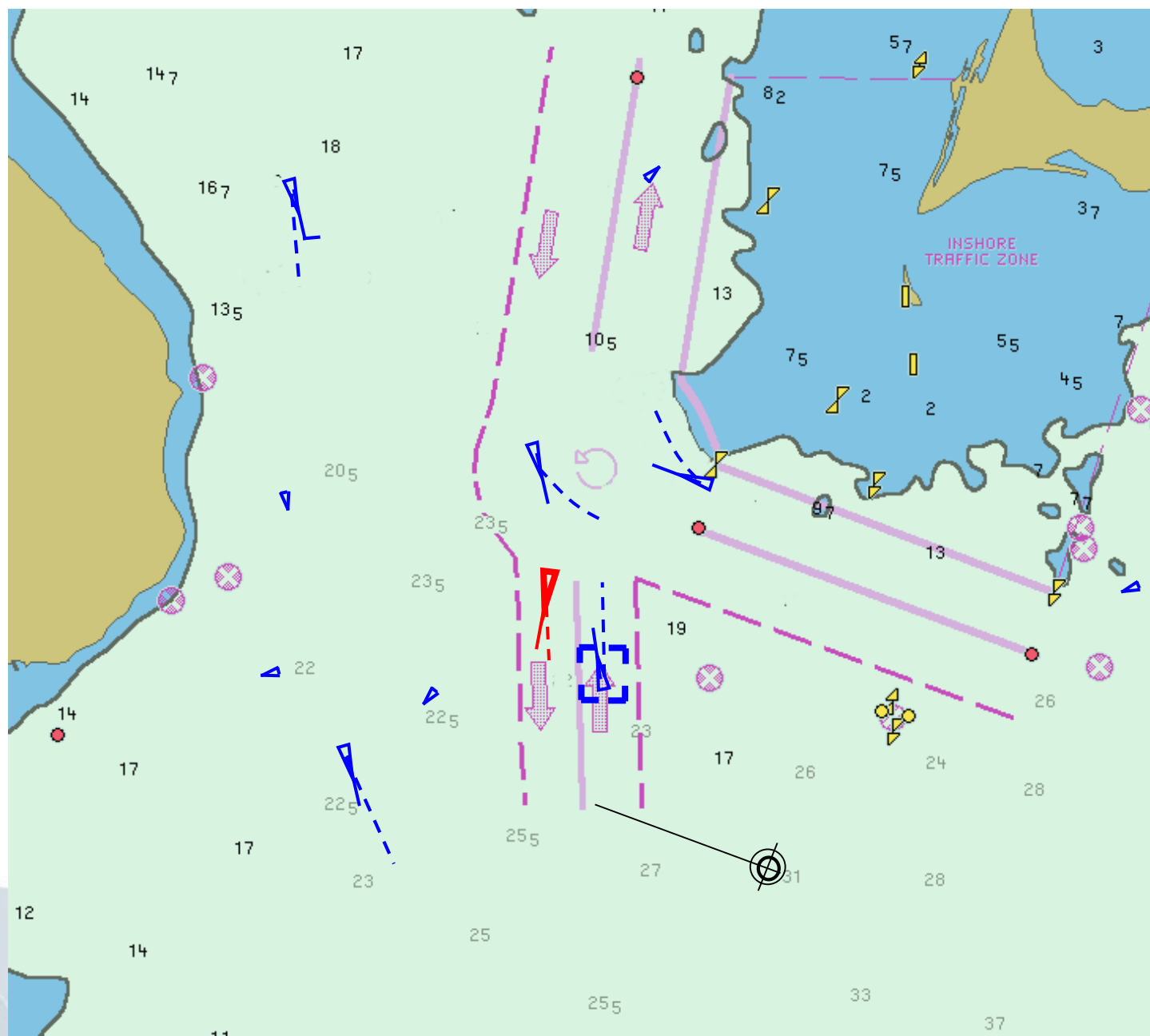
Lufttemp: -- deg C

Vattentemp: 2 deg C

Vattenstånd: -- m

Trend Vattenstånd: --

☐ Följ Aktuellt Mål



MALMOLINK
MMSI: 265242000
Updated: 10:37:26
Call Sign: 01
IMO Nr: 3301
Lat: 55 20.9159 N
Lon: 012 39.8367 E
SOG: 16,1 kn
COG: 000,9 deg
HDG: 350,0 deg
ROT: Undefined
Pos Accuracy: High
Name:
Draught: 5,7 m
Dest: MALM
Ship size: 193 m x 27 m
<input type="checkbox"/> Follow Actual Target





**NAVTOR, NavStation ; On Board e-NAV services with seamless data updating**



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MSI

NTM

port

Single  
Window



- ✓ Sailing plan exchanged between the ship and the Norwegian Coastal Administration (NCA) — Quality Assurance and Report.
- ✓ The VTS provides sailing clearance to the ship and transfers traffic images via AIS.
- ✓ The VTS transfers electronic updates of local port maps to the ship.
- ✓ The VTS transfers information about local regulations electronically to the ship.



# Bergen – hub for trade and tourism

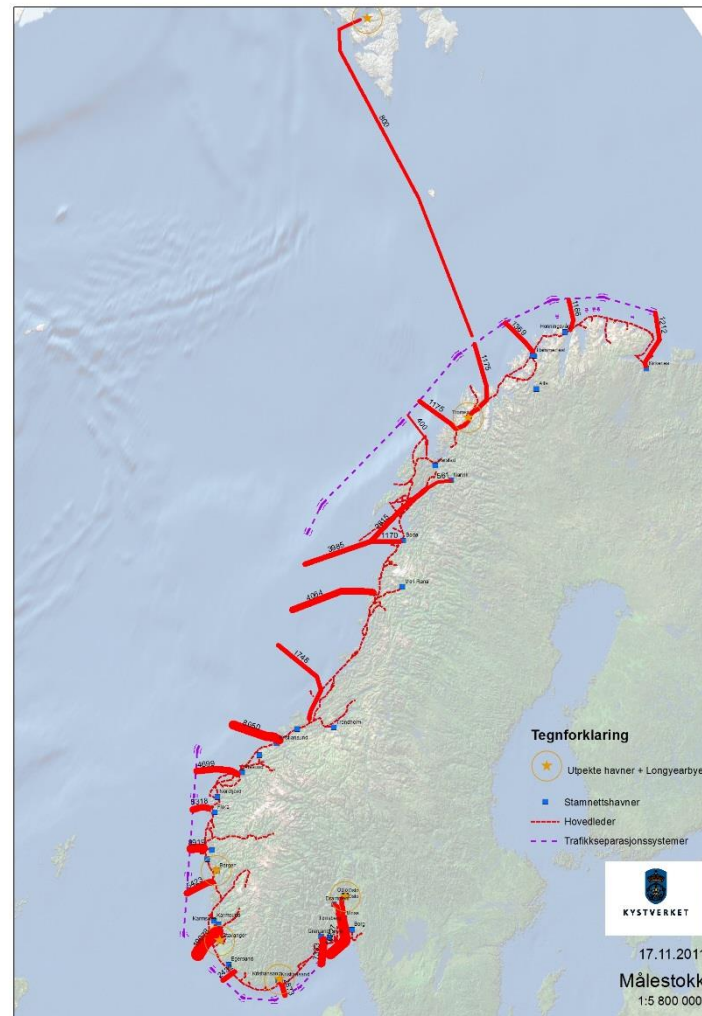


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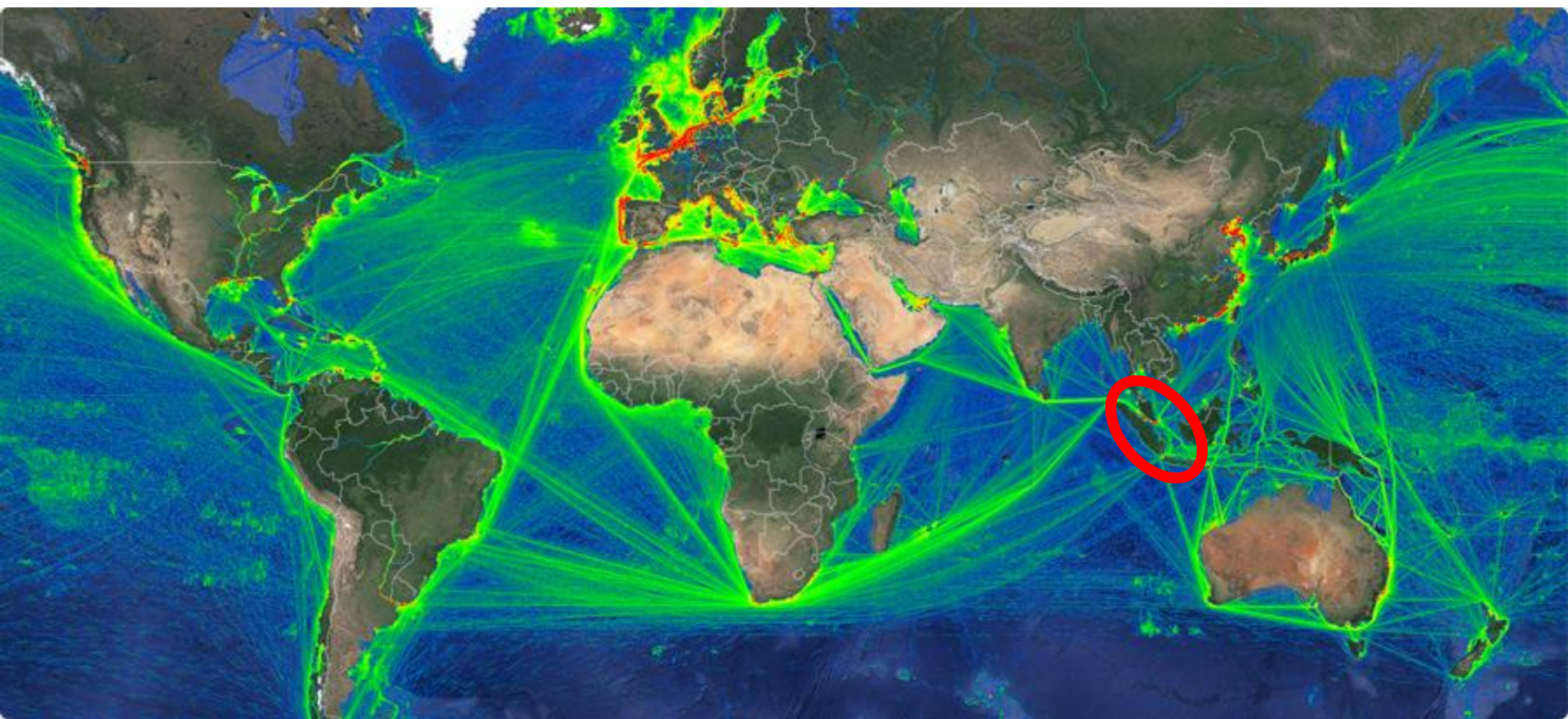
# Norwegian e-navigation strategy



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# Den maritime «motorvei»

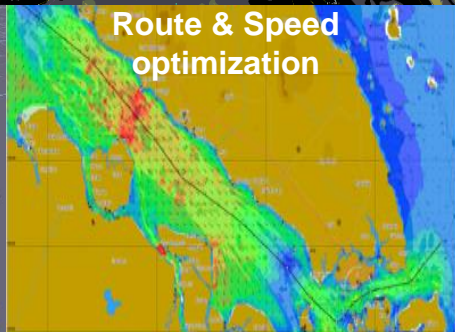
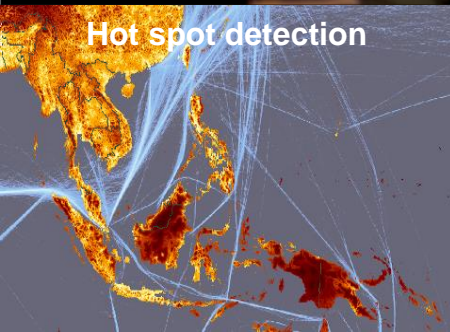
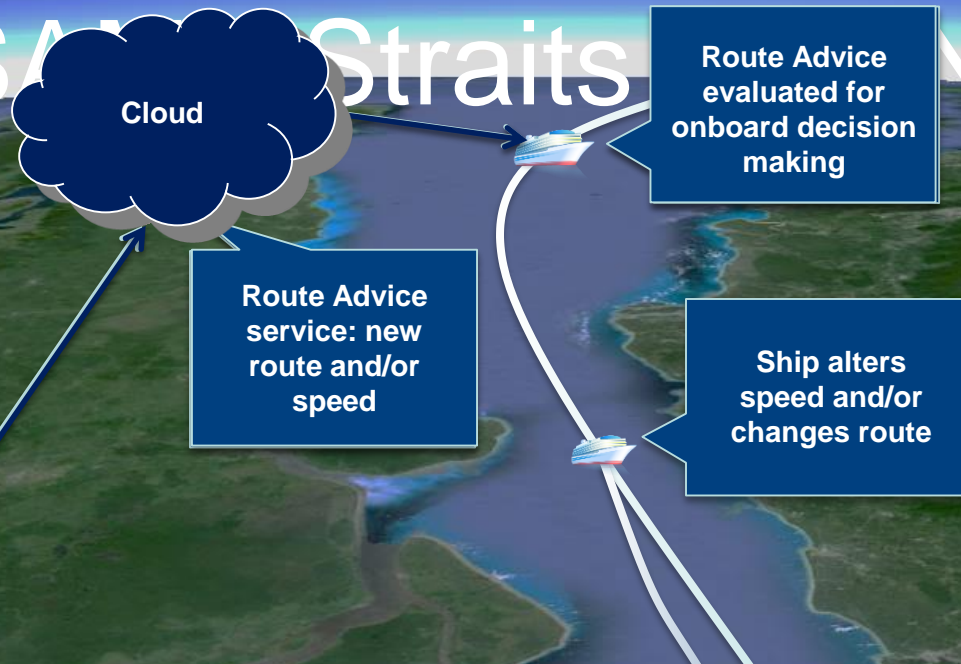


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# SESAME Straits NOPS



- Shared situational awareness
- Cooperative decision support
- Regional Maritime Service Portfolio (MSP) Route Advice-JIT:
  - Efficient traffic flow
  - Reduced navigation risk
  - Reduced ship bunkers
  - Reduced toxic gas emissions
  - Better utilization of port facilities resources



# Service - Provider

No	Identified Services	Identified [SE]Service Provider
MSP1	VTS Information Service (IS)	VTS Authority
MSP2	Navigational Assistance Service (NAS)	National Competent VTS Authority/ Coastal or Port Authority
MSP3	Traffic Organisation Service (TOS)	National Competent VTS Authority/coastal or Port authority
MSP4	Local port Service (LPS)	Local Port/Harbour operator
MSP5	Maritime Safety Information Service (MSI)	National Competent Authority
MSP6	Pilotage service	Pilot Authority/ Pilot Organization
MSP7	Tugs Service	Port/Commercial Tug Organization
MSP8	Vessel Shore Reporting	National Competent Authority, Shipowner/ Operator/Master
MSP9	Telemedical Assistance Service (TMAS)	National health organization / dedicated health organization
MSP10	Maritime Assistance Service (MAS)	Coastal/Port Authority / Organization
MSP11	Nautical Chart Service	National Hydrographic Authority / Organization
MSP 12	Nautical Publications service	National Hydrographic Authority / Organization
MSP 13	Ice navigation Service	National Competent Authority Organization
MSP14	Meteorological information service	National Meteorological Authority /WMO / Public Institutions
MSP15	Real time Hydrographic and environmental information service	National Hydrographic and Meteorological Authorities
MSP16	Search and Rescue Service (SAR)	National Competent Authority Organization/ Authorities

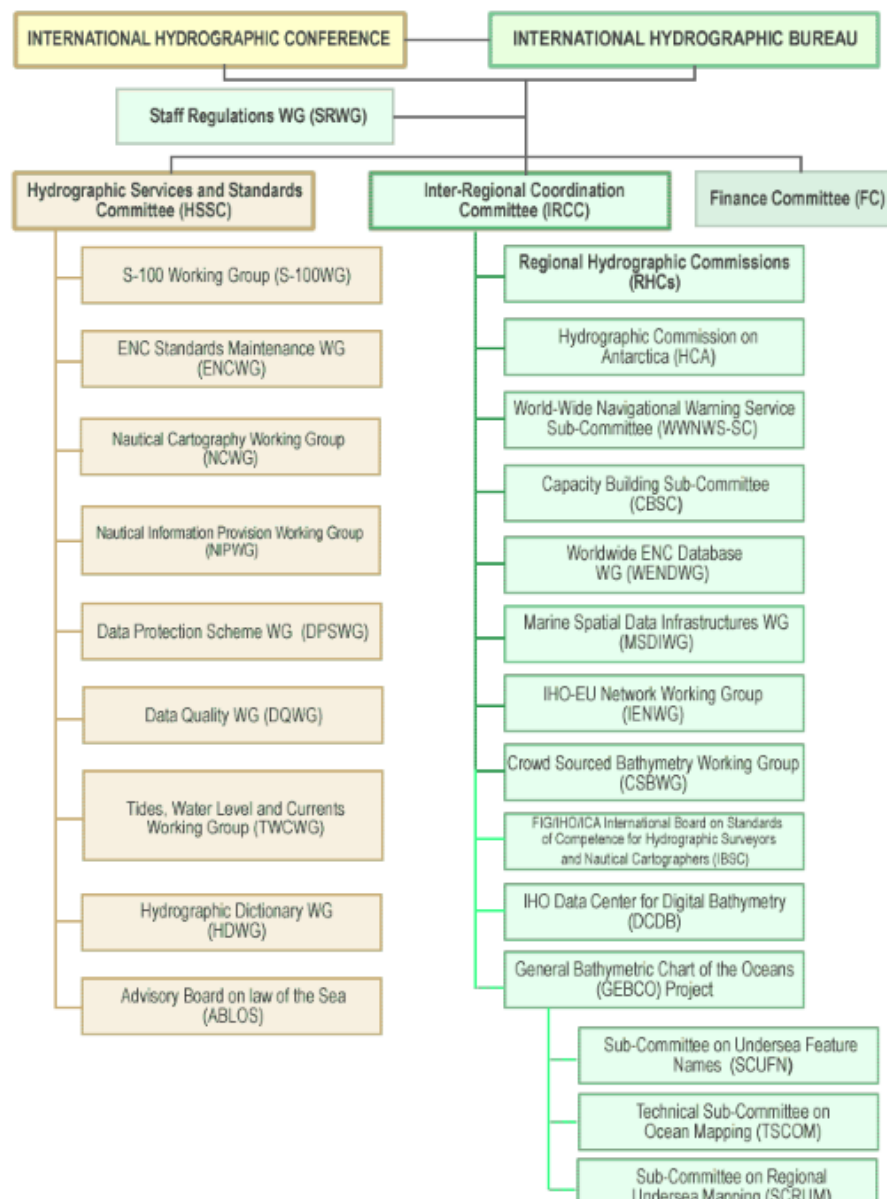


# Responsible international organization

No	Identified Services	Identified [SE]Service Provider
MSP1	VTIS Information Service (IS)	IALA
MSP2	Navigational Assistance Service (NAS)	IALA
MSP3	Traffic Organisation Service (TOS)	IALA
MSP4	Local port Service (LPS)	IAPH / IALA / IHO ....
MSP5	Maritime Safety Information Service (MSI)	IHO
MSP6	Pilotage service	IMPA
MSP7	Tugs Service	ICS
MSP8	Vessel Shore Reporting	IALA
MSP9	Telemedical Assistance Service (TMAS)	
MSP10	Maritime Assistance Service (MAS)	IMO
MSP11	Nautical Chart Service	IHO
MSP 12	Nautical Publications service	IHO
MSP 13	Ice navigation Service	IHO
MSP14	WMO	WMO
MSP15	Real time Hydrographic and environmental information service	IHO
MSP16	Search and Rescue Service (SAR)	



# International Hydrographic Organization

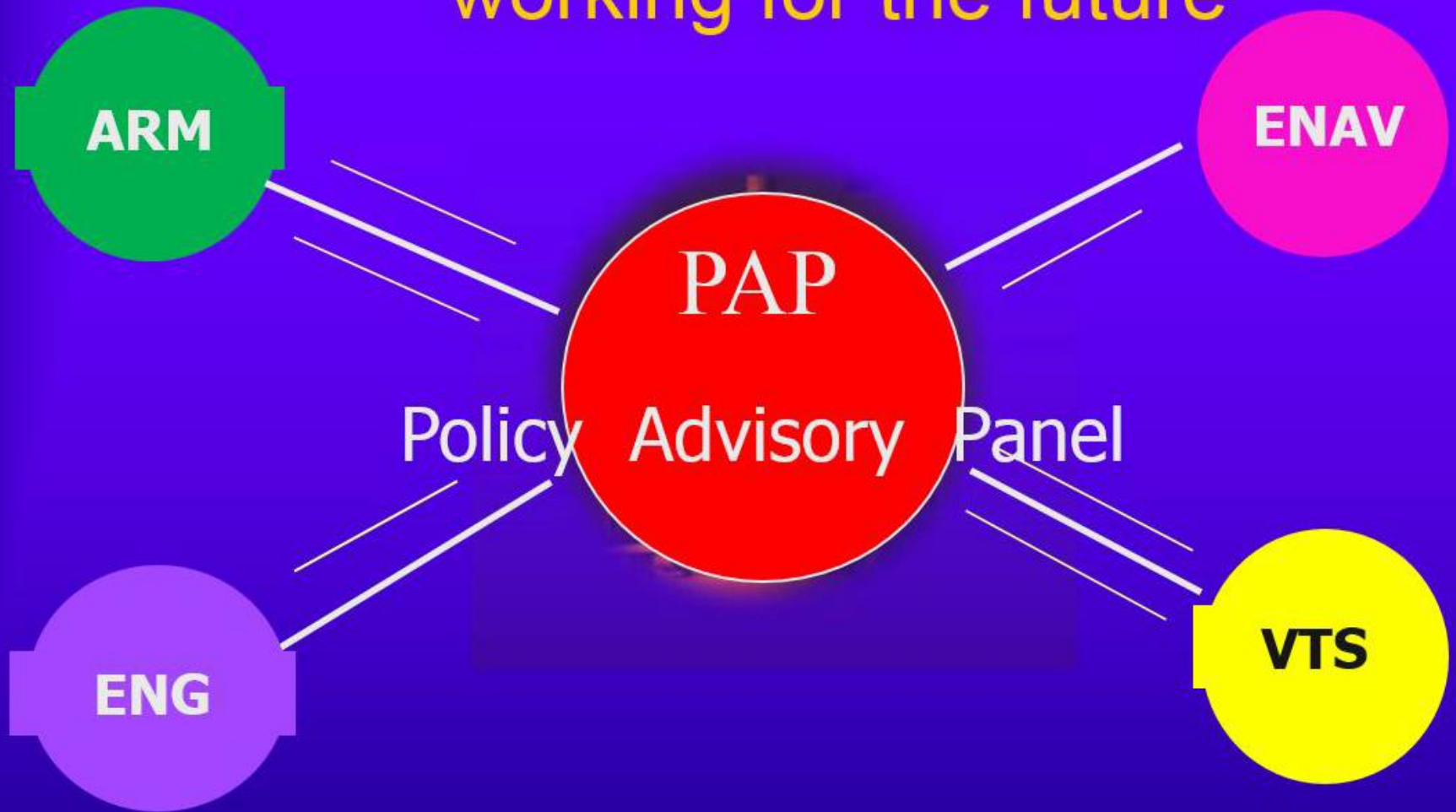




# The IALA 'Toolbox'



# IALA Committees working for the future



# Providing guidance ...



**IALA  
Documentation**

**Recommendations**

**Guidelines**

**Manuals**



### **Introduction**

At the end of the day, e-Navigation is about the exchange of valuable information between stakeholders utilizing a global infrastructure capable of ensuring safe, secure and seamless information exchange across available communication channels. It is of great importance that the information exchanged is to the point and directly relevant for the use case context.

### **Scope**

Content of e-Navigation services, non-technical aspects of e-Navigation and the added value services provide to the users.

### **Topics and activities**

- e-navigation services arising from SIP;
- User requirements including input from all IALA member types;
- Guidance on MSP information content and implementation;
- Utilizing Maritime Information Systems for e-Navigation services;
- Liaison with VTS on e-Navigation service content;
- Work closely with WG1 on harmonization including portrayal matters;

### **Deliverables**

- Appropriate draft Standards, Recommendations and Guidelines to fulfil the tasks assigned to the Working Group in the Committee Work Programme;
- Information and relevant subtasks requested from other Working Groups within the Committee for them to fulfil their tasks;
- Draft Liaison notes etc. as appropriate.



# Publications related to MSP

MSP	Name	International Standards	Code
MSP1	VTS Information Service (IS)	IALA VTS	IALA VTS Manual 2012
		IMO. 1997a. Guidelines for Vessel Traffic Services	Resolution A.857(20)
MSP2	Navigational Assistance Service (NAS)	Provision of a Navigational Assistance Service by Vessel Traffic Service	IALA Guideline No. 1068
MSP3	Traffic Organization Service (TOS)		
MSP4	Local Port Service (LPS)		
MSP5	Maritime Safety Information (MSI) Service	Joint IHO/IMO/WMO	S-53
MSP6	Pilotage Service		
MSP7	Tugs Service		
MSP8	Vessel Shore Reporting		
MSP9	Telemedical Maritime Assistance Service		
MSP10	Maritime Assistance Service (MAS)		IMO Resolution A.950(23)
		Guidelines on places of refuge for ships in need of assistance	Res A.949(23, December 2003)
MSP11	Nautical Chart Service	IHO Transfer Standard for Digital Hydrographic Data	S-57
		IHO Bathymetric Surface Product Specification	s-102
		Specifications for Chart Content and Display Aspects of ECDIS	S-52
		Specification for Data Descriptive file for information Exchange	ISO IEC 8211
		The International Standard for representation of each character	ISO/IEC 646
		Data Presentation	Ecma_6
			ECMA-35
			ECMA-43
			ECMA-48
			ECMA-94
			ECMA-113
			ECMA-114
			ECMA-118
			ECMA-121
			ECMA-128
			ECMA-144



# Publications related to MSP

MSP	Name	International Standards	Code
MSP12	Nautical Publications Service	Regulations for International (INT) Charts and Chart Specifications of the IHO	S-4
		Standardization of List of Lights and Fog Signals	S-12
		International Abbreviations, as requested by IEC 61174	S-4
		Hydrographic Dictionary	S-32
		International Hydrographic Review	P-1
		IHO Yearbook	P-5
		WMO: Guide to the Global Observing System	488
MSP13	Ice Navigation Service	ships operating in polar waters	IMO Resolution A.1024(26)
MSP14	Meteorological Information Service	WMO: Manual on Marine Meteorological Services	558
		Manual on Codes - International Codes, Volume I.2: Part B and Part C	306
		Manual on Codes - International Codes, Volume I.1: part A- Alphanumeric Codes	
		WMO: Basic Documents, 2. Technical Regulations, Volume I: General Meteorological Standards and Recommended Practices	
MSP15	Real-Time Hydrographic and Environmental Information Services	Bathymetric Surface Product Specification	S-102
		IHO Universal Hydrographic Data Model	S-100
		IHO Transfer Standard for Digital Hydrographic Data	S-57
MSP16	Search and Rescue (SAR) Service	International Search and Rescue Advisory Group Guidelines and Methodology	INSARAG Guidelines 2012





**JOINT IHO/IMO/WMO**

**MANUAL ON MARITIME SAFETY INFORMATION (MSI)**

**Special Publication No. 53**  
**(July 2009 Edition)**

**Published by the International Hydrographic Bureau**  
**MONACO**



					MESSAGE			
					Preamble			
					1	2	3	4
CATEGORY	ATTRIBUTES	ATTRIBUTE DETAILS	DATA FORMAT (Data to be available electronically)	Message Series Identifier	General area	Locality	Chart number	Key subject
Casualties to lights, fog signals, buoys and other aids to navigation affecting main shipping lanes	Lighthouses, Beacons, Light vessels	Unlit						
		Light Unreliable						
		Damaged						
		Destroyed						
		Racon Inoperative						
		Changed to flash three 2						
		Seconds 14 metres 16 mes						
		Temporarily changes to quick yellow 12 miles						
		Moved 0.3 miles north to 63-14.18N 022-15.6E						
		Re-established						
	Buoy, Lanbys, Superbuoys	Permanently discontinued						
		Temporarily removed						
		Unlit						
		Light Unreliable						
		Damaged						
		Off station						
		Missing						
		Temporarily changed						
		Moved						
		Permanently discontinued						
		Temporarily removed						



					MESSAGE			
					Preamble			
				Reference No →	1	2	3	4
CATEGORY	ATTRIBUTES	ATTRIBUTE DETAILS	DATA FORMAT (Data to be available electronically)		Message Series Identifier	General area	Locality	Chart number
Weather	Sea surface conditions							
	Selection of report from sea stations							
	Selection of report from land stations							
	Scheduled broadcasts							
	Unscheduled broadcasts							
	Wind (speed & Direction)	Type of Beaufort force; Extend of affected area; direction and speed of movement of disturbance; location; date time						
	Visibility	visibility grade						
	Weather (e.g.fog, rain, snow)							
	Dew point		From sensor - Text / GRIB GRIdded Binary format					
	Air temperature							
	Atmospheric pressure							
	gale, storm, hurricane, tsunami, freezing spray	Type of Beaufort force; Extend of affected area; direction and speed of movement of disturbance; location; date time						
Ice	Ice charts		Polygons					
	Selection of report from land stations							
	Selection of report from sea stations							
	Ice advisories		Text					
	Ice Routing		Lines					
	Ice webcams		Video format					
Water	Sea State	Significant wave height/total sea						
	Selection of report from land stations							
	Selection of report from sea stations							
	Real-time tide							
	Real-time water level / depth							
	Tide current							
	Swell	Sea and swell conditions in the affected area;						
	swell (height & direction)		IMO binary					
	Wave (height & direction)							
	integrated water columns	Temperature and salinity / Marine mammal distribution / Ocean current distribution	netCDF Network Common Data Form format					
	Water temperature							
Bathymetry	Large bottom objects	Rocks / Seabed installations / Obstructions						
	Marine habitat							
	Marine vegetation							
	bathymetry coverage							
	type of bathymetry							
	Small botom objects							





# Reference for s-100 development?



**EUROPEAN COMMISSION**

EUROPEAN MARITIME SAFETY AGENCY

Praça Europa, 4 - Cais Do Sodré

1249-206 Lisbon, Portugal

## SafeSeaNet XML Messaging Reference Guide

Version 3.01  
12/05/2014



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# Reference for s-100 development?

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC		
Changes from report 1.0: ADD: Added MOVED: MOVED NAME: Renamed DELETE: Deleted DEF: in definition TECH: in technical definition	Group/ Element Name	Label for user interface (if different from Name)	Mapping with formalities															Definition	Supported by all NSVs as reporting formality (Mandatory)	Arrival	Departure	Occ	Made available via SSN	Already in PortPlus message	To be provided on request	Type	Length	Code (if relevant)	Technical Definition	
			A1 - Port	A2- Border	A3 - DPG	A4 - Waste	A5 - Security	B1 - FAL1	B3 - FAL3	B4 - FAL4	B5 - FAL5	B6 - FAL6	B7 - FAL7	B8 - MDH	C1 - PSC Arrival	C2 - PSC Departure	C2 - PSC 72h pre-arrival													
	1. Ship identification																						1							
	Ship name	Name of ship	X		X	X	X	X	X	X	X	X	X	X	X	X	X	Given name of the ship in the ship registry	X	A	D	0-1	X	X		Text	0-35	Upon SOLAS, chapter I, part B, regulation 15 "Form Certificates",		
	Call sign		X		X	X	X	X	X	X	X	X	X	X	X	X	X	Call sign for the ship. Sequence of letters and numbers,	X	A	D	0-1	X	X		Text	0-7			
	IMO number		X		X	X	X	X	X	X	X	X	X	X	X	X	X	Unique ship identification number assigned by Lloyd's Register	X	A	D	0-1	X	X		Text	7	IMO number – IMO Res A.600 (15)		
TECH	MMSI number		X		X													Identifier used by maritime digital selective calling (DSC),	X	A	D	0-1	X	X		Text	9	Length of the MMSI number must always be 9.		
	Comment	Any other information related to												X				Any other information related to ship identity		A		0-1				Text	0-256	Possibility to provide information (e.g. registration number) on		
	2. Ship particulars																						0-1							
	Flag state of ship					X	X	X	X	X	X	X	X	X	X			The ISO code for the country subdivision in which the means	X	A	D	0-1	X	X		Enum	2	The Alpha-2 code (two-digits flag code) in accordance with the		
	Certificate of registry - Port							X	X									Port where the certificate of registry was issued	X	A	D	0-1	X			Text	5	The port is identified by its 5-digit LOCODE		
	Locode																		X			0-1	X			Text	0-256			
	Location name																		X			0-1	X			Text				
	Certificate of registry - Date								X									Date of issue of certificate of registry		A	D	0-1	Optional			Date				
	Certificate of registry - Number								X									Number of the certification of registry		A	D	0-1	Optional			Text	1-35			
	Inmarsat call number						X											Number indicating the location of the ship by satellite services	X	A		0-5	X			Text	1-50			
	Gross tonnage						X	X						X				The measure of the overall size of a ship determined in	X	A	D	0-1	X	X		Decimal	3			
	Net tonnage						X											The measure of the useful capacity of a ship determined in		A	D	0-1				Decimal	3			
	Ship type						X	X										Code specifying the type of means of transport.	X	A	D	0-1	X			Enum	2-3	codes the ship type according to UNECE R28.		
	Name of company						X											Name of ship's operating company, as defined in the ISM code	X	A		0-1	X			Text	1-70			
	IMO company identification number						X											IMO company identification number	X	A		0-1	X			Text	7			
	3. Port call																						1							
	Port of call		X		A	X	X	X	X	X	X	X	X	X	X	X	X	When referring to a voyage leg, this is the port at the end of	X	A	D	1	X	X		Text	5	The "port of call" attribute must only be the LOCODE of the specific		
	ETA port of call	ETA	X		A	X	X	A	A	A	A	A	A	X		X		Estimated time and date of arrival at the port of call	X	A		0-1	X	X		DT				
	ETD port of call	ETD	X		D	X		D	D	D	D	D				X		Estimated time and date of departure from the port of call	X	A	D	0-1	X	X		DT				
TECH	Position in port of call							X										Position of the ship in the port (berth or station)		A		0-1	Optional	X		Text	0-50	Any 50 character free text value will be accepted. However M.S		
	Port facility	Port Facility of arrival (if known)					X											Facility as defined in ISPS	X	A		0-1	X			Text	1-4	The port facility's code in the IMO GISIS maritime security database		
	Name of agent						X	X						X				Name of the organisation representing the ship in the context	X	A		0-1	X			Text	1-50			
	Contact details of agent						X	X										Contact details of agent at port of call	X	A		0-1	X			Text	1-20	with an international prefix code		
	Phone																		X	A		0-1	X			Text	1-20	with an international prefix code		
	Fax																		X	A		0-1	X			Text	0-50			
	Email																		X	A		0-1	X			Text	0-50			
	Purpose of call							X										Primary purpose of the call	X	A		0-9	X			Enum		EDIFACT codes (8025)		
	Brief description of onboard cargo	General description of the cargo					X	X										This is a short text giving an overview of what cargo the ship	X	A	D	0-1	X			Text	1-256	Type of cargo		
	4. Pre-arrival 72 hrs notification																						0-1							
	Possible anchorage	Call at anchorage														X		Whether the call is at an anchorage		A		0-1	Optional	X		Enum		Yes/ No status code		
	Planned operations															X		Planned operations at the port of call or anchorage of		A		0-1	Optional	X		Text	0-256			
	Planned works	Planned statutory survey														X		Planned statutory survey inspection and substantial		A		0-1	Optional	X		Text	0-256			
	Tanker hull configuration	For tankers: Configuration														X		Configuration: single hull, single hull with SBT, double hull		A		0-1	Optional	X		Enum		Possible values: SHT - indicating a single hull tanker; SHT-SBT -		
	Volume and nature of cargo	For tankers: Volume and nature of														X		volume and nature of the cargo on board the tanker		A		0-1	Optional	X		Text	0-256			
	Condition of cargo and ballast tanks	For tankers: Condition of cargo														X		Condition of the cargo and ballast tanks: full, empty, inerted		A		0-1	Optional	X		Text	0-256			
	5. Arrival																						0-1							
	ATA port of call	ATA													X			Actual time that ship arrived at port of call or anchorage		A		1	X	X		DT				
	Anchorage	Call at anchorage													X			Whether the call is at an anchorage		A		0-1	X	X		Enum		Yes/ No status code		
	6. Departure																						0-1							
	ATD port of call	ATD													X			Actual time that ship departed from port of call or anchorage			D	1	X	X		DT				







# Modern bridge?



## Modern day bridge

1. Fire Detection Panel
2. GPS, AIS and Speed Log Display
3. VHF radio
4. Rudder angle indicator
5. Electronic Charts Display & Information System (ECDIS)
6. Clinometer, Anemometer, Tachometer, Echo sounder
7. Radars (10cm and 3cm)
8. Engine controls
9. Switch panel (lighting etc)
10. Smoke alarm
11. Magnetic compass display
12. Search and Rescue transponder
13. Gyro compass
14. Steering stand



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# Future presentation of information



# Benefits for the user

- Tailor-made information for the operation
- Standardization
- Functions on demand
- Scalability
- Reduction of work load
- Efficiency
- Reduction of equipment costs
- Cost-effective operation (fuel material)





# Conclusions

- The implementation of all 5 e-navigation solutions will contribute to the enhanced interaction between ship and shore / shore and ship.
- Enhanced exchange of electronic information will contribute to the BRM process.
- Integration and user-friendly presentation of accurate and common information when needed will contribute to safety and efficiency
- MSP`s will contribute to establish safety and efficiency of a voyage or any other safety critical task.



Thank you



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