KYSTVERKET

NORWEGIAN COASTAL ADMINISTRATION

E-navigation from theory to practical applications

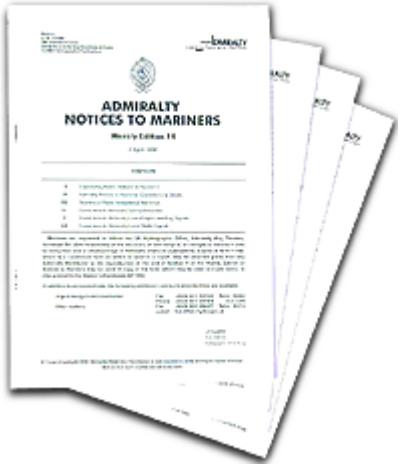
Jon Leon Ervik

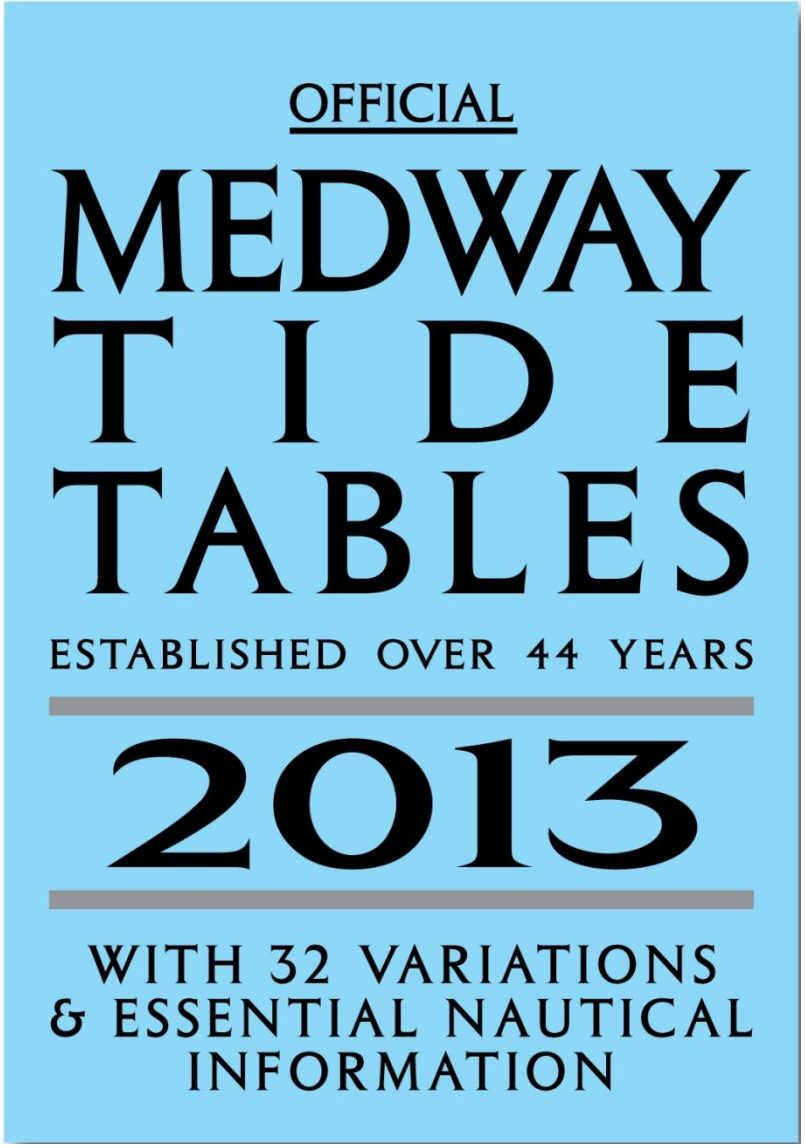
Head of Department

Development ?

Flight cockpit

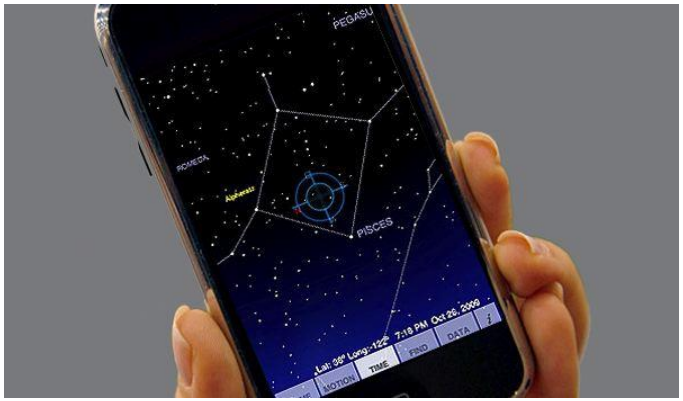
User friendly?





19		0411	1.1
		1031	4.8
	M	1629	1.4
		2242	4.9
20		0458	1.4
		1123	4.6
	TU	1718	1.7
		2338	4.7
21		0551	1.7
		1222	4.5
	W	1816	1.9

Technical opportunities ?



KYSTVERKET

www.kystverket.no

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

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

Example of Maritime Service Portfolio (MSP)

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

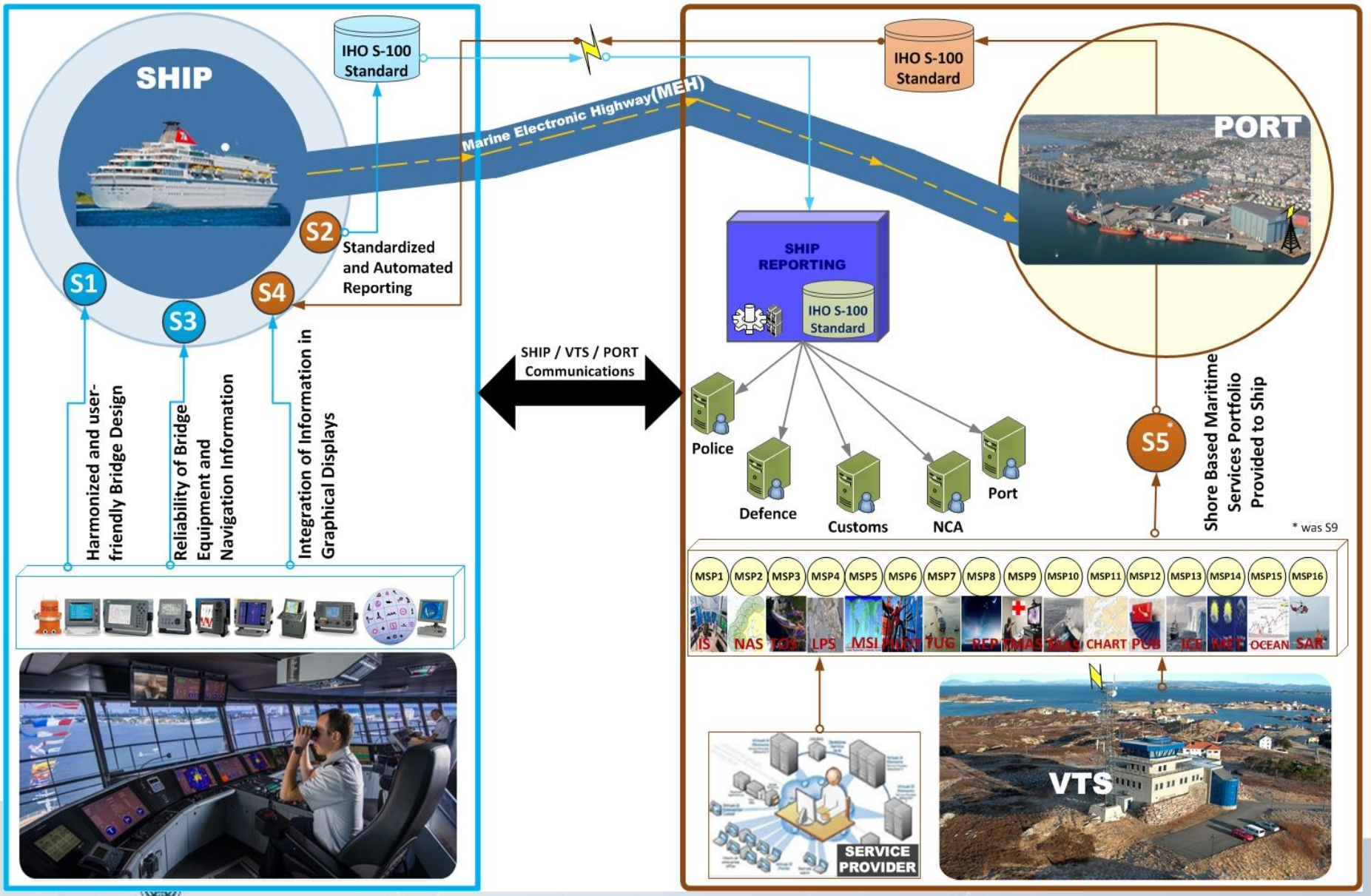
MSP10	Telemedical Maritime Assistance Service
MSP11	Maritime Assistance Service (MAS)
MSP12	Nautical Chart Service
MSP13	Nautical Publications Service
MSP14	Ice Navigation Service
MSP15	Meteorological Information Service
MSP16	Real-Time Hydrographic and Environmental Information Services
MSP17	Search 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.

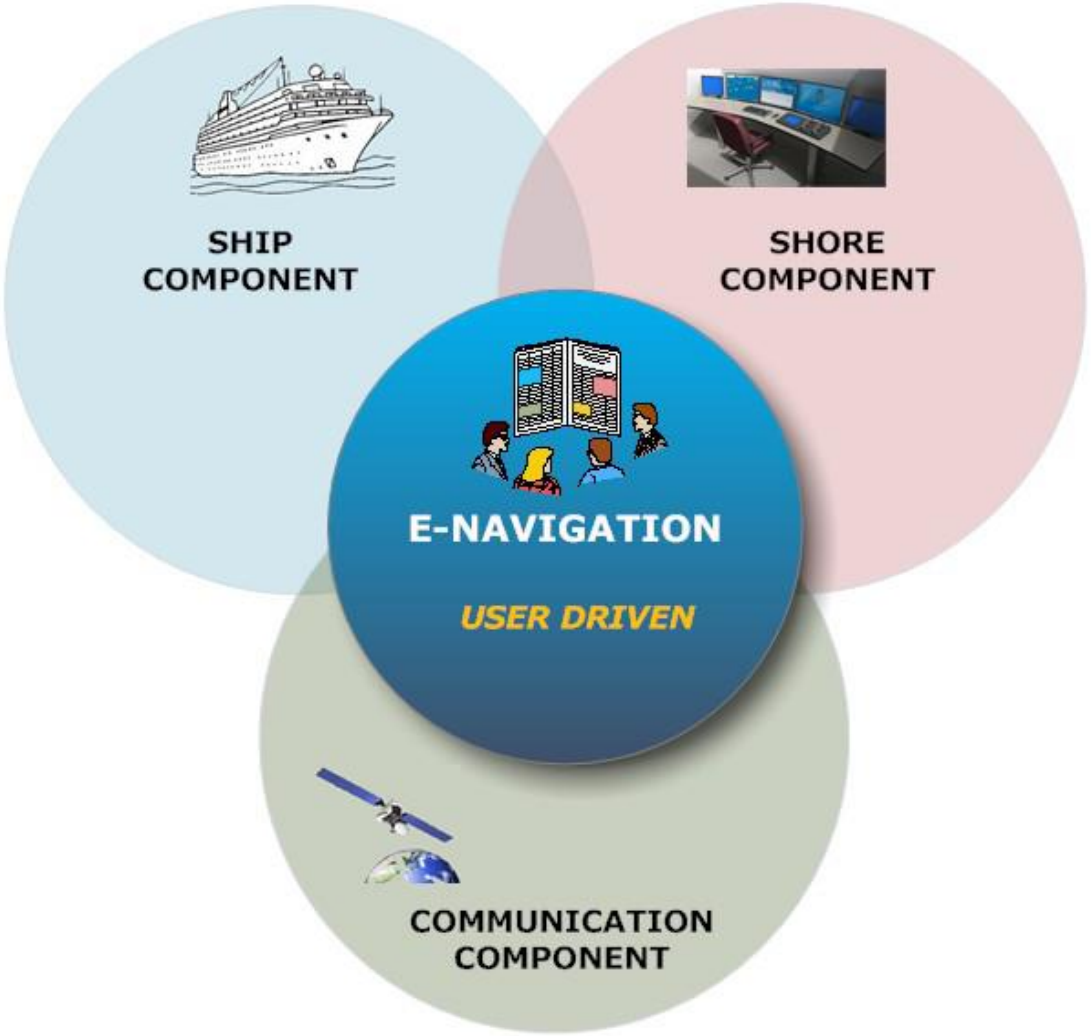
Six identified areas for MSP

- 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

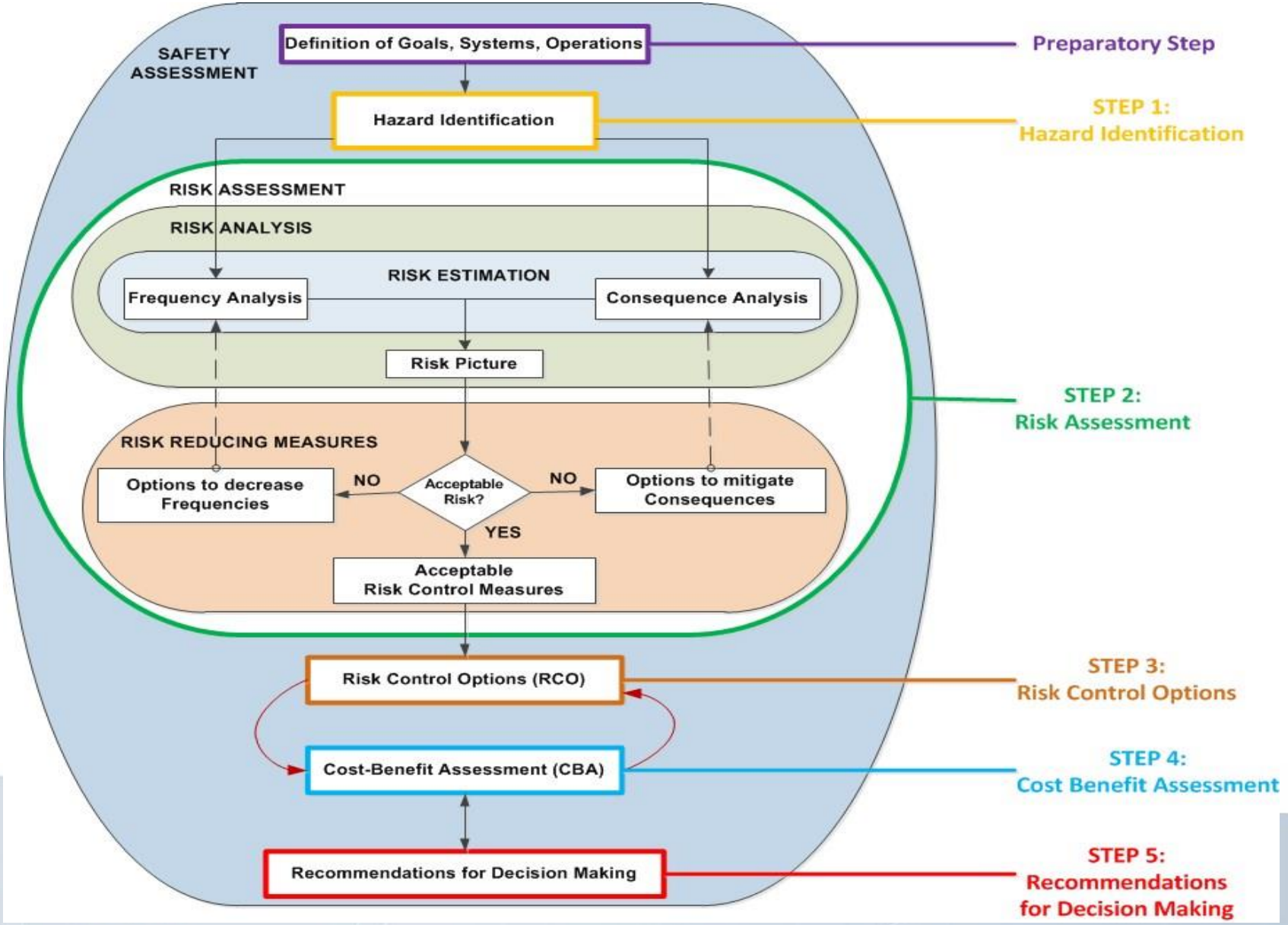
e-navigation Concept

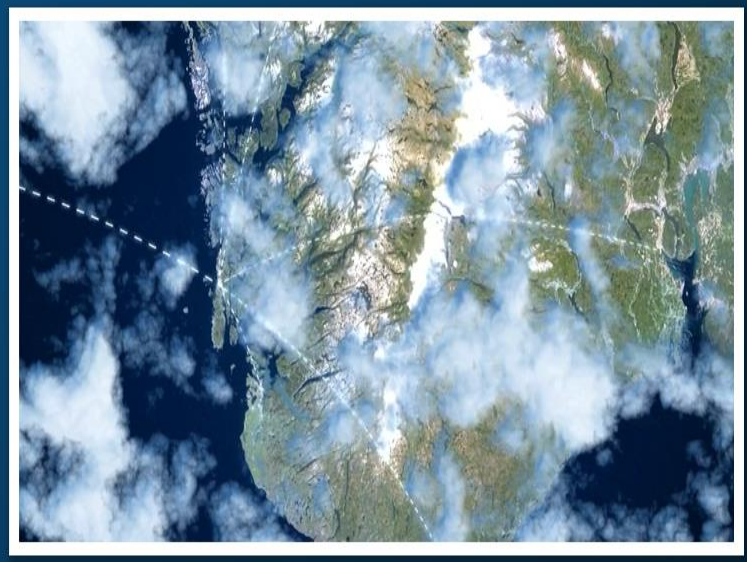


Key Components of e-Navigation



Formal Safety Assessment (FSA)





Interaction

IALA-AISM is…

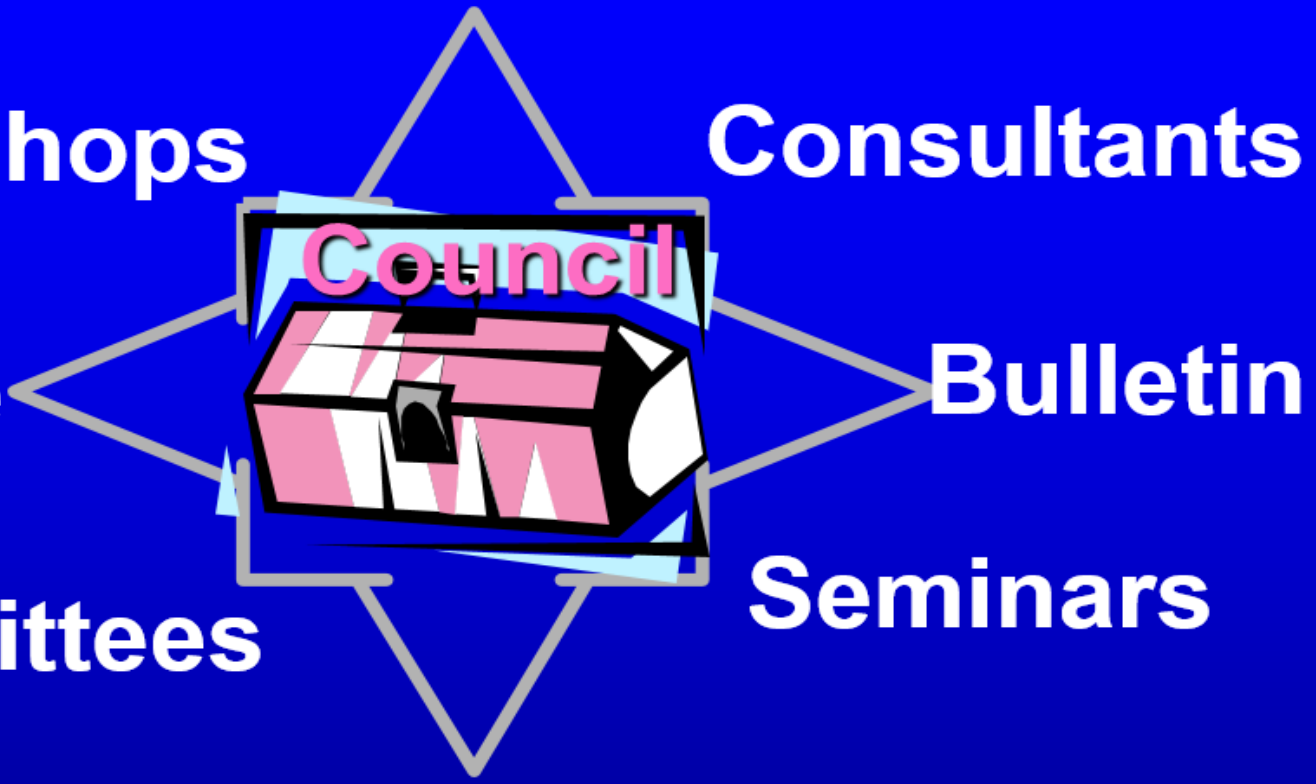
- ***An International Association created in 1957***
  - Not-for-profit
  - Secular and non-political
- ***Membership***
  - National
  - Associate
  - Industrial
  - Honorary

… brings together services and organisations that deal with marine aids to navigation

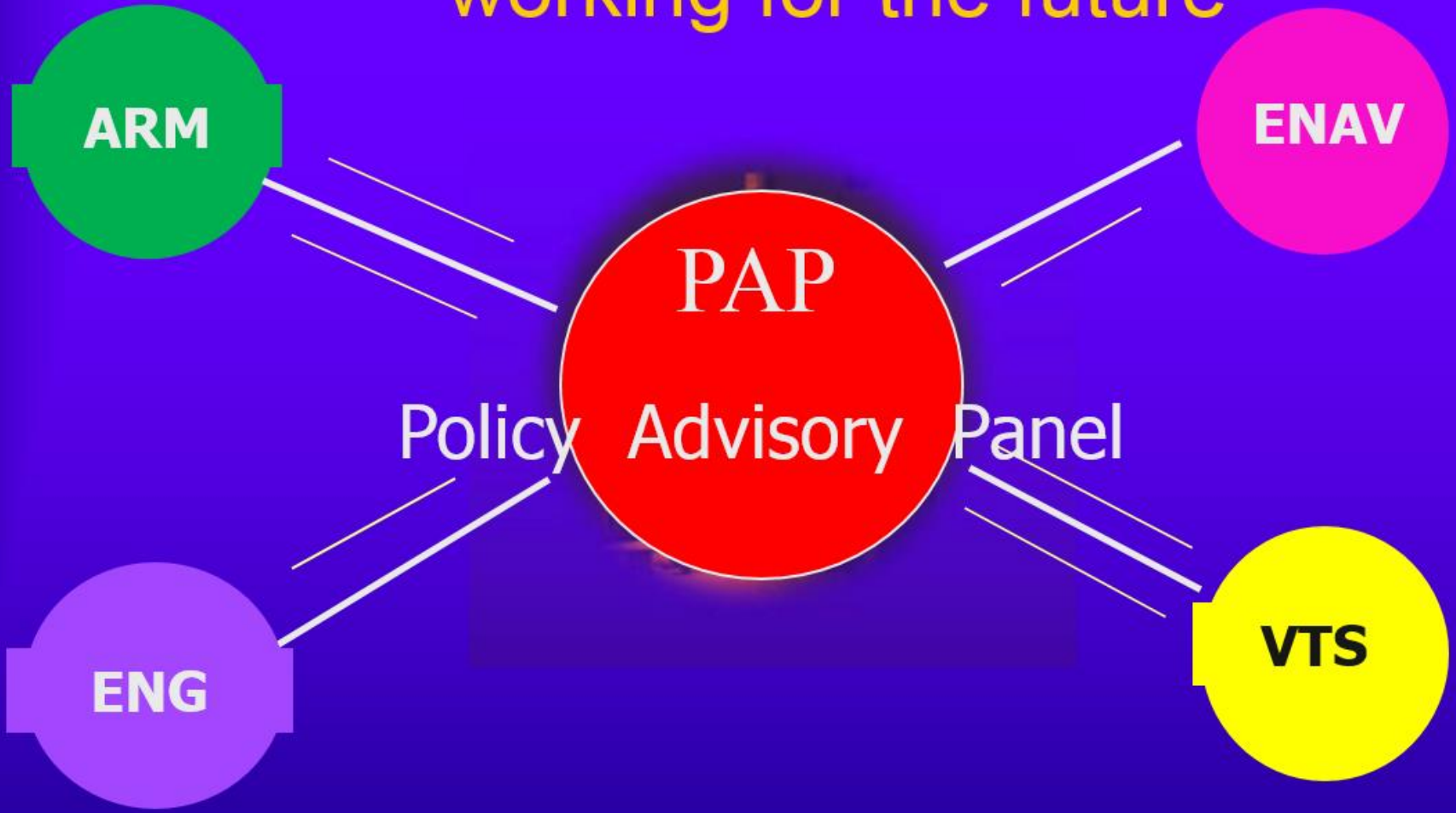
… provides a forum to share expertise

IALA AISM

The IALA 'Toolbox'



IALA Committees working for the future



Providing guidance …

IALA Documentation

- Recommendations
- Guidelines
- Manuals

IALA AISM

Terms of Reference for the

ENAV Services

Technical Working Group (WG4)

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.

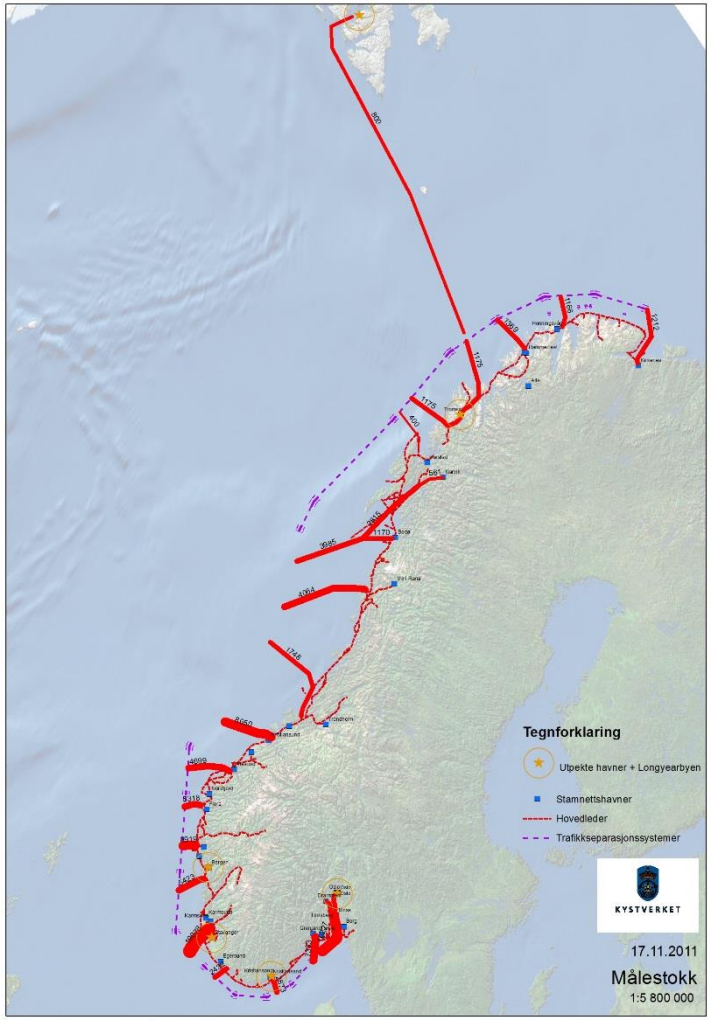
Topics and activities

- 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.

Norwegian e-navigation strategy



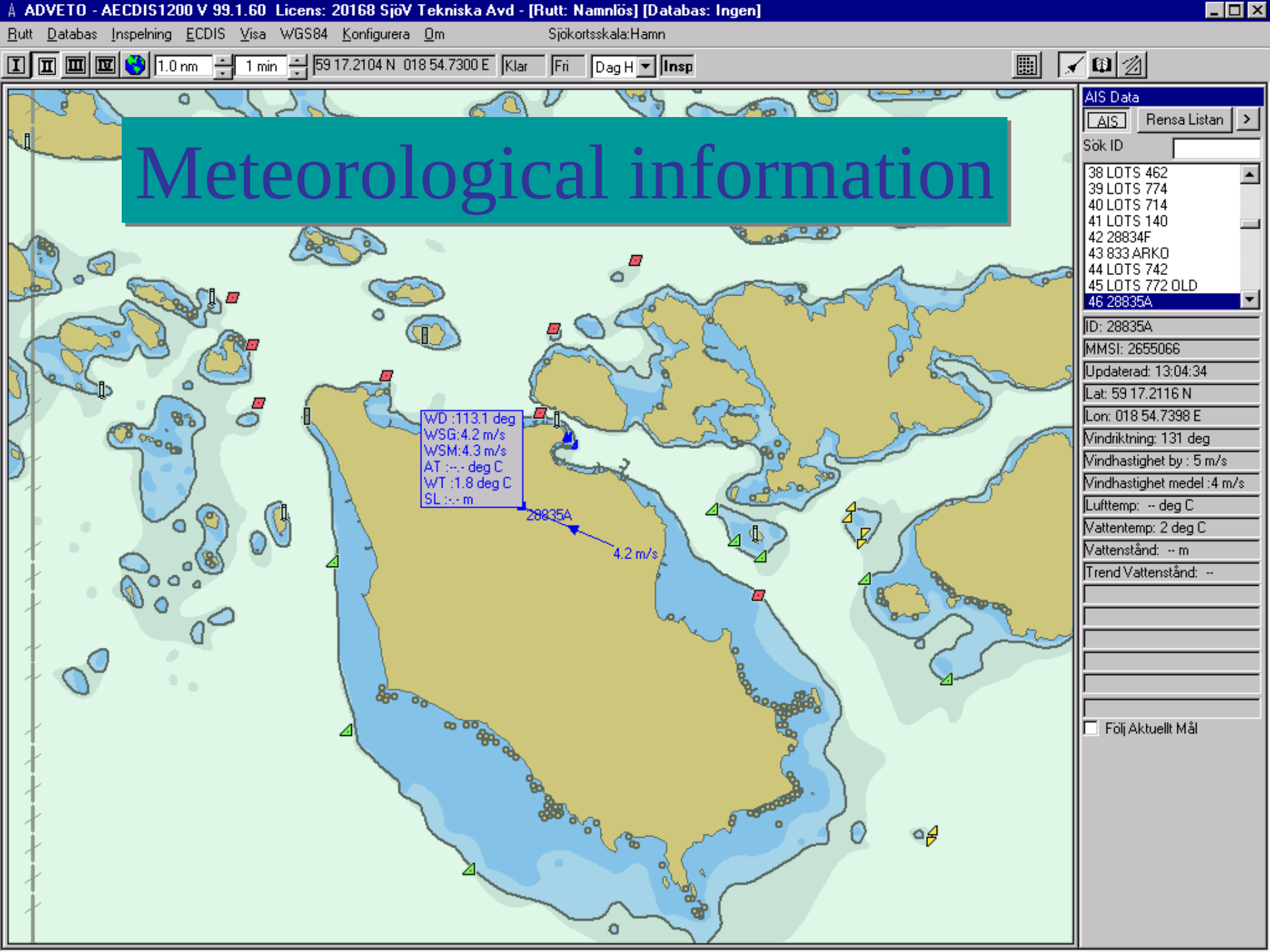
MSI

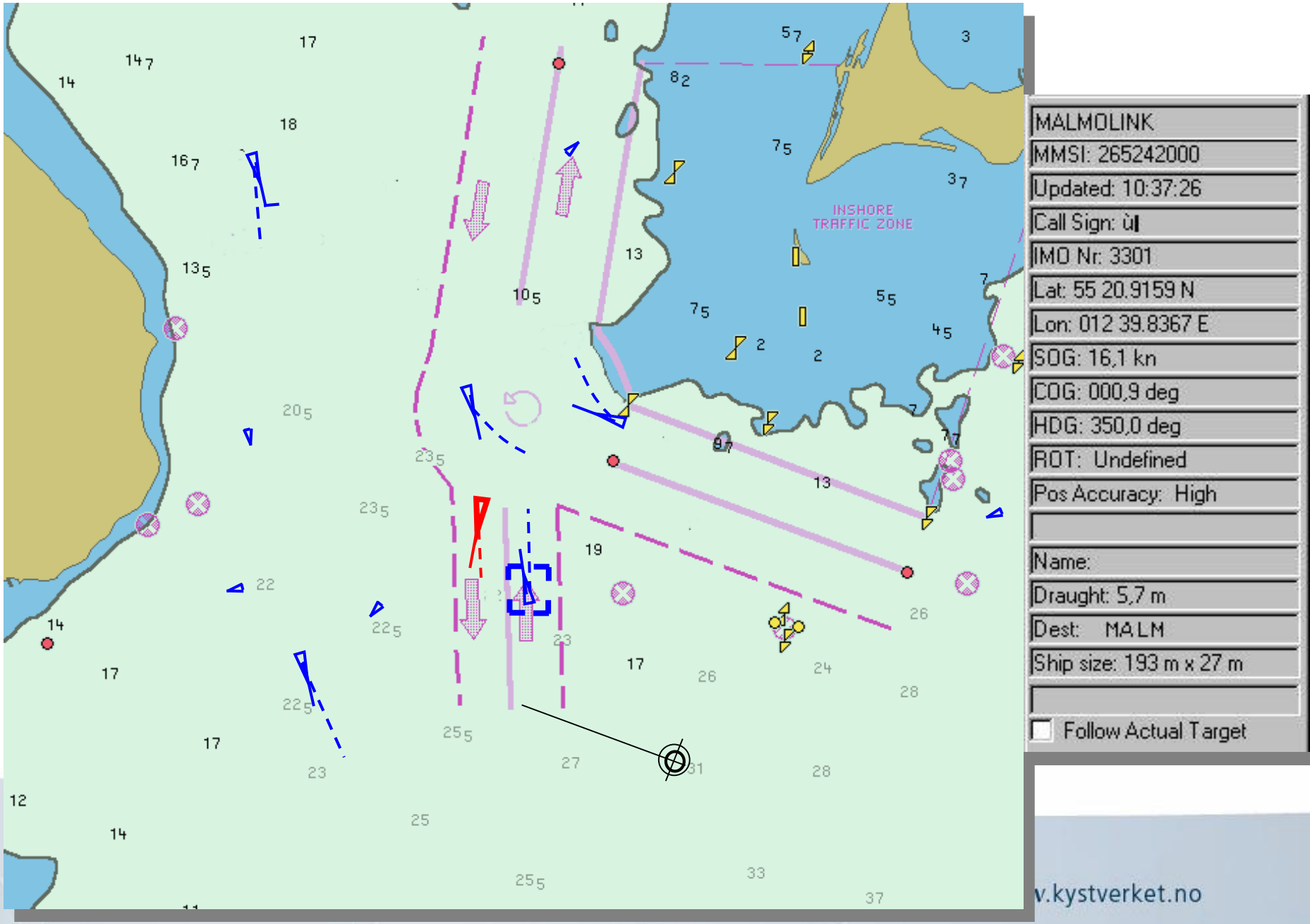
NTM

port

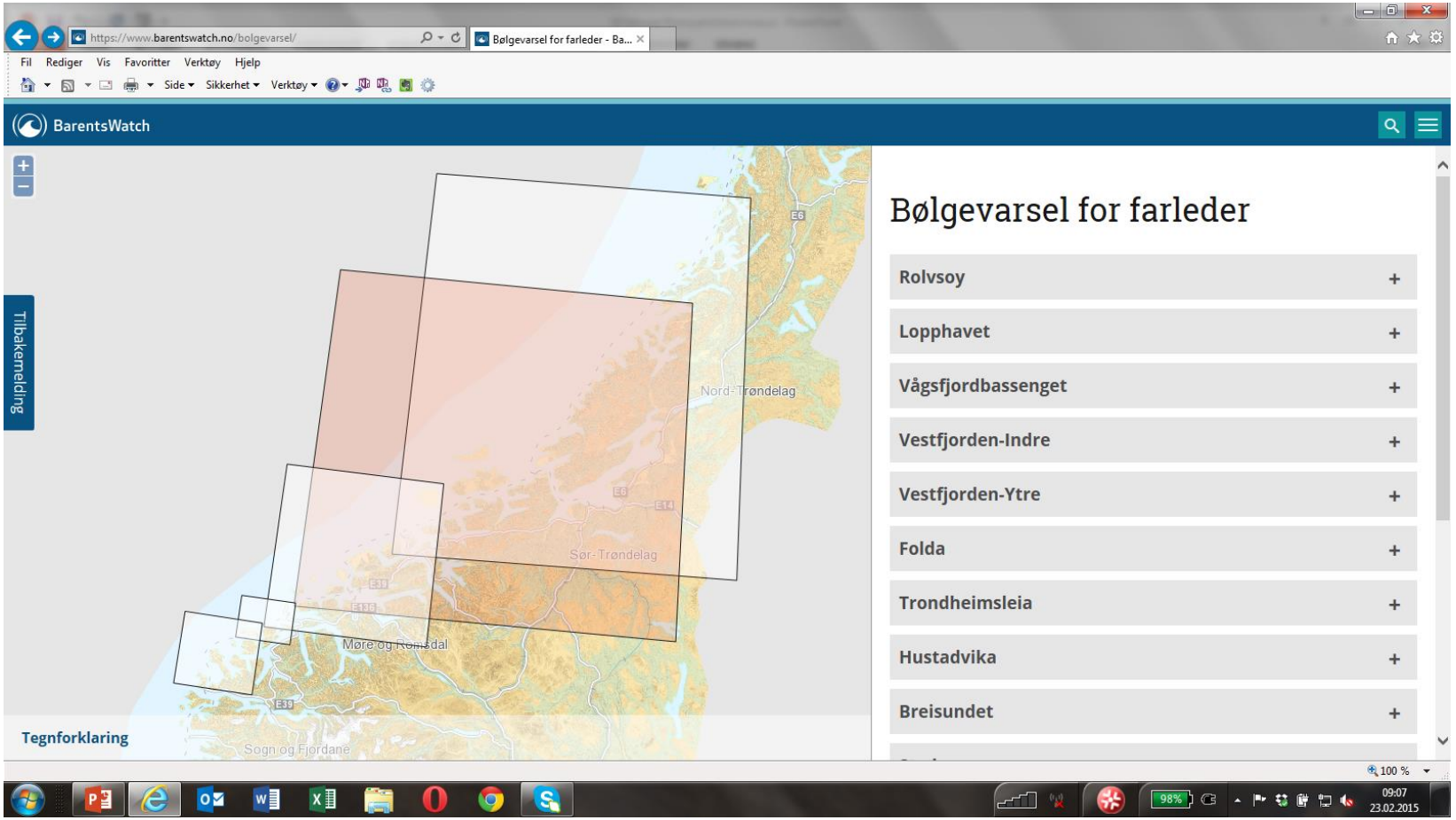
Single Window

- ✓ 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.

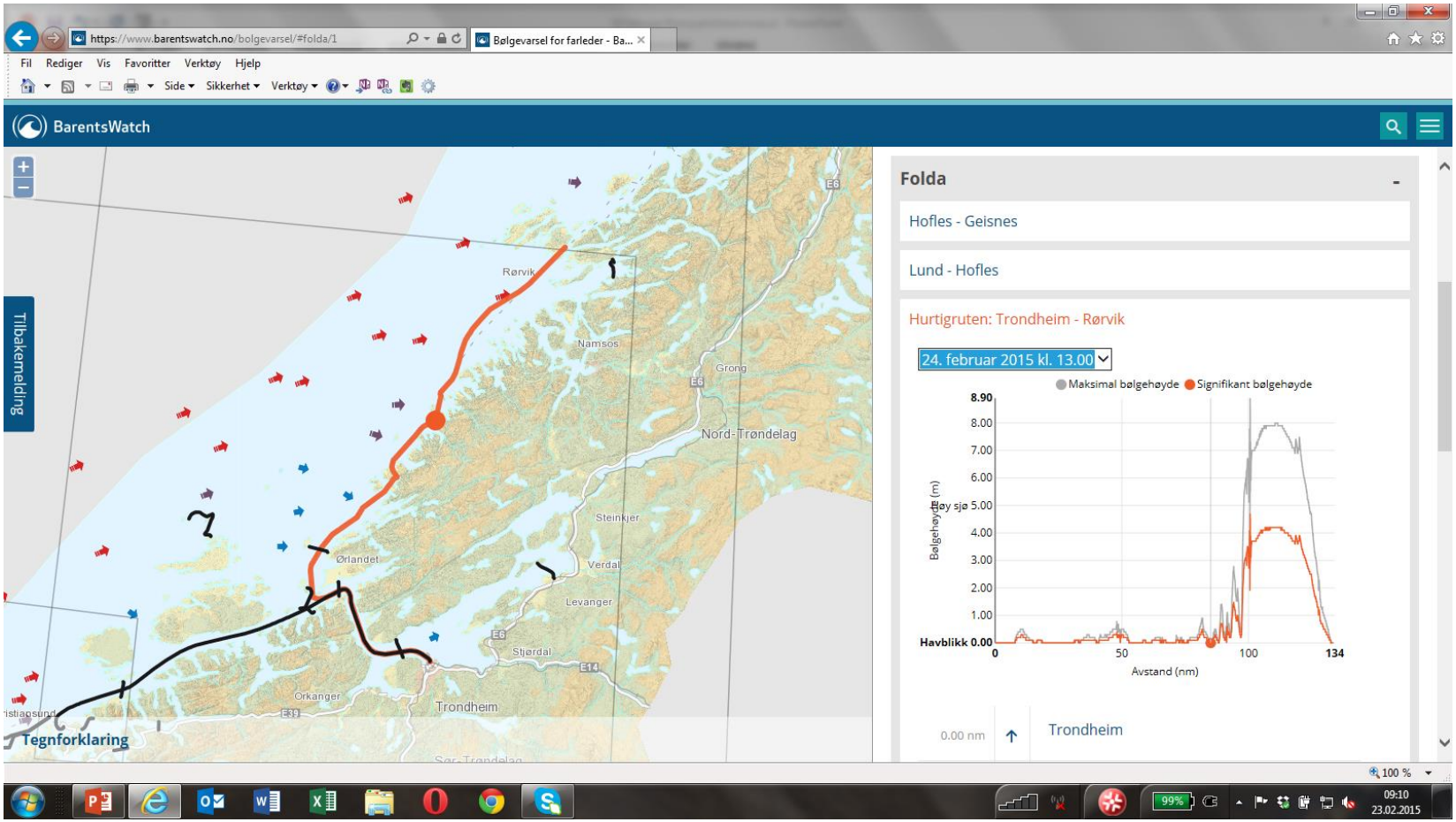

ADVETO - AECDIS1200 V 99.1.60 Licens: 20168 SjöV Tekniska Avd - [Rutt: Namnlös] [Databas: Ingen]
Rutt Databas Inspelning ECDIS Visa WGS84 Konfigurera Om
Sjökortsskala:Hamn
1.0 nm
1 min
59 17.2104 N 018 54.7300 E
Klar
Fri
Dag H
Insp
Meteorological information
AIS Data
AIS
Rensa Listan
Sök ID
38 LOTS 462
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
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



Wave forecast



Wave forecast



Arctic Shipping Route

From **Rotterdam to Yokohama:**
7,136 nm via Northern Sea Route; 11,548 nm via Suez Canal.

From **Rotterdam to Shanghai**:
7,874 nm via Northern Sea Route; 10,793 nm via Suez Canal.

From **Rotterdam to Singapore:**
9,919 nm via Northern Sea Route; 18, 664 nm via Suez Canal.

From **Shanghai to Hamburg:**
5,200 kilometers shorter via the Arctic than via the Suez Canal

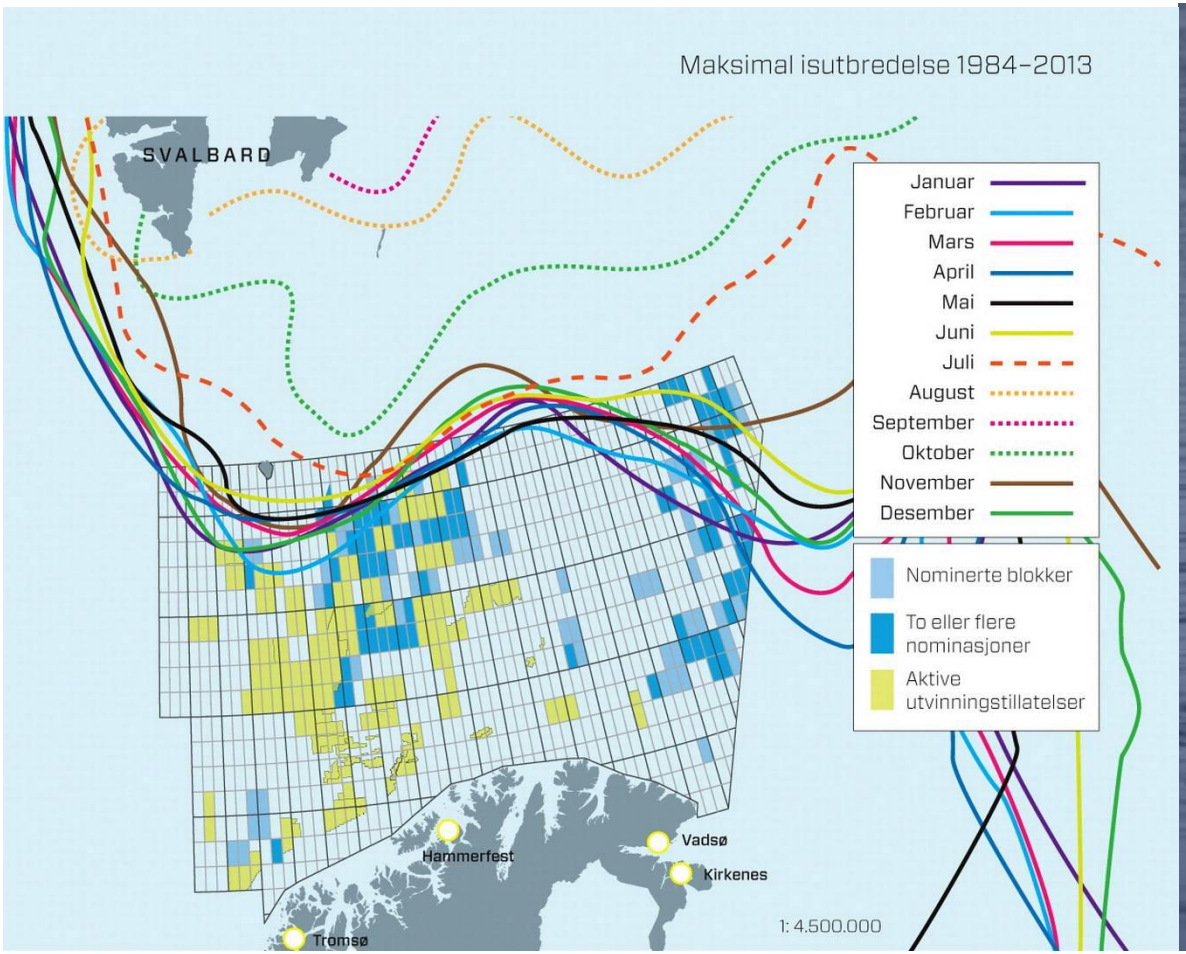
From **London to Japan:**
7,400 km shorter via the North East passage than the Suez route.

Malte Humpert and Andreas Raspotnik:The Future of Arctic Shipping Along the Transpolar Sea Route

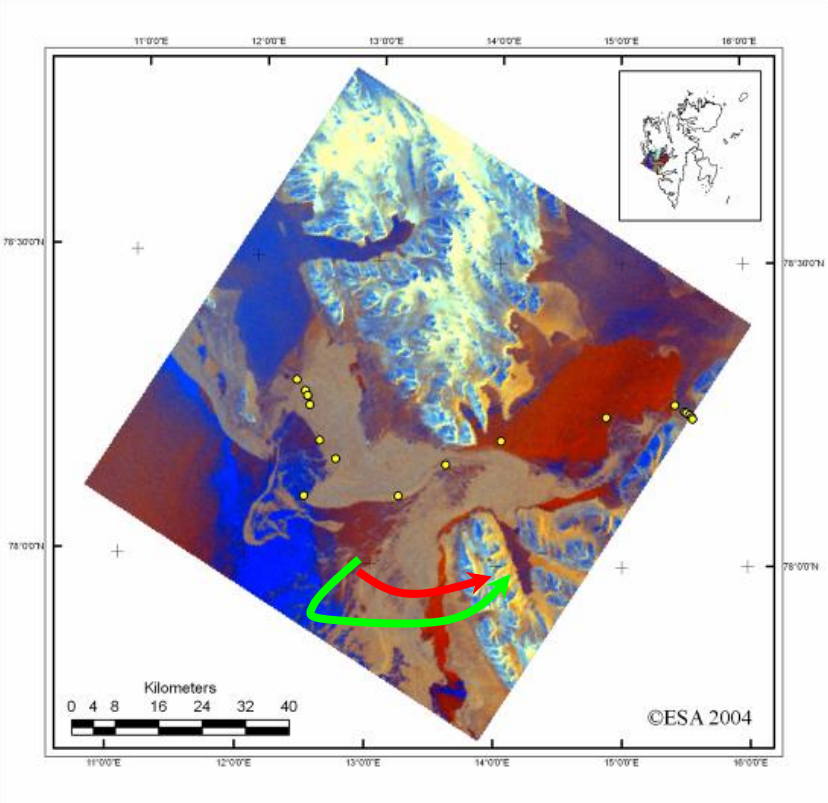
Port of Origin	Port of Destination	Distance in nautical miles		Days at see at 17 knots		Distance savings in %
		via Suez Canal	via TSR	Via Suez Canal	Via TSR	
Tokyo	Rotterdam	11,192	6,600	27.4	16.1	-41
Shanghai	Rotterdam	10,525	7,200	25.8	17.6	-32
Hong-Kong	Rotterdam	9,748	8,000	23.9	19.6	-18
Singapore	Rotterdam	8,288	9,300	20.3	22.7	+12

KYSTVERKET

www.kystverket.no


Maksimal isutbredelse 1984–2013
SVALBARD
Januar
Februar
Mars
April
Mai
Juni
Juli
August
September
Oktober
November
Desember
Nominerte blokker
To eller flere nominasjoner
Aktive utvinningstillatelser
Hammerfest
Vadsø
Kirkenes
Tromsø
1: 4.500.000

Ship routing in ice waters reduces fuel, emissions and risks



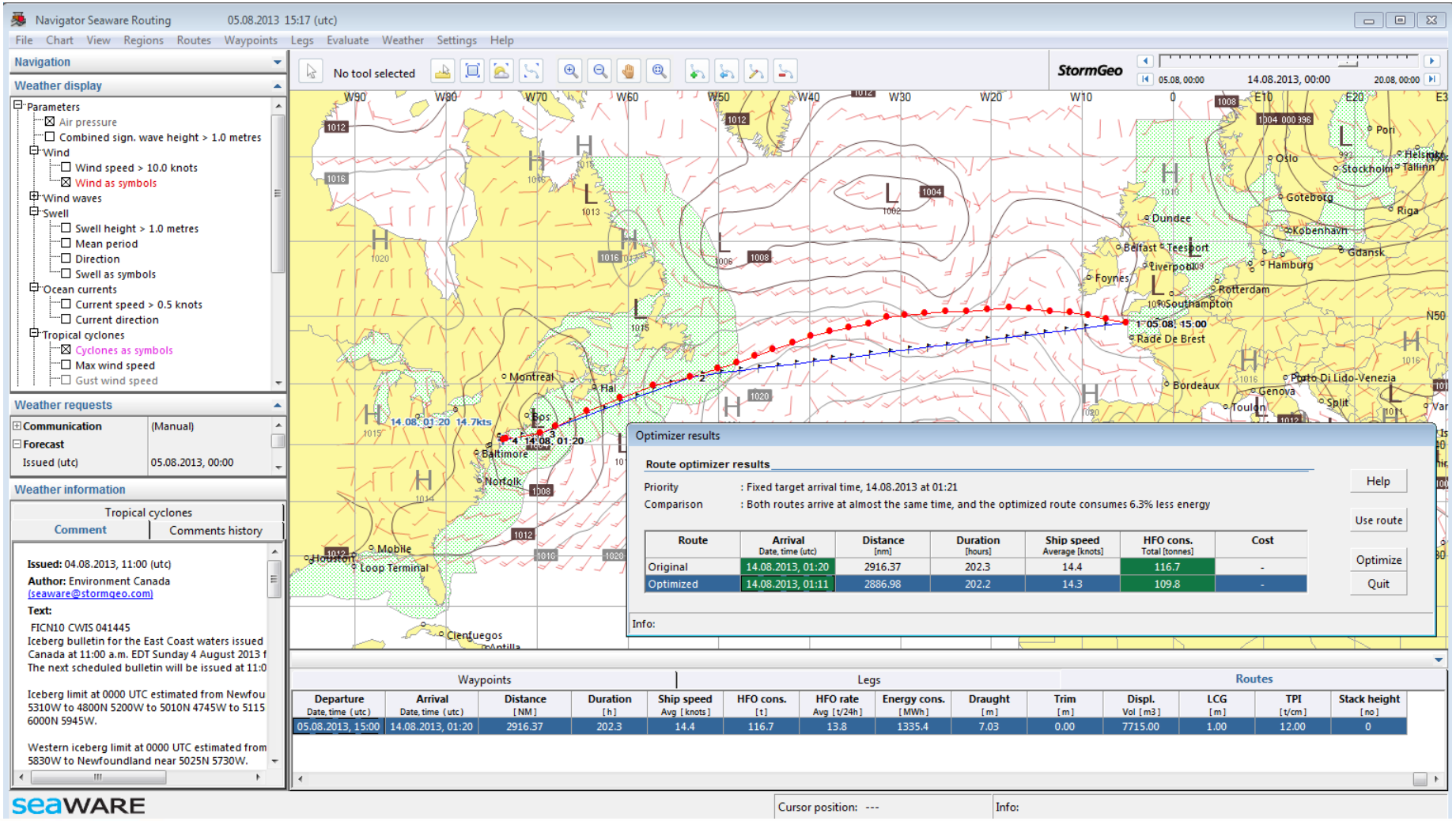
Planned route through the ice
6 hours
Actual route around the ice
3 hours

Special conditions

Extreme weather
Extreme climate
Important and vulnerable environment
Ice
Icing
Darkness

Remote area
Reduced communication
Reduced service
Restricted navigational
Restricted rescue

Fuel saving about 6 %



KYSTVERKET

www.kystverket.no

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

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)

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 (CMDS); and consequently
- The overarching e-navigation architecture;

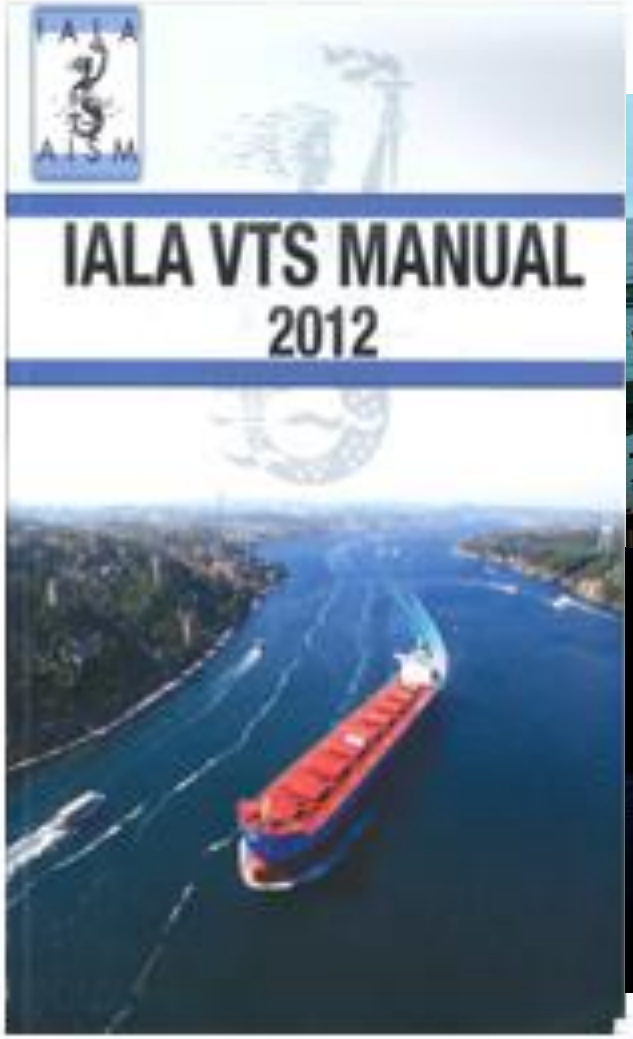
IHO S-100 data structure

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.

Test bed on IHO S-100

- NCA, in co-operation with MPA, held a workshop in Singapore to demonstrate the use of the S-100 framework data standard and to consider potential synergies between e-navigation and the Marine Electronic Highway (MEH) project in the Straits of Malacca and Singapore.
- The results showed the suitability of the IHO S-100 data structure for e-navigation information


IALA VTS MANUAL
2012

Publications relatet 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 relatet 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 Manual on Codes - International Codes, Volume I.1: part A-Alphanumeric Codes	306
		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

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

JOINT IHO/IMO/WMO

MANUAL ON MARITIME SAFETY INFORMATION (MSI)

					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	Lightouses, Beacons, Light vessels	Unlit						
		Light Unreliable						
		Damaged						
		Destroyed						
		Racon Inoperative						
		Changed to flash three 2(Seconds 14 metres 16 m es						
		Temporarily changes to c ick yellow 12 miles						
		Moved 0.3 miles north to 3- 14.18N 022-15.6E						
		Re-established						
		Permanently discontinued						
		Temporarily removed						
	Buoy, Lanbys, Superbuoys	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	From sensor - Text / GRIB GRIdded Binary format				
	Visibility	visibility grade					
	Weather (e.g.fog, rain, snow)						
	Dew point						
	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		IMO binary				
	Real-time water level / depth						
	Tide current						
	Swell	Sea and swell conditions in the affected area;					
	swell (height & direction)						
	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						

Thank you