

**Zdzisław Kopacz , Waclaw Morgaś, Józef Urbański
Naval University in Gdynia**

MARITIME-NAVIGATION ENVIRONMENT'S INFORMATION AND ITS PROVIDING BY THE OPERATIONAL INSTITUTIONS OF THE MARITIME SAFETY SYSTEM

ABSTRACT In this paper, the maritime–navigation–environment’s information, as the constituting part, of the maritime navigational information has been presented. There are also presented the forms and ways of provision of the users of sea with this kind of information as well as main information’s providers and information’s services rendered by them. This paper takes into consideration all being-in-force basic resolutions of the International Maritime Organization (IMO) regarding the organization and operation of maritime-navigation–information’s services providing the users of sea with the navigation–environment’s information. The issues discussed in this paper may and should be considered as the continuation of the earlier authors’ works regarding the navigational information, its gathering, processing and use.

INTRODUCTION

Maritime-navigation–environment’s information and proper providing all users of sea with such information is one of the main task of the operational institutions of the Maritime Safety System, but especially, the operational institutions of the Safety and Security of Life and Property System, Comprehensive, update and timely received maritime-navigation–environment’s information is the basic condition not only of safe conduct the ships at sea but also the basic condition of safe and efficient operation of the ships at sea as well as safe and efficient realization of all kinds of human activities being performed at sea.

Below, the following issues are being presented:

- place of the operational institutions of Maritime Safety System providing the maritime navigation–environment’s information,
- maritime navigation environment’s information, its kinds and features,

- forms of presentation and ways of provision of the maritime–navigation–environment’s information,
- main providers and provision of seafarers with maritime-navigation–environment’s information.

PLACE OF THE OPERATIONAL INSTITUTIONS OF THE MARITIME SAFETY SYSTEM PROVIDING THE MARITIME-NAVIGATION-ENVIRONMENT’S INFORMATION

Maritime-navigation-environment’s information is generated, i.e. being produced (gathered, processed and provided) by the operational institutions of the Maritime Safety System, but especially, by the operational institutions of the Safety and Security of Life and Property System.

The Maritime Safety System is one of the three basic maritime systems (Fig.1) [26], [27], [33], [34].

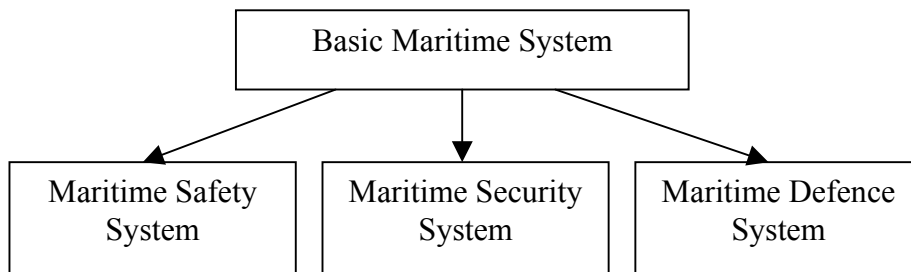


Fig. 1. Basic Maritime Systems.

Component systems constituting the Maritime Safety System are shown in Fig. 2.

Maritime Safety Systems				
Ports and Harbours Safety and Security Systems	Safety and Security of Life and Property System	Protection of Pollution of Marine Environment System	Sea Resources Protection System	Costal Zone Managemet System

Fig. 2. Component systems constituting the Maritime Safety System.

Component systems constituting the Safety and Security of Life and Property system are shown in Fig. 3.

Safety and Security of Life and Property System

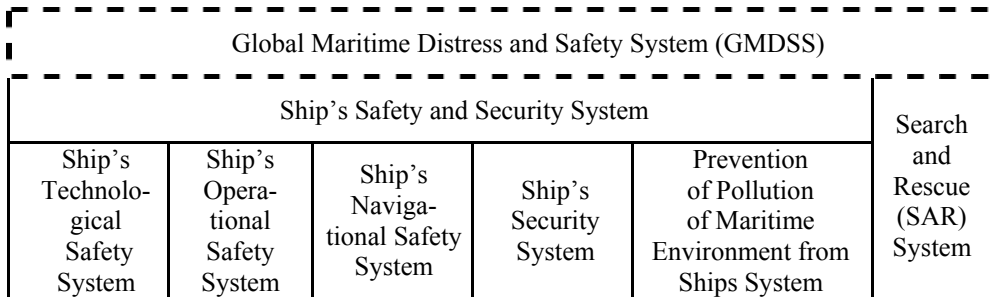


Fig. 3. Component systems constituting the Safety and Security of Life and Property System.

In Fig. 4, there are shown the operational institutions of the Maritime Safety System (of the Safety and Security of Life and Property System) providing the users of sea with the maritime-navigation-environment's information.

MARITIME-NAVIGATION-ENVIRONMENT'S INFORMATION, ITS KINDS AND FEATURES

The term "information" is understood here as "facts, figures, data, learning, lore that describe and express the state, features and relations of objects and phenomena existing in the real world, and from which the conclusions can be inferred" [43].

Navigational information is this part of the whole set of information which describes navigational characteristics and features of the ships; their geographical environment; Maritime Safety System; ships' traffic as well as the process and procedures of safe conduct the ships at sea and efficient realization of their tasks".

Each element of information (datum) can be expressed as follows:

$$\text{datum} = \text{obj} \wedge \text{attr} \wedge \text{valu} \wedge \text{lalo} \wedge \text{time} \tag{0}$$

where "obj" is the object class (type of information), "attr" is attribute of information (characteristic of information), "valu" is the value of attribute, "lalo" are coordinates of elementary information (latitude, longitude and height), and "time" is the datum-acquisition's time.

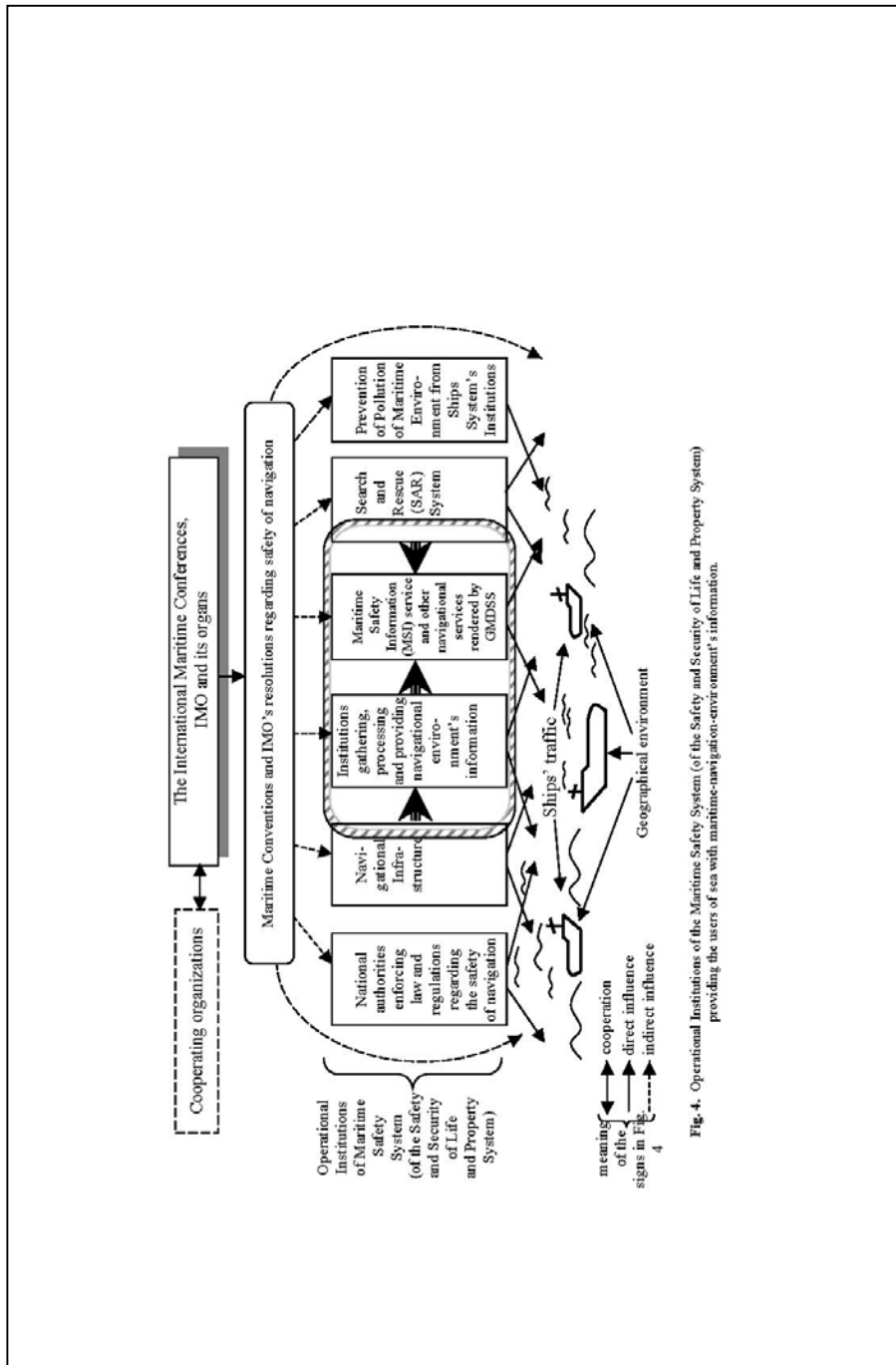


Fig. 4. Operational Institutions of the Maritime Safety System (of the Safety and Security of Life and Property System) providing the users of sea with maritime-navigation-environment's information.

Geographical information, in contradiction to other kinds of information, must always contain the component: "lalo". This kind of information contains also the component: "time".

Information which changes very slowly during the time period, is practically time-independent information. In such case it is assumed that component: time = 0.

Information which changes in time-period rapidly or very rapidly (e.g. weather information, traffic information, etc.) is time-dependent information. In such case, the component: time = t_i .

Maritime-navigation-environment's information is one of the component part of navigational information. In Fig. 5, there is shown the place of the maritime-navigation-environment's information among the other kinds of navigational information.

Taking into account the Fig. 5, the whole set of maritime navigational information [Mnin] can be expresses as follows:

$$[Mnin] = [Ship, Mnei, Npin] \quad (1)$$

where [Ship] stands for information describing the ships' navigational characteristics and properties; [Mnei] stands for maritime-navigation-environment's information and [Npin] stands for the navigation process (and procedures) information.

Below, only the maritime-navigation-environment's information has been discussed and described.

Information describing the ships' navigational characteristics and properties [Ship] and information describing the navigation process and procedures [Npin] have been described in [12], [13], [31], [38].

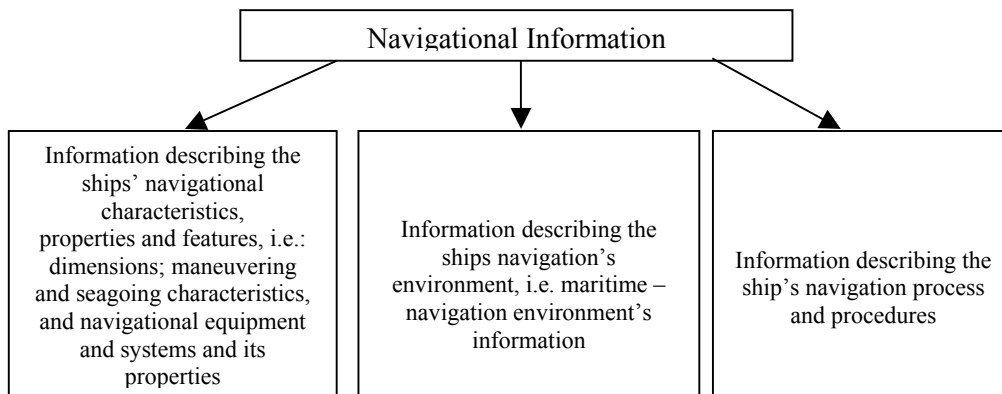


Fig. 5. The maritime-navigation-environment's information, as the component part of the whole set of navigational information.

Maritime–navigation–environment contains three component kinds of environments [30]:

- geographic environment,
- operational environment,
- legal environment.

Therefore, the maritime-navigation–environment’s information can be expressed as follows:

$$[\text{Mnei}] = [\text{Gein}, \text{Oper}, \text{Lega}] \quad (2)$$

where: Mnei = maritime–navigation environment’s information,

Gein = geographic environment’s information,

Oper = operational environment’s information.

Lega = legal environment’s information.

In Fig. 6, there are shown the component parts of the maritime–navigation–environment’s information:

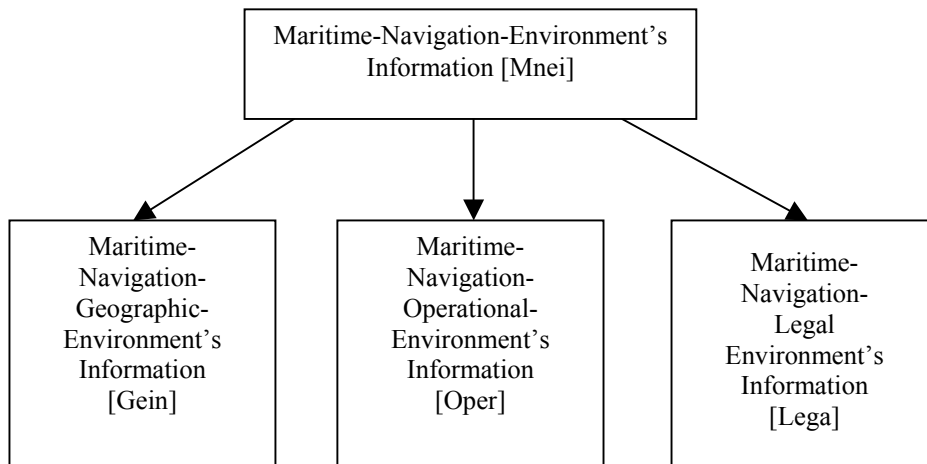


Fig. 6. The component parts of the maritime–navigation–environment’s information.

Maritime–navigation–environment’s information [Mnei] can be divided into two main parts, i.e.:

- standard environmental information [Stej],
- special environmental information [Spei].

Standard environmental information [Stej] is the basic kind of information. It is this kind of information which is necessary for ensuring the safe conduct the ships at sea.

Special environmental information [Spei] is the additional information in relation to the standard information which is necessary for ensuring the efficient realization of ships' special tasks at sea. Special ships' tasks, or non-navigational tasks, are such tasks whose realization process and procedures need the additional information (towards standard information), i.e. special environmental information.

The above can be expressed as follows:

$$[Mnei] = [Stei, Spei] \quad (3)$$

The expression (3) regards all component parts of environmental information. Therefore, the geographic environment's can be expressed as follows:

$$[Gein] = [Stgi, Spgi] \quad (4)$$

where [Stgi] and [Spgi] stand respectively for standard geographic environment's and special geographic environment's information.

Below, only the standard geographic information [Stgi] is being discussed and presented. Whereas special geographic information is described in detail in [4], [5], [24], [40] and [41].

Geographic environment's information [Gein] consist of the following kinds of information:

- hydrometeorological information [Hrol],
- hydrographic information [Hgra],
- navigation-infrastructure information [Infr],
- maritime safety information [Msin],
- weather forecast information [Wefo].

the above can be expressed as follows:

$$[Gein] = [Hrol, Hgra, Infr, Msin, Wefo] \quad (5)$$

Taking into account the sources of information's acquisition and information's dependence on time, the above equation can be expressed as follows [17], [20], [22], [42].

$$[Gein] = [Char, Msin, Wefo] \quad (6)$$

where:

$$[Char] = [Hrol, Hgra, Infr] \quad (7)$$

The set of hydrometeorological information [Hrol] can be expressed as follows:

$$[Hrol] = [Clim, Ocea] \quad (8)$$

where: [Clim] stands for the average values describing the sea climate; [Ocea] stands for the sea-water characteristics being important for maritime navigation.

The set of the hydrographic information [Hgra] can be expressed as follows:

$$[Hgra] = [Bath, Gemo, Obst, Tide, Curr, Geph, Topo] \quad (9)$$

where: [Bath] stands for bathymetric information (depths, isobaths, etc.), [Gemo] stands for geomorphologic information (kinds of bottom grounds, bottom structure, bottom layers, etc.); [Obst] stands for ships' wrecks and other kinds of fixed obstacles; [Tide] stands for sea-tides parameters; [Geph] stands for geophysical parameters (variation and other magnetic, electric and gravity parameters, if needed) and [Topo] stands for topographical elements and features of importance for maritime navigation.

The set of the navigation-infrastructure information [Infr] can be expressed as follows [27]:

$$[Infr] = [Ways, Aids, Traf] \quad (10)$$

where: [Ways] stands for characteristics of seaways and maneuvering areas (fairways, traffic separation schemes, artificial canals anchorages, passing areas, etc.); [Aids] stands for characteristics of aids to navigation (floating and fixed seamarks, land-and space-based electronic position-fixing systems, etc.); [Traf] stands for characteristics of traffic management and navigation-assistance systems (pilot services, ships reporting systems, vessel traffic services automatic identification system, etc.).

The set [Msin] stands for the maritime safety information being providing by the GMDSS system [14]:

$$Msin = [Nawa, Wewa, Sari] \quad (11)$$

where [Nawa] stands for navigational warnings; [Wewa] stands for weather warning and [Sari] stands for search-and-rescue information.

The set [Wefo] stands for long-terms weather forecast information.

The set of the operational information [Oper] includes the following kinds of information:

- management (command) information [Main],
- traffic information [Trin],
- navigation-assistance information [Nain],
- search-and-rescue information [Sari] being a component of [Msin] information (cf. exp. (11),
- port-and-harbour operation's information [Phin],

- weather warnings [Wewa] being a component of [Msin] information (cf. exp. (11)),
- security information [Sein].

The above can be expressed as follows:

$$\text{Oper} = [\text{Main}, \text{Trin}, \text{Nain}, \text{Sari}, \text{Phin}, \text{Wewa}, \text{Sein}] \quad (12)$$

The set of the legal information [Lega] should include:

- basic regulations of the United Nation Convention on Law of Sea (UNCLOS III) regarding territorial waters, prohibited areas, exclusive economic zones, right of the harmless passage, etc. [Uncl];
- regulations regarding the maritime and navigational safety contained in the basic maritime conventions (SOLAS 74, COLREG 72, MARPOL 73/78, STCW 78/95, SAR 79, LL 66, TONNAGE 69, CSC 72, ILO 147 Convention) [Conv],
- IMO's regulations regional (EU Directives, Convention on Protection of the Marine Environment of Baltic Sea area, etc.), national and local regulations regarding the maritime safety [Regu].

The above can be expressed as follows:

$$\text{Lega} = [\text{Uncl}, \text{Conv}, \text{Regu}] \quad (13)$$

Maritime-navigation-environment's information [Mnei] as well as all other kinds of maritime navigation information [Mnin] (cf. exp. (1), (2) and (3)) should fulfill the requirements which demand that this kind of information should be:

- adequate,
- comprehensive,
- timely (received),
- updated, and
- easy to get, store, retrieve, and display in the most suitable form for use in ship's navigation process.

FORMS OF PRESENTATION AND WAYS OF PROVISION OF THE MARITIME-NAVIGATION-ENVIRONMENT'S INFORMATION

There exist three main forms of presentation of navigation environment's information:

- paper-end-product's presentation,
- computer-aided presentation,
- (shipboard) receiver-dependended presentation.

As form of navigation environment's information's presentation called: paper-end-product's presentation, we will mean the form of presentation of the paper charts and all paper nautical publications (lists of lights, sailing directions, radio signals, tide tables, and many other publications).

As form of navigation environment's information presentation called: computer-aided –presentation, we will mean electronic navigational chart (ENC) and nautical publications which are recorded in the form of data bases of these navigational-end-products being visualized on the monitors of ECDIS (electronic chart display and information system).

As form of navigation environment's information' presentation called: (shipboard-receiver-depended–presentation, we mean the form of presentation being the function of shipboard's receivers. It can be vocal information, letter-printed data, facsimile data, and many other forms of presentation. To this groups of presentation also belong NAVTEX, presentation, EGS SafetyNET presentation, etc.

Taking above into consideration, the chart information [Char] (7) can be also presented in the following way:

$$[\text{Char}] = [\text{Nach}, \text{Napu}, \text{Noma}] \quad (14)$$

where: [Nach] stands for paper navigational charts; [Napu] stands for nautical publications (in paper form), and [Noma] stands for Noticed to Marines (also in printed form).

The chart information [Char] 7) can be also presented in the following equivalent form:

$$[\text{Char}] = [\text{Ecdb}, \text{Ecco}] \quad (15)$$

where: [Ecdb] stands for data bases of electronic navigational charts (ENC) and electronic nautical publications. (ENP) and [Ecco] stands for corrections of ENC and ENP.

There exist also three main ways of navigational information provision/distribution:

- of-the-shelf navigation environment-information product's distribution,
- special radio services (NAVTEX, SafetyNET, Radio-Weather Services, and others,
- public means of communication (telephone, telegraph, Internet, etc).

Over the way called: of-the-shelf navigation-information-products' distribution there are distributed (provided) paper navigational charts, nautical publications and Notices to Mariners (in paper form) as well as data bases of ENC, and ENP, and their corrections.

Over the way called: special radio services there are provided the following kinds of information:

- radio weather forecasts [Wefo] (5),
- navigational warnings [Nawa],
- maritime safety information [Msin] (11),
- operational information [Oper] (12), and many other kind of information, as specified in Admiralty Lists of Radio Signals, volumes 1-8.

Over the “public-means-of communication provision”, i.e. over the telephone, telegraph, INTERNET and many other modern means of communication, there are distributed larger and larger amount of the navigation-environment’s information. Especially important are the global digital radio-telephone networks and INTERNET service.

Taking the above into consideration as well as expressions (14) and (15) the set of the geographic environmental information [Gein] (5) can be expressed as follows:

$$[\text{Gein}] = [\text{Nach}, \text{Napu}, \text{Noma}, \text{Msin}, \text{Wefo}] \quad (16)$$

or by the equivalent expression:

$$[\text{Gein}] = [\text{Ecdb}, \text{Ecco}, \text{Msin}, \text{Wefo}] \quad (17)$$

where the names of the particular information sets have been already given above.

In Fig. 7, there are shown the kinds of the geographic environment’s information according to forms of their presentation and ways of their distribution.

Ways of information provision (distribution) / Forms of information presentation	Off-the-shelf products distribution	Special radio services	Public means of communication (telephone, INTERNET, etc)
Paper-end-products' presentation	[Nach] [Napu] [Noma]	[Nama] [Nawa] [Wefo] [Wewa]	[Nach] [Napu] [Noma] [Nawa]
Computer-aided presentation	[Ecdb] [Ecco]	[Ecdb] [Ecco]	[Ecdb] [Ecco]
Receiver-depended presentation	-	[Msin] [Wefo] [Wewa] [Nawa] and many others	[Wefo] [Wewa] [Nawa] [Sari]]

[Nach] – paper navigational charts,
[Napu] – nautical publications in paper form,
[Noma] – Notices to Marines,
[Nawa] – navigational warnings, according to WWNWS,
[Ecdb] – data bases of ENC and ENP,
[Ecco] – corrections of ENC and ENP,
[Msin] – maritime safety information according to NAVTEX and EGC SafetyNET,
[Wefo] – weather forecasts,
[Wewa] – weather (storm) warnings,
[Sari] – search and rescue information.

Fig. 7. Kinds of geographic environmental information [Gein] according to forms of presentations and ways of provision/ distribution.

MAIN PROVIDERS AND PROVISION OF SEAFARERS WITH MARITIME-NAVIGATION ENVIRONMENT'S INFORMATION

Main Providers Of Geographic Environmental Information

There are three main providers of navigational, especially geographic environment's information [Gein] (5), by Maritime Safety System which provides the seafarers and other users of sea with navigational information. They are:

- National Hydrographic Offices,
- National Meteorological Offices,
- National Rescue Co-ordination Centers.

There are also some additional institution as International Ice Patrol and others. The main providers of environmental information are National Hydrographic Offices. These offices exist almost for 300 years and provide the seafarers with charts and nautical publications. The SOLAS 74 Convention for many years required the ships to possess and use updated charts and nautical publications, In spite of these facts, only the new draft of chapter V (Safety and Navigation) of SOLAS 74 Convention (entered into force on 1.07.2002) established the regulation (Regulation 9 of Chapter V) which imposed an obligation on Hydrographic Offices: "... to arrange for the collection and compilation of hydrographic data and the publications and keeping up to date of all nautical information necessary for safe navigation".

The above mentioned Regulation 9 (Ch.V SOLAS 74 Convention) obligates the Hydrographic Offices:

- to prepare and issue nautical charts, sailing directions, lists of lights, tide tables and other publications, where applicable, satisfying the needs of safe navigation,
- to promulgate notices to mariners in order that nautical charts and publications are kept, as far as possible, up to date.

The additional duties of National Hydrographic Offices regarding the navigational information result from IMO's resolutions, but especially:

- resolution A.706 (17) on World-Wide Navigational Warning Services, as amended.

The duties of National Hydrographic Offices as well as other main providers of environmental information [Gein] (5) result also from Chapter IV (Radiocommunications) of SOLAS 74 Convention, which defines the basis for organization and operation of GMDSS system. By coastal, space and shipboard radio-means of this System the maritime safety information [Msin] is being promulgated.

The cooperation principles of IMO and main navigation-information providers are contained in the JOINT IMO/IHO/WMO Manual on Maritime Safety Information (MSI), issued as Special Publication-Appendix 1, by International Hydrographic Bureau in Monaco.

It should be mentioned that the term "National Hydrographic Offices" means the authorized by government institutions which realize the duties of Hydrographic Offices defined by Regulation 9 of Chapter of SOLAS 74 Convention. Such institutions may be also the following:

- Oceanographic Offices,
- Navigational Offices,
- Navigation-Safety Department of Maritime Board (Maritime Administration),
- Coast Guards, etc.

The duties of National Meteorological Offices regarding the geographic environmental information [Gein] (5) result from Regulation 5 (Meteorological services and warnings) of chapter V SOLAS 74 Convention. These services are also precisely specified in Admiralty List of Radio Signals vol.1 (Coast Radio Stations-Public Correspondence), Vol.3 (Radio Weather Services and Navigational Warnings) and Vol. 5 (Global Maritime Distress and Safety System). The details on marine meteorological services are also given in Manual on Marine Meteorological Services, Volumes i and II, published by the World Meteorological Organization in

Geneva. Besides the standard weather forecasts [Wefo] and weather (storm) warnings [Wewa], there are also available the very most comprehensive weather information in graphic forms, including weather-facsimiles, and other forms of presentation.

The duties of Rescue Coordination Centers regarding the set of information [Sari] being the component of the set of maritime safety information [Msin] (11) result from the following legal acts:

- International Convention on Maritime Search and Rescue, 1979 (SAR 79), as amended,
- Chapter IV (Radiocommunications) of SOLAS 74 Convention which has established the GNDSS system.

The operational particulars regarding the National and Regional Rescue Coordination Centers are contained in Admiralty List of Radio Signals Volume 5 (Global Maritime Distress and Safety System).

In Fig. 8, there are shown the main providers of geographic environmental information [Gein] (5) and scopes of their responsibilities.

Names of providers of environmental information	Kinds of environmental information			
National Hydrographic Offices	[Nach] ¹ [Napu] [Noma]	[[Ecdb] [Ecco]	[Newa]	[Main] ²
National Meteorological Offices	[Wefo]	[Wewa]	-	[Msin] ²
National and Regional Coordination Centres	Circulation of SAR System's information by the means of GMDSS equipment and systems			[Msin] ²

- 1) Names of the particular kinds of environmental information are given in Fig. 7.
- 2) Proper components of [Msin] information, i.e. [Nawa], [Wewa], and [Sari].

Fig. 8. The main providers of geographic environmental information [Gein] (6) and kinds of provided information.

Provision of Navigational Warnings

Navigational warnings are being promulgated in the World-Wide Navigational Warning Service (WWNWS) established by the Resolution A.706 (17) (1991) on this service. The main principles of operation this service, besides the above mentioned resolution, are contained in, also already mentioned: IHO/IMO WORLD WIDE NAVIGATIONAL WARNING SERVICE GUIDANCE

DOKUMENT, Special Publication No.53. Published by the IHB in Monaco, 1998, as amended. According to this document:

All the world's, navigable waters are divided into 16 NAVAREAs. Each NAVAREA is divided into Sub-areas or Regions. Region includes one or a few national waters' areas. For example, Baltic Sea is Sub-area of NAVAREA i (Fig. 9).

Each NAVAREA, Sub-area, Region and national waters area has its co-ordinator. For example, the co-ordinator of NAVAREA i to which belongs Baltic-Sea Sub-area, is United Kingdom (The Hydrographer of the Navy of United Kingdom Hydrographic Office). The co-ordinator of Sub-area of Baltic Sea is Sweden (Head of Sweden Hydrographic Office). One of national-co-ordinators in each Region is appointed the Region co-ordinator.

Each Region can be divided into Subregions being served by one coastal radiostations.

There are estimated three kinds of navigational warnings:

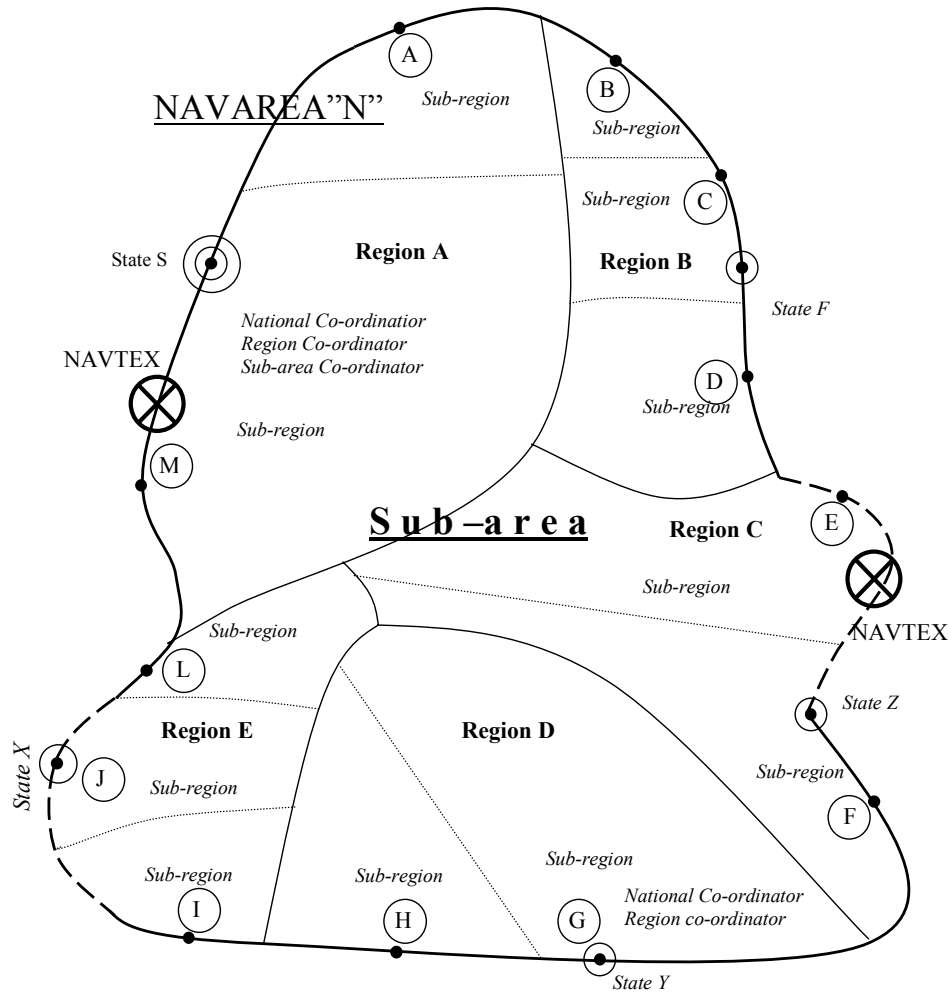
- NAVAREA warnings,
- Coastal warnings,
- Local warnings.

The NAVAREA warnings are warnings coordinated, collated and issued by the NAVAREA Co-ordinator. Their regard, as a rule to ocean-going shipping and to main shipping lines. The above mentioned GUIDANCE DOCUMENT (Special publication No. 53) specifies 13 kinds of warnings. They include lights, buoys, new aids to navigation, drifting mines, obstacles, etc. NAVAREA navigational warnings are promulgated by NAVTEX system or by the International SafetyNET service.

The coastal warnings regard the particular Regions. They are co-ordinated, collated and issued by the Region co-ordinator who is one of Navigational co-ordinator in this Region.

Coastal warnings promulgate information which is necessary for safe navigation within a given region. They should normally provide sufficient information for safe navigation to seaward of fairway buoy or pilot station and not been restricted to main shipping lanes. Coastal warnings are also promulgated by NAVTEX System or in International SafetyNET service.

The local warnings supplement the coastal warnings giving detailed information within inshore waters including the limits of harbour or port jurisdiction areas.



Notation in Fig. 9.

- ⊙ - State "X" / Regional Coordinator/National Coordinator
- ⊛ - State "S" / Sub-area Coordinator/National Coordinator
- ⊙ - Subregional Coordinator
- ⊗ - NAVTEX –NAVTEX Radiostation
- - limits of Regions
- - limits of Subregions

Fig. 9. The illustration of elements of World-Wide Navigational Warning Service (WWNWS).

The NAVAREA warnings are transmitted in English. The coastal warnings are also transmitted in English and national language of national co-ordinator who issues the warnings in given region. Local warnings are transmitted usually in national language. However, they can be also transmitted in English language.

The ships to which the carriage requirements for GMDSS radio equipment do not apply, i.e. the ships below 300 gross tonnage, receive the navigational warnings from coastal radio station specified in Vol. 3 of ALRS (Radio Weather Services and Navigational Warnings).

The broadcast scheduling of navigational warning is given in Vol. 1, 2 and 3 of Admiralty List of Radio Signals, and it must agree with:

- International SafetyNET Manual (IMO Publication 908),
- NAVTEX Manual (IMO Publication 951).

Maritime Safety Information (MSI) Service

Maritime Safety Information (MSI) Service is rendered by the GMDSS system (cf. Fig. 4 and Fig. 10). MSI is defined as “navigational and meteorological warnings, meteorological forecast and other urgent safety related messages” of vital importance to all ships at sea.

There are seven basic categories of MSI within the GMDSS:

- navigational warnings,
- meteorological warnings,
- ice reports,
- search and rescue information,
- meteorological forecast,
- pilot service messages (not in United States),
- electronic navigational systems update messages.

The Maritime Safety Information Service is shown in Fig. 10.

The providers of MSI are:

- National Hydrographic Offices, for navigational warnings and electronic chart correction,
- National Meteorological Offices, for weather warnings and forecasts,
- Rescue Co-ordination centers, for shore-to-ship distress alerts, and other urgent messages,
- International Ice Patrol, for North Atlantic Ice hazards.

The MSI Service is composed of two services:

- International NAVTEX service,
- International SafetyNET service.

For coordination of the transmission of MSI service the world-waters, similarly as in WWNWS, are divided in 16 areas, which in this case are called NAVAREAs/METAREAs.

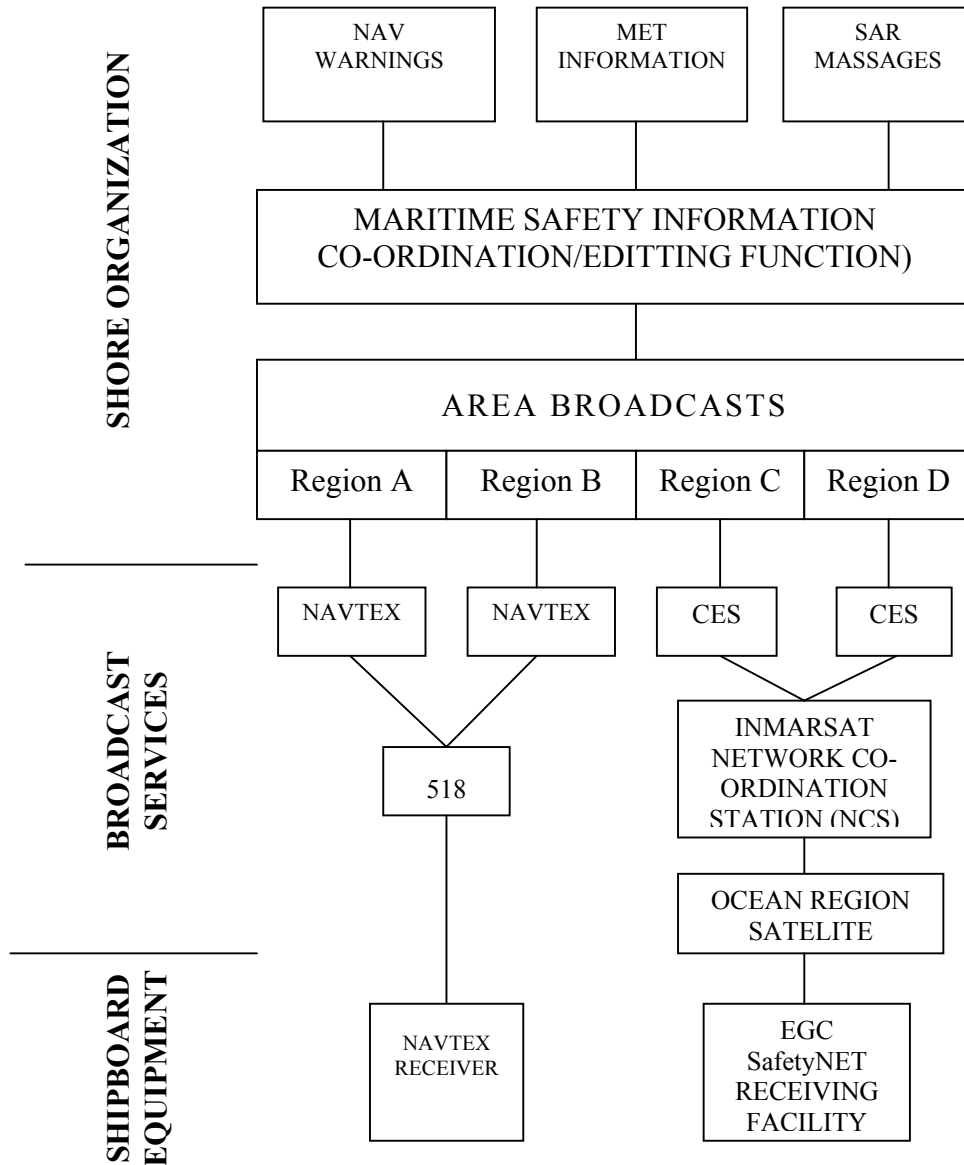


Fig. 10. International Maritime Safety Information Service (Source: IMO A.705(17)).

NAVTEX Service

Navtex means the system for broadcast and automatic reception of maritime safety information by means of narrow-band directed printing telegraphy.

International NAVTEX Service means the co-ordinated broadcast and automatic reception on 518kHz of maritime safety information by means of narrow-band direct-printing telegraphy using the English language, as set out in the NAVTEX Manual (IMO Publication 951).

The concept of International NAVTEX Service is shown in Fig. 11.

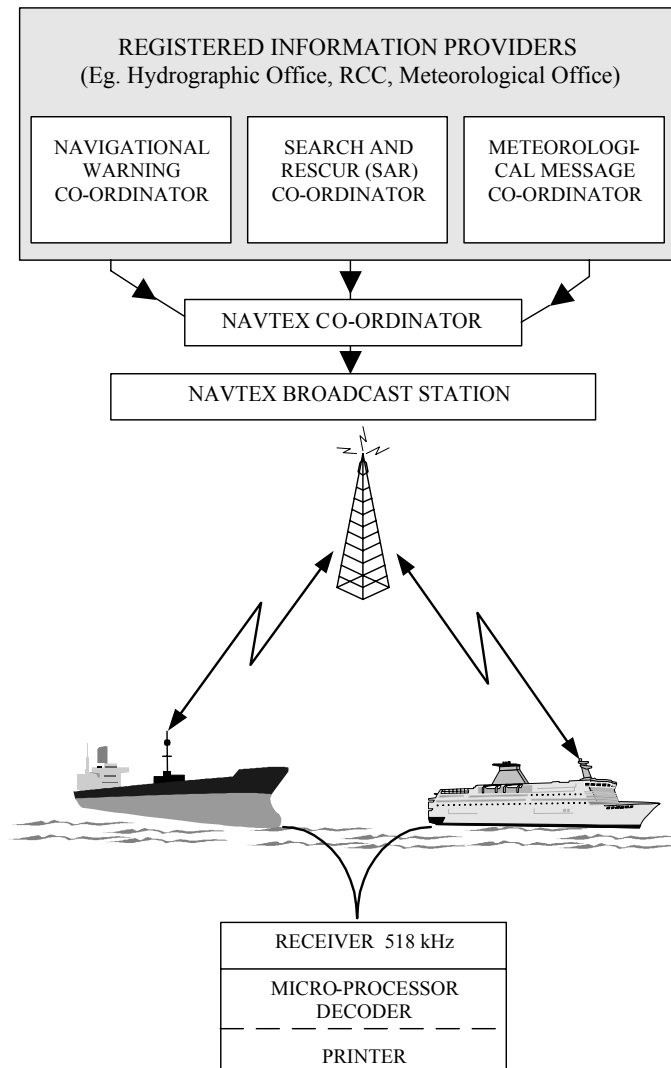


Fig. 11. Structure of the NAVTEX Service (Source: ALRS Volume V).

The International NAVTEX Service covers most of coastal areas. coverage range of particular NAVTEX station amount from 100 n.miles to 400 n.miles and more. The arrangement of NAVTEX stations is specified in ALRS Volume 5.

In Baltic Sea Sub-area such stations are arranged in Sweden (2) and in Estonia (1).

The MSI of coastal warnings broadcast over NAVTEX Services (International and National), contains:

- navigational warnings,
- meteorological warnings,
- ice reports,
- search and rescuer information,
- meteorological forecasts,
- pilot service messages,
- land-based electronic position-fixing system messages,
- SATAN system messages,
- other electronic nav aids messages,
- additional navigational warning.

Besides the International NAVTEX Service, there exist too the National NAVTEX Service. The national NAVTEX Service means the broadcast and automatic reception of maritime safety information by means of narrow-band direct-printing telegraphy using frequencies other than 518kHz and language as decided by the Administrations concerned.

International SafetyNET Service

The International SafetyNET Service means the area-addressable by global broadcast system, provided by Inmarsat, through the geostationary maritime communication satellite network for promulgation of maritime safety information, as set out in the International SafetyNET Manual (IMO Publication 908). The International SafetyNET Service uses the Inmarsat system capability known as “Enhanced Group Call (EGC)”, which enables information-providers to send messages for selective reception by EGC receivers located anywhere in the four Ocean Regions covered by Inmarsat system.

The SafetyNET Service also transmits the MSI to all coastal areas where NAVTEX MSI is not provided.

In Volume 5 ALRS there are specified the particulars about SafetyNET Service for respective NAVAREA/METAREA, as well as for areas not covered by NAVTEX..

The concept of International SafetyNET Service is shown in Fig. 12.

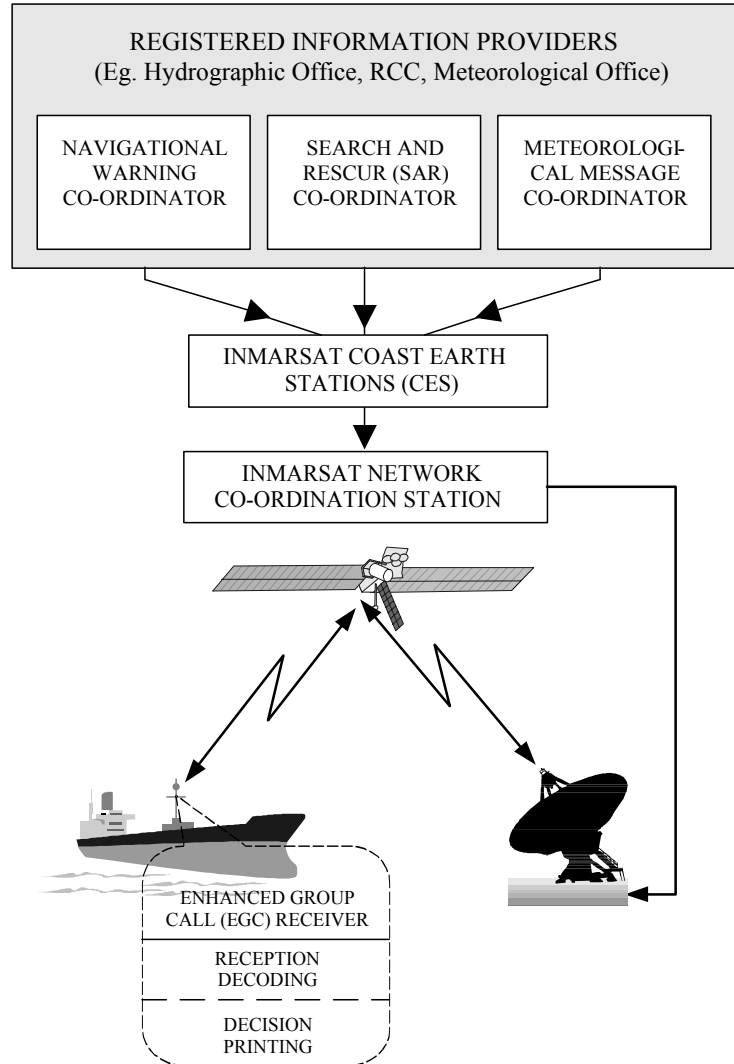


Fig. 12. The SafetyNET Service concept (Source: ALRS Volume 5).

CONCLUSIONS

In this paper, the issues of the maritime-navigation-environment's information have been presented. This kind of information has been more detailed identified and specified, and its place in the whole set of navigation information has been shown. There are also discussed the forms of presentation and ways of provision of navigation's environmental information. Especially, there have been stressed, established by the IMO, maritime-navigation-environment-information's providers and kinds of information's services rendered by them.

This paper should be considered as the presentation of resent authors-study results regarding the navigation information, but especially, maritime-navigation-environment's information.

The authors' belief is that the presented facts, relations, generalizations and conclusions will contribute to the better understanding of the issues of the maritime-navigation-environment's information and will be useful in the process of navigation's education as well as in research and development studies of maritime navigations issues and in improving the navigation and maritime safety.

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Received May 2004

Reviewed October 2004