MONALISA 2.0 – Activity 4

Implementation of maritime/hydrographical/meteorological information

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1 Introduction

Among the most important data required by seafarers is that related to the weather and hydrography; for one side, meteorological observations from ships has been a major pillar supporting this modern science; by the other, hydrography supports the safe navigation in coastal waters and in harbour approaches. In the sea side, the automation on board merchant ships suffered during some decades, a kind of blocking that has changed only in the first 2,000 decade towards a progressive assimilation of the technical advances offered in the market.

Electronic chart systems like ECDIS have improved the integration of hydrographical and navigation information in one screen combining fixed data with dynamic data coming from the AIS, information from the own ship is not also display but also of the neighbouring vessels as well, improving safety and reducing collision risks in combination with RADAR.

Tools for automatic Route and Voyage planning from Port A to B via C can be integrated as a part of the ECDIS systems in the market.

Optimizing the schedule taking into consideration the latest weather forecast (weather routing) and using integrated environmental databases for tides and currents will allow the vessel to proceed along the route at the safest economical speed and arrive at its final destination on time.

Nevertheless, in SAR operations, the limitations of the units deployed require precise information about the conditions at sea. Weather, and navigation combined with hydrography data require real time access and reduced space to install a standard ECDIS equipment. In D.4.5.2, the customized solution MiniECDIS provided by SAINSEL has been developed to be adopted by the Spanish Maritime Safety Agency (SASEMAR) and installed in the small units.

This report is referred to the results in providing an alternative information systems served by internet to the small vessels when they are sailing/operating in coastal waters. Some previous results in combining hydrographical/navigation/meteorological information have been applied to offer a complementary solution when sophisticated or advanced ECDIS is not be able on-board, making possible to access the information by means of portable devices like tablets, mobile phones or laptops.

1.1 Legal framework

The reference safety legislation in the marine environment is approved by the IMO and in general is contained in the SOLAS convention. Then as official documents are the ones carried on board under the SOLAS chapter V specifications, that in most of the cases do not accept as official an important number of digital cartography because do not contemplate the minimum requirements specified by the own organisation.

The SOLAS chapter V is applicable to all ships except for the ones smaller of 500 GRT in national voyages, fishing vessels and in general of a tonnage under
150 GRT. This rule establishes the carriage prescriptions in terms of electronic and navigational aids on board for each tonnage level.

However the SOLAS convention do not clarify the governmental responsibility of charts production, but in 1983, it was approved a resolution where was reminded the importance of having exact and updated hydrographical information for the safety of navigation and the need also of being carried out under the most modern available techniques. That resolution invited governments to cooperate between them when it was needed.

This last point, was followed by an IMO resolution urging the member states to establish regional hydrographic commissions or charting groups, together to help through the IHO the existing groups working on precision cartography. This action was derived from the IHO report sent the IMO on the nautical charts inadequacy in a lot of marine areas, due to the old cartographic surveys, noting that in order to develop new charts, adequate technical means are required.

Within the SOLAS rule V/9 are mentioned the charting services, stating that contracting Governments should to arrange for the collection and compilation of hydrographical data and the publication, dissemination and keeping up to date of all nautical information necessary for safe navigation. This would be carried out in order to ensure that hydrographical surveying is carried out, as far as possible, adequate to the requirements of safe navigation; to prepare and issue nautical charts, sailing directions, lists of lights, tide tables and other nautical 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; and to provide data management arrangements to support these services.

Contracting Governments undertake to ensure the greatest possible uniformity in charts and nautical publications and to take into account, whenever possible, relevant international resolutions and recommendations, and to co-ordinate their activities to the greatest possible degree in order to ensure that hydrographic and nautical information is made available on a world-wide scale as timely, reliably, and unambiguously as possible.

1.1.1 Meteorological and Hydrographic Information provided via AIS Application-Specific Messages.

Automatic Identification System (AIS) Application-specific messages transmitted in binary format will be increasingly used to digitally communicate maritime safety/security information between participating vessels and shore stations. This includes time-sensitive meteorological and hydrographic information that is critical for safe vessel transits and efficient ports/waterways management. IMO recently completed a new Safety-of-Navigation Circular

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(SN/Circ.) that includes a number of meteorological and hydrographic message applications and data parameters. In conjunction with the development of a new SN/Circ., IMO will establish an International Application (IA) Register for AIS Application-Specific Messages. IALA plans to establish a similar register for regional applications. While there are no specific standards for the presentation/display of AIS application-specific messages on shipborne or shore-based systems, IMO issued guidance that includes specific mention of conforming to the e-Navigation concept of operation. For both IHO S-57 and S-100-related data dealing with dynamic met/hydro information, it is recommended that IHO uses the same data content fields and parameters that are defined in the new IMO SN/Circ. on AIS Application-specific Messages. The Maritime Safety Committee, at its eighty-seventh session (12 to 21 May 2010), concurred with the Sub-Committee’s views and approved the Guidance on the use of AIS Application Specific Messages.

Automatic Identification System (AIS) is an autonomous and continuous broadcast system that exchanges maritime safety information between participating vessels and shore stations. AIS operates in the VHF maritime mobile band using Time Division Multiple Access (TDMA) technology. Chapter V of the 1974 SOLAS Convention [1] required mandatory carriage of AIS equipment for all types and sizes of SOLAS Convention vessels by 31 December 2004. As defined in the IMO Performance Standards for AIS [2], AIS enables both ships and maritime safety administrations to effectively track the movement of vessels in coastal waters. In addition, AIS can contribute to safety of navigation and protection of the environment by providing additional navigation-related information in the form of AIS binary messages. This includes meteorological and hydrographic data, carriage of dangerous cargos, safety and security zones, status of aids-to-navigation, and other ports/waterway safety information. This information is broadcast from shore-side AIS Base Stations or specially equipped buoys to ships that are at-sea or in port.

1.1.2 AIS Application-Specific Messages.

ITU-R Recommendation M.1371- “Technical characteristics for a universal shipborne automatic identification system using time-division multiple access (TDMA) in the VHF maritime mobile band”) provides the basis for the use of AIS binary messages. These messages contain application-specific binary data, which can be created by an application on the transmitting side and interpreted and displayed by another application on the receiving end. Proper interpretation depends on the use of an agreed data structure. This means that internationally-agreed binary message (now referred to as “AIS Application-Specific Messages”) standards are essential.
1.1.3 Standards.

Circ.236 defines the data content for seven (7) types of AIS Binary Message Applications. These were to be tested and evaluated in conjunction with existing ship-borne navigation systems during a trial period lasting four (4) years. This included the AIS Minimum Key-board Display (MKD), radar, ECDIS, and Integrated Navigation System (INS) equipment, as well as Electronic Charting Systems (ECS) and Portable Piloting Units (PPUs). While it is IMO that defines the content of AIS Messages, it is ITU-R M.1371 that specifies the technical characteristic and the structure of the binary AIS messages [3]. The ITU-R Recommendation M.1371-3 provides the basis for the use of AIS binary messages. These messages contain application-specific binary data which can be created by an application on the transmitting side and interpreted and displayed by another application on the receiving end.

In July 2008, IMO established a Correspondence Group included representatives from 14 IMO Member Governments, a UN specialized agency (WMO), and IHO. In developing international application specific messages, several criteria pertained:

- The messages should provide information that enhances safety of life at sea, efficiency of navigation, and protection of the marine environment.
- The use of the message should result in operational benefits.
- The information should be effectively displayed by an appropriate user interface.
- Messages should not be used for information that is available from other sources with sufficient time in advance, or used for private or profitable purpose.

In April 2009, the CG submitted a report to IMO that included both revised and new messages [5]. In July 2009, IMO NAV 55 agreed to issue a new SN/Circular—Specific were revised while others were replaced by new messages with enhanced functionality. In addition, some messages with similar functionality were harmonized and merged into a new message. Following formal approval by the Maritime Safety Committee (MSC87) in May 2010, this new circular would supersede SN/Circ.236 beginning 1 January 2013.

Table 1: provides a comparison of existing applications contained in SN/Circ.236 and the revised/new messages in the new SN/Circ. AIS Application—Specific messages that pertain to meteorological/hydrographic information are high-lighted in blue.

The following is a brief description of those message applications that are directly related to meteorological and hydrographic parameters.

Meteorological and Hydrographic Data This message provides a wide variety of meteorological and hydrographic data including, wind speed/direction, visibility, tide/water levels, surface currents, wave and swell measurements, sea state, and ice. Initially developed by IALA, it is currently in wide use. Other than
changing the name from Hydrological to Hydrographic, the information content in SN/Circ.236 is unchanged.

Comparison of “old” AIS Application-Specific Messages in IMO SN/Circ.236 and the revised/new messages contained in the “new” SN/Circ.

<table>
<thead>
<tr>
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<tr>
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<td>Message Name</td>
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<tr>
<td>1</td>
<td>Met/Hydrological</td>
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<td>2</td>
<td>Dangerous cargo indication</td>
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<tr>
<td>3</td>
<td>Fairway closed</td>
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<td>4</td>
<td>Tidal window</td>
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<tr>
<td>5</td>
<td>Extended ship static and voyage related data</td>
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<tr>
<td>6</td>
<td>No. of persons onboard</td>
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<tr>
<td>7</td>
<td>Pseudo-AIS targets</td>
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Table 1. Comparison of “old” AIS Application-Specific Messages in IMO SN/Circ.236 and the revised/new messages contained in the “new” SN/Circ. 236.

Tidal Window – This message is used to inform vessels about tidal windows which allow a vessel safe passage in a fairway or channel. In addition to date/time and location, information is also provided on current direction and speed. Similar to the Met/Hydro, this message is already in use. As such, the information content in SN/Circ.236 is unchanged.

Weather Report from Ship to Other Ships - Developed by the World Meteorological Organization (WMO), this message is intended to provide weather information observed on a ship in transit to other vessels, or to WMO. This includes present weather conditions related to visibility, wind, temperature, wave height and swell period/direction.

Environmental - Proposed by the USA/RTCM, this message has a flexible design and is well-suited for some applications, while the Met/Hydro message in SN/Circ.236 is more suited for other situations. Since transmission of Met/Hydro information via binary messages is increasingly used, two different message types are available depending on the particular situation.
The Met/Hydro message is best suited for local transmission of information from several sensors at the same position. Alternatively, the Environmental message separates static data (e.g., station ID, location) from dynamic sensor data. In some situations, it is possible to send same data content using fewer slots than the Met/Hydro message.

This is particularly useful when broadcasting both forecast and "Nowcast" (i.e. continuously updated forecast) information.

The complete IMO SN/Circ. can be downloaded from the IMO website [http://www.imo.org], under the NAV55 documents. However, this website is accessible only to IMO Member States and Authorized Organizations. (A working copy of the revised SN/Circ. (NAV55/21/Add.1) that was issued by IMO on 22 October 2009 is available at: [http://vislab-com.unh.edu/~schwehr/papers/2009-Nav55-CG-AIX-Report-Annex1.pdf].

2 Operational requirements

The possibility to have the geographic information required by the SOLAS convention and displayed on an electronic way over a screen, has been an idea developed by several entities producing different commercial products served on the web during these last year. An example is the European Project EPDIS (Electronic Pilot Book and Information System contract number IST-2001-35306) co-funded by the European Commission under the 5th Framework Programme. It provided the needed funds to demonstrate the integration of the information contained in several nautical publications already in paper, over a screen, including 2D/3D/4D information display, in an interactive manner, describing the coast and all the elements surrounding it, to enrich and ease the area recognition tasks and improving the safety of the passage most of all in reduced visibility conditions.

Of course that not all ships at sea are SOLAS ones and it exists a big segment represented by fishing vessels and pleasure yachts not requiring the quality standards posed by IMO at least in a compulsory way. This affords however the existence an important technological and commercial niche, that would permit a commercial development.

The technical solution has been developed in two directions:

- Geographical information as a visual element over a friendly chart display, in addition of particular objects contained in sailing directions books, including their particulars, attributes, services and performances.

- A geo referenced data base containing all the objects included in the previous description. The objects in themselves are entities to be added in information layers on the visual environment. That information is mainly text information accompanied by images when available.

- A weather forecast in real time layer, coming from near official meteorological agencies.
• Navigation data coming from AIS antennas and provided by official entities in charge.

As defined by IMO:

e-Navigation is the harmonized collection, integration, exchange, presentation and analysis of marine 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. Annex 12)

Further, AIS Application-specific messages should become an effective means to achieve many of the core objectives of e-Navigation:

1. facilitate safe and secure navigation of vessels having regard to hydrographic, meteorological and navigational information and risks;
2. facilitate vessel traffic observation and management from shore/coastal facilities, where appropriate;
3. facilitate communications, including data exchange, among ship to ship, ship to shore, shore to ship, shore to shore and other users;
4. provide opportunities for improving the efficiency of transport and logistics;
5. support the effective operation of contingency response, and search and rescue services;
6. demonstrate defined levels of accuracy, integrity and continuity appropriate to a safety-critical system;
7. integrate and present information on board and ashore through a human-machine interface which maximizes navigational safety benefits and minimizes any risks of confusion or misinterpretation on the part of the user;
8. integrate and present information on board and ashore to manage the workload of the users, while also motivating and engaging the user and support
9. ing decision-making;

(NAV 54/25, Annex 12)

The Guidance issued at IMO NAV 55 also included some guiding principles that should apply to the display of AIS application-specific messages both for shipborne equipment/systems (e.g., ECDIS, radar, & INS) and shore-based systems (e.g., VTS Centre console):

1. Use consistent symbology across all displays.
2. Uniqueness only one possible meaning.
3. Non-ambiguous ability to determine differences (i.e. distinct).
4. Intuitively obvious an easily recognized symbol, icon or pattern.
5. Have a basic symbol for different categories. Further attributes should be enhancements (not changes) to the basic symbol. (NAV 55/25, Add.1, Annex 2) [10]

In concept, few would likely disagree with these principles. However, in practice it will be a challenge to achieve a consensus between providers and users as to what is really suitable or effective.

2.1 Relationship to IHO Standards

Since its adoption 1998, IHO S-57 Edition 3.0/3.1 has been used almost exclusively for encoding Electronic Navigational Charts (ENCs) for use in Electronic Chart Display and Information Systems (ECDIS) [11]. More recently, Marine Information Overlays (MIOs) in S-57 format have been developed for both static and dynamic parameters [12].

The new IHO Geospatial Standard for Digital Hydrographic Data (S-100) [7] is intended to be used for the exchange of digital hydrographic data between hydrographic offices, and for the distribution of hydrographic data to manufacturers, mariners and other data users (e.g., environmental management organizations). It was developed so that the transfer of all forms of hydrographic data would take place in a consistent and uniform manner. As announced by IHO, an S-101 ENC Product Specification is under development and will go into force in 2012.

AIS application-specific messages are already in use, and this will likely increase. Ideally, AIS binary Messages and IHO S-100 will be compatible in terms of complementary data content and format such that both can be used in ECDIS, INS, and PPUs. For both IHO S-57 and S-100-related data dealing with dynamic met/hydro information, it is recommended that the hydrographic community use the same data content fields and parameters that are defined in the new IMO SN/Circ. on AIS Application Specific messages.

3 Previous work: Electronic Pilot Display and Information System (EPDIS)

The work of the EPDIS-project was carried out by a consortium of six partners from different European countries and co-funded by the 5th Framework Programme of the European Commission, DG Information Society (IST-2001-35306). The original project-idea was to introduce 3D-visualisation to the maritime community and connect it with the information from the so-called Pilot Books or Sailing Directions. The 3D-Models and the Pilot Book databases have been built for two demonstration areas and will be installed on board of two ships in order to be tested by the crews. EPDIS will be able to be used in two different modes: in "Drive"-mode it will be connected with the ships-data and display the view as seen from the bridge. In "Explorer"-mode it will be
possible to investigate 3D-models on its own path. Within the MONALISA 2.0 Project, 3D visualization function has not been used as it is not required.

3.1 Support of Navigation

Size and draught of commercial vessels, and water congestion are increasing rapidly and an end to this development cannot currently be foreseen. Ports and waterways are approaching their limits and beyond. For both port operators and ship owners, reliability in terms of time and performance is of utmost importance and therefore precise navigation is becoming an issue of vital interest. For large ships in narrow waterways, shipborne equipment according to international carriage requirements is often not sufficient to ensure the required accuracy of navigation and also depends on the navigator’s understanding of the maneuvering situation.

Because of all this, the navigator of the future will have to bear much higher responsibility than today. Therefore it is necessary to develop strategies to meet the increasing demand in an efficient and safe manner and to assist the responsible officer on the bridge in coping with the rising demands. Navigation must be adapted alongside ship development. Administrations have to assist the mariners in dealing with the higher demands and support the development of technologies which can help them in an efficient way.

Nowadays the most efficient way to train navigators and prepare them for their next passages is to practice in a simulator. Fully equipped modern simulators can emulate the whole environment including wind, current, sea condition, the behavior of the ship, etc. Due to the 3D models used the training is most realistic. It is possible to use them to practice any passage under real conditions and find out how the ship has to be sailed in different conditions.

3.2 General concept

The initial project idea of EPDIS derives from the Pilot Book, a book describing coastlines, harbors and their approaches. Pilot books often depict shorelines and navigational landmarks by sketches or photographs to provide a more detailed understanding to the mariner than only words could do. Current onboard technology, from GPS to ECDIS, has made position finding easy and has reduced the significance of pilot books. Seafarers, however, are not sufficiently aware of the fact that an accurate position on a chart does not necessarily match reality because of deficiencies in the sea charts. In some geographical areas shorelines and shallows are charted quite inaccurately. Hence the navigators most important tool, his eyes, have not lost their importance at all and viewing through the bridge windows in addition to reading displays is still a crucial part of prudent seamanship. To master challenging maneuvering situations, a navigator must quickly and reliably compose a true picture of the real situation from all available sources.

But there is still lots of useful information in the book like radio signal information, phone and fax numbers, addresses, pilotage, etc. EPDIS tries to find
a way to conserve the information of the Pilot Book by developing an up-to-date framework for it and making it electronically available. This information will be combined with a simple 2D landscape-viewing tool in which one can see the relevant area and explore it and enabling other important layers like AIS and weather forecasts. The navigator shall also be able to take a look at the objects from which he got some information in the Pilot Book.

### 3.3 The Implementation

Basically EPDIS consists of three elements: the databases, the Viewer and the Electronic Pilot Book (Fig. 1). The databases can be separated into two. The first contains the 3D-models including the terrain and objects such as lighthouses and other prominent buildings. These models can be regarded by the Viewer. The second database contains the Pilot Book Information which will be read by the Electronic Pilot Book. The EPDIS application itself combines the Viewer and the Electronic Pilot Book and connects them to the ECDIS. From there it will get the ship information necessary for a proper display, e.g. height of the bridge, position, course, heading.

![Figure 1: General overview of the EPDIS system](image)

The 3D-models have been created in Open Flight Format (flt). Open Flight is more or less the standard format for simulation and thus was our preferred choice. To create the 3D-Models we first built the landscape models by connecting Digital Elevation Models with S-57-ECDIS-data. This “backbone” of the 3D-model was improved by building 3D-objects of principal marks and
other conspicuous objects and integrating them into the 3D-model. The viewer (Fig. 2) is based upon Open Scene Graph. Open Scene Graph is a free and open source library that can display .flt-files. It is a software kernel that improves the graphics library of the computer system. It is independent of a system software and can be modified by C++ programming.

The Pilot Book Information has been stored in an SQL-database. The data can be retrieved via a user interface and will be displayed with XML, thus enabling them to be viewed in many applications, e.g. a browser (Fig. 3).

EPDIS will be used in two different modes. Due to the connection with the ECDIS it will be possible to connect the 3D-view with the position, the heading and the speed of the ship. Thus the view as seen from bridge will be displayed in this mode. This could be of use during the conning process. In the other mode it will be possible to explore the 3D-terrain on its own path, e.g. prior to a challenging passage.

![Figure 2: Screenshot of the EPDIS-Viewer.](image)

### 4 The MAR/HYDRO/METEO tool

The described application has technically solved, as regards of displayed components and geo referenced hydro graphic information. Both aspects work
interactively completely based on strictly geographic relationships and links, as whatever geographic information system. The approximation to an object oriented database has been the best point in the product development, affording to explode the information coming from different applications and devices (Internet, web services, mobile phones, laptops or tablets). The data base in itself is a set of relations between tables containing geographic records and other complementary data, however its working creates temporary “objects”, acquiring an identity once the application asks its immediate creation through the user's queries.

Analysing publications as the pilot book or sailing directions, we found that those mentioned objects exist, and are described in a particular manner. Sometimes this description is followed by an image or any other attribute describing explicitly them. From now it has been possible to deduct a direct relationship between the different nautical publications and to create the system data base, together with the necessary information segments that really are needed.

The system is complemented with other relevant to navigation information services. There exist meteorological services forecasting and sharing site images or other numerical models providing sea and wind state and direction information, through links to visualize in the system windows. In this way it is available an integral tool, providing official hydrographic data being updated in a three dimensional vision friendly environment and also providing weather information in real time from the weather information web sites.

4.1 The hydrographical objects

The architecture offered can create storage, update and dynamically manage conspicuous objects. Operating with data from different sources and information produced by the users, the system is able to create rich data and geographical objects, with an Object Oriented data base structure and geo-referenced attributes. These objects shall be queried manually or according to automatic queries including route plans in GPS systems.

Relevant objects are:

- **Land marks and Conspicuous points**: the current and most relevant reference points for a safe navigation or simply a walk like castles, buildings, light houses or natural topographic objects, even maritime spatial planning protected and restricted areas.

- **Pictures and images**: most of the graphical information stored must be completed with a set of images, photos, diagrams or even models. This is an important attribute which can add value to the data sets. The collection of objects enriched with all of the data that can explain them is better described with the help of the graphical information.
4.2 The viewer screen

The service working mode has been centred around the functional philosophy, based on the client/server paradigm criteria, easing the clients the access to a big number of data, where a simple client on any navigation scenario is capable to connect with Internet and obtain the information that could be distributed in any kind of portable device, including laptops, tablets and even smartphones provided with an internet connection or data package. The access to data will be done through the subscription formula and this will guarantee their availability in its last version and also will have the certainty of their total updating and feasibility.

The site is accessible at: http://www2.cimne.com/monalisa/
4.3 Inside the tool

Once the user access the web service application, the basic screen displays the chart neighbouring the current GPS position. The basic layer shows the geographical area chart and the AIS information available. Some circles over the chart indicate the availability of available hydrographical information in the coastal areas and other functionalities like optimal routes calculations based on weather conditions.
The detailed description of hydrographical or conspicuous point is displayed as the user makes a query.

*Figure 6: MAR/HYDRO/METEO tool coastal object information over a natural protected area (in green)*

The weather and meteorological information layer must be enabled by the user as it requires. The latest weather forecast is displayed as it is provided by the information service linked. A geo-referenced picture is overlapped on the screen maintaining the original chart view and the other elements are able to be called in case a combined query is required.
The figure above shows a surf map useful to improve navigation under difficult sea conditions.

5 Information exchange

One important factor is data rights since each actor has their own data and each organization wants to keep their own data which, most of times, cost some money to gather. To resolve this issue and to be able to integrate the information in one information system we have defined a sort of web services using SOAP protocol to access the data when is needed and we agreed to not to store it in a database. Using this protocol, we will need to define at least one web service for each type of information system that needs to be accessed.

5.1.1 Web Services

A Web service is a method of communication between two electronic devices over a network. It is a software function provided at a network address over the Web with the service always on as in the concept of utility computing. The W3C defines a Web service generally as: a software system designed to support interoperable machine-to-machine interaction over a network. Other systems interact with the Web service in a manner prescribed by its description using SOAP (Simple Object Access Protocol) messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards.
We can identify two major classes of Web services:

- REST-compliant Web services, in which the primary purpose of the service is to manipulate representations of Web resources using a uniform set of stateless operations.
- Arbitrary Web services, in which the service may expose an arbitrary set of operations.

5.1.2 Simple Object Access Protocol (SOAP)

SOAP, originally an acronym for Simple Object Access Protocol, is a protocol specification for exchanging structured information in the implementation of web services in computer networks. It uses XML Information Set for its message format, and relies on other application layer protocols, most notably Hypertext Transfer Protocol (HTTP) or Simple Mail Transfer Protocol (SMTP), for message negotiation and transmission.

6 Conclusion

The challenges associated with the use of any AIS- Application Specific Messages are more organizational than technical. Based on what has occurred in the past, it may be a difficult and time-consuming process to establish the necessary infrastructure for one government agency to convert met/hydro sensor data into a binary format, and then pass it to another agency to be broadcast via AIS base stations as AIS application specific messages. Often times, different agencies have different ideas on what types of met/hydro data are important, and the level of detail that is required. While most would agree on the need to provide met/hydro data, agreeing on the specific details regarding data parameters, formatting, and distribution can be problematic. To accomplish the process will require a fair amount of cooperation between intra- and inter- government agencies, equipment manufacturers, and maritime user groups. While these organizational challenges may be difficult to overcome, significant benefits result when "harmonized" regional and/or international standards are implemented and used by all concerned.

From a technical point of view, an important step forward has been made, integrating in one screen displaying all the specific navigational, geographical and meteorological information to be needed by a user. However the system is far from being official as a SOLAS approved system. One important goal is to achieve the approval from relevant organizations as the IHO, hydrographical organizations and the stakeholders in order to optimize a commercial product useful for different type of end users.
7 References


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