French Pilot study for WP4 - Testing

D11
4.3.12 PING
NAVIGATIONAL WARNING S-124 API

PILOT STUDY AND TESTING REPORT

French Hydrographic and Oceanographic Service (Shom)

Project co-financed by the European
Regional Development Fund

Document Control Sheet

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Shom really enjoyed the collaboration and team work made possible by this study and the MED OSMoSIS project, is looking forward to building on this network in the coming years and projects.

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Contents

Project co-financed by the European Regional Development Fund

Project co-financed by the European Regional Development Fund

Illustrations

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Glossary

AIS	Automatic Identification System
API	Application Programming Interface
CECMED	Commandant in Chief for the Mediterranean sea (*Commandant en chef pour la Méditerranée*)
CISE	Common Information Sharing Environment
COM	Maritime Operations Command (*Commandement des opérations maritimes*)
CROSS	MRCC: Maritime Rescue Coordination Center (*Centre régional opérationnel de surveillance et de sauvetage*)
CSI	Home Security Code *(Code de la sécurité intérieure)*
CSN	Vessels Security Center (*Centre de sécurité des navires*)
CZM	Commander of Maritime Zone *(Commandant de zone maritime), French regional maritime Authority*
DIRM	Inter-regional Directorate for the Sea *(Direction inter-régionale de la mer)*
DSF	Sea Basin Strategy Document (*Document stratégique de façade)*
ECDIS	Electronic Chart Display and Information System
EGC	Enhanced Group Call – Satellite-based broadcast system agreed for GMDSS (ex: SafetyNET and SafetyCast)
EMODnet	European Marine Observation and Data Network
EMSA	European Maritime Safety Agency
EN	English
ENC	Electronic Navigational Chart
EU	European Union
Europol	European Union Agency for Law Enforcement Cooperation
FR	France
GIS	Geographical Information System
GMDSS	Global Maritime Distress and Safety System
GML	Geography Mark-up Language
HTML	HyperText Markup Language
HYDROLANT	Navigational Warnings categorized by their Atlantic Ocean location
IHO	International Hydrographic Organisation
HR	Croatia
IMO	International Maritime Organisation
INSPIRE	Infrastructure for Spatial Information in Europe
INTERREG	Interreg MED Programme: European Transnational Cooperation Programme
ISO	International Organisation for Standardisation
ISPS	International Ship and Port Facility Security Code (annexed to the Safety of Life at Sea Convention (SOLAS))
MARSUR	Maritime Surveillance project (from the European Defence Agency)
Med	Mediterranean
MED OSMoSIS	Mediterranean governance for Strategic Maritime Surveillance and Safety issues project
MPA	Marine Protected Area

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MRCC	Maritime Rescue Coordination Centre
MS	Member States
MSFD	Marine Strategy Framework Directive
MSI	Maritime Safety Information
NAVAREA	Geographical sea area established for the purpose of coordinating the broadcast of navigational warnings
NAVTEX	NAVigational TEXt Messages – Terrestrial radio system agreed for MSI broadcast
NW	Navigational Warning
OFB	French Biodiversity Agency (*Office français de la biodiversité*)
OGC	Open Geospatial Consortium
ORSEC	French Civil Security Response Organisation (*Organisation de la réponse de sécurité civile*)
PING	French Nautical Geographic Information Platform *(Plateforme de l'information nautique géographique)*
PREMAR	Maritime Prefecture *(Préfecture Maritime)*
PT	Portugal
REST	Representational State Transfer
SafeSeaNet	Vessel traffic monitoring and information system
SafetyCast	Service for the international broadcast and automatic reception of Maritime Safety Information (MSI) and Search and Rescue (SAR) related information via the Iridium Enhanced Group Calling system (satellite-based)
SafetyNET	Service for the international broadcast and automatic reception of Maritime Safety Information (MSI) and Search and Rescue (SAR) related information via the Inmarsat Enhanced Group Calling system (satellite-based)
SAR	Search & Rescue
SGmer	Secretariat General for the Sea, inter-ministerial department of the Prime Minister Office (*Secrétariat Général de la mer*)
Shom	French Hydrographic and Oceanographic Service and NAVAREA II Coordinator (*Service hydrographique et océanographique de la Marine*)
SL	Slovenia
SP	Spain
SOLAS	Safety of Life at Sea Convention. The main objective of the SOLAS Convention is to specify minimum standards for the construction, equipment and operation of ships, compatible with their safety
SPATIONAV	Surveillance system adopted by the French Navy since 2002
TSS	Traffic Separation Schemes
UNCLOS	United Nation Convention on Law of the Sea
URL	Uniform Resource Locator
WFS	Web Feature Service
VHF	Very High Frequency (30-300 MHz; 10-1m)
WL	Worldline (Software developer)
WMS	Web Map Service
XML	Extensible Markup Language

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1. Introduction

1.1. International Context

Enhanced cooperation and smooth-flowing exchange of information between Maritime Surveillance authorities is today one of the main strategic objectives of the European Union (EU) in the framework of the Integrated Maritime Policy. It is also a key component of the European Maritime Security Strategy[1].

Since 2006, the European Commission has worked to improve cooperation across the Maritime Surveillance authorities of Member States (MS) and to enhance the interoperability of their respective data systems, at both national and European levels. The information exchange systems Europol (criminal and terrorist networks tracking), MARSUR (Maritime Surveillance dialog) and SafeSeaNet (SSN - vessel traffic monitoring and information system) are good examples, of this working collaboration.

Today, the exchange of maritime information between various authorities at National and European levels is still complex and limited, mainly because of the "non-interoperability" of surveillance systems and existence of legal barriers (national policies, etc.). Maritime Surveillance stakeholders continue to produce, collect and use geographical information very often separately, without initiating data sharing. This data can then be collected several times, leading to unnecessary operating costs and loss of efficiency. The development of the Common Information Sharing Environment (CISE) network - another European initiative within the framework of the Integrated Maritime Policy - aims in particular to overcome these limitations while meeting information needs that are not yet covered by existing networks. The Mediterranean governance for Strategic Maritime Surveillance and Safety issues project (MED OSMoSIS) ambitions to tackle this complexity through the development of tools and the implementation of pilot studies that will enable to improve information exchange between different authorities and MS.

1.2. The MED OSMoSIS project

MED OSMoSIS is a strategic project funded by the Interreg MED programme that consists of promoting the implementation of improved governance and data exchange among different actors of the Mediterranean Area towards the policy development of Integrated Maritime Surveillance in the European Union.

MED OSMoSIS brings together 10 partners from 8 coastal states of the Mediterranean: Greece – as the Lead Partner – Croatia, France, Italy, Montenegro, Portugal, Slovenia and Spain. It gathers public scientific institutions and national authorities in charge of maritime safety and maritime surveillance. The project focuses on the

[1] Better situational awareness by enhanced cooperation across maritime surveillance authorities: next steps within the Common Information Sharing Environment for the EU maritime domain (2014). *Communication from the Commission to the European Parliament and the Council*, COM (2014) final, 1-8.

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development of modules and applications regarding maritime surveillance activities – in terms of safety and security – to facilitate information exchanges that will support the further development of a regional/local smart plug-in capability.

The project explores the application of current guidelines and capabilities of the ongoing evolution of interoperability tools. It carries out pilot activities and capitalization actions to test, disseminate and distribute the tools and protocols developed among partners either as potential users or as intermediaries to reach other participant entities.

Three pilot activities are foreseen in the project:

Greece and Spain – Search and Rescue (SAR) Planning: Testing of tools, methodologies and algorithms for SAR operations;

Italy – Improvement of the cycle management of information necessary for the update of nautical charts to ensure mariners' safety;

France – Development of an API (S-124) for the production and diffusion of Navigational Warnings by web services in French and English; Study on CISE to assess the process and needs for the integration of Shom's data into the French CISE network.

Pilot activities were planned to enable the testing of the tools developed and implemented. The goal for the pilot studies was to take place in key areas where i) a gap has been identified within maritime surveillance activities ii) data modelling and forecasting capacities can be enhanced and iii) surveillance capacities of the chosen pilot sites can be improved.

1.3. Purpose of the document

This pilot study and testing report corresponds to the deliverable D11 within the Work Package 4 "Testing" and responds to the task 4.3.12 "Navigation Warning Tool".

This Study and testing report will be presenting the pilot study conducted by Shom, the steps taken and results obtained for the development of **the PING NAVIGATIONAL WARNINGS S-124 API dedicated to the production and diffusion of navigational warnings by web services in France.**

This report aims to:

- give the context in which the pilot study was carried out
- present the study and its objectives
- define the API's main characteristics
- describe the actions and tests performed
- summarise the results and feedback obtained
- provide Shom's conclusions following the tests results

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2. French Pilot study: context

The MED OSMoSIS project, dedicated to maritime surveillance, raises the subject of situational awareness which presents a strong interest for Shom, provider of nautical information and NAVAREA II Coordinator.

The MED OSMoSIS project, dedicated to maritime surveillance, raises the subject of situational awareness. Events at sea impact the maritime traffic and are a full part of the situational awareness. These events are the subject of navigational warnings that need to be integrated more easily into maritime surveillance systems.

For example, a surveillance service will be able to check that no vessel enters into an area declared temporarily prohibited by a navigational warning. Navigational warnings may also explain why a vessel will deviate from its usual course, to avoid a hazardous area announced by a navigational warning.

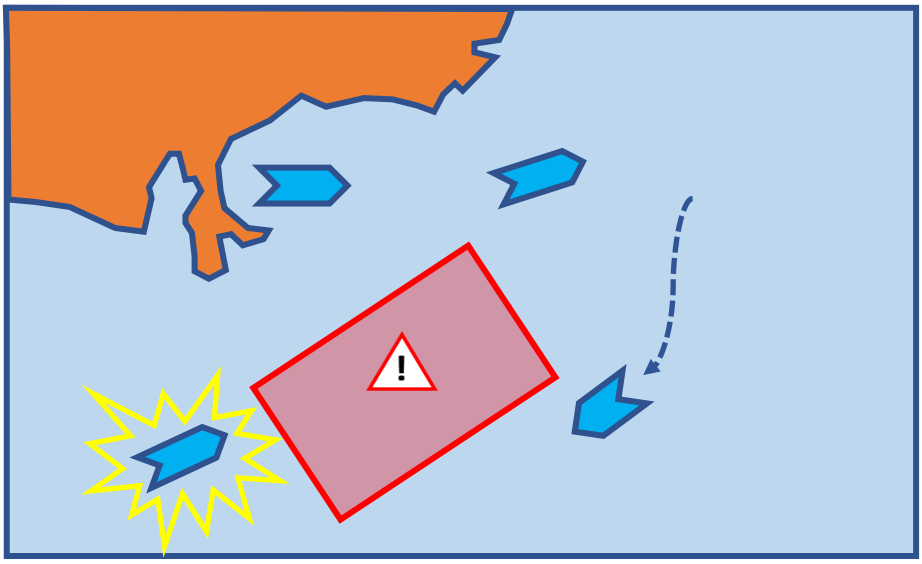

Figure 1 Utility of navigational warnings in situation awareness

2.1. Navigational warnings today

The nautical environment is subject to changes and new information constantly needs to be brought to the attention of mariners to prevent accidents. Navigational warnings provide early and important information on events or activities which may constitute a danger to navigation. These navigational warnings are part of the **Maritime Safety Information (MSI)**.

Navigational warnings are divided in 3 different categories:

- NAVAREA warnings
- Coastal warnings
- Local warnings

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Subjects in the following list, which is not exhaustive, are considered suitable for broadcast as local, coastal or NAVAREA warning:

- the presence of dangerous wrecks in or near main shipping lanes and, if relevant, their marking
- establishment of major new aids to navigation or significant changes to existing ones when such establishment or change, might be misleading to shipping;
- the presence of large unwieldy tows in congested waters;
- drifting hazards (including derelict ships, ice, mines, containers, other large items, etc.);
- areas where search and rescue (SAR) and anti-pollution operations are being carried out (for avoidance of such areas);
- the presence of newly discovered rocks, shoals, reefs and wrecks likely to constitute a danger to shipping, and, if relevant, their making;
- unexpected alteration or suspension of established routes;
- cable or pipe laying activities, the towing of large submerged objects for research or exploration purposes, the employment of manned or unmanned submersibles, or other underwater operations constituting potential dangers in or near shipping lanes;
- the establishment of research or scientific instruments in or near shipping lanes;
- the establishment of offshore structures in or near shipping lanes;
- significant malfunctioning of radio-navigation services and shore-based maritime safety information radio or satellite services;
- information concerning special operations which might affect the safety of shipping, sometimes over wide areas, e.g. naval exercises, missile firings, space missions, nuclear tests, ordnance dumping zones etc. It is important that where the degree of hazard is known, this information is included in the relevant warning. Whenever possible such warnings should be originated not less than five days in advance of the scheduled event and reference may be made to relevant national publications in the warning; acts of piracy and armed robbery against ships;
- tsunamis and other natural phenomena such as abnormal changes to sea level;
- World Health Organization (WHO) health advisory information; and
- security related requirements
- casualties to lights, fog signals, buoys and other aids to navigation affecting main shipping lanes

2.1.1. World-Wide Navigational Warning Service (WWNWS)

NAVAREA and **coastal** navigational warnings are issued by national authorities in the framework of the **World-Wide Navigational Warning Service** (WWNWS), which was established in 1977 for the promulgation of information on hazards to navigation for shipping. The WWNWS is a coordinated global service established through the joint efforts of the International Hydrographic Organization (IHO) and the International Maritime Organization (IMO) for the promulgation of navigational warnings. It is an integral part of the Global Maritime Distress and Safety System (GMDSS).

The WWNWS divides the world's oceans into 21 areas called NAVAREAs. Each NAVAREA is under the responsibility of a NAVAREA Coordinator in charge of issuing navigational warnings for the high sea. For NAVAREA II, this role is endorsed by Shom.

In each NAVAREA, national coordinators issue coastal navigational warnings.

In addition to WWNWS, local navigational warnings may be produced by relevant country authorities.

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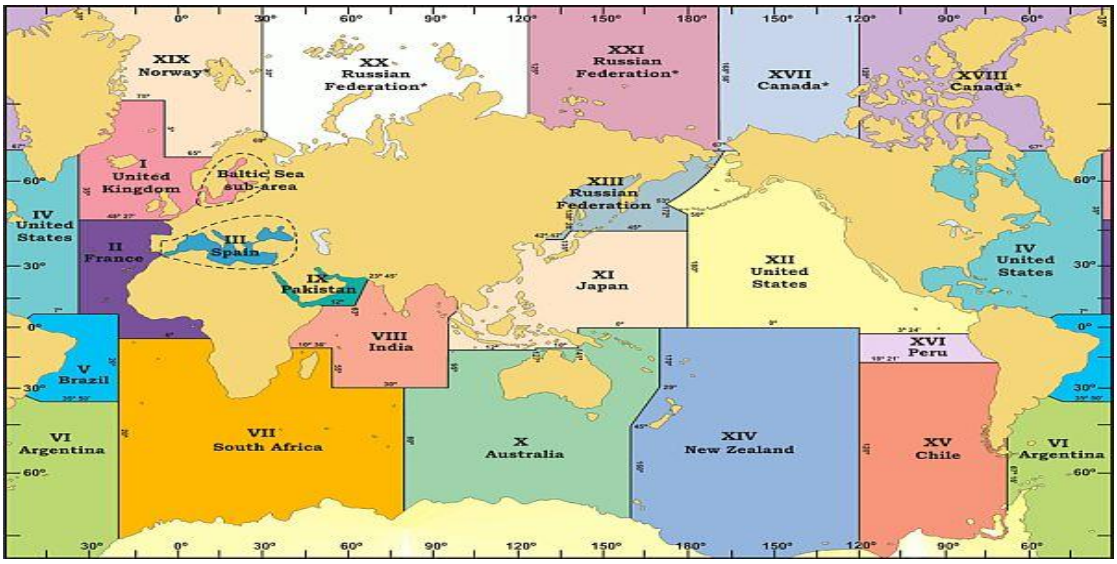

Figure 2 NAVAREA areas (Source WWNMS)

In France, Shom, the French Hydrographic Service, acts on behalf of the French Government as NAVAREA II Coordinator and French national coordinator.

The issuing of coastal and local navigational warnings is delegated to regional Authorities (regional coordinators) represented by the Commanders of Maritime Zone (CZM).

In mainland France, the issuing authorities are based in Cherbourg, Brest and Toulon.

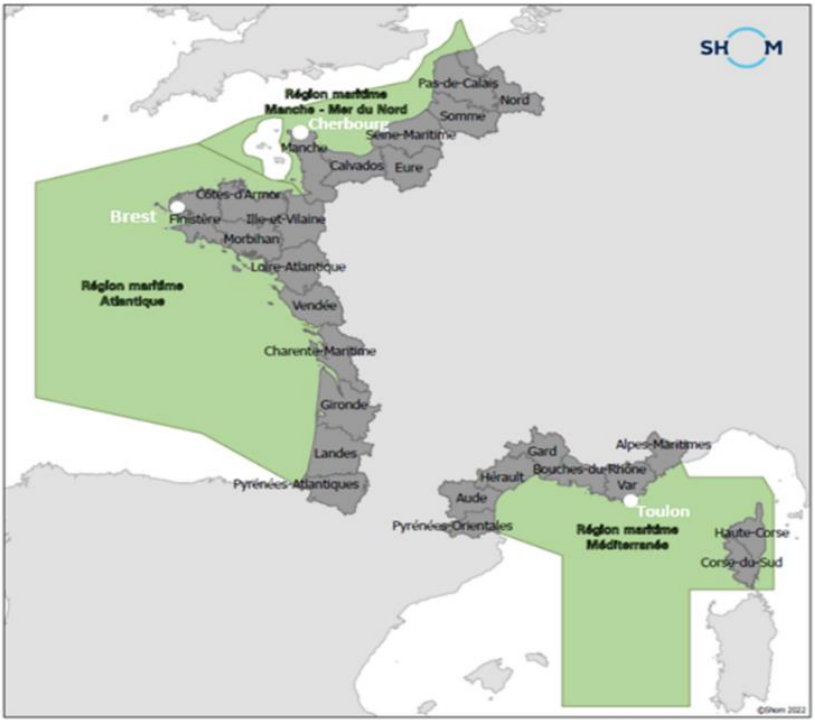

Figure 3 Mainland France NW issuing regional authorities (CZM)

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As of today, EGC and NAVTEX are the systems used to radiobroadcast at sea NAVAREA and coastal warnings in the framework of the WWNWS. Most often, navigational warnings are also posted on the issuing authorities' web portals. They are delivered in TELEX format, in the form of texts, usually including geographical coordinates that the user has to read then plot onto a paper or electronic chart. This way of proceeding is not convenient nor practical in the era of electronic navigation and maritime surveillance systems.

Figure 4 Sharing Navigational Warning information today

2.2. Need for digitisation and standardization

2.2.1. Digitization and interoperability

Current navigational warnings suffer from their outdated format, which is hardly interoperable. Today, systems need data, therefore data needs to be digitized.

Once digitized, navigational warnings may be integrated directly by ships' navigation systems such as ECDIS[2], or by onshore systems such as maritime surveillance systems.

Surveillance and/or navigation safety operations require collaboration and sometimes transboundary collaboration. The lack of interoperability, when using data, can be an obstacle to efficient decision-making. In order for the marine spatial information to be interoperable, the data needs to be standardized and accessible through standardized exchange protocols.

2.2.2. E-navigation, data standardization, S-100 &- S124 formats

E-navigation, promoted by the IMO, is defined as "*the harmonized collection, integration, exchange, presentation and analysis of marine information onboard and ashore by electronic means to enhance berth to berth navigation*

[2] Electronic Chart Display and Information System

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and related services for safety and security at sea and protection of the marine environment." E-navigation is intended to meet the present and future needs of shipping users through harmonization of marine navigation systems and supporting shore services. E-navigation is expected to provide digital information and infrastructure for the benefit of maritime safety, security and protection of the marine environment, reducing the administrative burden and increasing the efficiency of maritime trade and transport. This involves harmonized exchanges of digital information from shore-to-ship, ship-to-shore, ship-to-ship, and shore-to-shore.

The IMO is responsible for establishing mandatory standards in order to enhance the safety of life at sea, maritime security and protection of the marine environment.

The IHO's S-100[3] framework standard was adopted by the IMO as a common data structure for e-navigation. The S-100 Universal Hydrographic Data Model extends the scope of the existing S-57 Hydrographic Transfer standard, used for electronic nautical charts[4] (ENC) displayed on ships' ECDIS.

The S-100 format is more flexible since it enables the use of imagery and gridded data types, enhanced metadata and multiple encoding formats. The S-100 provides a data framework for the development of the next generation of ENC products, as well as other related digital products required by the hydrographic, maritime and GIS[5] communities[6].

The S-100 format is based on ISO[7] standards for geographical information (ISO/TC211). The IHO and other organizations are developing data product specifications based on S-100 among which the IHO S-124 for navigational warnings, currently under development.

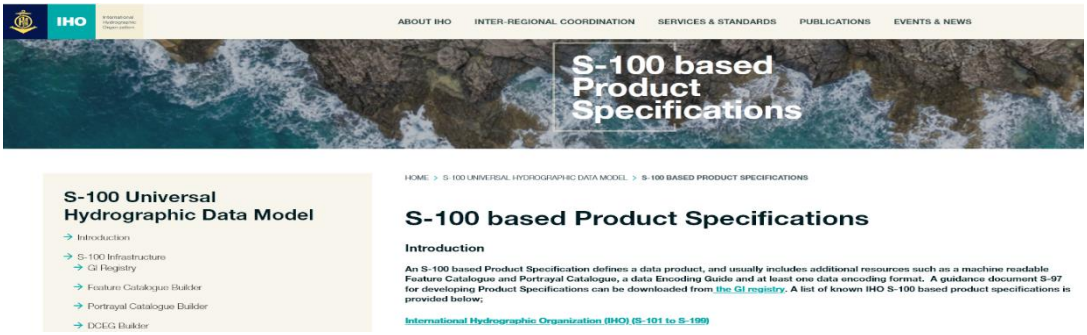

Figure 5 IHO website and S-100 specifications https://iho.int/en/s-100-based-product-specifications

[3] S-100 Standard: framework document intended for the development of digital products and services for hydrographic, maritime and GIS communities

[4] An electronic navigational chart or ENC is an official database created by a national hydrographic office for use with an Electronic Chart Display and Information System (ECDIS)

[5] Geographic Information System

[6] Source: https://iho.int/iho_pubs/standard/S-100_Index.htm

[7] International Organisation for Standardisation

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The French Hydrographic Service (Shom) is strongly involved in the current development of the S-124, which has benefited from inputs from Danish Maritime Authority (ACCSEA - EfficienSea – NIORD) and KRISO (South Korea – SMART-Navigation project).

The S-124 will use the GML format which is a declination of XML for geographic data.

2.3. Digitization of Nautical information in France

2.3.1. Instruction from the French Prime Minister

On the 8 April 2020, an instruction was issued by the French Prime Minister relating to the collection, transmission, processing and diffusion of the nautical information, stating that: "*nautical information shall be digitised whenever possible in order to facilitate its larger diffusion and integration into client systems (ships navigation systems, user systems, etc…). Nautical information data will be geo-localised, formatted and supplied following applicable standards and recommendations in order to be interoperable and accessible according to standard exchange protocols*.

As a corollary and as stipulated in this other extract of the instruction: "*Together with the Ministry of Transport, Shom will set up a national plaform for nautical information. This platform will constitute a shared information system for the transmission, design, digitisation and upload on Internet of nautical information.*"

2.3.2. PING: French national platform for nautical information

PING, which stands in French for Geographic nautical information platform ("*Plateforme d'information nautique géographique*"), is the national platform currently developed by Shom, as per the Prime Minister's instruction from the 8 April 2020, and dedicated to the digitization of nautical information PING will enable the concretization of the digitization for all the nautical information production and broadcast process in France.

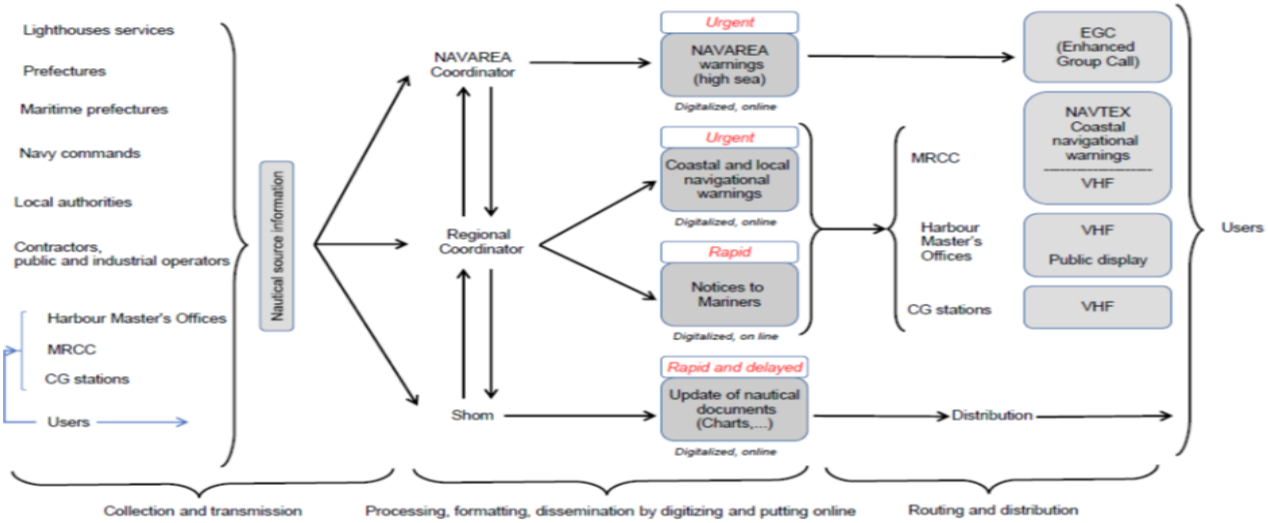

Figure 6 Nautical information production and broadcast process in France

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The project, launched in 2020 and following a successful demonstration phase in 2016-2017, is supported by the European Union funds Interreg through the MED OSMOSIS project and the European Maritime and Fisheries Fund (EMFF). The project involves the development of a web platform, including on the one hand a geoportal for humans, and application programming interfaces (API) for systems.

Three functional modules of the web platform are currently under development:

- Navigational Warnings
- Transmission of source information
- Georegulation

A mobile application (developed in collaboration with Nav&Co project) will also be associated to the platform. The aim of this app will be to enable the user to access on a marine chart the Navigational warnings, nautical information, information on regulation, maritime protected area, environmental information, beaconing and notifications of entry in a specific area.

The platform is expected to be operational and available to the public in 2023.

Once operational and in service, the PING platform will be the official national platform and reference source for French nautical information.

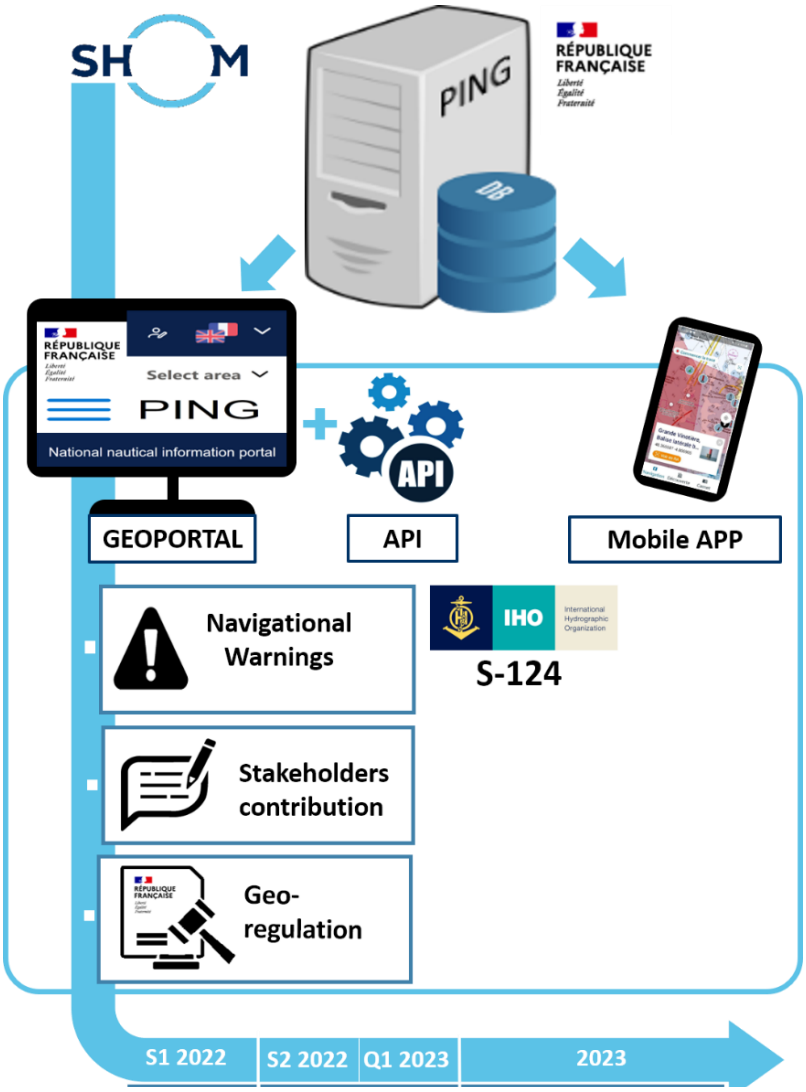

Figure 7 PING Project overview

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- **Navigational warnings**

This first module of the platform's development was carried out in the framework of the project MED OSMoSIS. This module consists of the production and delivery of NW through web services and is the subject of the MED OSMoSIS French pilot study conducted by Shom.

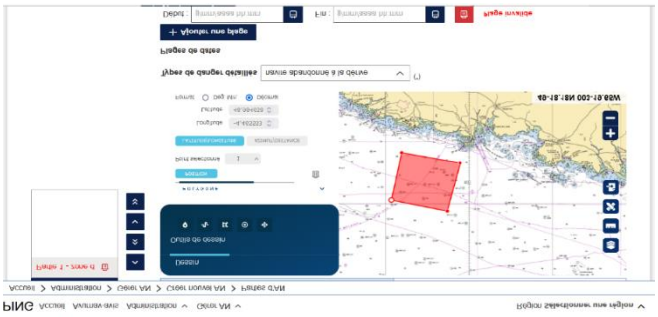


Figure 8 NW Production tools on PING portal

- **Transmission of source information/ stakeholders contribution**

This module will enable stakeholders (maritime services and users) to contribute to nautical information (i.e. navigational warnings, notices to mariners, nautical charts and publications updates). The platform will enable maritime services and users to provide for example information on anomalies related to beacons or to signal a danger. The platform will enable users to fill the information through a form and keep the information on a dashboard.

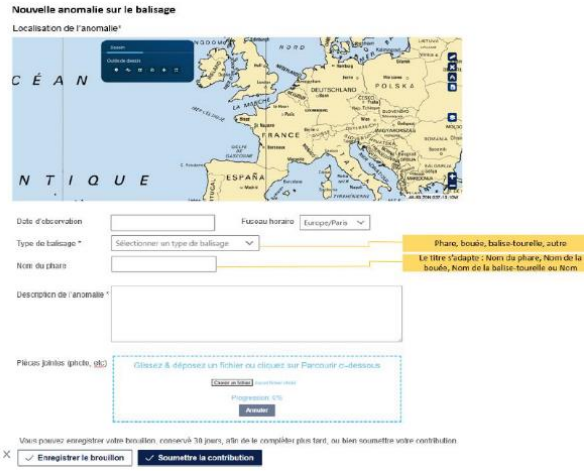
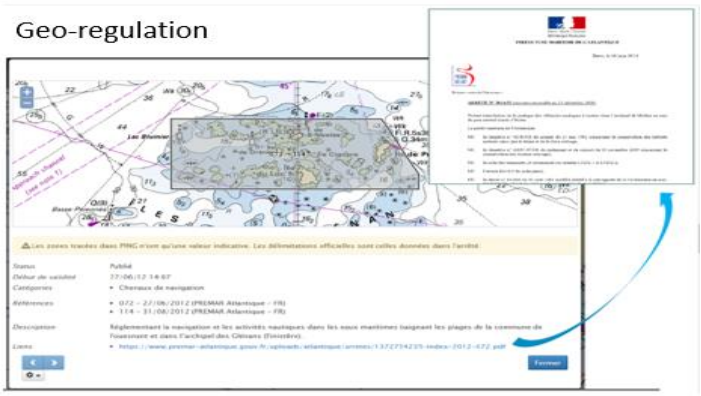


Figure 9 PING Stakeholders contribution form

- **Geo-regulation**



This module involves the dissemination of spatialized maritime regulation produced by the Authorities.

Once produced by the Authorities, spatialized regulation will be uploaded onto the platform and accessible to users.

Figure 10 PING Georegulation example overview

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3. MED OSMoSIS French PING NW S-124 Pilot study

3.1. PING Navigational Warning Module

The first increment of the PING platform, the Navigational Warnings module for the production and diffusion of navigational warnings (NavWarnings) through webservices, was the subject of the French pilot study carried out by Shom within the MED OSMoSIS project and work Package 4 (task 4.3.12, deliverable D11).

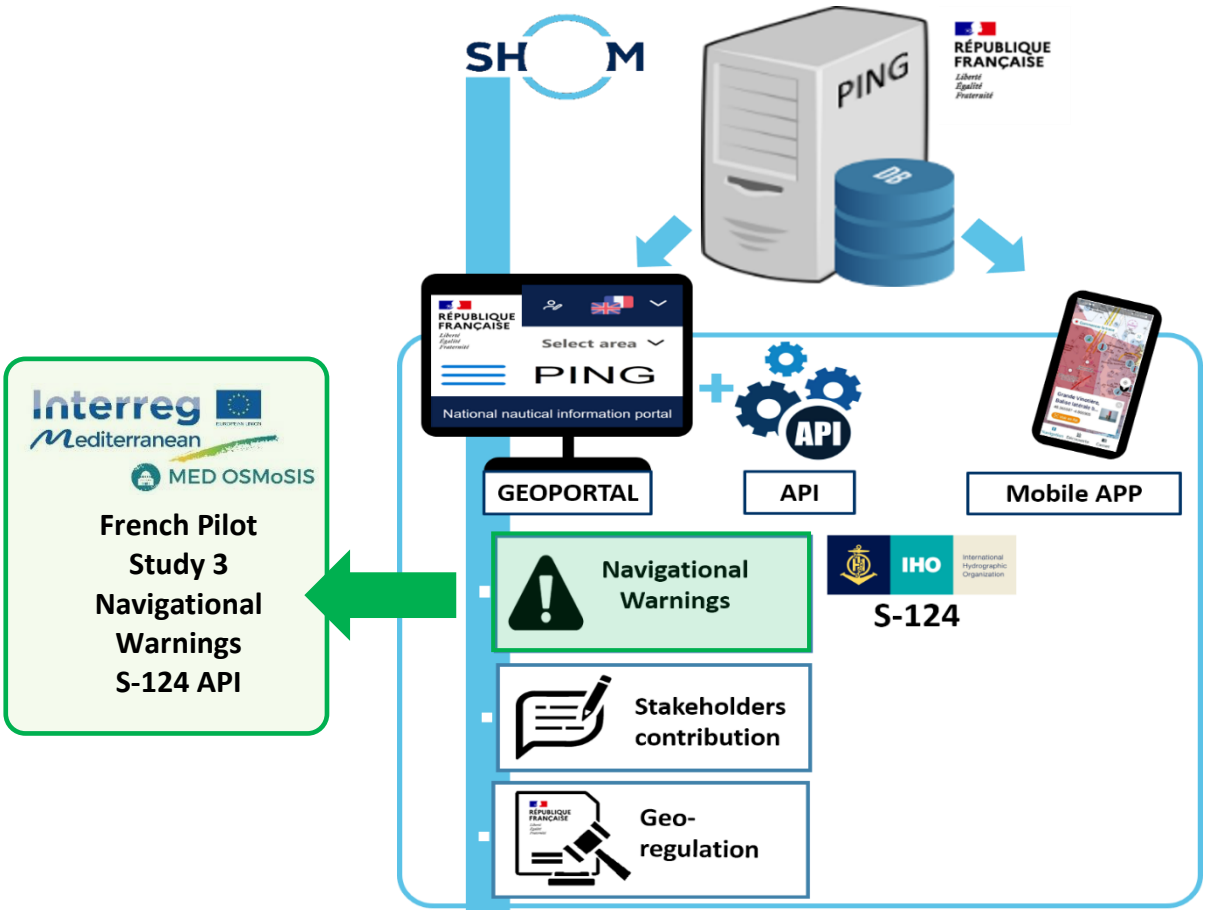

Figure 11 PING navigational warnings 1st increment of the PING project

The development of this module responds to the need for digitalization and interoperability of navigational warnings issued by the national authorities, using the S-124 standard currently under development within the International Hydrographic Organization.

Navigational Warnings are primarily intended for ships. As seen previously, NAVAREA and Coastal navigational warnings are delivered by Satellite (EGC systems SafetyNET, SafetyCAST) and/or by NAVTEX radio-stations, and in France, local navigational warnings are delivered by VHF by Coast Guard Stations.

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The objective at term of the PING project will be to deliver French S-124 navigational warnings to ships and ECDIS at sea via appropriate radio communication systems. However, this is not in the scope of the PING project nor of the navigational warnings module of the MED OSMoSIS pilot study. Indeed, broadcast to ships would require studying and consideration of other issues, such as the future maritime radio communication facilities to be used by the Worldwide Navigational Warning Service (WWNWS) for the delivery of data to ships. These topics would have to be addressed by the IMO and IHO.

The target of MED OSMoSIS pilot study is the **production and dissemination of NW to onshore-based** systems as a first step.

The principles of operation of the navigational warnings module are the following:

- The PING platform includes a web portal with production tools for national NW series producers.

  Producers are Shom as NAVAREA II, and French regional authorities coordinated by Shom for coastal and local warnings.

  Navigational warnings are created by the operators using the S-124 data model.

  The TELEX form of each navigational warning is automatically generated from the S-124 data, to supply legacy broadcast systems (NAVTEX, EGC).

  The navigational warnings produced are displayed on PING's public portal.

- Navigational warnings data for client systems are available through 2 web protocols:
  - a S-124 REST API
  - a WFS flow for GIS

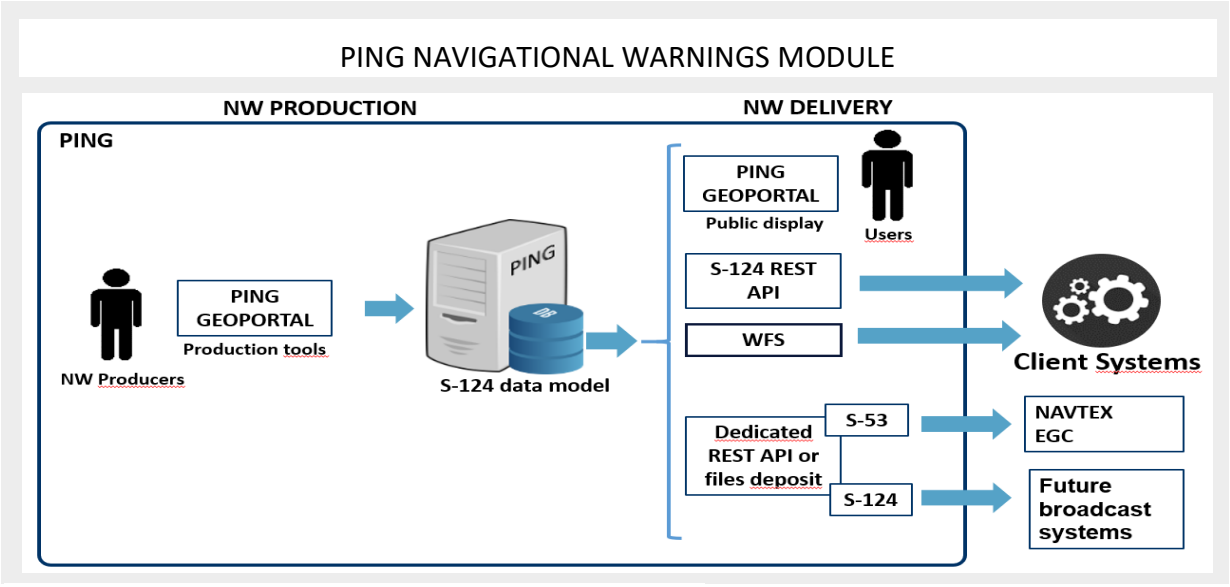

Figure 12 PING Navigational Warnings module overview

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Dedicated exchanges based on REST protocol or file deposit supply TELEX navigational warnings to NAVTEX stations and EGC systems and S-124 data to future broadcast systems enable to carry data at sea.

Although the WFS protocol does not strictly complies with the S-124 draft, the WFS was chosen considered it is an efficient protocol to supply maritime surveillance systems mostly based on GIS software.

3.2. Objective of the study

The study aimed to develop, implement and test the navigational warnings module focusing primarily on the ability to produce navigational warnings using the S-124 data model and to disseminate navigational warnings data to shore-based systems.

Participants were asked to test:

- the production navigational warnings through the portal's production tools
- the delivery and integration of navigational warnings trough 2 protocols: WFS and REST.

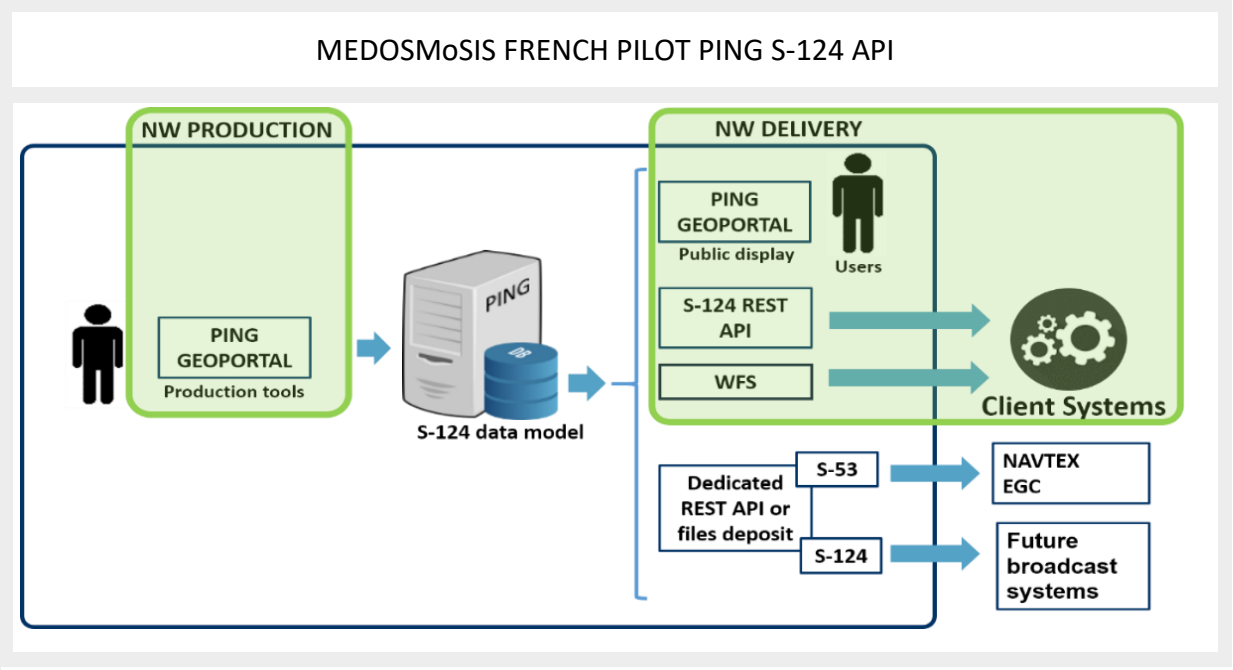

Figure 13 MEDOSMoSIS French PING S-124 API pilot study

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3.3. Implementation

3.3.1. Timeline

The study involved 3 main phases:

- Subcontracting and specifications
- Development
- Testing

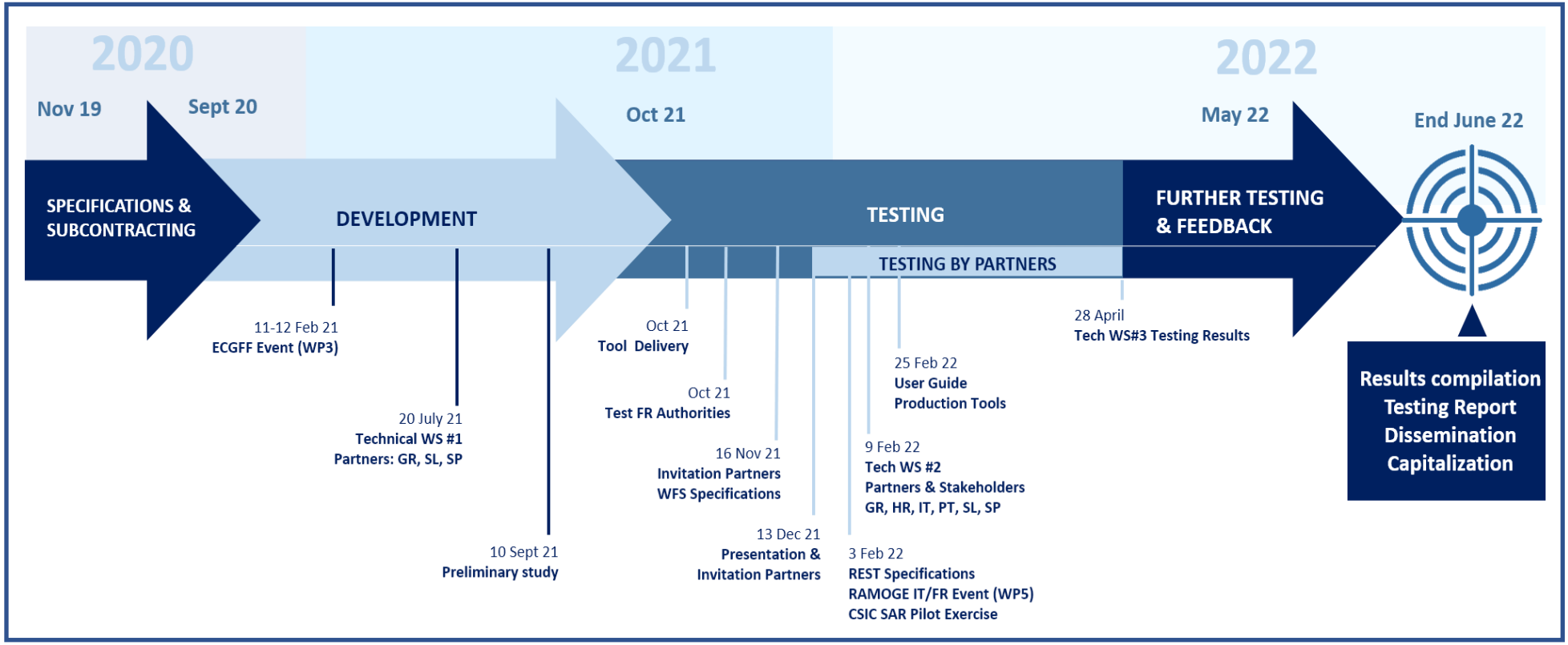

Figure 14 Pilot study timeline overview

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3.3.2. Subcontracting and Specifications

The drafting of the specifications and subcontracting took place from the beginning of the project until September 2020. Functional requirements were based on detailed user scenarios, with a portal for navigational warnings public end-users, producers of navigational warnings. The lessons learned from the 2016-2017 demonstration phase were taken into consideration.

The specifications also covered the data delivery to client systems, requiring to use well-known web technologies, a build-in API, data base, front layers (authentication, portal, services for outdoor use) with specific security access. Specifications referred to the last draft of the S-124 standard currently under development. The main technologies finally selected for the software were Java, PostgreSQL, OpenLayers, GeoServer, WFS, REST, stateless API.

The specifications also covered the data delivery to client systems, requiring to use well-known web technologies, a built-in API, data base, front layers (authentication, portal, services for outdoor use) with specific security access.

3.3.3. Development

The development phase involved:

- An agile method with 2 weeks sprints
- Incremental implementation
  - Models: maritime services, users, series of Navwarnings, NavWarnings (S-124)
  - Portal and tools according to user profiles
  - WFS API
  - REST API
- Tests by Shom

Over this period, Shom presented the study at a first workshop organized by the ECGFF in February 2021 and to French authorities. A more detailed presentation of the study was given during a first technical workshop in July 2021 during which Shom invited partners to participate. Greece, Spain and Hellenic Coastguards expressed their interest.

The preliminary study detailing the purpose of the module was produced and shared with MED OSMoSIS partnership in September 2021.

The portal and the production tools were delivered in October 2021 and an update was provided to the partnership.

The first production tests could be conducted by French authorities, mainly by Toulon authority.

In November 2021, the WFS API was delivered and its specifications were shared with the participants. Fictive navigational warnings produced by French authorities were made available through the WFS API.

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3.3.3.1 Data models overview and data delivery

The navigational warnings module as developed implements data models on which its functions are based. This chapter gives an overview of these models providing some keys for understanding the data services delivered by the module.

- Overview of the Module's general model

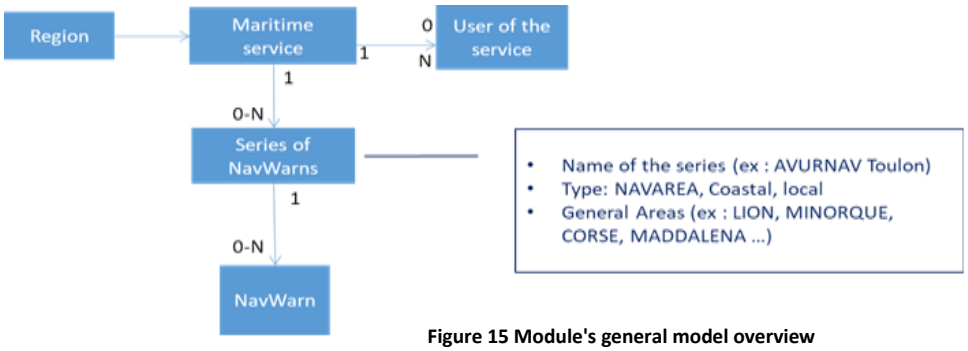

Figure 15 Module's general model overview

A maritime service is based in a maritime Region and is in charge of one or more series of navigational warnings.: Series of coastal warnings, series of local warnings (for example AVURNAV TOULON series, local warnings series).

Maritime services have their internal users: the operators producing the navigational warnings.

A navigational warning belongs to a series of navigational warnings (the navigational warning AVURNAV TOULON 12/22 belongs to the series AVURNAV TOULON which is a series of the Toulon authority)

PING is based on an API architecture and technology with specific security access.

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- Overview of S-124 navigational warnings model

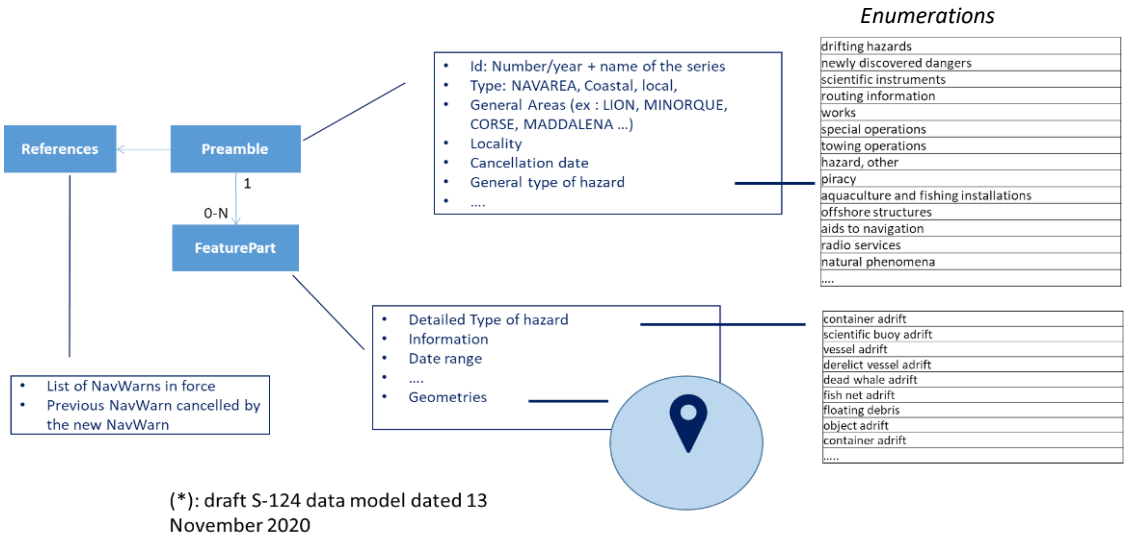

Figure 16 S-124 Navigational warning model

The module implements the draft S-124 data model (dated 13 November 2020). In PING, navigational warnings are created and stored according to this model.

A navigation warning is composed of a Preamble with 0, 1, or more associated spatialized Feature parts.

A Feature part is spatialized by 0, 1 or more geometries point, line, surface.

Most often, a navigational warning is made of 1 feature part and 1 geometry. In some cases, a geometry designates the area affected by the hazard (for example the range of an unlit light).

The Reference is used to provide the list of navigational warnings in force or to provide the ID of navigational warnings to be cancelled.

General types of hazards and detailed types of hazards are standardized enumerations of cases.

Using this enumeration, it is easy to display the essential information from the navigational warning. The user can select the language of his preference between English and French.

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3.3.3.2 Data delivery: characteristics of WFS and REST protocols

- S-124 REST API

The S-124 REST API delivers navigational warnings in accordance with the S-124 data model and uses the GML syntax. Here is example of S-124 data delivered by the module for one navigation warnings:

Typically, the REST API delivers the navigational warnings in-force in a chosen series.

- GET NavWarns in force in a series, in a language
- **S-124 conformance**


```
−<S124:DataSet>
 −<imember>
  −<S124:NWPreamble gml:id="PR.AVURNAV_TOULON.4005.2021">
    <id>NW.AVURNAV_TOULON.4005.2021</id>
   −<messageSeriesIdentifier>
      <nameOfSeries>AVURNAV TOULON</nameOfSeries>
      <warningNumber>4005</warningNumber>
      <warningType>COASTAL_NAVIGATIONAL_WARNING</warningType>
      <year>2021</year>
      <language>fr</language>
      <productionAgency>CECMED</productionAgency>
    </messageSeriesIdentifier>
    <publicationDate>2021-10-21T16:01:50.173792Z</publicationDate>
   −<generalArea>
    −<locationName>
       <text>ELBE</text>
     </locationName>
    </generalArea>
    <warningHazardType>DRIFTING_HAZARDS</warningHazardType>
    <theWarningPart xlink:href="#NW.AVURNAV_TOULON.4005.2021.1"/>
  </S124:NWPreamble>
 </imember>
−<imember>
 −<S124:NavigationalWarningFeaturePart gml:id="NW.AVURNAV_TOULON.4005.2021.1">
    <id>NW.AVURNAV_TOULON.4005.2021.1</id>
   −<geometry>
    −<S100:pointProperty>
     −<S100:Point>
      −<gml:Point srsName="EPSG:3857">
         <gml:coordinates> 1073923.1730454788,5291083.980565329 </gml:coordinates>
       </gml:Point>
      </S100:Point>
     </S100:pointProperty>
    </geometry>
   −<S124:warningInformation>
      <warningType>CONTAINER_ADRIFT</warningType>
      <information>42-51.76N 009-38.83E</information>
    </S124:warningInformation>
    <header xlink:href="#PR.AVURNAV_TOULON.4005.2021"/>
  </S124:NavigationalWarningFeaturePart>
 </imember>
</S124:DataSet>
```


Figure 17 REST API Protocol for advanced integration and delivery of S-124 datasets

- Overview of the WFS API

The WFS protocol[8] is normally easy to integrate into GIS and does not require software development on the client side. However, it brings a constraint: in WFS 1 feature is spatialized by 1 geometry. That implies that S-124 data must be transformed as in S-124 model a feature part may be spatialized by several geometries and 1 navigational warning may have several Feature parts. The solution chosen is to duplicate the S-124 preamble and the S-124

[8] WFS: Web Feature Service protocol of the Open Geospatial Consortuim

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feature part on each geometry of the S-124 feature to obtain the WFS features. Technical identifiers are used to reflect the links between the WFS feature and the components of the original S-124 navigational warnings.

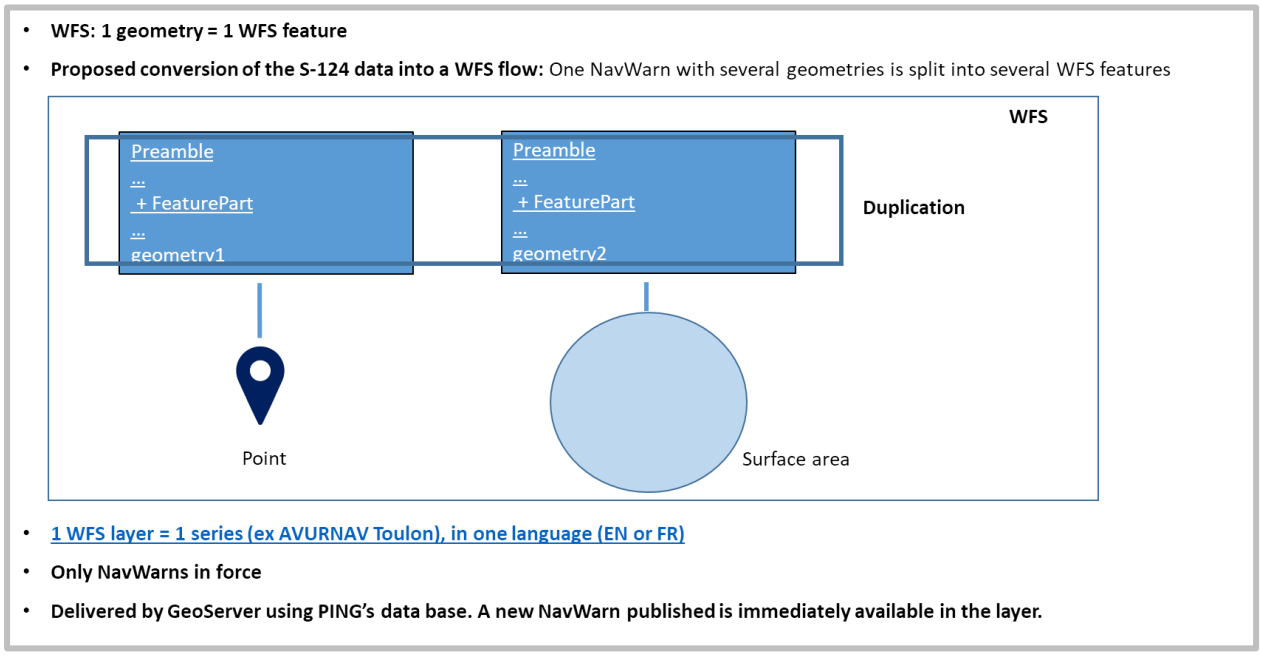

Figure 18 Model overview of WFS for easy integration

Typically, the WFS flow delivers the navigational warnings in-force in a chosen series.

Here is example of navigational warning with one S-124 feature part with 2 points delivered by WFS API:


```
{
"type": "Feature",
"id": "nw_published_all.fid-93ed855_17a432105f6_-755b",
"geometry": {
"type": "Point",
"coordinates": [-560437.9764, 6181208.873]
},
"geometry_name": "geom",
"properties": {
"warningid": "b4d9a5a2-fc88-4746-a4f4-9b5782e99bd9",
"warningtype": "LOCAL_WARNING",
"nameofseries": "AVURNAV local Brest",
"warningnumber": 1,
"year": 21,
"generalarea": "Finistère",
"locality": "Chenal du Fromveur",
"warninghazardtype": "RESEARCH_OR_SCIENTIFIC_OPERATIONS",
"publicationdate": "2021-01-01T04:00:00Z",
"cancellationdate": null,
"language": "fr",
"productionagency": "CECLANT",
"country": "FR",
"featurepartid": "754c2e08-bb04-4c9d-9c19-03b65da2473b",
"featurepartposition": 1,
"featurepartwarningtype": "SCIENTIFIC_SURVEY",
"featurepartinformation": "Les usagers sont informes de la mise à
l'eau de deux instruments de mesure dans le chenal du Fromveur du 07
septembre 2020 au 30 avril 2021 inclus. Annuler ce message le 010000 UTC
mai 21.",
```


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```
"featurepartdate": "2020-09-07 10:00:00/2021-05-01 00:00:00",
"type": "geom"
},
"bbox": [-560437.9764, 6181208.873, -560437.9764, 6181208.873]
},
{
"type": "Feature",
"id": "nw_published_all.fid-93ed855_17a432105f6_-75e3",
"geometry": {
"type": "Point",
"coordinates": [-560382.3167, 6181124.9649]
},
"geometry_name": "geom",
"properties": {
"warningid": "b4d9a5a2-fc88-4746-a4f4-9b5782e99bd9",
"warningtype": "LOCAL_WARNING",
"nameofseries": "AVURNAV local Brest",
"warningnumber": 1,
"year": 21,
"generalarea": "Finistère",
"locality": "Chenal du Fromveur",
"warninghazardtype": "RESEARCH_OR_SCIENTIFIC_OPERATIONS",
"publicationdate": "2021-01-01T04:00:00Z",
"cancellationdate": null,
"language": "fr",
"productionagency": "CECLANT",
"country": "FR",
"featurepartid": "754c2e08-bb04-4c9d-9c19-03b65da2473b",
"featurepartposition": 1,
"featurepartwarningtype": "SCIENTIFIC_SURVEY",
"featurepartinformation": "Les usagers sont informes de la mise à
l'eau de deux instruments de mesure dans le chenal du Fromveur du 07
septembre 2020 au 30 avril 2021 inclus. Annuler ce message le 010000 UTC
mai 21.",
"featurepartdate": "2020-09-07 10:00:00/2021-05-01 00:00:00",
"type": "geom"
},
```


The preliminary study detailing the purpose of the module was produced and shared with the MED OSMoSIS partnership in September 2021. The development phase ended with the tool's delivery in October 2021, and the first tests could be conducted by the French Authorities.

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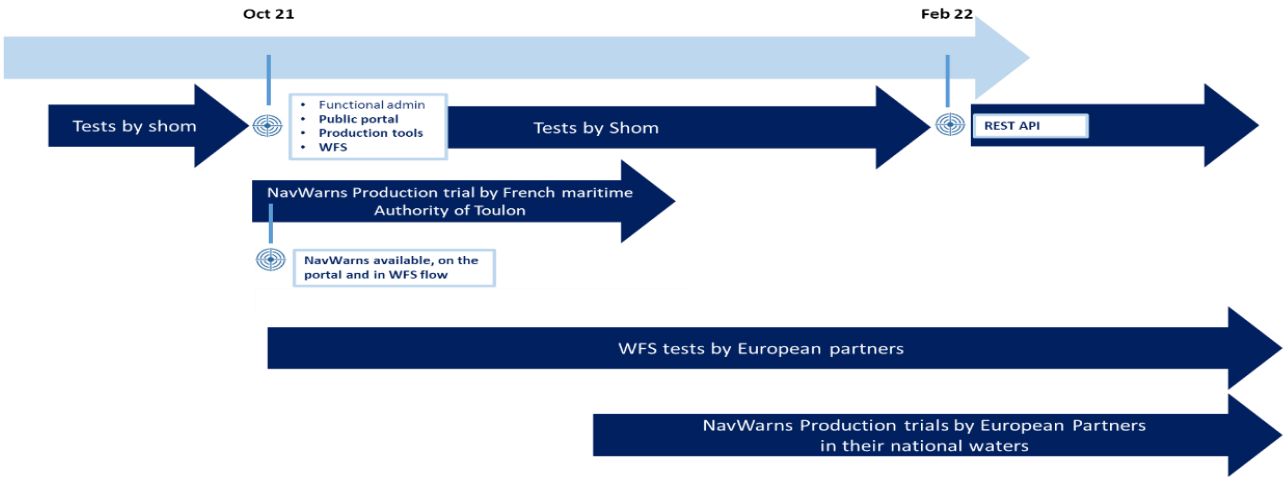
3.3.4. Testing phase: steps and tools



The testing phase was carried out in two steps:

- a first phase involving tests at a national level
- a second phase involving tests with MED OSMoSIS Partners and European stakeholders

During this period, Shom issued the documentation necessary to the testing:

- WFS API protocol Specifications
- REST API protocol Specifications
- PING portal production tools User Guide

The specifications for the WFS API protocol were shared with the participants in November 2021. The REST API protocol and User Guide for the portal's production tools were shared with participants.

As PING was in a development and testing phases, the access to PING on Internet was restricted to authorized IP addresses.

- *Testing by French national authorities*

At the national level, Shom carried out the first tests. Further tests were then carried out by the French Maritime Authority in Toulon. These tests ensured that navigational warnings could be produced by an entity other than Shom, with no expertise and not familiar with the PING system.

The first warnings produced in Mediterranean Sea by Toulon authority in the AVURNAV TOULON series were used to be displayed the on the portal and feed the WFS flow.

The French Authorities of Cherbourg (La Manche) and Brest (Atlantic) produced also some other French warnings in parallel.

All navigational warnings produced were fictive.

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- *Testing by MED OSMoSIS participants*

Once the testing by national authorities was well advanced, Shom invited the MED OSMoSIS participants to perform the following actions:

- Provide an IP address so Shom could grant an access to the PING platform
- Browse the platform and view nav warnings previously issued by French authorities
- Test the WFS protocol to integrate into a client system a NW issued by French authorities
- Test the REST protocol to integrate into a client system a NW issued by French authorities
- Produce a NW in their country waters using PING portal's tools
- Integrate NW produced in their own waters into their client system

Shom asked the participants to fill an online briefing form asking them to:

1) advise which functionalities they were willing to test
2) provide necessary information related to the creation of their own navigational warnings in their area: maritime service, series…
3) pass on to any potential third party interested in participating to the study
4) provide consent for the sharing of their details in the framework of the study

The online form available in Appendix and here:

https://docs.google.com/forms/d/17SJn5BeyoLmGK4HdcB_Pb82MKITtjoNMAScezFHD7jk/

A summary recapitulating the actions to be performed by both Shom and participants including links to access the supporting documentation for the completion of the tests was sent to participants shortly after the second technical workshop held on the 9th February.

The table below provides the detail of the steps followed and tools used during the length of the study.

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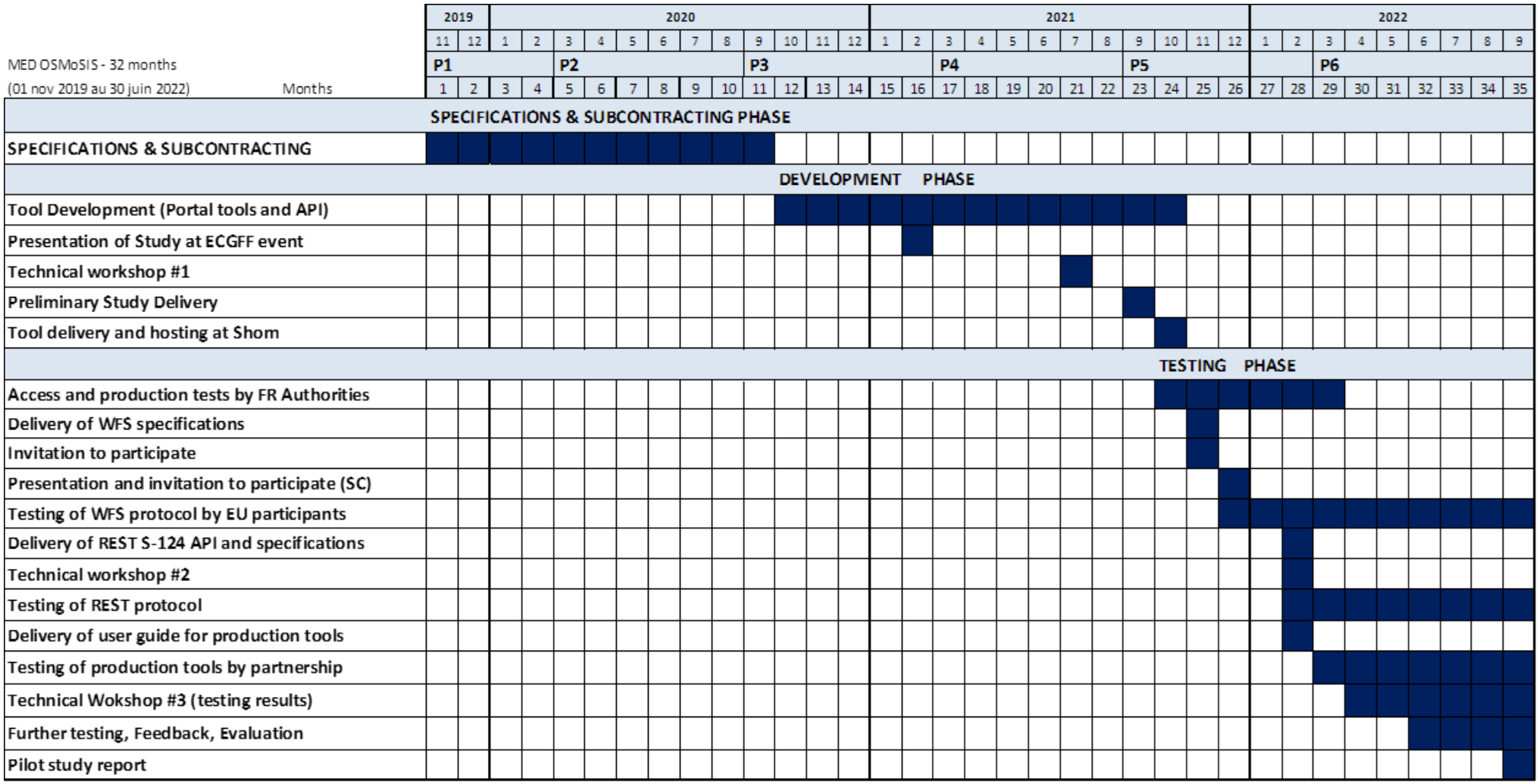

Figure 19 Pilot study steps and tools

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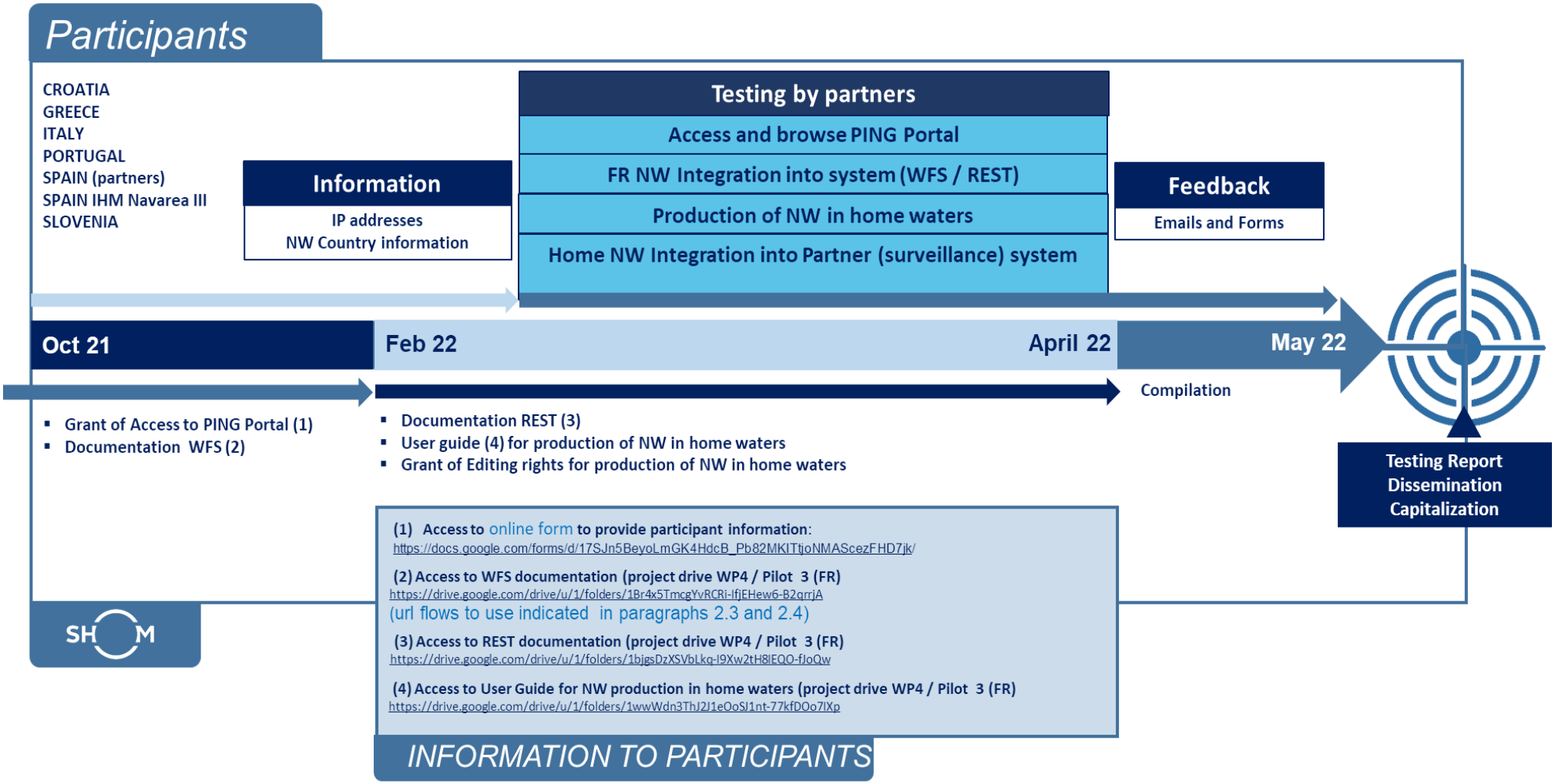

Figure 20 PING pilot study stakeholders tasks and tools

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3.3.5. Participants

Figure 21 Participants overview

The MED OSMoSIS partners Hellenic Coast Guards, CSIC, University of Ljubljana expressed their interest to participate at the first technical workshop held in July 2021.

Following several exchanges between partners within the framework of the project, a transborder workshop involving maritime surveillance authorities from Italy, France and Monaco (WP5 transferring workshop RAMOGE) and a second technical workshop held on the 9th February 2022, the Portuguese Hydrographic Institute and Croatian Hydrographic Institute, then the Spanish Hydrographic Institute also NAVAREA III coordinator and Italian Hydrographic Institute joined the testing process.

Shom held its third technical workshop on the 28th April 2022 to present the results of the study. However, participants were able to carry on with their testing until the end of May 2022.

The following table recapitulates the types of tests carried out by the participants.

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PARTICIPATION	ORGANISATION	GRANT OF ACCESS (Provision of IP)	NW visualization & Browsing	API Testing through WFS PROTOCOL	Creation of EDITING account	NW Production through portal tools in home waters	Display of NW produced in surveillance system (EX: CG)	API Testing through REST PROTOCOL
FRANCE	Shom	✓	✓	✓	✓	✓		✓
	CND (Toulon)	✓	✓			✓		
SLOVENIA	University of Ljubljana	✓	✓					
SPAIN	CSIC & Valencia Port	✓	✓	✓			✓	
	IHM Cadiz NAVAREAIII	✓	✓		✓	✓		
GREECE	Hellenic Coast Guards	✓	✓	✓			✓	
CROATIA	Hydrographic Institute	✓	✓	✓	✓	✓		
PORTUGAL	Hydrographic Institute	✓	✓	✓	✓	✓	✓	✓
ITALY	Hydrographic Institute	✓	✓		✓	✓		

Figure 22 Tests carried out per participant

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4. Testing

At a national level, tests were successfully carried out by the French regional Authorities of Cherbourg, Brest and Toulon, and by NAVAREA II coordinator (Shom).

4.1. Geoportal display of navigational warnings

On the PING portal, navigational warnings are displayed on a nautical chart basemap. When rolling the mouse over the number of the navigational warning, a short indication of the type of hazard are displayed. Navigational warnings are also available into tables. The map and the tables can be filtered.

A click on a specific NW generates a pop-up window displaying the associated NW information.

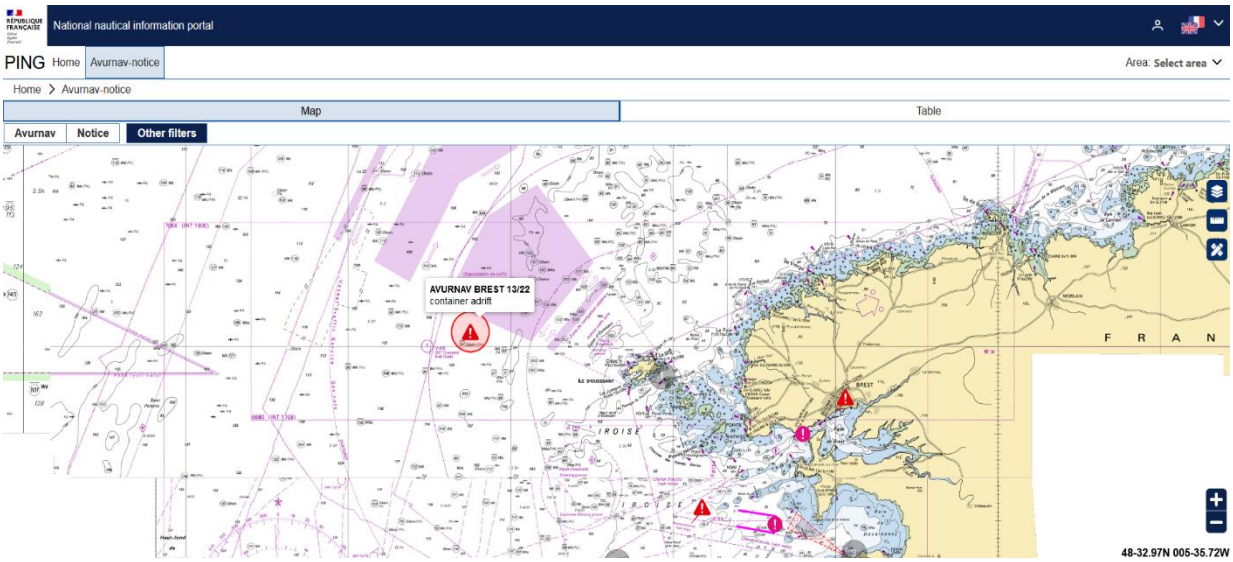

Figure 23 Display of Nav warnings from PING database using S-124 data model

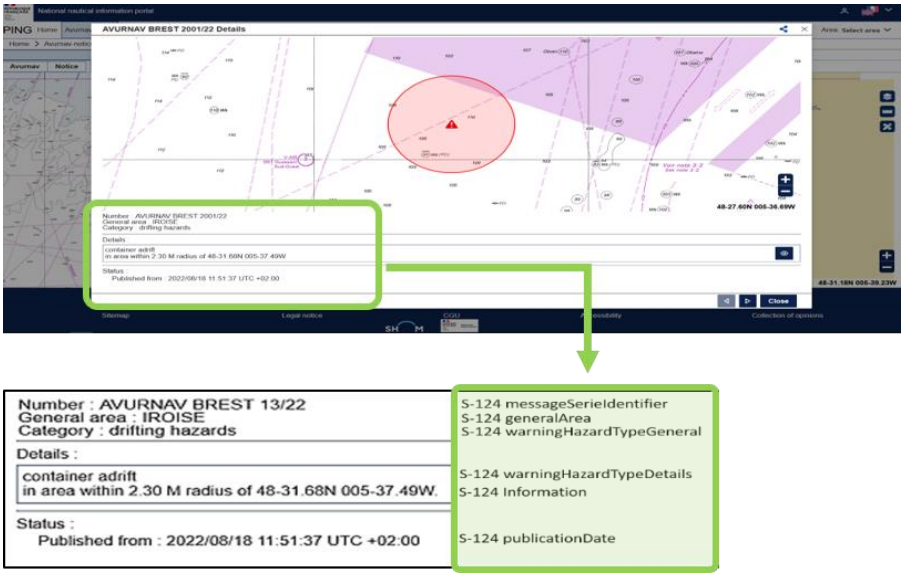

Figure 24 NW details display pop-up window and corresponding format

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The platform is available in both English and French, and successfully displays navigational warnings in both languages as per shown in the figure below.

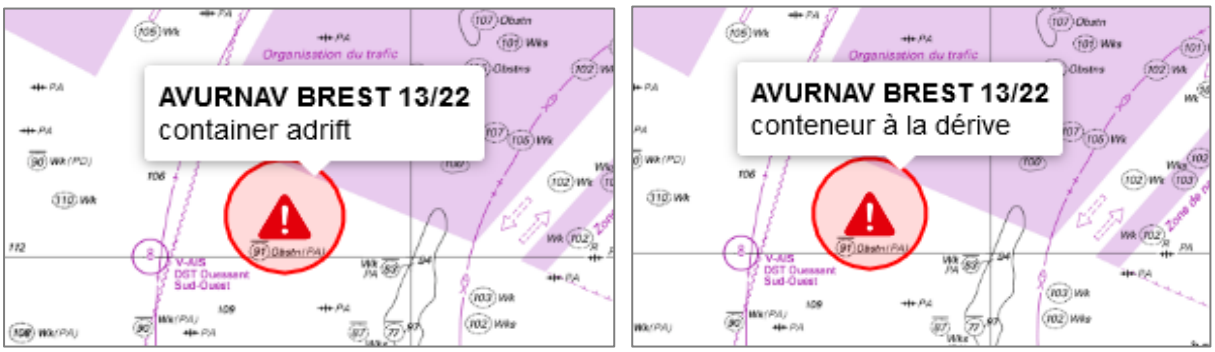

Figure 25 Display of Navigational warning in both English and French

4.2. Testing of navigational warnings production

4.2.1. Production tools

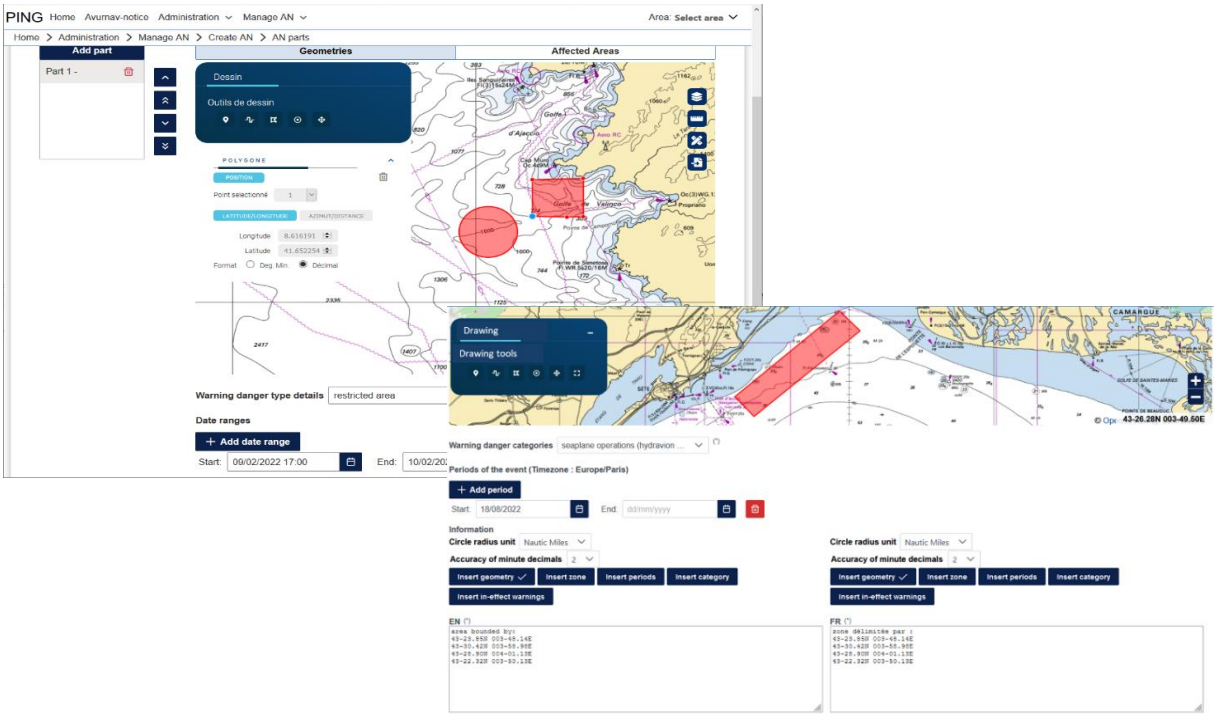

Figure 26 Online production tools based on S-124 data model

The geoportal's tools were successfully tested and showed a good usability: they proved to be intuitive, with no requirement for an expertise in S-124 model. The tools enable the generation and display of navigational warnings in English and French using the S-124 data model.

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Once created on the portal, the navigational warnings become automatically available in WFS flow and REST API.

In order to enable the testing of the production tools and creation of navigational warnings by the participants in their own waters, new maritime services and associated series of Navigational Warnings were created into PING, as shown below, for the following participants:

- Instituto Hidrográfico of Portugal,
- Hydrographic Institute of the Republic of Croatia
- -Instituto Hidrográfico de la Marina of Spain (NAVAREA III coordinator)

Portugal		
Maritime services	**Series**	**Type**
CENCOMAR	ANAV CONTINENTAL	Costal Warnings
CENCOMARMADEIRA	ANAV MADEIRA	Costal Warnings
Capitania do Porto do Douro	AL DOURO	Local Warnings
Capitania do Porto de Faro	AL FARO	Local Warnings

Croatia		
Maritime service	**Series**	**Type**
Hidrographic Institute of Republic of Croatia	CRONAV	Costal Warnings

Spain		
Maritime service	**Series**	**Type**
Instituto Hidrografico de la Marina–NAVAREA III	NAVAREA III	Navarea

Figure 28 Marine services and series created into PING for testing

4.2.2. Production of navigational warnings by participants

As a result, the French regional authorities of Toulon and the hydrographic institutes of Croatia, Italy, Portugal and Spain (Navarea III coordinator) were able to produce successfully several types of warnings among which “operation on cable” or “scientific buoy adrift” warnings.

A Search and Rescue navigational warning was issued by Toulon authority on the occasion of the Franco-Spanish rescue exercise led by partner CSIC on the 3rd February 2022 in the framework of the Spanish pilot study (4.3.4). This NW was later integrated by partners CSIC and Valencia Port Fundation into the Cosmo-View tool.

The Portuguese Hydrographic Institute produced numerous coastal and local warnings.

The Spanish Hydrographic Institute and NAVAREA III Coordinator also produced a navigational warning related to “Possible drifting mines in the West of the Black sea”.

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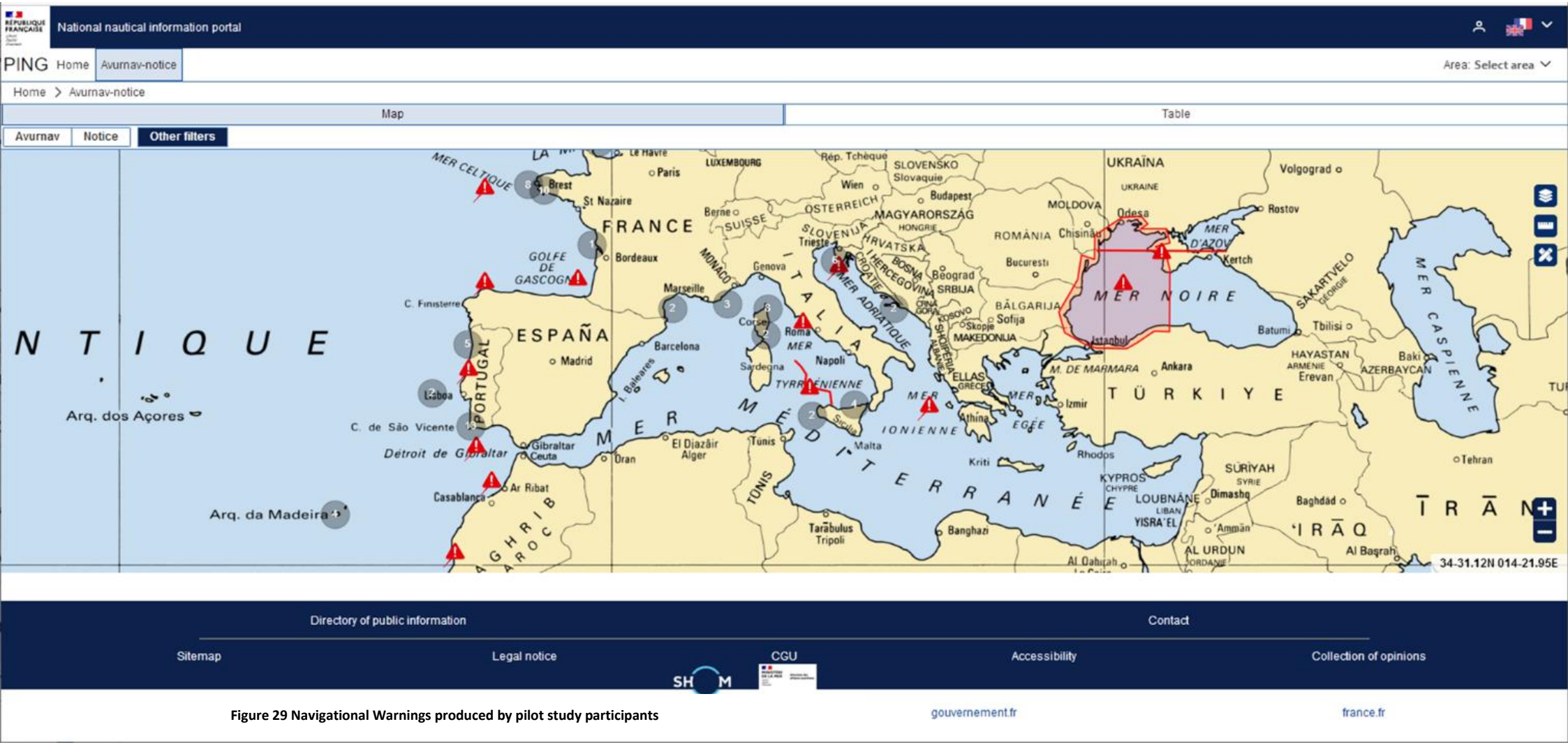

Figure 29 Navigational Warnings produced by pilot study participants

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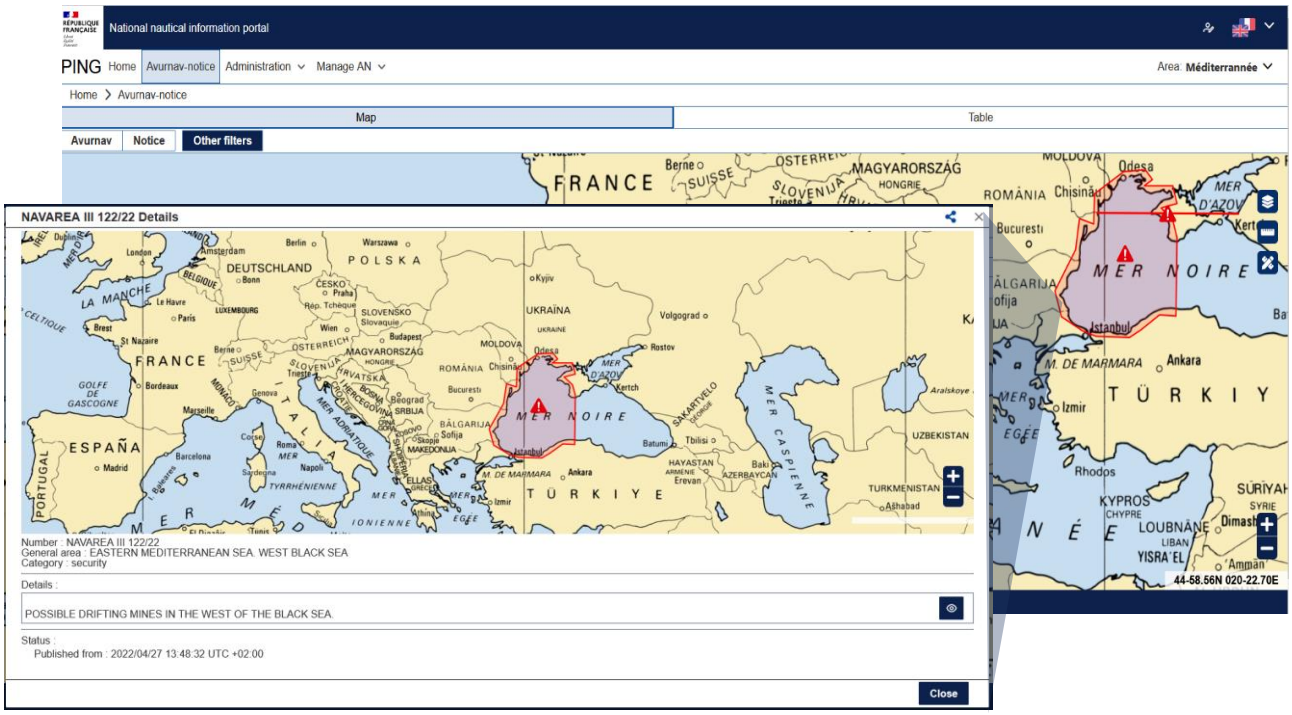

Figure 30 Detail of NW produced by NAVAREA III Coordinator

4.2.3. Feedback

Feedback received from participants over the testing period was very positive and gave useful information and directions to enable improvement. The feedback relates to the usability, buggs and defects encountered, as well as ideas and suggestions, as summarized below:

Usability

- Participants from Croatia, France, Portugal and Spain successfully tested the platform and tools and found them easy to use
- Portal and tools were described as intuitive and not requiring much training
- The creation of a NavWarn in the S-124 model is understandable

Buggs

- When consulting a punctual navigational warning, the map display is too zoomed (feedback from FR and PT)
- Occasional Pro sign-in failures were encountered (feedback from HR)

Defects

- Ergonomics for the addition of a *Sector* and *Locality* need improvement (feedback from FR and PT)
- An English option for the text to fill in related to the Locality should be made available (feedback from FR)
- Basemap charts are missing in areas distant from France (feedback from all partners)

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- The generation of texts for NAVTEX (or safetyNET) is missing (feedback from FR)
- In some tables, some titles occasionally overlap (feedback from HR)
- In some of the menus, some items do not show at the right place (feedback from HR)

Ideas and suggestions

- Addition of filters on polygons (drawing tool), charts and publications in order to show related navigational warnings
- Synchronization of map and table filtering
- Make status, publication date and cancellation date always visible
- Addition in the navigational warning of the reference to the affected nautical charts

This feedback was very constructive and Shom carried out some improvements since the tests were completed: the platform now runs with the functionality of automatic generation of S-53 format, for example.

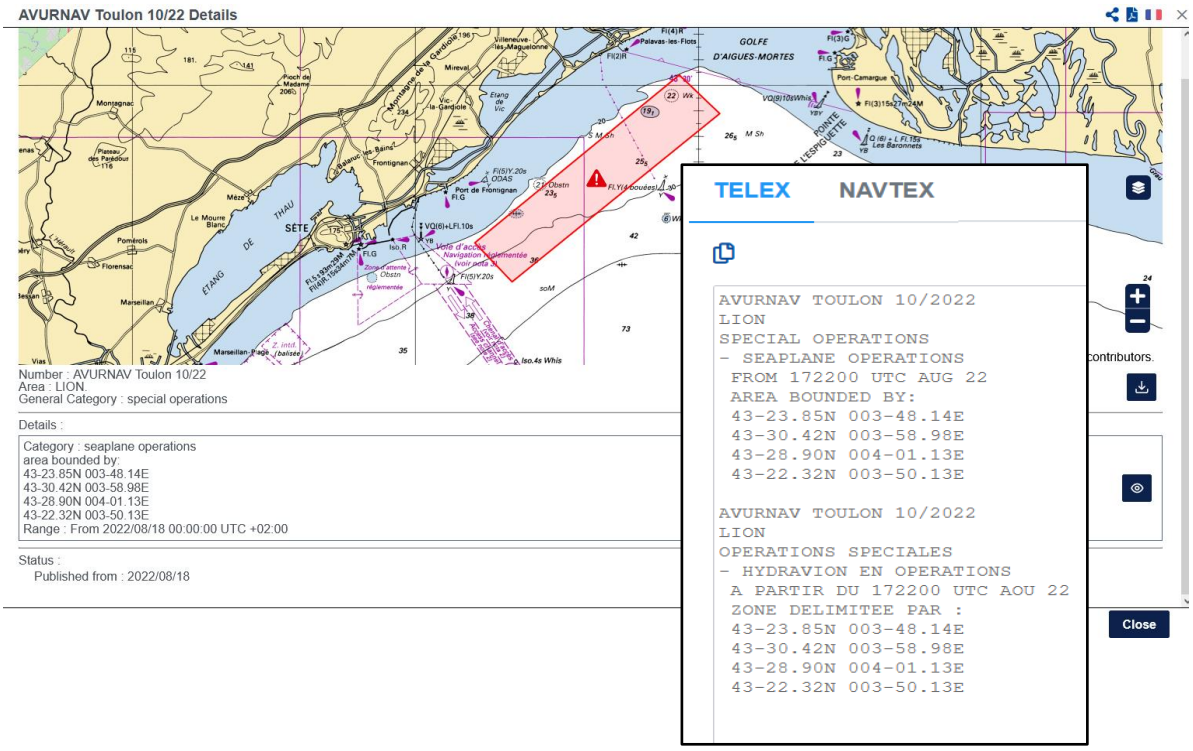

Figure 31 Improvement since testing: S-53 format automatic generation

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4.3. WFS Testing

4.3.1. Display

- In Openlayer (Shom's Mapit system – layers tester)

The testing of the integration of the various series was successful and completed using Shom's Openlayer Mapit system.

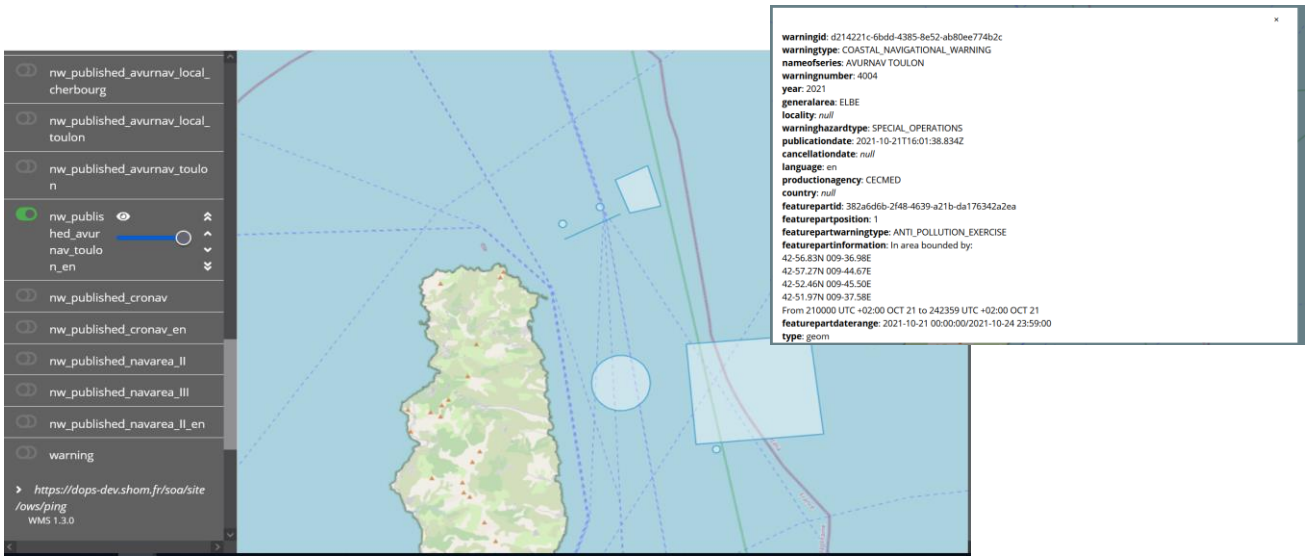

Figure 32 Successful display of French TOULON AVURNAV series in Openlayer Mapit system

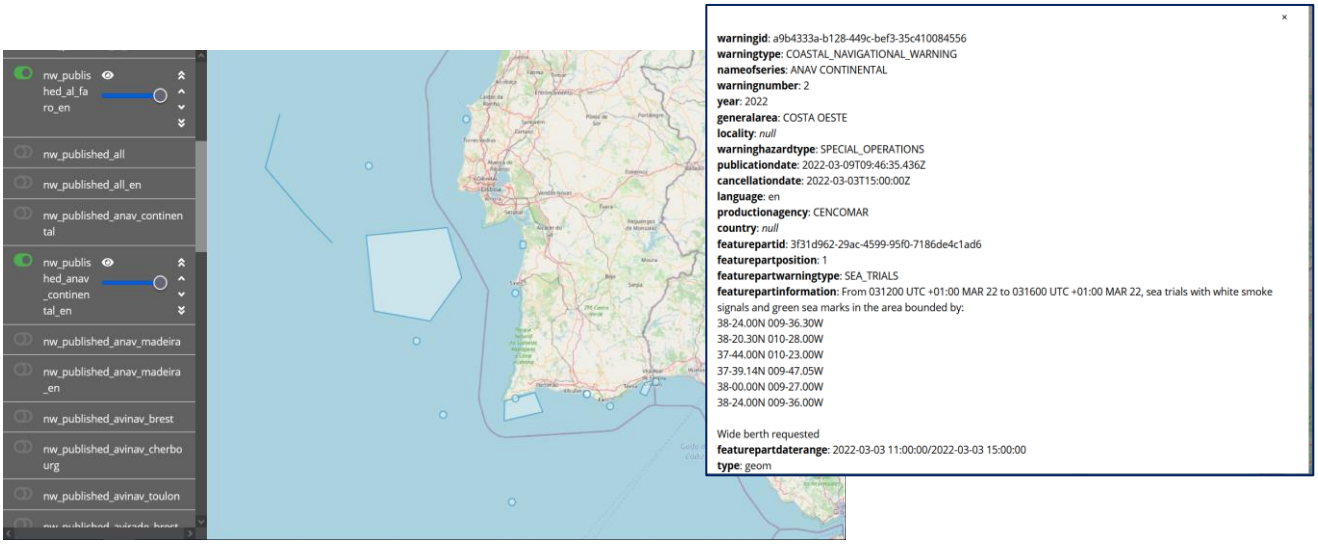

Figure 33 successful display of AL FARO and ANAV CONTINENTAL series, Instituto Hidrográfico, Portugal

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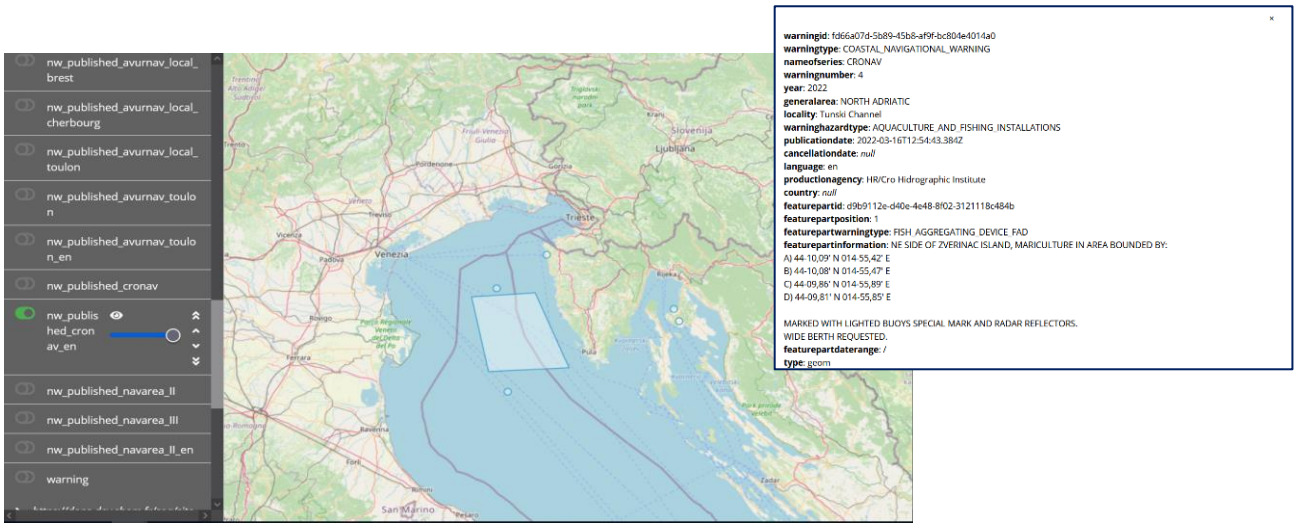

Figure 34 Successful display of CRONAV series – Hydrographic Institute of the Republic of Croatia

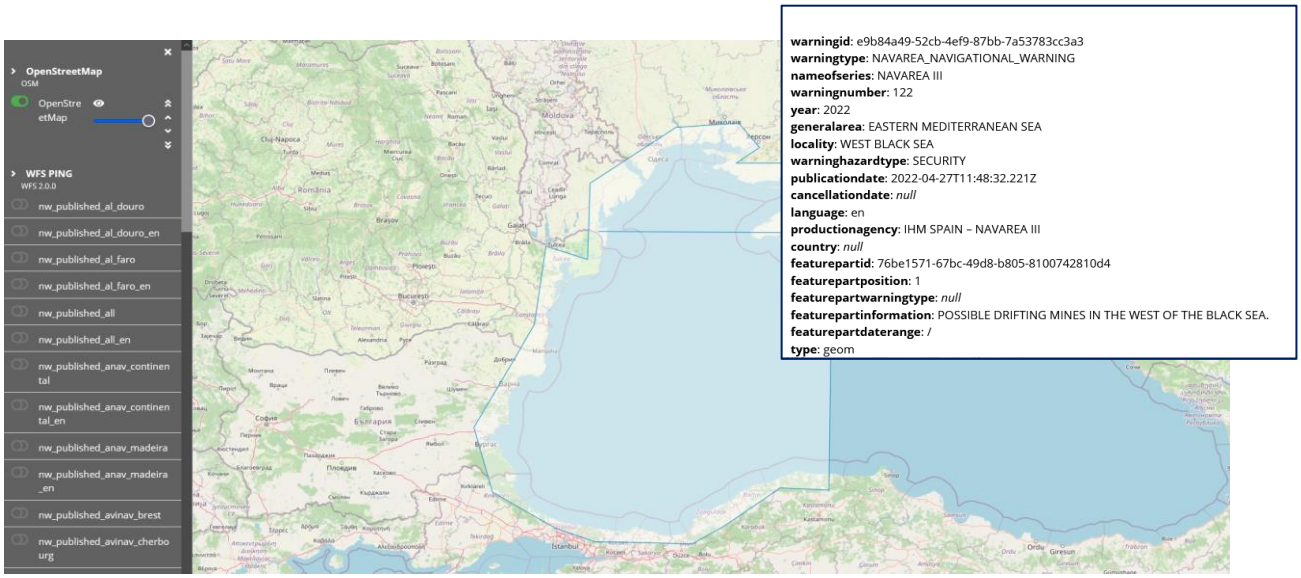

Figure 35 NAVAREA III series displayed – Instituto Hidrográfico de la Marina of Spain

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- In QGIS

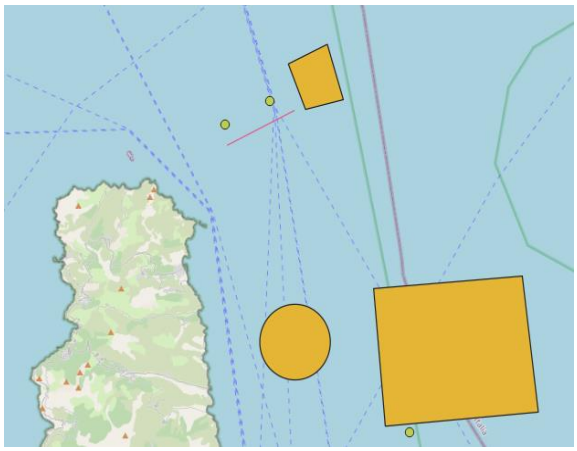
When using the Internet Menu of QGIS, the WFS integration was correct and very easy to achieve.

The testing enabled to spot a default occurring in QGIS with the Feedback from the Portuguese Hydrographic Institute indicated that in QGIS, if imported using the “add a WFS layer tool”, only one type of geometry was imported: either polygons, either points.

This testing would imply that some GIS software don’t manage correctly WFS with multi-types of geometries (point, line, surface) like the WFS of PING. An option could be to generate one WFS flow for each type of geometries.

Menu: Internet/WFS 2.0 Client/WFS 2.0 Client

- **Successful**



Menu: Layer/Add a layer/Add a WFS layer

- **Feedback from Portugal: only 1 type of geometry is imported.**
- **Only polygons for example, or only points**

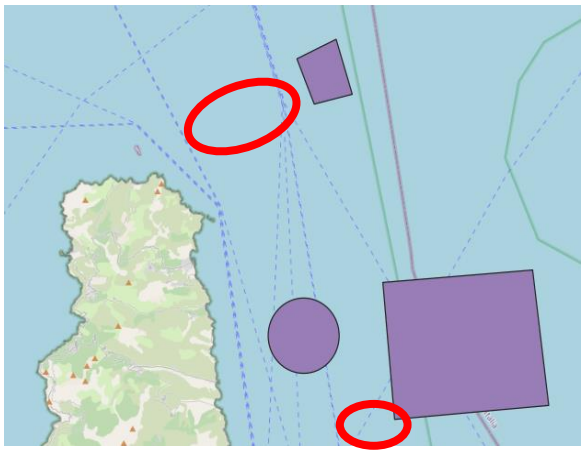


Figure 36 Limitation spotted using display in QGIS

Another point is that small lines are not visible on screen and need to reinforced the symbology for lines.

These points suggest that an image stream such as WMS (Web Map Service) might be more secure and practical than WFS (Web Feature Service) for some GIS. The portrayal would be that of PING. In this case, the WMS would be used for basic graphical display only on the client GIS when WFS allows advanced used of the data provided. The WMS supplementary option is feasible due to the architecture of the module.

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4.3.2. Integration into client systems

The Spanish partner CSIC was the first partner to test the integration though WFS into the Cosmoview tool when a navigation warning issued from TOULON on the 3rd February 2022 on the occasion of a Search and Rescue exercise organized in the framework of the Spanish pilot study carried out in Franco-Spanish waters. This integration into the COSMOVIEW system was demonstrated by CSIC during the Technical Workshop #2 held on the 9 February 2022.

During the 3rd and final technical workshop on the 28th April 2022, the Instituto Hidrográfico of the Portuguese Navy and the Portuguese Maritime Geospatial, Meteorological and Oceanographic Centre (CGEOMETOC) shared the WFS integration of the NW produced in Portuguese waters into their operations support systems GEOMETOC. A demonstration was also made by the Greek partner from the Hellenic Coast Guards sharing how all the navigational warnings produced by all participants during the pilot study had been integrated into the new Hellenic GIS portal, the specific web application GEOHUB (geohub.hcg.gr) developed by Greece specifically within the MED OSMoSIS project.

The information associated to the NW could be displayed and interrogated in each case.

- Spain: WFS Integration of NW into COSMOVIEW during Spanish SAR exercise

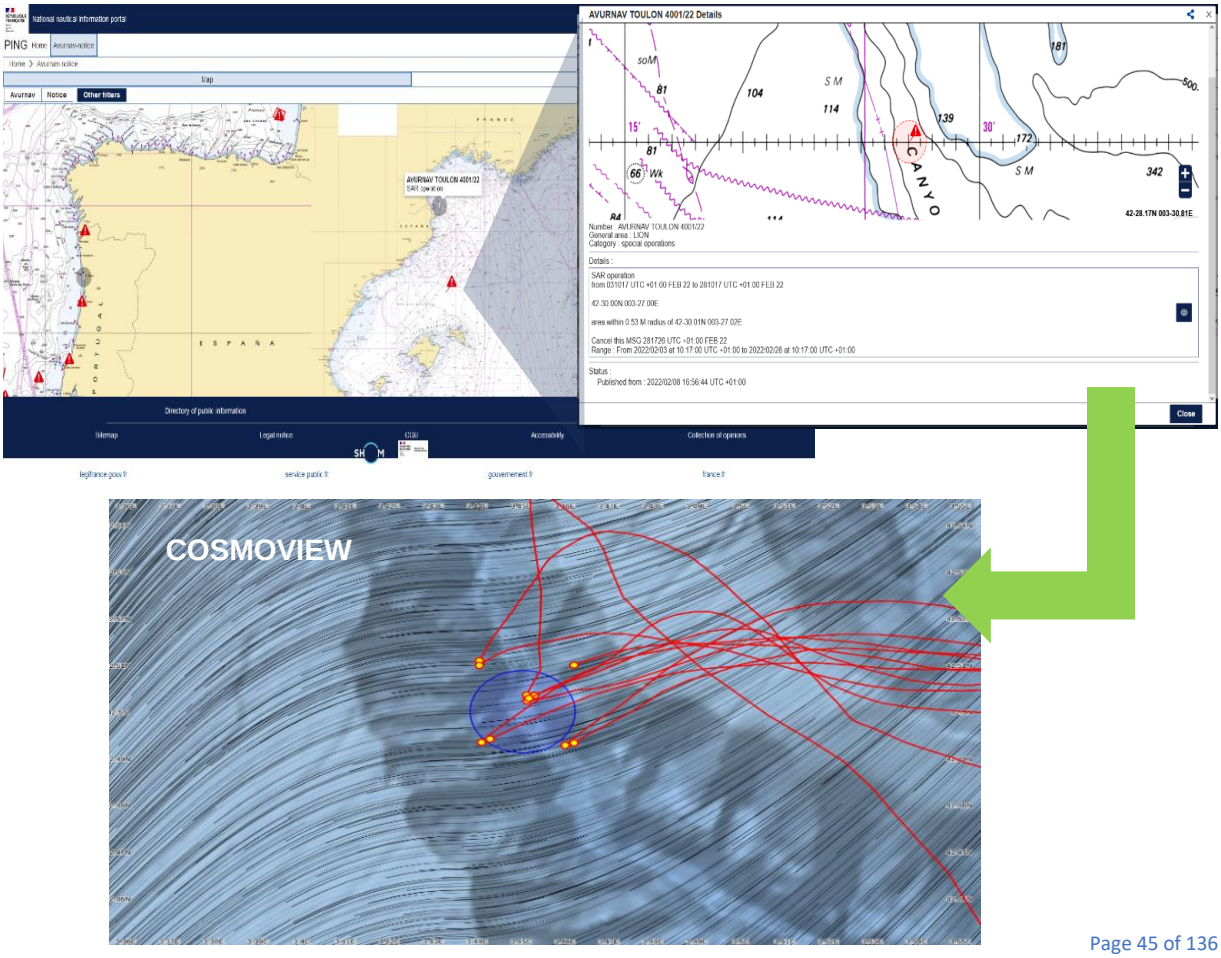

Figure 37 Spain: WFS Integration of NW into COSMOVIEW

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- Portugal: Integration into GEOMETOC (maritime surveillance system)

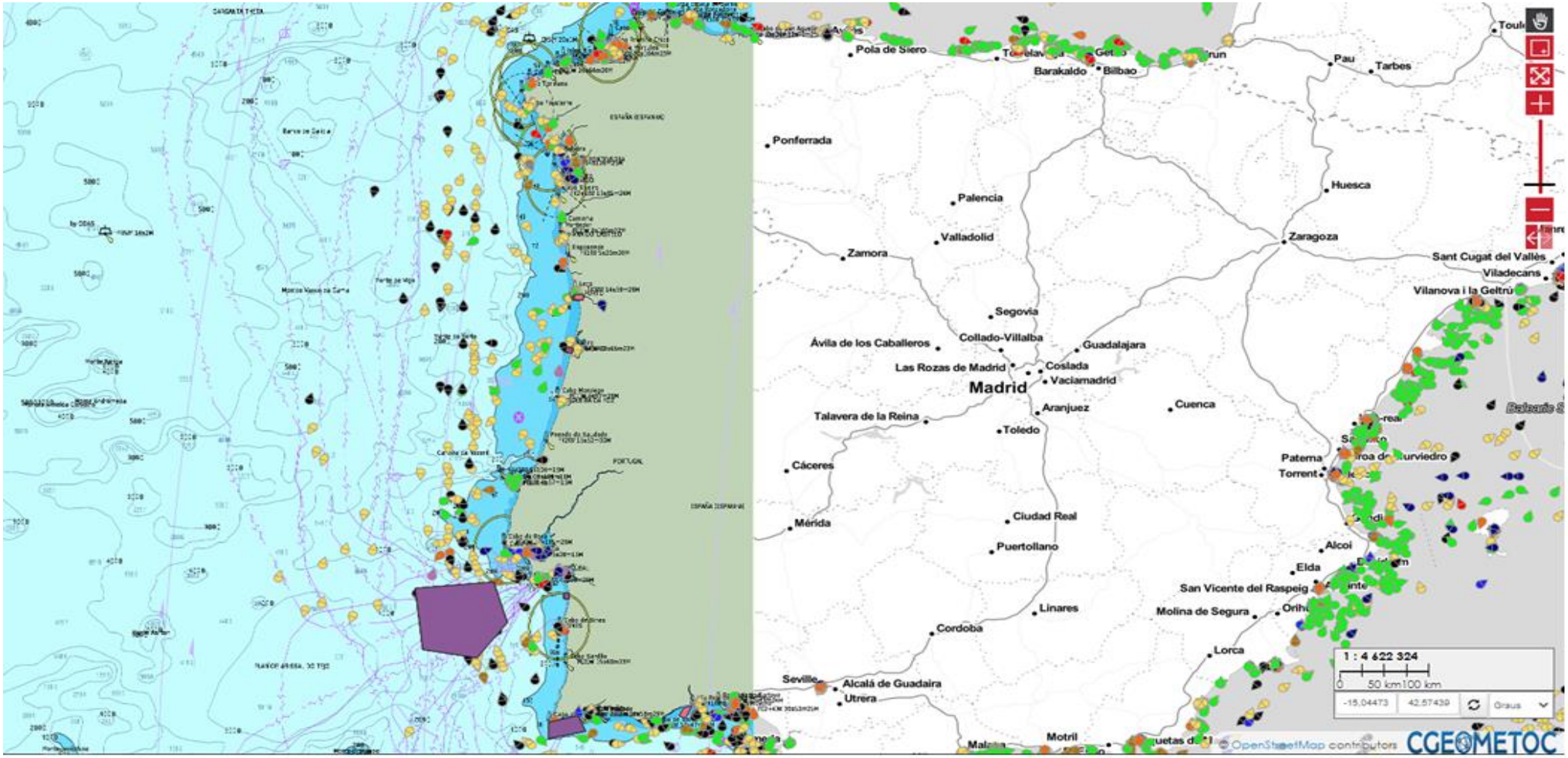

Figure 38 Portugal: WFS integration of NW into Geometoc

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- Hellenic Coast Guards: Integration into GIS Portal: https://geohub.hcg.gr

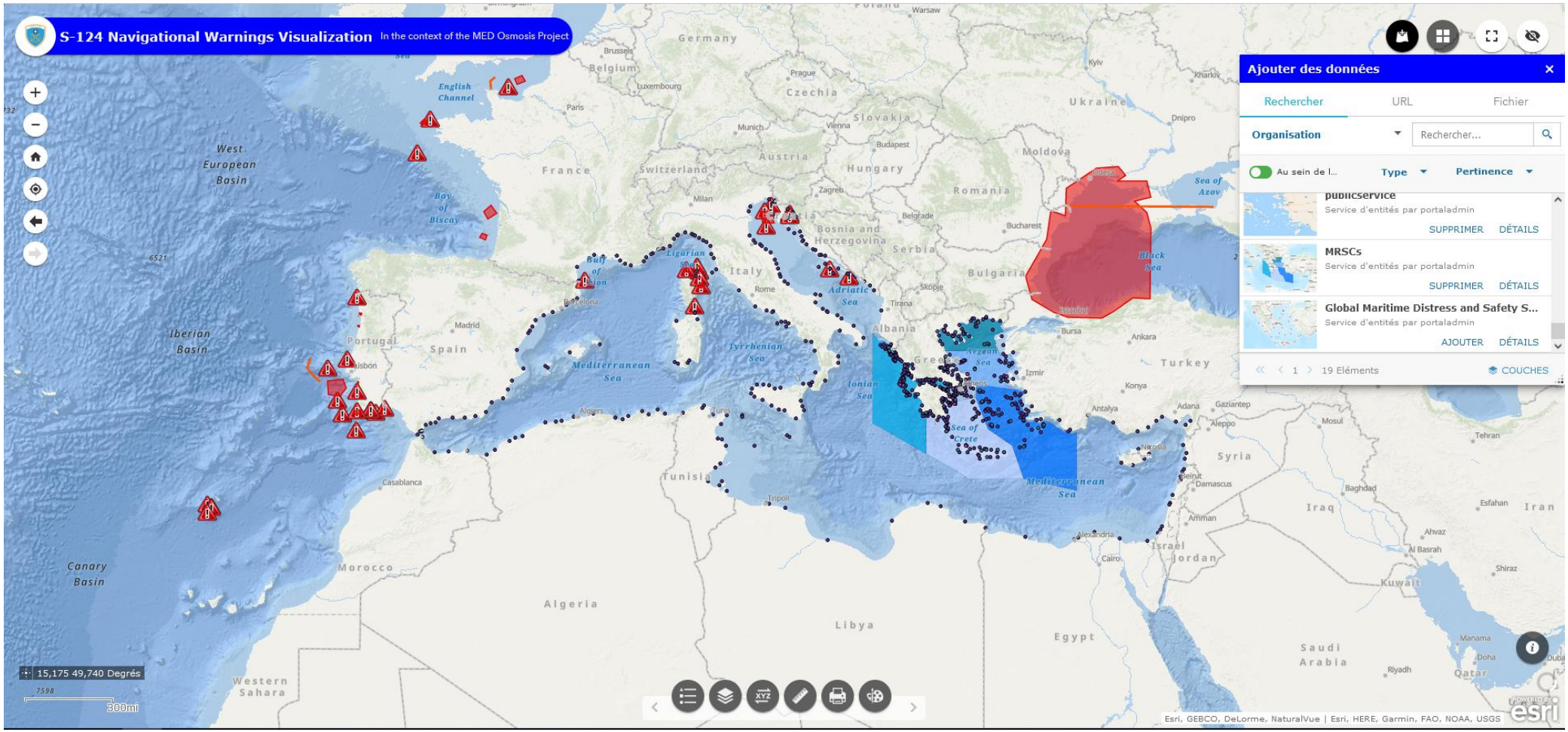

Figure 39 Greece: Display of NW on Hellenic new GIS portal

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4.4. S-124 REST API Testing

The PING module delivers navigational warnings data in accordance with the S-124 standard through its S-124 REST API as shown below:


```
−<S124:DataSet>
  −<imember>
    −<S124:NWPreamble gml:id="PR.AVURNAV_TOULON.10.2022">
      <id>NW.AVURNAV_TOULON.10.2022</id>
      −<messageSeriesIdentifier>
        <nameOfSeries>AVURNAV Toulon</nameOfSeries>
        <warningNumber>10</warningNumber>
        <warningType>COASTAL_NAVIGATIONAL_WARNING</warningType>
        <year>2022</year>
        <language>en</language>
        <productionAgency>CECMED</productionAgency>
      </messageSeriesIdentifier>
      <publicationDate>2022-08-18T15:05:31.270272Z</publicationDate>
      −<generalArea>
        −<locationName>
          <text>LION</text>
        </locationName>
      </generalArea>
      <warningHazardType>SPECIAL_OPERATIONS</warningHazardType>
      <theWarningPart xlink:href="#NW.AVURNAV_TOULON.10.2022.1"/>
    </S124:NWPreamble>
  </imember>
  −<imember>
    −<S124:NavigationalWarningFeaturePart gml:id="NW.AVURNAV_TOULON.10.2022.1">
      <id>NW.AVURNAV_TOULON.10.2022.1</id>
      −<geometry>
        −<S100:surfaceProperty>
          −<S100:Surface>
            −<gml:Polygon srsName="EPSG:3857">
              −<gml:outerBoundaryIs>
                −<gml:LinearRing>
                  −<gml:coordinates>
                    423279.3460038737,5372662.7482798295 443392.6845344159,5389472.446665259 447376.48588587594,5385585.811200419 426971.6496954708,5368776.112814991 423279.3460038737,5372662.7482798295
                  </gml:coordinates>
                </gml:LinearRing>
              </gml:outerBoundaryIs>
            </gml:Polygon>
          </S100:Surface>
        </S100:surfaceProperty>
      </geometry>
      −<S124:fixedDateRange>
        <timeOfDayStart>22:00:00</timeOfDayStart>
        −<dateStart>
          <date>2022-08-17</date>
        </dateStart>
        <dateEnd/>
      </S124:fixedDateRange>
      −<S124:warningInformation>
        <warningType>SEAPLANE_OPERATIONS</warningType>
        −<information>
          area bounded by: 43-23.85N 003-48.14E 43-30.42N 003-58.98E 43-28.90N 004-01.13E 43-22.32N 003-50.13E
        </information>
      </S124:warningInformation>
      <header xlink:href="#PR.AVURNAV_TOULON.10.2022"/>
    </S124:NavigationalWarningFeaturePart>
  </imember>
</S124:DataSet>
```


Figure 40 S-124 data of the navigational warning AVURNAV TOULON 10.2022

Unlike the WFS, the REST API needs the intervention of software developers on the client side. The S-124 REST API was published later, leaving little time to test it within the timing of the MED OSMOSIS project.

The Hydrographic Institute of Portugal verified that the PING S-124 REST API responded correctly when sending a request and provided positive feedback for navigational warnings in force in a series.

At Shom, the REST S-124 API was fully tested. An application was created for demonstration purposes using the navigational warnings data in a different way by a developer who was not involved in the PING project nor navigational warning module development.

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The application created enabled to monitor the navigational warnings announcing a specific type of event or hazard. The monitoring of blasting operations was chosen as an example, due to its interest in terms of monitoring of the ocean's ambient noise.

Shom's developer found the exercise easy to perform given the simplicity of the API, which is based on state-of-the-art web technologies with which developers are usually very familiar (REST protocol, S-124 data using GML format, considering that GML is a special form of XML). The application was developed in a few days only and PING provided a good time response.

Following the testing, It was suggested that specific requests could be added for the most common requirements, for example relating to a specific general area (such as MADDALENA or LION areas) or NW provide all navigational warning issued from a specific date.

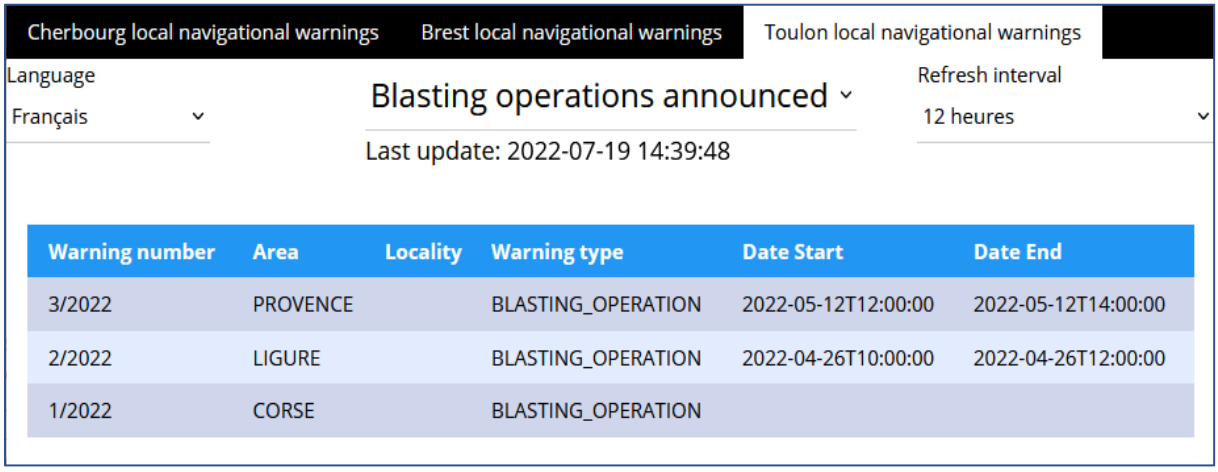

Figure 41 Application development test using the S-124 REST API: Blasting operation monitoring

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5. Conclusions and way forward

From a technical point of view, Shom was very pleased with the outcome of the testing since all the different functionalities of the module were tested and the objectives set for the pilot study were achieved. The testing was successful and proved the feasibility of issuing navigational warnings in S-124 format and their integration into other systems, therefore demonstrating that the interoperability of navigational warnings can be improved significantly by using standardized data and exchanges protocols.

Feedbacks on production tools in particular showed that creating navigational warnings according to the S-124 data model is easy despite some ergonomics points to be improved in the PING platform. It is an important point to promote and to generalize the issuing of S-124 NW which completely renews the way of doing and strongly can benefit the users.

With regards to the delivery, both WFS and REST options present advantages with regards to the interoperability of navigational warnings:

- The WFS option is efficient, user-friendly, and requires minor effort for integration into most GIS.
- The REST option is an easy option for developers and NW delivered according to international S-124 format (no transformation required)

The active participation and constructive feedback from all participants enabled Shom to quickly plan further technical improvements of the module for an enhanced integration in a wider environment. Since the study was completed, a new version of PING was installed and some improvements were carried out already, such as the automatic generation of texts for NAVTEX (or EGC). Other improvements are being considered, for example the possibility of having different WFS according to a type of geometry in order to better comply with specific softwares (QGIS)… Technically, all the improvements suggested during the length of the study can be realized and will be carried out (correction of bugs, upgrades).

The construction of the operational PING platform is currently ongoing and a new version of PING was installed following the testing. The development of the 2 other modules are under way: the *Transmission of source information/Stakeholders contribution* module, including a machine to machine interface (REST) with the French administration's Aids to Navigation (AtoN) management system, and the *Geo-regulation* module. The development of the mobile application is also ongoing. The new standard "*Secure communication between ship and shore*" (SECOM - IEC63173-2) of the International Electrotechnical Commission (IEC) published in May 2022 related to cyber-security will also need to be considered. PING is expected to be deployed operationally in 2023 in mainland France, then in French overseas territories. The platform will be hosted on an IT infrastructure with an availability higher than 99,9%.

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From a general point of view, the pilot study benefited from a strong interest and involvement from partners and stakeholders, and illustrated a very successful cooperation effort. It was very valuable for Shom to have participants demonstrating that the platform was quick and easy to use. The study also proved to be constructive for participants since:

- Spanish partners CSIC and Valencia Port Fundation integrated into their COSMOVIEW tool a navigational warning specifically produced for the SAR exercise in Franco-Spanish waters (pilot study 4.3.4)
- Greek partner Hellenic Coast Guards were able to integrate and display all the navigational warnings produced over the study onto their new GIS portal (pilot study 4.3.2)
- the Portuguese Hydrographic Institute are currently developing their national nautical information platform and advised that the PING pilot study results would be used as a reference
- The Croatian Hydrographic Service were able to compare value, and further develop their established navigational warning system model for the promulgation of maritime safety information
- the Spanish Hydrographic Institute advised that they were looking into developing a similar project

In addition, the Spanish Hydrographic Institute (NAVAREA III Coordinator) also indicated to be interested in pursuing further a close cooperation with Shom (NAVARAEA II Coordinator) on topics related to the S-124 development.

Looking forward, at a time when interoperability is a topic of growing interest and concern, and when requirements for faster dissemination are constantly increasing, this successful testing of the PING NW S-124 module and demonstration of the feasibility of producing Navigational Warnings in the IHO-recommended format S-124 represent a strong step towards the interoperability of emerging national digital systems for navigation safety in Europe. Although the PING platform is aiming to remain a national portal, the study illustrated well the advantage for EU members to develop their own national digital system for navigation safety, from and to which information can easily be imported or exported.

With regards to transferring, it is planned that PING model will be available in open source. The sharing of the source code will be possible once i) the conditions of the open source have been defined and ii) the S-124 edition 1 has been officially published by the IHO since PING needs to remain compliant with the official version.

The interoperability of the navigational information will be further re-enforced with the connection of PING's navigational warning module to CISE[9] (Common Information Sharing Environment at the European level for maritime surveillance). The CISE pilot study, also carried out within the MED OSMoSIS project (pilot study 4.3.14), studied the possible integration of Shom's data to the CISE environment. A new European project, CISE Alert, due to start at the end of 2022, will enable Shom to build up on the fruitful outcomes of both MED OSMoSIS CISE and PING pilot studies.

[9] https://emsa.europa.eu/cise.html

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Given the strong requirements for maritime security in relation with the development of sustainable blue economy and protection of marine biodiversity, ecosystems and habitats, the interest and key role of tools enabling all the maritime authorities to have access in their own systems to warning messages issued by other countries was strongly highlighted during the study. Considering the responsibility of the European Union in its maritime basins, Shom hopes and strongly recommends continuing to develop the “PING spirit" and similar platforms and tools all around the Mediterranean and the European maritime basins.

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APPENDICES

1. Participant stakeholders
2. Online briefing form
3. Study Evaluation forms
4. Portal Tools User Guide
5. WFS specifications
6. REST specifications

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1. PARTICIPANTS

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Slovenia	UNIVERSITY OF LJUBLJANA FACULTY OF MARITIME STUDIES AND TRANSPORTATION	Valter SUBAN	Capt. Valter Suban, M.Sc	valter.suban@fpp.uni-lj.si
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2. ONLINE BRIEFING FORM

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French Pilot study 3: PING NavWarning S-124 API

Participant information and consent form

armelle.sommier@shom.fr (non partagé) Changer de compte

*Obligatoire

Thank you for participating to the French pilot study dedicated to the PING Navigational Warning module S-124 API. To help us carry out the study, make sure we have the right details for you, and comply with the project's guidelines and requirements, please kindly fill the information below.

REMINDER: The pilot study's objective is to test the NAVIGATIONAL WARNING S-124 API. Following the communication of your IP address, your access has been granted to the PING platform. You are invited to browse the geoportal and to test the integration of the WFS flow to visualise a NavWarning from Toulon onto your client systems. Since the 3rd February, you can also test the REST API. If you wish, you can take the test further and use the production tools from the PING geoportal to issue fictive NavWarnings located in your home waters.

WFS PROTOCOL DOCUMENTATION - Information available for download at address below
https://drive.google.com/drive/u/0/folders/1Br4x5TmcgYvRCRi-IfjEHew6-B2qrrjA

REST PROTOCOL DOCUMENTATION - Information available for download at address below
https://drive.google.com/drive/u/0/folders/1bjgsDzXSVbLkq-I9Xw2tH8IEQO-fJoQw

Name *

Réponse courte

Organisation *

Réponse courte

Country *

Réponse courte

E-mail *

Réponse courte

Telephone *

Réponse longue

You wish to participate to the pilot exercise through *

- [ ] Browsing the PING geoportal
- [ ] WFS protocol only
- [ ] REST protocol only
- [ ] Both WFS and REST protocols
- [ ] Production of Navigational Warnings in my country waters using PING portal tools

So far, your participation include attendance to information meetings or events : *

- [ ] MEDOSMoSIS Subgroup meeting #1 - 20 July 2021
- [ ] MEDOSMoSIS&MSPMED RAMOGE Italy-France-Monaco Workshop on 3rd February
- [ ] Other event
- [ ] MEDOSMoSIS Subgroup meeting #2 - 9 February2022

Please share your GENERAL comments, feedback, and questions HERE:

Réponse longue

Please share your comments, feedback, and detail the issues encountered browsing the PING Geoportal HERE:

Réponse longue

Please share your comments and feedback, detail the issues using the WFS protocol HERE:

Réponse longue

Please share your comments and feedback, detail the issues using the REST protocol HERE:

Réponse longue

Do you wish to test the production of Nav Warnings in your country waters. If yes, please send us by email: 1) Name of the Nav Warnings series. Ex: AVURNAV Toulon 2) name of the general areas for the series. Ex: Elbe, Corse, Maddalena, Lion... 3) type of NW: Navarea, coastal or local. Ex: Coastal for Toulon NW) 4) Name of entity/department issuing the Navwarning. Ex: CND Toulon (French Maritime Authority)

- ( ) YES
- ( ) NO

Please share your comments and feedback, detail the issues using the REST protocol HERE:

Réponse longue

Do you wish to test the production of Nav Warnings in your country waters. If yes, please send us by email: 1) Name of the Nav Warnings series. Ex: AVURNAV Toulon 2) name of the general areas for the series. Ex: Elbe, Corse, Maddalena, Lion... 3) type of NW: Navarea, coastal or local. Ex: Coastal for Toulon NW) 4) Name of entity/department issuing the Navwarning. Ex: CND Toulon (French Maritime Authority)

- ○ YES
- ○ NO

General Data Protection Regulation

We are committed to ensuring the security and protection of the personal information and to provide a compliant and consistent approach to data protection as per the Data Protection Regulation (GDPR) (EU) 2016/679. https://europa.eu/youreurope/business/dealing-with-customers/data-protection/data-protection-gdpr/index_en.htm

I hereby confirm that I consent to the sharing of my details : *

- ☐ for the sake of the exercise
- ☐ during the exercise or recording of the exercise
- ☐ in the exercise's report
- ☐ in the coordinator's communications related to the exercise

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3. STUDY EVALUATION FORMS

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FRENCH PILOT STUDY TESTS

Evaluation Form from CSIC, Spain

How do you rate the *overall organisation* of the pilot study and tests?

Overall organisation of the pilot exercise	Not Applicable	Excellent	Good	Fair	Poor
Communication about the study tests and prior-planning		X			
Organisation of the study tests		X			
Opportunities for networking and making new contacts during the study tests		X			

How do you rate the *overall outcome* of the pilot exercise?

Overall outcome of the exercise		Excellent	Good	Fair	Poor
The **usefulness** of the study tests to your work and daily practice			X		
The **relevance of the information** received (e.g. through the study tests) for your work			X		
The **value of the exchange** with other participants				X	
The extent to which you **improved your skills** during the study tests		X			

Do you think you will use the *learnings* of the pilot study tests and if so, how?

Please write any comments here: ICM-CSIC is partner in MEDOSMOSIS, but with a profile of research character with no responsibilities in terms of Maritime Surveillance. However, the research has implications and is directly related with several aspects of Maritime Surveillance. In particular we have developed an interactive Atlas of surface currents and some software development to assess search and rescue (SAR) operations. Our main interest and concerns regarding the FR Pilot Study have been to test and implement the integration of the information provided by the PING Navigation Warning System in our own developments. This has brought us on one hand the opportunity to learn about the standards of the IHO relative to this kind of information, and on the other hand we have successfully integrated the WFS distribution of Navigation Warnings in both the stand-alone COSMO-VIEW tool and the Atlas web site. As far as the WFS distribution is not restricted we hope to continue the systematic integration of such layer as a complementary information into our tools.

Learnings of the exercise	Yes, totally	Yes, partially	No, not really	Not at all	Unable to say
Will the study tests outcome impact your daily practice?					X
Will you change your practices as a result of the study tests?		X			

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FRENCH PILOT STUDY TESTS

Evaluation Form from Hellenic Coast Guards, Greece

How do you rate the *overall organisation* of the pilot study and tests?

Overall organisation of the pilot exercise	Not Applicable	Excellent	Good	Fair	Poor
Communication about the study tests and prior-planning		X			
Organisation of the study tests		X			
Opportunities for networking and making new contacts during the study tests		X			

How do you rate the *overall outcome* of the pilot exercise?

Overall outcome of the exercise		Excellent	Good	Fair	Poor
The **usefulness** of the study tests to your work and daily practice		X			
The **relevance of the information** received (e.g. through the study tests) for your work		X			
The **value of the exchange** with other participants		X			
The extent to which you **improved your skills** during the study tests		X			

Do you think you will use the *learnings* of the pilot study tests and if so, how?

Please write any comments here:

From an organizational perspective, the pilot study and tests can be considered successful and mostly useful for all participants. The results will be further evaluated by our relevant Authorities to determine how our services can be further enhanced and new functionalities and novel technologies integrated.

Learnings of the exercise	Yes, totally	Yes, partially	No, not really	Not at all	Unable to say
Will the study tests outcome impact your daily practice?		X			
Will you change your practices as a result of the study tests?		X			

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FRENCH PILOT STUDY TESTS

Evaluation Form from Hydrographic Institute, Portugal

How do you rate the *overall organisation* of the pilot study and tests?

Overall organisation of the pilot exercise	Not Applicable	Excellent	Good	Fair	Poor
Communication about the study tests and prior-planning			x		
Organisation of the study tests			x		
Opportunities for networking and making new contacts during the study tests		x			

How do you rate the *overall outcome* of the pilot exercise?

Overall outcome of the exercise		Excellent	Good	Fair	Poor
The **usefulness** of the study tests to your work and daily practice			x		
The **relevance of the information** received (e.g. through the study tests) for your work		x			
The **value of the exchange** with other participants		x			
The extent to which you **improved your skills** during the study tests			x		

Do you think you will use the *learnings* of the pilot study tests and if so, how?

Please write any comments here:

The knowledge gained from the participation in this pilot study was very important as it coincides with a phase in which the Portuguese Hydrographic Institute is also developing its maritime warnings management platform.
The validation of platforms by international entities is an important action to make relevant adjustments and to involve other institutions in the subject that is common.
The findings of this pilot study will be used as a reference in the various stages of the development of our application.

Learnings of the exercise	Yes, totally	Yes, partially	No, not really	Not at all	Unable to say
Will the study tests outcome impact your daily practice?		x			
Will you change your practices as a result of the study tests?		x			

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FRENCH PILOT STUDY TESTS

Evaluation Form from the Spanish Hydrographic Institute and NAVAREA III Coordinator, Spain

How do you rate the *overall organisation* of the pilot study and tests?

Overall organisation of the pilot exercise	Not Applicable	Excellent	Good	Fair	Poor
Communication about the study tests and prior-planning		x			
Organisation of the study tests		x			
Opportunities for networking and making new contacts during the study tests			x		

How do you rate the *overall outcome* of the pilot exercise?

Overall outcome of the exercise		Excellent	Good	Fair	Poor
The **usefulness** of the study tests to your work and daily practice		x			
The **relevance of the information** received (e.g. through the study tests) for your work			*x*		
The **value of the exchange** with other participants				x	
The extent to which you **improved your skills** during the study tests			x		

Do you think you will use the *learnings* of the pilot study tests and if so, how?

Please write any comments here:

Please write any comments here:

Learnings of the exercise	Yes, totally	Yes, partially	No, not really	Not at all	Unable to say
Will the study tests outcome impact your daily practice?	x				
Will you change your practices as a result of the study tests?	x				

Project co-financed by the European Regional Development Fund

FRENCH PILOT STUDY TESTS

Evaluation Form from Hellenic Hydrographic Services, Croatia

How do you rate the *overall organisation* of the pilot study and tests?

Overall organisation of the pilot exercise	Not Applicable	Excellent	Good	Fair	Poor
Communication about the study tests and prior-planning		x			
Organisation of the study tests		x			
Opportunities for networking and making new contacts during the study tests			x		

How do you rate the *overall outcome* of the pilot exercise?

Overall outcome of the exercise		Excellent	Good	Fair	Poor
The **usefulness** of the study tests to your work and daily practice			x		
The **relevance of the information** received (e.g. through the study tests) for your work		x			
The **value of the exchange** with other participants			x		
The extent to which you **improved your skills** during the study tests			x		

Do you think you will use the *learnings* of the pilot study tests and if so, how?

Please write any comments here:

FR Pilot Study and PING Navigation Warning System provided the opportunity to compare, value, and further develop our established NWS model for the promulgation of MS information (thru GIS application) with respect to presented tests and relative IHO standards.

As affiliated associates we would especially like to thank our colleagues from the Plovput d.o.o. for the overall communication during the project.

Learnings of the exercise	Yes, totally	Yes, partially	No, not really	Not at all	Unable to say
Will the study tests outcome impact your daily practice?			x		
Will you change your practices as a result of the study tests?					x

FRENCH PILOT STUDY TESTS

Project co-financed by the European Regional Development Fund

Evaluation Form from University of Ljubljana, Slovenia

How do you rate the *overall organisation* of the pilot study and tests?

Overall organisation of the pilot exercise	Not Applicable	Excellent	Good	Fair	Poor
Communication about the study tests and prior-planning			x		
Organisation of the study tests		x			
Opportunities for networking and making new contacts during the study tests			x		

How do you rate the *overall outcome* of the pilot exercise?

Overall outcome of the exercise		Excellent	Good	Fair	Poor
The **usefulness** of the study tests to your work and daily practice			x		
The **relevance of the information** received (e.g. through the study tests) for your work				*x*	
The **value of the exchange** with other participants			x		
The extent to which you **improved your skills** during the study tests		x			

Do you think you will use the *learnings* of the pilot study tests and if so, how?

Please write any comments here:

With this project we start to develop idea to extend the project results to spreading navigational warnings also through AIS information, for the vessels without ECDIS and internet access. The University of Ljubljana, Faculty of Maritime Studies are expecting the invitation for the next project calls.

Learnings of the exercise	Yes, totally	Yes, partially	No, not really	Not at all	Unable to say
Will the study tests outcome impact your daily practice?			x		
Will you change your practices as a result of the study tests?			x		

Project co-financed by the European Regional Development Fund

FRENCH PILOT STUDY TESTS

Evaluation Form from Plovput, Croatia

How do you rate the *overall organisation* of the pilot study and tests?

Overall organisation of the pilot exercise	Not Applicable	Excellent	Good	Fair	Poor
Communication about the study tests and prior-planning	x				
Organisation of the study tests	x				
Opportunities for networking and making new contacts during the study tests	x				

How do you rate the *overall outcome* of the pilot exercise?

Overall outcome of the exercise		Excellent	Good	Fair	Poor
The **usefulness** of the study tests to your work and daily practice	x				
The **relevance of the information** received (e.g. through the study tests) for your work	x				
The **value of the exchange** with other participants		x			
The extent to which you **improved your skills** during the study tests	x				

Do you think you will use the *learnings* of the pilot study tests and if so, how?

Please write any comments here:

Plovput is a partner in the MED OSMOSIS project, as Lighthouse authority, also in charge of the transmission of the Maritime Safety Information (MSI) eg. navigational warnings, weather reports, search and rescue report, other urgent information about the safety of navigation, utilizing the VHF and Navtex system. Regarding the FR Pilot Study Plovput'smain interest and concerns have been to learn more about the standards of the IHO, collection of marine data, and interoperability as navigational warning services include all urgent information about the safety of navigation. The National Coordinator for navigational warnings in the Republic of Croatia is the Croatian Hydrographic Institute from Split (HHI), while the Navarea Coordinator for Navarea region III is located in Cadiz, Spain. Plovput informed HHI about project and pilot study and included them in the project activities, so HHI were in a position to test developed PING app and to present Croatian applications that have been recently produced by HHI. Plovput has developed an interactive Registre of the Aids to Navigation as a GIS application and will continue to work to enhance cooperation with international and regional organizations in the area of interest.

Learnings of the exercise	Yes, totally	Yes, partially	No, not really	Not at all	Unable to say
Will the study tests outcome impact your daily practice?			x		
Will you change your practices as a result of the study tests?			x		

Project co-financed by the European Regional Development Fund

4. PING PRODUCTION TOOLS: USER GUIDE

Project co-financed by the European
Regional Development Fund

Date	20 February 2022
Type of the document	User guide
SUBJECT	WP4 - SHOM PILOT STUDY 3 – PING MODULE API S-124 NavWarnings production tools
Author	Yves Le Franc – yves.le.franc@shom.fr – Shom (France)

PING module API S-124 Navigational warnings production tools – User guide

Ed. 1.00 - Feb 20, 2022

6. Table of Contents

1 Introduction

1.1 Disclaimer - advice

NavWarnings module of PING is at this stage only of testing purposes in the framework of MED OSMoSIS project and for other Shom partners. Thus, services and data provided can't be used for navigation. It should be considered that the data do not reflect real situations.

The service may be modified.

The url presented in this document may be changed by Shom. Partners will be informed.

The access to the PING is for authorized IP addresses only.

1.2 Services and series of NavWarnings

NavWarnings are organized into series of NavWarnings.

A service is responsible of series of Navwarnings.

For example, the French maritime authority of Toulon is responsible of:

- a series of coastal NavWarnings. The name of this series is "AVURNAV Toulon",
- a series of local NavWarnings. The name of this series "AVURNAV local Toulon".

A series used pre-defined geographic sectors (for example LIGURE, CORSE, ELBE, etc for AVURNAV Toulon):

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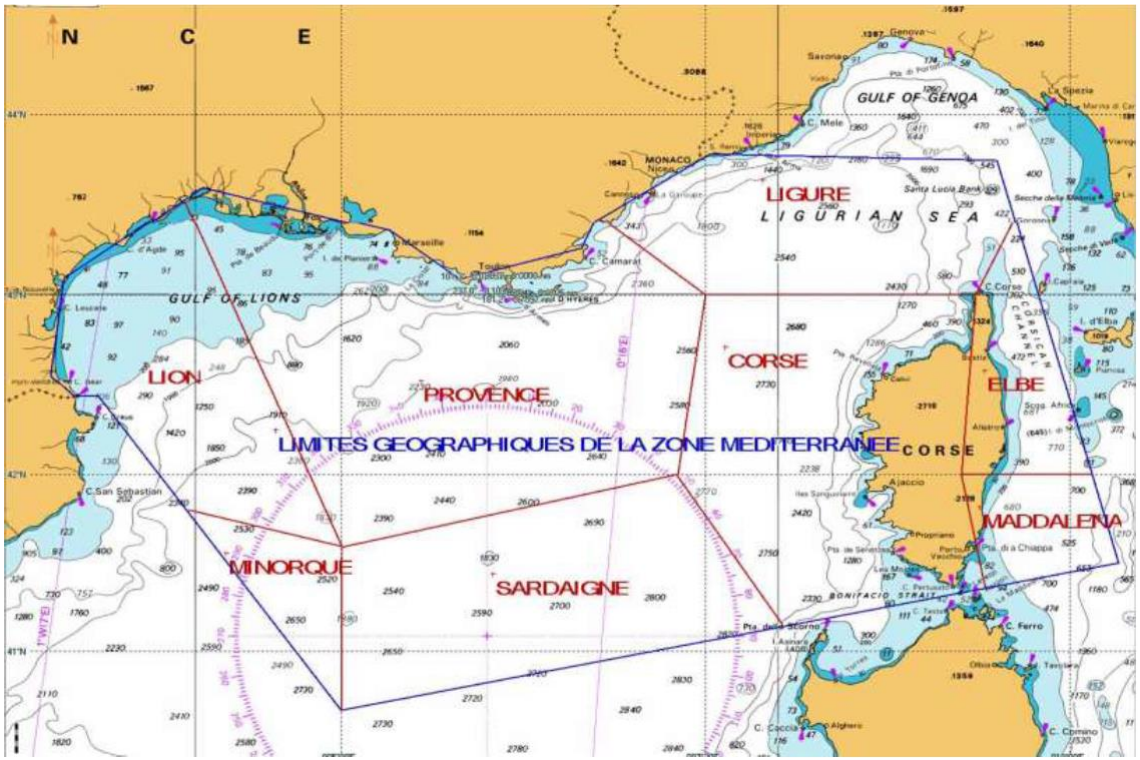


A series can have 2 languages (English and French), each language is mandatory or optional.

1.3 PING's portal

NavWarnings are displayed on PING's portal under development: https://ping-portail-re7.shom.fr/ (for example, select area "Méditerrannée" on the right of the menu and go to "Avurnav-notice" on the left of the menu).

The portal also comprises NavWarnings production tools authorities who have a special professional account for this.

2 Production tools – scenario

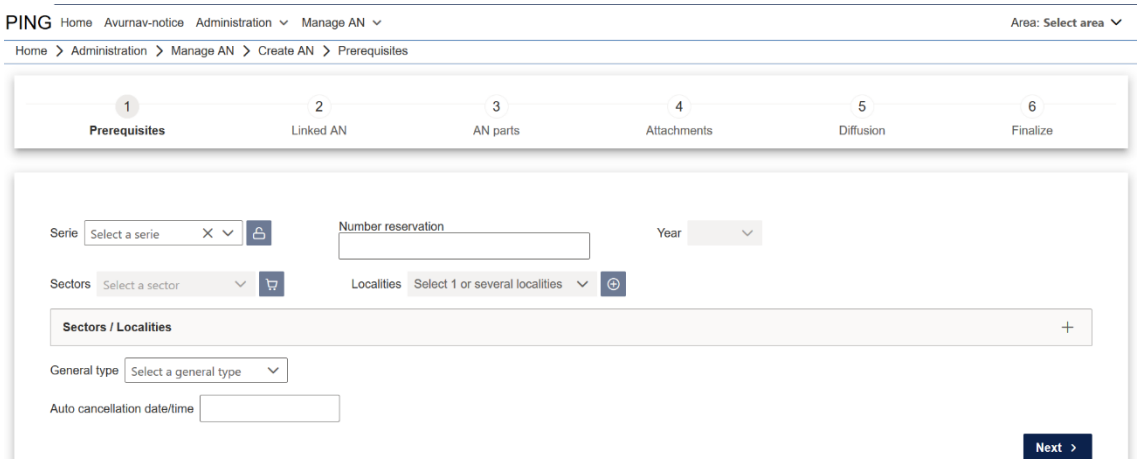
2.1 Connexion

- Choose your preferred language (up, right button)
- Go to connexion menu and choose **PRO sign in**
- Use login that Shom provided to you.

2.2 Create a NavWarning

Note: “AN” means NavWarnings or Notice to Mariners (Avertissements de Navigation ou Avis aux Navigateurs in French)

- Go to **Manage AN** in the main menu
- Choose **Create AN**
- The creation Menu appears with its 6 steps.



2.2.1 Prerequisites

- **Serie**: select the series of the NavWarnings in the list. The list of series gives the series of your service. Note: when selected, the series can not be changed without erasing the other data of the warning.
- **Sectors:** In the list, select a geographic Sector concerned by the warning and clic on  . You can repeat the operation to add another sector
- **Localities:** please, don't use it for the moment (bug!).
- **General Type:** select a general type of hazard in the list**.** The general types are from the S-124 draft standard.

Optional:

- **Auto cancellation date/time:** enter a date/time (UTC) of self-cancelling of the warning.
- **Number reservation and Year:** to be used if you want to fix the number of the warning (eg 13/22). If not used, PING will provide automatically a number.

- **Go to Next (**down-right button)

2.2.2 Linked AN

Optional:

- **Cancelled warnings:** select in the list of in force warnings of the series, the warning(s) that the new warning will cancel when published.
- **Parents:** select in the list of in force warnings of all the series, warnings which refer to the new one (this information is for the service only)

- **Go to Next (**down-right button)

2.2.3 AN parts

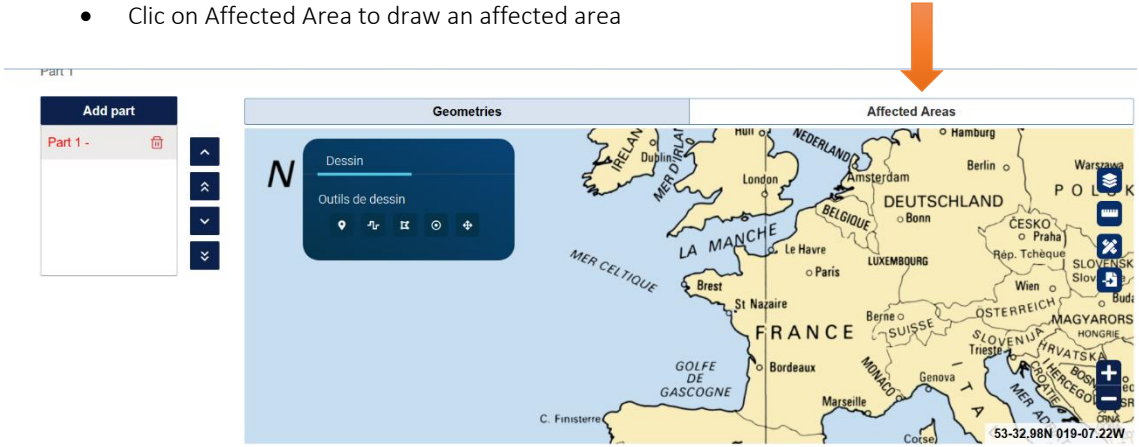
Note : in the S-124 data model, a warning is composed of 1 or more parts.

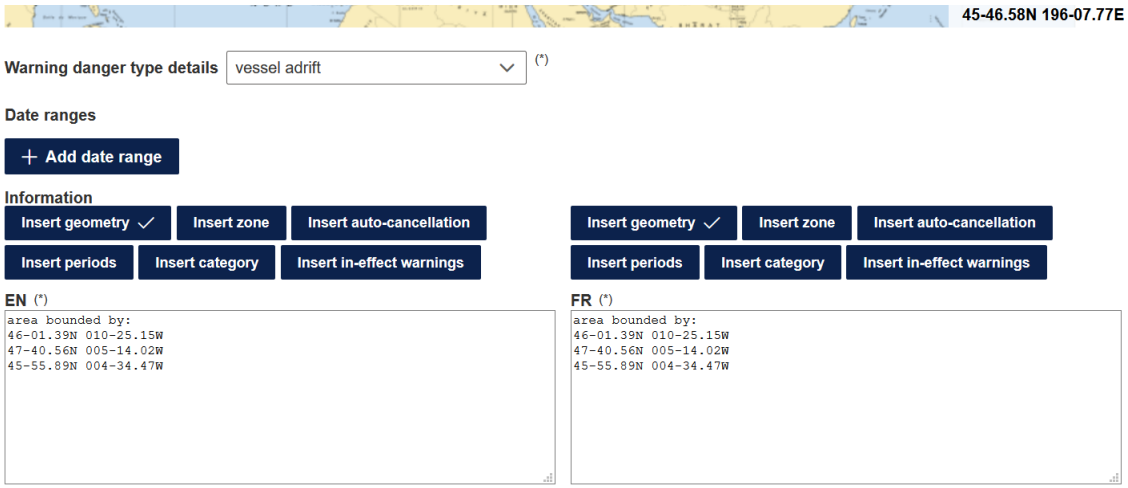
- Clic on **Add part**. Then, the menu to create the Part 1 is displayed.

- Draw the **geometrie(s)** using the drawing tool box

Optional:

- Clic on Affected Area to draw an affected area





- **Warning danger type details:** select a detailed type of hazard in the list**. T**he detailed types are from the S-124 draft standard. The list depends of the general type selected in the prerequisite.
- **Dates ranges:** optional – add the period(s) of the event (UTC)
- **Information:** write the free text of the warning in the box*. This text will complement the information that you entered before (type of hazard, date ranges, cancellation,…). Usually, the Lat, Long of geometries are introduced is this text.

For that clic on 

. Then the text with Lat Long of the geometries is inserted the text box.

- The other buttons provide equivalent facility for other data:

(*): if the series is bilingual, there are 2 box.

- Go to Next (down-right button)

2.2.4 Attachments

Here, you can add attachments. Optional. For example, the documents received and related to the warning.

- Go to Next (down-right button)

2.2.5 Diffusion

Under development. Here, the menu will be for entering data related to diffusion (Vital, Important, Routine , etc)

- Go to Next (down-right button)

2.2.6 Finalize

- **Estimated publication date:** Optional. This date will be used in the Table of draft wanrings to highlight warnings that must be published on the current day. This information is internal to the service.
- **Review date:** Optional. This date will be used in the Table of draft warnings to highlight warnings that must be reviewed on the current day. This information is internal to the service.
- **Internal comment:** Optional. This information is internal to the service.
- Go to 

to finish and save your work. Then, you are redirected to the tables of warnings.

To go back to your draft warning, you have to go to the AN drafts table of the series of the draft warning.

2.1 Tables

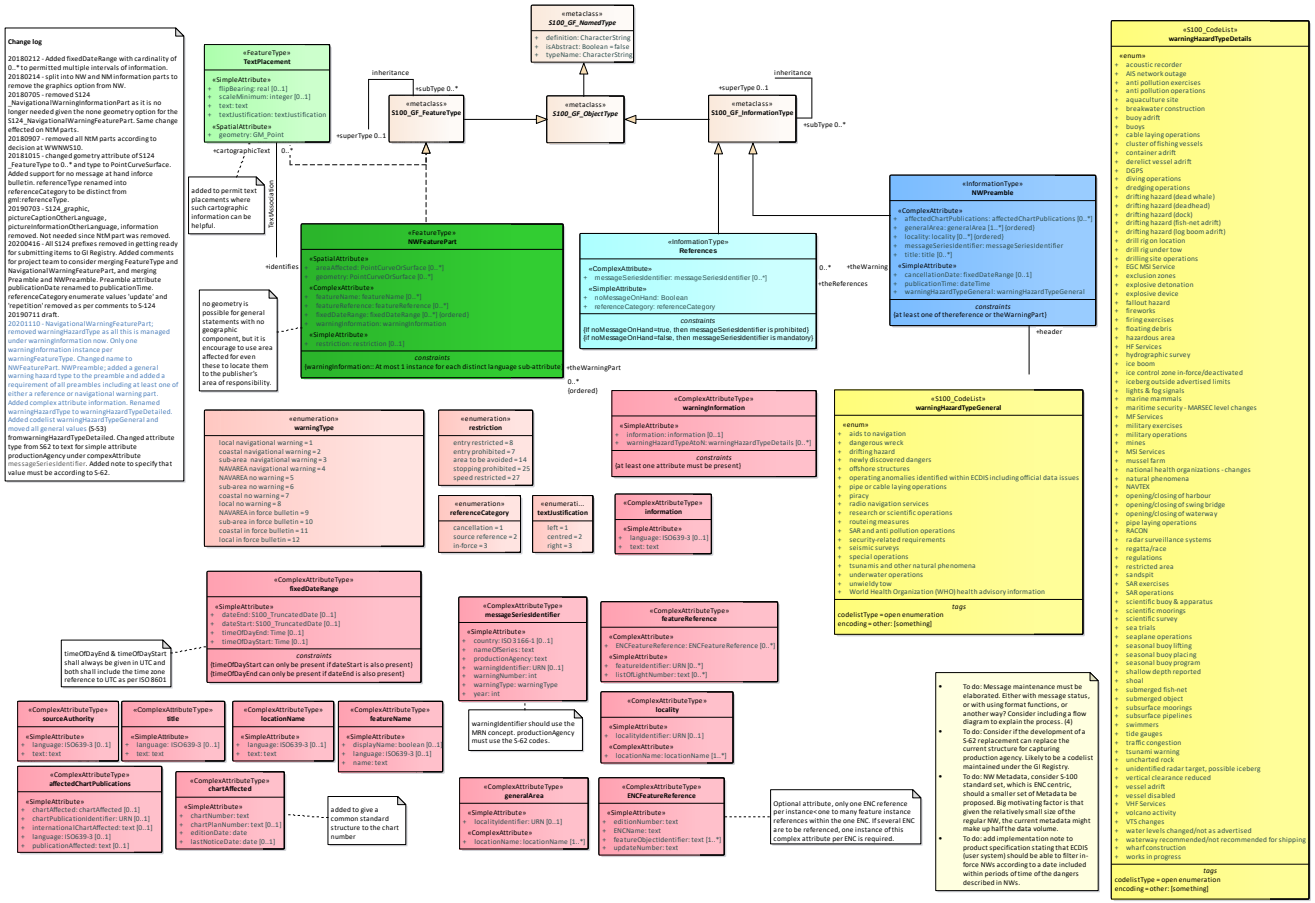
- Go to **Manage AN** in the main menu
- Choose **table**
- Select a series in the list of the series of your service

- Select the table of drafts, of in force (in effect) warnings, of cancelled warnings in the series

- Clic on a line to get the details on a warning and then, make actions on the warning
- Actions on draft:
    - Delete
    - Edit
    - **Publish**
    - Clone (copy)

- Actions on an in-force warning:
    - Edit
    - Clone
    - Cancel
- Actions on an cancelled warning:
    - Clone

Annex A- Draft S-124 data model dated 13th November 2020


Change log
20180212 - Added fixedDateRange with cardinality of 0..* to permitted multiple intervals of information.
20180214 - split into NW and NM information parts to remove the graphics option from NW.
20180705 - removed S124 _NavigationalWarningInformationPart as it is no longer needed given the none geometry option for the S124_NavigationalWarningFeaturePart. Same change effected on NtM parts.
20180907 - removed all NtM parts according to decision at WWWNS10.
20181015 - changed gometry attribute of S124 _FeatureType to 0..* and type to PointCurveSurface. Added support for no message at hand inforce bulletin. referenceType renamed into referenceCategory to be distinct from gml:referenceType.
20190703 - S124_graphic, pictureCaptionOtherLanguage, pictureInformationOtherLanguage, information removed. Not needed since NtM part was removed.
20200416 - All S124 prefixes removed in getting ready for submitting items to GI Registry. Added comments for project team to consider merging FeatureType and NavigationalWarningFeaturePart, and merging Preamble and NWPreamble. Preamble attribute publicationDate renamed to publicationTime. referenceCategory enumerate values 'update' and 'repetition' removed as per comments to S-124 20190711 draft.
20201110 - NavigationalWarningFeaturePart; removed warningHazardType as all this is managed under warningInformation now. Only one warningInformation instance per warningFeatureType. Changed name to NWFeaturePart. NWPreamble; added a general warning hazard type to the preamble and added a requirement of all preambles including at least one of either a reference or navigational warning part. Added complex attribute information. Renamed warningHazardType to warningHazardTypeDetailed. Added codelist warningHazardTypeGeneral and moved all general values (S-53) fromwarningHazardTypeDetailed. Changed attribute type from S62 to text for simple attribute productionAgency under compexAttribute messageSeriesIdentifier. Added note to specify that value must be according to S-62.
«FeatureType» TextPlacement
«SimpleAttribute» + flipBearing: real [0..1] + scaleMinimum: integer [0..1] + text: text + textJustification: textJustification
«SpatialAttribute» + geometry: GM_Point
«metaclass» S100_GF_NamedType
+ definition: CharacterString + isAbstract: Boolean = false + typeName: CharacterString
«metaclass» S100_GF_FeatureType
«metaclass» S100_GF_ObjectType
«metaclass» S100_GF_InformationType
inheritance
+subType 0..*
+superType 0..1
+cartographicText
0..*
textAnnotation
added to permit text placements where such cartographic information can be helpful.
«FeatureType» NWFeaturePart
«SpatialAttribute» + areaAffected: PointCurveOrSurface [0..*] + geometry: PointCurveOrSurface [0..*]
«ComplexAttribute» + featureName: featureName [0..*] + featureReference: featureReference [0..*] + fixedDateRange: fixedDateRange [0..*] ordered} + warningInformation: warningInformation
«SimpleAttribute» + restriction: restriction [0..1]
constraints {warningInformation:: At most 1 instance for each distinct language sub-attribute}
+identifies
no geometry is possible for general statements with no geographic component, but it is encourage to use area affected for even these to locate them to the publisher's area of responsibility.
«InformationType» References
«ComplexAttribute» + messageSeriesIdentifier: messageSeriesIdentifier [0..*]
«SimpleAttribute» + noMessageOnHand: Boolean + referenceCategory: referenceCategory
constraints {If noMessageOnHand=true, then messageSeriesIdentifier is prohibited} {If noMessageOnHand=false, then messageSeriesIdentifier is mandatory}
0..*
+theReferences
+theWarning
«InformationType» NWPreamble
«ComplexAttribute» + affectedChartPublications: affectedChartPublications [0..*] + generalArea: generalArea [1..*] [ordered] + locality: locality [0..*] [ordered] + messageSeriesIdentifier: messageSeriesIdentifier + title: title [0..*]
«SimpleAttribute» + cancellationDate: fixedDateRange [0..1] + publicationTime: dateTime + warningHazardTypeGeneral: warningHazardTypeGeneral
constraints {at least one of thereference or theWarningPart}
+header
+theWarningPart
0..* {ordered}
«enumeration» warningType
local navigational warning = 1 coastal navigational warning = 2 sub-area navigational warning = 3 NAVAREA navigational warning = 4 NAVAREA no warning = 5 sub-area no warning = 6 coastal no warning = 7 local no warning = 8 NAVAREA in force bulletin = 9 sub-area in force bulletin = 10 coastal in force bulletin = 11 local in force bulletin = 12
«enumeration» restriction
entry restricted = 8 entry prohibited = 7 area to be avoided = 14 stopping prohibited = 25 speed restricted = 27
«enumeration» referenceCategory
cancellation = 1 source reference = 2 in-force = 3
«enumerati... textJustification
left = 1 centred = 2 right = 3
«ComplexAttributeType» warningInformation
«SimpleAttribute» + information: information [0..1] + warningHazardTypeAtoN: warningHazardTypeDetails [0..*]
constraints {at least one attribute must be present}
«ComplexAttributeType» information
«SimpleAttribute» + language: ISO639-3 [0..1] + text: text
«S100_CodeList» warningHazardTypeGeneral
«enum» + aids to navigation + dangerous wreck + drifting hazard + newly discovered dangers + offshore structures + operating anomalies identified within ECDIS including official data issues + pipe or cable laying operations + piracy + radio navigation services + research or scientific operations + routeing measures + SAR and anti pollution operations + security-related requirements + seismic surveys + special operations + tsunamis and other natural phenomena + underwater operations + unwieldy tow + World Health Organization (WHO) health advisory information
tags codelistType = open enumeration encoding = other: [something]
«S100_CodeList» warningHazardTypeDetails
«enum» + acoustic recorder + AIS network outage + anti pollution exercises + anti pollution operations + aquaculture site + breakwater construction + buoy adrift + buoys + cable laying operations + cluster of fishing vessels + container adrift + derelict vessel adrift + DGPS + diving operations + dredging operations + drifting hazard (dead whale) + drifting hazard (deadhead) + drifting hazard (dock) + drifting hazard (fish-net adrift) + drifting hazard (log boom adrift) + drill rig on location + drill rig under tow + drilling site operations + EGC MSI Service + exclusion zones + explosive detonation + explosive device + fallout hazard + fireworks + firing exercises + floating debris + hazardous area + HF Services + hydrographic survey + ice boom + ice control zone in-force/deactivated + iceberg outside advertised limits + lights & fog signals + marine mammals + maritime security - MARSEC level changes + MF Services + military exercises + military operations + mines + MSI Services + mussel farm + national health organizations - changes + natural phenomena + NAVTEX + opening/closing of harbour + opening/closing of swing bridge + opening/closing of waterway + pipe laying operations + RACON + radar surveillance systems + regatta/race + regulations + restricted area + sandspit + SAR exercises + SAR operations + scientific buoy & apparatus + scientific moorings + scientific survey + sea trials + seaplane operations + seasonal buoy lifting + seasonal buoy placing + seasonal buoy program + shallow depth reported + shoal + submerged fish-net + submerged object + subsurface moorings + subsurface pipelines + swimmers + tide gauges + traffic congestion + tsunami warning + uncharted rock + unidentified radar target, possible iceberg + vertical clearance reduced + vessel adrift + vessel disabled + VHF Services + volcano activity + VTS changes + water levels changed/not as advertised + waterway recommended/not recommended for shipping + wharf construction + works in progress
tags codelistType = open enumeration encoding = other: [something]
«ComplexAttributeType» fixedDateRange
«SimpleAttribute» + dateEnd: S100_TruncatedDate [0..1] + dateStart: S100_TruncatedDate [0..1] + timeOfDayEnd: Time [0..1] + timeOfDayStart: Time [0..1]
constraints {timeOfDayStart can only be present if dateStart is also present} {timeOfDayEnd can only be present if dateEnd is also present}
timeOfDayEnd & timeOfDayStart shall always be given in UTC and both shall include the time zone reference to UTC as per ISO8601
«ComplexAttributeType» messageSeriesIdentifier
«SimpleAttribute» + country: ISO3166-1 [0..1] + nameOfSeries: text + productionAgency: text + warningIdentifier: URN [0..1] + warningNumber: int + warningType: warningType + year: int
warningIdentifier should use the MRN concept. productionAgency must use the S-62 codes.
«ComplexAttributeType» featureReference
«ComplexAttributeType» + ENCFeatureReference: ENCFeatureReference [0..*]
«SimpleAttribute» + featureIdentifier: URN [0..*] + listOfLightNumber: text [0..*]
«ComplexAttributeType» locality
«SimpleAttribute» + localityIdentifier: URN [0..1]
«ComplexAttribute» + locationName: locationName [1..*]
«ComplexAttributeType» sourceAuthority
«SimpleAttribute» + language: ISO639-3 [0..1] + text: text
«ComplexAttributeType» title
«SimpleAttribute» + language: ISO639-3 [0..1] + text: text
«ComplexAttributeType» locationName
«SimpleAttribute» + language: ISO639-3 [0..1] + text: text
«ComplexAttributeType» featureName
«SimpleAttribute» + displayName: boolean [0..1] + language: ISO639-3 [0..1] + name: text
«ComplexAttributeType» affectedChartPublications
«SimpleAttribute» + chartAffected: chartAffected [0..1] + chartPublicationIdentifier: URN [0..1] + internationalChartAffected: text [0..1] + language: ISO639-3 [0..1] + publicationAffected: text [0..1]
«ComplexAttributeType» chartAffected
«SimpleAttribute» + chartNumber: text + chartPlanNumber: text [0..1] + editionDate: date + lastNoticeDate: date [0..1]
added to give a common standard structure to the chart number
«ComplexAttributeType» generalArea
«SimpleAttribute» + localityIdentifier: URN [0..1]
«ComplexAttribute» + locationName: locationName [1..*]
«ComplexAttributeType» ENCFeatureReference
«SimpleAttribute» + editionNumber: text + ENCName: text + featureObjectIdentifier: text [1..*] + updateNumber: text
Optional attribute, only one ENC reference per instance<one to many feature instance references within the one ENC. If several ENC are to be referenced, one instance of this complex attribute per ENC is required.
To do: Message maintenance must be elaborated. Either with message status, or with using format functions, or another way? Consider including a flow diagram to explain the process. (4)
To do: Consider if the development of a S-62 replacement can replace the current structure for capturing production agency. Likely to be a codelist maintained under the GI Registry.
To do: NW Metadata, consider S-100 standard set, which is ENC centric, should a smaller set of Metadata be proposed. Big motivating factor is that given the relatively small size of the regular NW, the current metadata might make up half the data volume.
To do: add implementation note to product specification stating that ECDIS (user system) should be able to filter in-force NWs according to a date included within periods of time of the dangers described in NWs.

Note: the enumerations warningHazardTypeGeneral and warningHazardTypeDetails are under construction within the S-124 PT. PING uses new values that are not the ones presented in this diagram.

5. WFS SPECIFICATIONS

Project co-financed by the European
Regional Development Fund

Date	Ed. 1.2 23 June 2022
Type of the document	Specification
SUBJECT	WP4 - SHOM PILOT STUDY 3 – PING MODULE API S-124 Specification for WFS delivery of navigational warnings
Author	Yves Le Franc – yves.le.franc@shom.fr – Shom (France)

PING module API S-124 Specification for WFS delivery of navigational warnings

Ed. 1.2 – June 23, 2022

7. Table of Contents

UPDATES			
Version	Date	Author	Reason
1.0	21/10/2021	Y. Le Franc	Creation of the document
1.1	03/05/2022	Y. Le Franc	Cautions about the display of lines, about some problems experimented with multi-types of geometries, about the frequency of reloading.
1.2	23/06/2022	Y. Le Franc	Change of PING's url

3 Introduction

3.1 Disclaimer - advice

NavWarnings module of PING is at this stage only of testing purposes in the framework of MED OSMoSIS project and for other Shom partners. Thus, services and data provided can't be used for navigation. It should be considered that the data do not reflect real situations.

The service may be modified.

The url presented in this document may be changed by Shom. Partners will be informed.

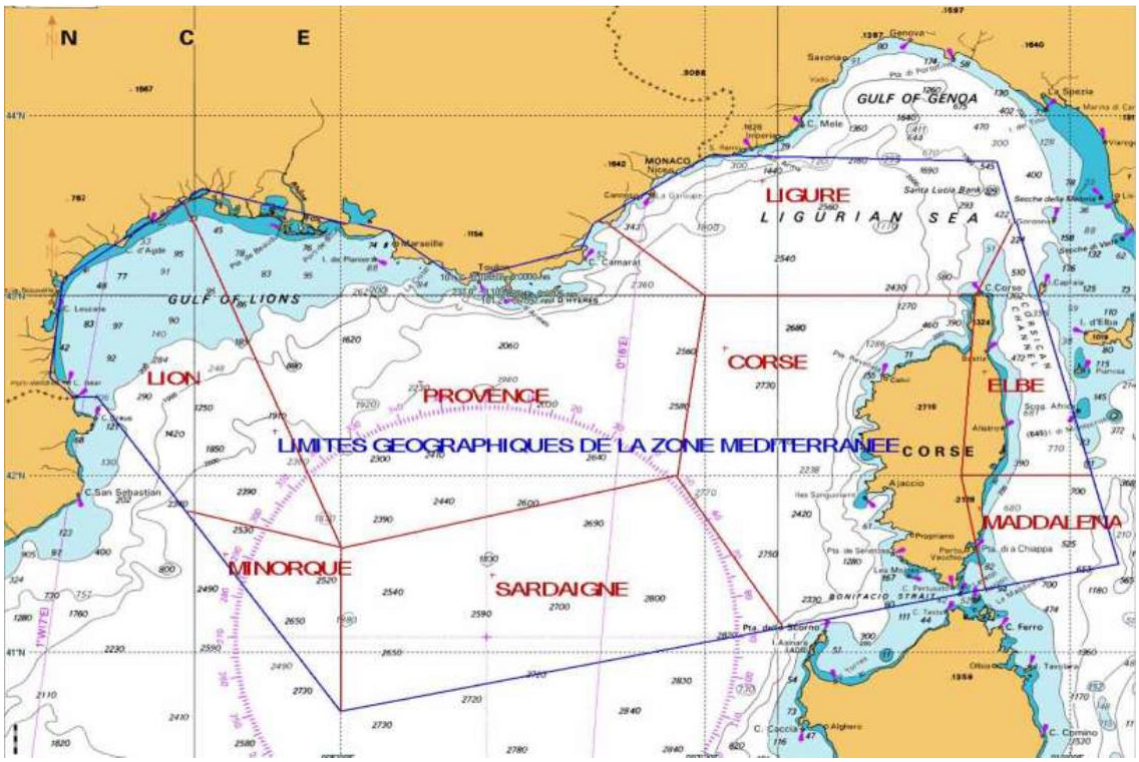
The access to the PING is for authorized IP addresses only.

3.2 Series of warnings and languages

NavWarnings module of PING delivers NavWarnings using Web Feature Service (WFS) protocol.

The WFS layers are organized to reflect the series of NavWarnings. The series are for example, the series of coastal NavWarnings issued by the French maritime authority of Toulon, the series of local NavWarnings issued by the French maritime authority of Toulon, the series of NAVAREA II warnings, the series of other French maritime authorities (Brest, Cherbourg, etc).

As an example, the French maritime authority of Toulon issues NavWarning in the following area:



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International series are available both in English and in French (NAVAREA II series and coastal NavWarnning series) ; national series are only available in French (local NavWarnings, local notices to mariners).

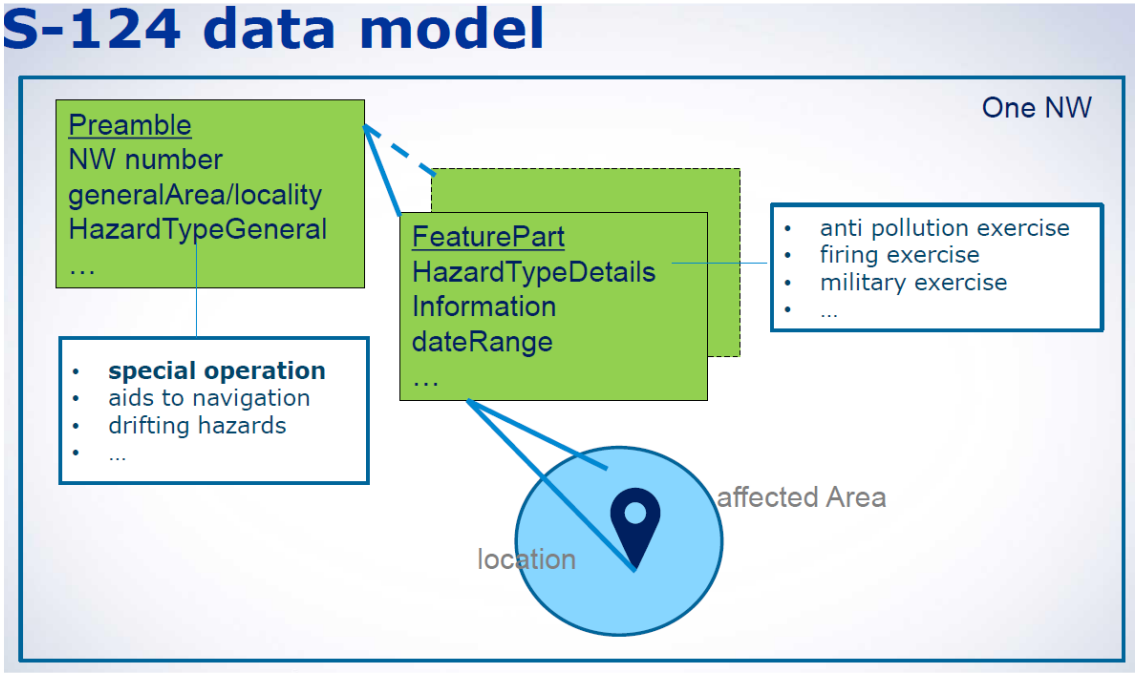
The layers contain only in-force NavWarnings.

3.3 Data model

In the PING's module the NavWarnings are encoded using a draft S-124[10] data model dated 13 November 2020 which is a working document of the IHO/IRCC/WWNWS-SC/S-124 Project Team. This draft S-124 data model is in Annex A.

In that data model, a NavWarning is composed of a Preamble and of 0, one or more FeatureParts.

Each FeaturePart may have 0, 1 or more geometries. Possibly, some surface geometries are the area affected by the hazard.



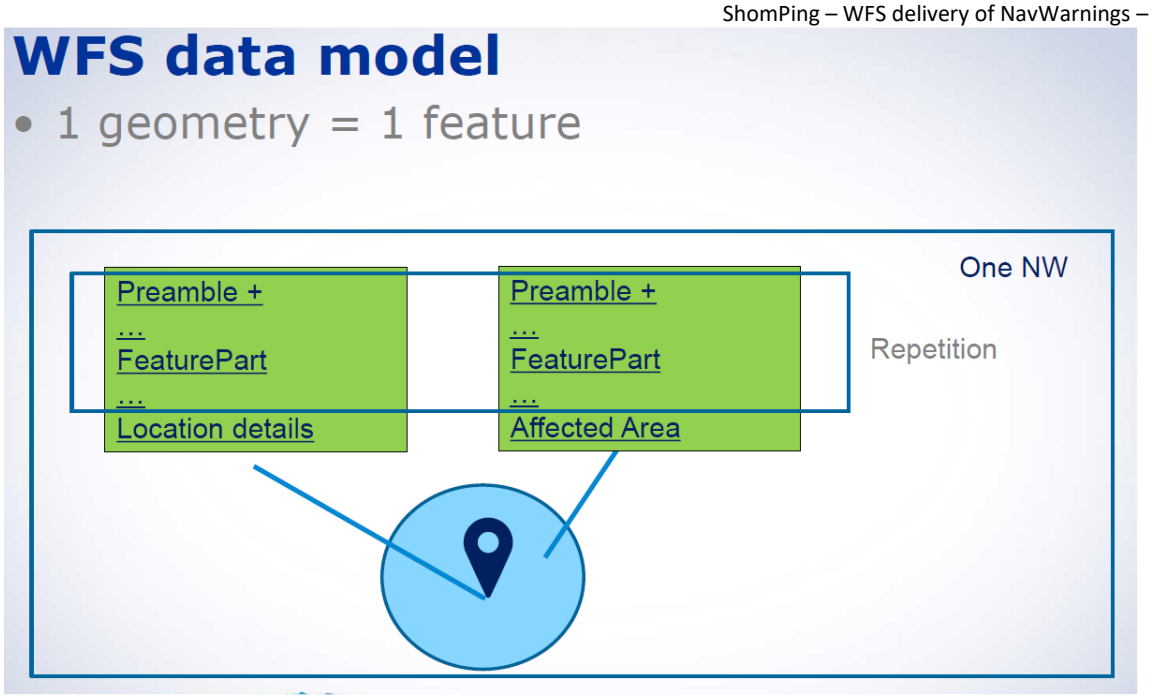
Note that most of the NavWarnings have 1 FeaturePart with 1 geometry (point, curve, polygon).

The draft S-124 data model can not be supported by WFS, and for the time being, WFS is not supported by S-100 ed. 4 IHO standard.

So, for the WFS delivery the model has been adapted by Shom to be aligned with WFS limitations.

In our WFS model, the Preamble and the FeaturePart are duplicated on each geometry of the the original FeaturePart. So, we obtain one geometry = one feature to be aligned with WFS limitations. Technical ids are used to recompose the original NavWarning if necessary.

[10] S-124 is the IHO product specification for Navigational Warnings. S-124 is under development. S-124 is an application of the IHO S-100 framework standard.



3.4 PING's portal

NavWarnings are displayed on PING's portal under development: https://ping-portail.shom.fr/(for example, select area "Méditerrannée" on the right of the menu and go to "Avurnav-notice" on the left of the menu).

The portal also comprises NavWarnings production tools for French maritime authorities who have a special professional account for this.

4 Description of the WFS flow

4.1 WFS Configuration

WFS configuration follows these principles:

One WFS layer = One Serie

One WFS Feature = One geometry or One Affected-area of a feature part

Only 'PUBLISHED' warnings are available in those API

4.2 Description of a feature

For each WFS feature (ie. each geometry or affected area of a feature-part), we have :

warningId	**Technical id of the warning**	**usefull to recompose the global warning**
warningType	Warning type	
nameOfSeries	Name of the serie	
warningNumber	Number of the warning in the serie	
year	Year of publication	
generalArea	Concatenation of general areas	
locality	Concatenation of localities	
warningHazardType	Warning Hazard Type General	
publicationDate	Publication Date of the warning	
cancellationDate	Cancellation Date of the warning	
language	The current language	
productionAgency	The production Agency	
country	The country	
featurePartId	Technical id of the feature part	usefull to recompose the global warning
featurePartPosition	Position of the part in the warning	
featurePartWarningType	Concatenation of Feature part type (Warning Hazard Type Details)	
featurePartInformation	Warning Information of the feature part	
featurePartDateRange	Concatenation of date ranges in UTC by comma : dateStart timeOfDayStart / dateEnd timeOfDayEnd	

warningId	Technical id of the warning	usefull to recompose the global warning
type	geom or affected_area	usefull to apply different style between geometries ans affected areas
geom	Geometry	

4.3 WFS Capabilities

A WFS capabilities request is available to describe available layers and operations.

For example : https://ping-services.shom.fr/geoserver/ows?service=wfs&version=2.0.0&request=GetCapabilities, those layers are currently configured :

- ping:nw_published_avurnav_local_brest : published warnings of the serie 'AVURNAV LOCAL BREST'
- ping:nw_published_avurnav_brest : published warnings of the serie 'AVURNAV BREST' in French
- ping:nw_published_avurnav_brest_en : published warnings of the serie 'AVURNAV BREST' in English
- ping:nw_published_avinav_brest : published warnings of the serie 'AVINAV BREST'
- ping:nw_published_avirade_brest : published warnings of the serie 'AVIRADE BREST'
- ping:nw_published_avurnav_cherbourg : published warnings of the serie 'AVURNAV CHERBOURG' in French
- ping:nw_published_avurnav_cherbourg_en : published warnings of the serie 'AVURNAV CHERBOURG' in English
- ping:nw_published_avirade_cherbourg : published warnings of the serie 'AVIRADE CHERBOURG'
- ping:nw_published_avinav_cherbourg : published warnings of the serie 'AVINAV CHERBOURG'
- ping:nw_published_avurnav_toulon : published warnings of the serie 'AVURNAV TOULON' in French
- **ping:nw_published_avurnav_toulon_en : published warnings of the serie 'AVURNAV TOULON' in English**
- ping:nw_published_avurnav_local_toulon : published warnings of the serie 'AVURNAV LOCAL TOULON'
- ping:nw_published_avinav_toulon : published warnings of the serie 'AVINAV TOULON'

An extract :

```
<FeatureType xmlns:ping="ping">
 <Name>ping:nw_published_avurnav_toulon</Name>
 <Title>nw_published_avurnav_toulon</Title>
 <Abstract/>
 <ows:Keywords>
  <ows:Keyword>features</ows:Keyword>
  <ows:Keyword>nw_published_avurnav_toulon</ows:Keyword>
 </ows:Keywords>
 <DefaultCRS>urn:ogc:def:crs:EPSG::3857</DefaultCRS>
 <ows:WGS84BoundingBox>
  <ows:LowerCorner>-180.00000000000003 -85.06</ows:LowerCorner>
  <ows:UpperCorner>180.00000000000003 85.06</ows:UpperCorner>
 </ows:WGS84BoundingBox>
</FeatureType>

<FeatureType xmlns:ping="ping">
 <Name>ping:nw_published_avurnav_toulon_en</Name>
 <Title>nw_published_avurnav_toulon_en</Title>
 <Abstract/>
 <ows:Keywords>
  <ows:Keyword>features</ows:Keyword>
  <ows:Keyword>nw_published_avurnav_toulon_en</ows:Keyword>
 </ows:Keywords>
 <DefaultCRS>urn:ogc:def:crs:EPSG::3857</DefaultCRS>
 <ows:WGS84BoundingBox>
  <ows:LowerCorner>-180.00000000000003 -85.06</ows:LowerCorner>
  <ows:UpperCorner>180.00000000000003 85.06</ows:UpperCorner>
 </ows:WGS84BoundingBox>
</FeatureType>
```

Code Block 1 GetCapabilities extract

AVURNAV TOULON will be used for the tests.

4.4 WFS Get Feature

The WFS GetFeature is available to get all features of a layer.

Multiple output can be used, the most common:

- application/json

- GML2

For example :

- AVURNAV TOULON in English:
    - In json : https://ping-services.shom.fr/geoserver/ows?service=WFS&version=2.0.0&request=GetFeature&typenames=ping:nw_published_avurnav_toulon_en&outputFormat=application/json&srsname=EPSG:3857 In GML2 : https://ping-services.shom.fr/geoserver/ows?service=WFS&version=2.0.0&request=GetFeature&typenames=ping:nw_published_avurnav_toulon_en&outputFormat=GML2&srsname=EPSG:3857

4.4.1 Simple example

A warning *AVURNAV Local Brest 1002/21* with 1 feature part with one geometry

```
{
    "type": "Feature",
    "id": "nw_published_all.fid-93ed855_17a432105f6_-75ec",
    "geometry": {
        "type": "LineString",
        "coordinates": [
            [-506113.9606, 6108652.1357],
            [-506228.6161, 6105327.125],
            [-504757.2033, 6105346.2343],
            [-504212.5895, 6107658.4544]
        ]
    },
    "geometry_name": "geom",
    "properties": {
        "warningid": "260f0c13-3b98-41a8-8516-6aa2501a0909",
        "warningtype": "COASTAL_NAVIGATIONAL_WARNING",
        "nameofseries": "AVURNAV Local Brest",
        "warningnumber": 1002,
        "year": 21,
        "generalarea": "Finistère",
        "locality": "La gamelle",
        "warninghazardtype": "RESEARCH_OR_SCIENTIFIC_OPERATIONS",
        "publicationdate": "2021-01-30T14:05:00Z",
        "cancellationdate": null,
        "language": "fr",
        "productionagency": "CECLANT",
        "country": "FR",
        "featurepartid": "4ace6d89-305d-4baa-8c84-633827746e2e",
        "featurepartposition": 1,
        "featurepartwarningtype": "HYDROGRAPHIC_SURVEY",
        "featurepartinformation": "Relevés hydrographiques",
        "featurepartdaterange": "2021-04-02 12:00:00/2021-05-02 17:00:00",
        "type": "geom"
    },
    "bbox": [-506228.6161, 6105327.125, -504212.5895, 6108652.1357]
}
```

In GML:

```
<gml:featureMember>
 <ping:nw_published_avurnav_local_brest fid="nw_published_avurnav_local_brest.fid-186d7153_17ca1ff6cb4_-7086">
  <gml:boundedBy>
   <gml:Box srsName="http://www.opengis.net/gml/srs/epsg.xml#3857">
    <gml:coordinates xmlns:gml="http://www.opengis.net/gml" decimal="." cs="," ts=" ">-506228.6161,6105327.125 -504212.5895,6108652.1357</gml:coordinates>
   </gml:Box>
  </gml:boundedBy>
  <ping:warningid>260f0c13-3b98-41a8-8516-6aa2501a0909</ping:warningid>
  <ping:warningtype>LOCAL_NAVIGATIONAL_WARNING</ping:warningtype>
  <ping:nameofseries>AVURNAV Local Brest</ping:nameofseries>
  <ping:warningnumber>1002</ping:warningnumber>
  <ping:year>2021</ping:year>
  <ping:generalarea>Finistère</ping:generalarea>
  <ping:locality>La gamelle</ping:locality>
  <ping:warninghazardtype>SPECIAL_OPERATIONS</ping:warninghazardtype>
  <ping:publicationdate>2021-01-30T14:05:00Z</ping:publicationdate>
  <ping:language>fr</ping:language>
  <ping:productionagency>CECLANT</ping:productionagency>
  <ping:country>FR</ping:country>
  <ping:featurepartid>4ace6d89-305d-4baa-8c84-633827746e2e</ping:featurepartid>
  <ping:featurepartposition>1</ping:featurepartposition>
  <ping:featurepartwarningtype>HYDROGRAPHIC_SURVEY</ping:featurepartwarningtype>
  <ping:featurepartinformation>Relevés hydrographiques</ping:featurepartinformation>
  <ping:featurepartdaterange>2021-04-02 12:00:00/2021-05-02 17:00:00</ping:featurepartdaterange>
  <ping:type>geom</ping:type>
  <ping:geom>
   <gml:LineString srsName="http://www.opengis.net/gml/srs/epsg.xml#3857">
    <gml:coordinates xmlns:gml="http://www.opengis.net/gml" decimal="." cs="," ts=" ">-506113.9606,6108652.1357 -506228.6161,6105327.125 -504757.2033,6105346.2343 -504212.5895,6107658.4544</gml:coordinates>
   </gml:LineString>
  </ping:geom>
 </ping:nw_published_avurnav_local_brest>
</gml:featureMember>
```

For all examples below, only the json example is illustrated, but it's the same for GML2.

4.4.2 Multiple geometries example

One Warning *AVINAV Brest 3/21* with one feature part with 2 geometries

```
{
    "type": "Feature",
    "id": "nw_published_all.fid-93ed855_17a432105f6_-755b",
    "geometry": {
        "type": "Point",
        "coordinates": [-560437.9764, 6181208.873]
    },
    "geometry_name": "geom",
    "properties": {
        "warningid": "b4d9a5a2-fc88-4746-a4f4-9b5782e99bd9",
        "warningtype": "LOCAL_NOTICE_TO_MARINER",
        "nameofseries": "AVINAV Brest",
        "warningnumber": 1,
        "year": 21,
        "generalarea": "Finistère",
        "locality": "Chenal du Fromveur",
        "warninghazardtype": "RESEARCH_OR_SCIENTIFIC_OPERATIONS",
        "publicationdate": "2021-01-01T04:00:00Z",
        "cancellationdate": null,
        "language": "fr",
        "productionagency": "CECLANT",
        "country": "FR",
        "featurepartid": "754c2e08-bb04-4c9d-9c19-03b65da2473b",
        "featurepartposition": 1,
        "featurepartwarningtype": "SCIENTIFIC_SURVEY",
        "featurepartinformation": "Les usagers sont informes de la mise à l'eau de deux instruments de mesure dans le chenal du Fromveur du 07 septembre 2020 au 30 avril 2021 inclus. Annuler ce message le 010000 UTC mai 21.",
        "featurepartdate": "2020-09-07 10:00:00/2021-05-01 00:00:00",
        "type": "geom"
    },
    "bbox": [-560437.9764, 6181208.873, -560437.9764, 6181208.873]
},
{
    "type": "Feature",
    "id": "nw_published_all.fid-93ed855_17a432105f6_-75e3",
    "geometry": {
        "type": "Point",
```

```
        "coordinates": [-560382.3167, 6181124.9649]
      },
      "geometry_name": "geom",
      "properties": {
        "warningid": "b4d9a5a2-fc88-4746-a4f4-9b5782e99bd9",
        "warningtype": "LOCAL_NOTICE_TO_MARINER",
        "nameofseries": "AVINAV Brest",
        "warningnumber": 1,
        "year": 21,
        "generalarea": "Finistère",
        "locality": "Chenal du Fromveur",
        "warninghazardtype": "RESEARCH_OR_SCIENTIFIC_OPERATIONS",
        "publicationdate": "2021-01-01T04:00:00Z",
        "cancellationdate": null,
        "language": "fr",
        "productionagency": "CECLANT",
        "country": "FR",
        "featurepartid": "754c2e08-bb04-4c9d-9c19-03b65da2473b",
        "featurepartposition": 1,
        "featurepartwarningtype": "SCIENTIFIC_SURVEY",
        "featurepartinformation": "Les usagers sont informes de la mise à l'eau de deux instruments de mesure dans le chenal du Fromveur du 07 septembre 2020 au 30 avril 2021 inclus. Annuler ce message le 010000 UTC mai 21.",
        "featurepartdate": "2020-09-07 10:00:00/2021-05-01 00:00:00",
        "type": "geom"
      },
      "bbox": [-560382.3167, 6181124.9649, -560382.3167, 6181124.9649]
    }
```


In this example, we can see that both features have the same featurepartid ("754c2e08-bb04-4c9d-9c19-03b65da2473b") and the same warningid ("b4d9a5a2-fc88-4746-a4f4-9b5782e99bd9") : the client can use this ids to rebuild warnings from those features.

4.4.3 Multiple feature parts example

One Warning *AVURNAV Local Brest 13/21* with two feature parts :

- first part : a submerged object
- second part : a restricted area around the the submerged object

```
{
    "type": "Feature",
    "id": "nw_published_all.fid-93ed855_17a432105f6_-75eb",
    "geometry": {
        "type": "Point",
        "coordinates": [-575899.895, 6121208.2547]
    },
    "geometry_name": "geom",
    "properties": {
        "warningid": "33ab1dd5-e362-40dc-8172-dc8e47f43b5f",
        "warningtype": "COASTAL_NAVIGATIONAL_WARNING",
        "nameofseries": "AVURNAV Local Brest",
        "warningnumber": 13,
        "year": 21,
        "generalarea": "Finistère",
        "locality": "Ile-de-Sein",
        "warninghazardtype": "NEWLY_DISCOVERED_DANGERS",
        "publicationdate": "2021-02-01T07:00:00Z",
        "cancellationdate": null,
        "language": "fr",
        "productionAgency": "CECLANT",
        "country": "FR",
        "featurepartid": "ae924d54-ea9c-4a18-8fef-3e2026a89dd6",
        "featurepartposition": 1,
        "featurepartwarningtype": "SUBMERGED_OBJECT",
        "featurepartinformation": "épave",
        "featurepartdaterange": "2021-02-01 08:00:00/ ",
        "type": "geom"
    },
    "bbox": [-575899.895, 6121208.2547, -575899.895, 6121208.2547]
},
{
    "type": "Feature",
    "id": "nw_published_all.fid-93ed855_17a432105f6_-75ea",
    "geometry": {
        "type": "Polygon",
        "coordinates": [
```

```
            [
                [-574906.2137, 6118494.7402],
                [-572804.1954, 6121361.1287],
                [-576587.8283, 6123730.6766],
                [-578804.5021, 6120596.7584],
                [-574906.2137, 6118494.7402]
            ]
        ]
    },
    "geometry_name": "geom",
    "properties": {
        "warningid": "33ab1dd5-e362-40dc-8172-dc8e47f43b5f",
        "warningtype": "COASTAL_NAVIGATIONAL_WARNING",
        "nameofseries": "AVURNAV Local Brest",
        "warningnumber": 13,
        "year": 21,
        "generalarea": "Finistère",
        "locality": "Ile-de-Sein",
        "warninghazardtype": "NEWLY_DISCOVERED_DANGERS",
        "publicationdate": "2021-02-01T07:00:00Z",
        "cancellationdate": null,
        "language": "fr",
        "productionAgency": "CECLANT",
        "country": "FR",
        "featurepartid": "cc8b1835-14da-4534-9dd9-ffe09939bed3",
        "featurepartposition": 2,
        "featurepartwarningtype": "RESTRICTED_AREA",
        "featurepartinformation": "zone à éviter",
        "featurepartdaterange": "2021-02-01 08:00:00/ ",
        "type": "geom"
    },
    "bbox": [-578804.5021, 6118494.7402, -572804.1954, 6123730.6766]
}
```

In this example, we can see that 2 features with different featurepartid ("ae924d54-ea9c-4a18-8fef-3e2026a89dd6" and "cc8b1835-14da-4534-9dd9-ffe09939bed3") but the same warningid ("33ab1dd5-e362-40dc-8172-dc8e47f43b5f") : the client can use this ids to rebuild warnings from those features.

4.4.4 Affected area example

One Warning *AVURNAV Local Brest 7/21* with :

- one feature part with one geometry = 1 point (a lighthouse)
- one affected area = 1 polygon (he unlint area)

```
{
    "type": "Feature",
    "id": "nw_published_all.fid-93ed855_17a432105f6_-75e5",
    "geometry": {
        "type": "Point",
        "coordinates": [-497193.5626, 6123354.377]
    },
    "geometry_name": "geom",
    "properties": {
        "warningid": "8ff5ba91-6af4-43a7-8079-77b4d5c9101d",
        "warningtype": "COASTAL_NAVIGATIONAL_WARNING",
        "nameofseries": "AVURNAV Local Brest",
        "warningnumber": 7,
        "year": 21,
        "generalarea": "Finistère",
        "locality": "Pointe du milier",
        "warninghazardtype": "NEWLY_DISCOVERED_DANGERS",
        "publicationdate": "2021-02-01T02:34:00Z",
        "cancellationdate": null,
        "language": "fr",
        "productionAgency": "CECLANT",
        "country": "FR",
        "featurepartid": "9c0c53cd-da02-4fef-accc-2d0fb315558f",
        "featurepartposition": 1,
        "featurepartwarningtype": "LIGHTS_AND_FOG_SIGNALS",
        "featurepartinformation": "Phare éteint",
        "featurepartdaterange": "2021-02-01 03:30:00/ ",
        "type": "geom"
    },
    "bbox": [-497193.5626, 6123354.377, -497193.5626, 6123354.377]
},
{
    "type": "Feature",
    "id": "nw_published_all.fid-93ed855_17a432105f6_-75e6",
    "geometry": {
        "type": "Polygon",
        "coordinates": [
```

```
            [
                [-497422.8736, 6123469.0326],
                [-514353.6754, 6137189.4792],
                [-517372.938, 6132029.9798],
                [-497422.8736, 6123469.0326]
            ]
        ]
    },
    "geometry_name": "geom",
    "properties": {
        "warningid": "8ff5ba91-6af4-43a7-8079-77b4d5c9101d",
        "warningtype": "COASTAL_NAVIGATIONAL_WARNING",
        "nameofseries": "AVURNAV Local Brest",
        "warningnumber": 7,
        "year": 21,
        "generalarea": "Finistère",
        "locality": "Pointe du milier",
        "warninghazardtype": "NEWLY_DISCOVERED_DANGERS",
        "publicationdate": "2021-02-01T02:34:00Z",
        "cancellationdate": null,
        "language": "fr",
        "productionAgency": "CECLANT",
        "country": "FR",
        "featurepartid": "9c0c53cd-da02-4fef-accc-2d0fb315558f",
        "featurepartposition": 1,
        "featurepartwarningtype": "LIGHTS_AND_FOG_SIGNALS",
        "featurepartinformation": "Phare éteint",
        "featurepartdaterange": "2021-02-01 03:30:00/ ",
        "type": "affected_area"
    },
    "bbox": [-517372.938, 6123469.0326, -497422.8736, 6137189.4792]
}
```


In this example, we can see that 2 features with the same featurepartid ("9c0c53cd-da02-4fef-accc-2d0fb315558f") and the same warningid ("8ff5ba91-6af4-43a7-8079-77b4d5c9101d") but the first has

"type": "geom" and the second "type": "affected_area" : the client can use this ids to rebuild warnings from those features and the "type" attribute to make different style for geometries and affected areas.

4.4.5 Filters available on WFS

It's possible to filter on a dedicated BBOX or to apply CQL Filters.

4.5 Examples with Openlayers

A custom style is defined here just to differ geometries and affected area

4.5.1 The global layer

In this example, we have the global layer with a overlay which could present properties of each feature on hover.

Diffusion des ANs en WFS

4.5.2 One layer by series

In this example, we have one layer by series.

Diffusion des ANs en WFS

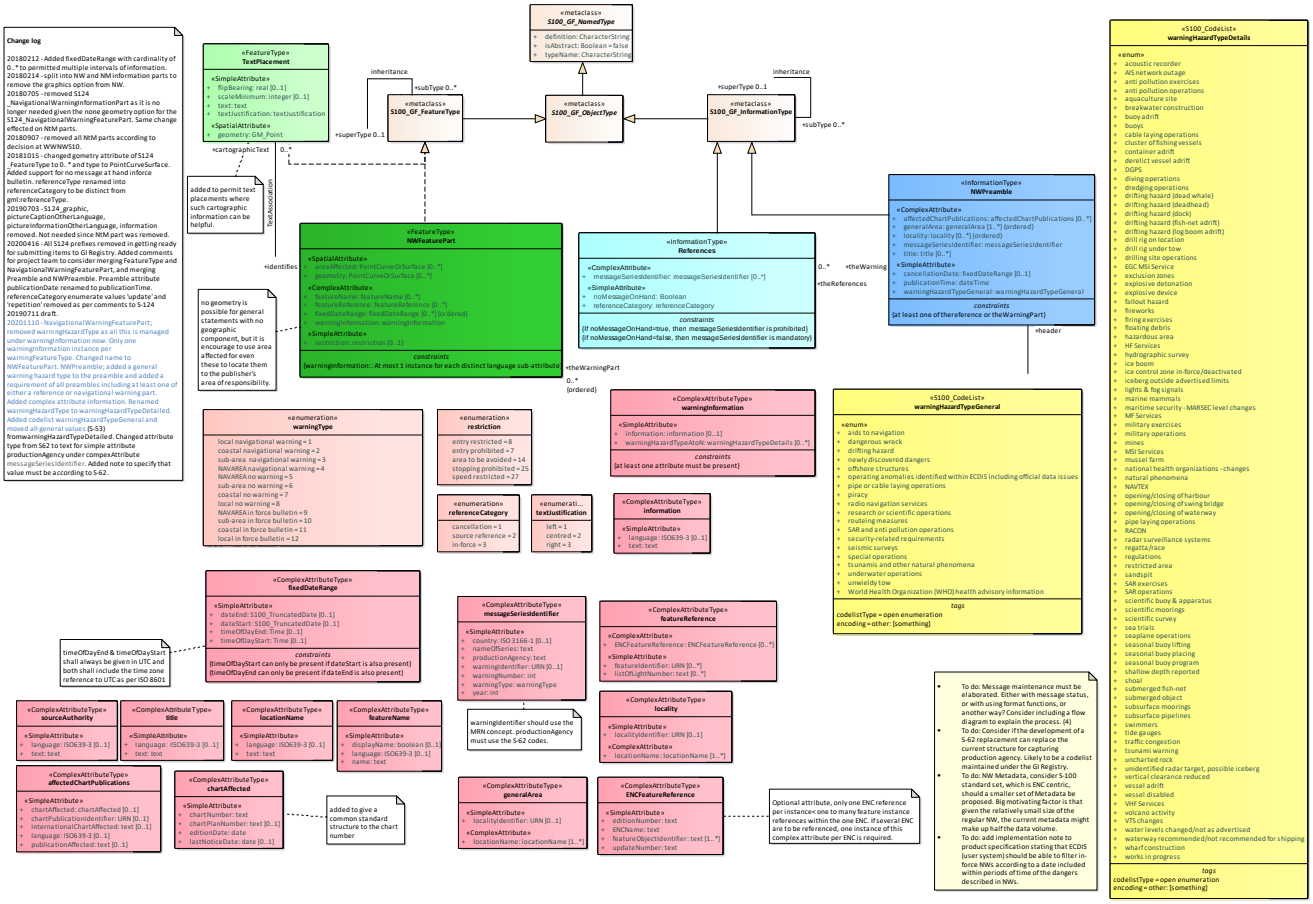
4.6 Cautions

Caution 1: the WFS 2.0 issued by PING may contain several types of geometries (point, line, polygon). Some GIS software may omit to integrate some types of geometries. It is for example the case of QGIS, when using the “add layer” menu. The “Internet” menu of QGIS should be preferred. It will create a points layer, a lines layer, a polygons layer from the WFS 2.0 issued by PING.

Caution 2: some geometry may be lines. It has been observed that some GIS software does not amplify the display of lines and the result is that small lines may not be very visible on the screen. It is recommended to adjust the line representation to avoid this situation.

Caution 3: a new NavWarning may be published at any time. It is important to reload the WFS data at a suitable frequency to obtain the most up-to-date information layer.

Annex A - Draft S-124 data model dated 13th November 2020



Note: the enumerations warningHazardTypeGeneral and warningHazardTypeDetails are under construction within the S-124 PT. PING uses new values that are not the ones presented in this diagram.

6. REST SPECIFICATIONS

Project co-financed by the European
Regional Development Fund

Date	23 June 2022
Type of the document	Specification
SUBJECT	WP4 - SHOM PILOT STUDY 3 – PING MODULE API S-124 **Specification for REST delivery of navigational warnings**
Author	Yves Le Franc – yves.le.franc@shom.fr – Shom (France)

PING module API S-124 Specification for REST delivery of navigational warnings

Ed. 1.10 - June 23, 2022

Project co-financed by the European Regional Development Fund

2. Table of Contents

UPDATES			
Version	Date	Author	Reason
1.0	21/10/2021	Y. Le Franc	Creation of the document
1.1	23/06/2022	Y. Le Franc	Editorial. Change of PING's url

Project co-financed by the European Regional Development Fund

5 Introduction

5.1 Disclaimer - advice

NavWarnings module of PING is at this stage only of testing purposes in the framework of MED OSMoSIS project and for other Shom partners. Thus, services and data provided can't be used for navigation. It should be considered that the data do not reflect real situations.

The service may be modified.

The url presented in this document may be changed by Shom. Partners will be informed.

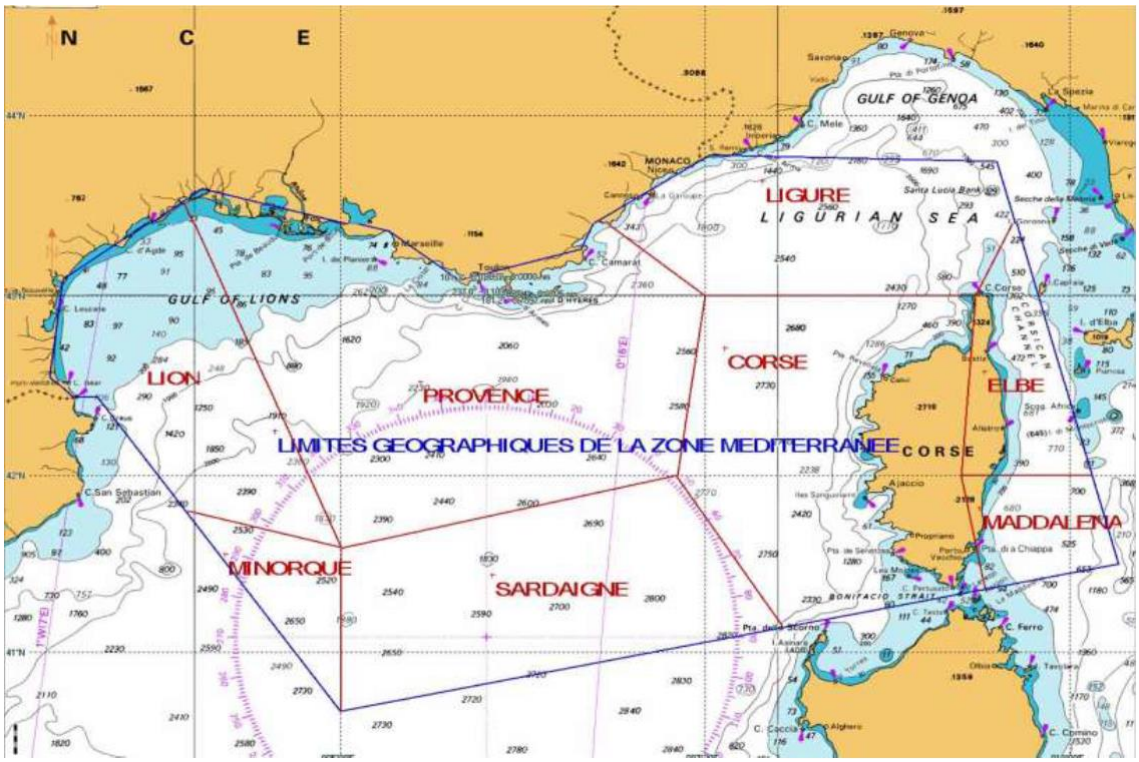
The access to the PING is for authorized IP addresses only.

5.2 Series of warnings and languages

NavWarnings module of PING delivers NavWarnings using REST protocol.

The NavWarnings are organized into series of NavWarnings. The series are for example, the series of coastal NavWarnings issued by the French maritime authority of Toulon, the series of local NavWarnings issued by the French maritime authority of Toulon, the series of NAVAREA II warnings, the series of other French maritime authorities (Brest, Cherbourg, etc).

As an example, the French maritime authority of Toulon issues NavWarning in the following area:



International series are available both in English and in French (NAVAREA II series and coastal NavWarnning series) ; national series are only available in French (local NavWarnings, local notices to mariners).

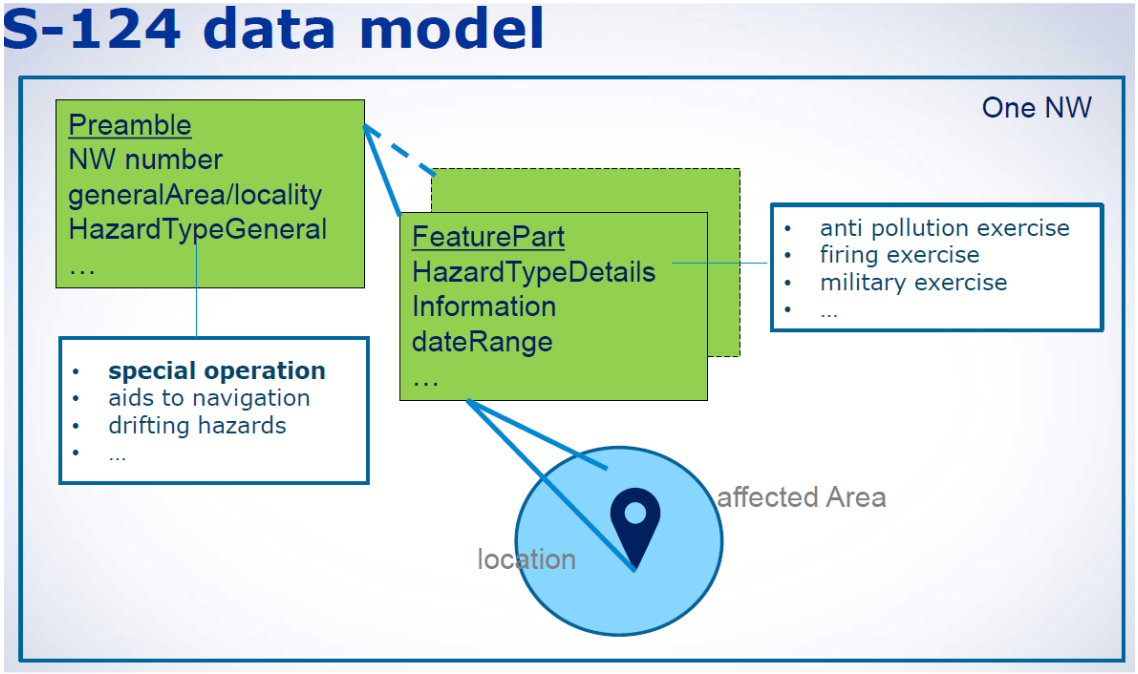
Only in-force NavWarnings are delivered.

5.3 Data model

In the PING's module the NavWarnings are encoded using a draft S-124[11] data model dated 13 November 2020 which is a working document of the IHO/IRCC/WWNWS-SC/S-124 Project Team. This draft S-124 data model is in Annex A.

In that data model, a NavWarning is composed of a Preamble and of 0, one or more FeatureParts.

Each FeaturePart may have 0, 1 or more geometries. Possibly, some surface geometries are the area affected by the hazard.



Note that most of the NavWarnings have 1 FeaturePart with 1 geometry (point, curve, polygon).

5.4 PING's portal

NavWarnings are displayed on PING's portal under development: https://ping-portail.shom.fr/ (for example, select area "Méditerrannée" on the right of the menu and go to "Avurnav-notice" on the left of the menu).

The portal also comprises NavWarnings production tools for French maritime authorities who have a special professional account for this.

5.5 PING's APIs

The PING is built by using REST APIs. The PING's APIs are documented here: https://ping-services.shom.fr/swagger-ui/#.

In the framework of MED OSMOSIS Pilot Study 3, the API of interest is under s-124-controller (/nw/v1/Get_NW_Messages).

In the following, this document describes in more detail the **/nw/v1/Get_NW_Messages** request.

[11] S-124 is the IHO product specification for Navigational Warnings. S-124 is under development. S-124 is an application of the IHO S-100 framework standard.

The url is https://ping-services.shom.fr/nw/v1/Get_NW_Messages

5.6 Delivery of In-force Navigational Warnings of a series

5.6.1 The request

This API to get all in-force messages for a given series.

GET /nw/v1/Get_NW_Messages

Parameters

Name	Description	Constraints	Example
nameOfSeries	Name of the given series	String	"AVURNAV Local Brest"
lang	Language	language available in the languages of the series	fr

For example :

- */nw/v1/Get_NW_Messages?nameOfSeries=AVURNAV%20Local%20BREST*
- */nw/v1/Get_NW_Messages?nameOfSeries=AVURNAV%20Local%20BREST&lang=fr*

Note:

- the list of PING's series of NavWarnings and local notices to mariners can be obtained here: https://ping-services-re7.shom.fr/api/series
- For MED OSMOSIS Pilot Study 3 trials, please use the AVURNAV TOULON series: https://ping-services.shom.fr/nw/v1/Get_NW_Messages?nameOfSeries=AVURNAV%20TOULON *https://ping-services.shom.fr/nw/v1/Get_NW_Messages?nameOfSeries=AVURNAV%20TOULON&lang=fr*

5.6.2 Response status

5.6.2.1 Nominal case

Status	Message	Description
200	S124:ExchangeSet	Contains all the in force messages in the serie, each represented as a Dataset and gathered in an ExchangeSet

5.6.2.2 Error cases

Status	Message	Description
400	nameOfSeries is missing	Missing series
400	nameOfSeries is unknown	Unknown series
400	lang is not available for this nameOfSeries	Unavailable language for this series
500	Internal server error	Internal Error while processing the request

5.6.3 Description of S124:ExchangeSet & S124:DataSet

The response includes an object named **S124: ExchangeSet** which contains a set of **S124: DataSet** which will themselves contain a set of members.

> It is necessary to validate with the community, the use of an ExchangeSet to establish a collection of DataSet within this API

Schematically, an ExchangeSet contains a set of DataSet presenting the messages as follows:

```
<S124:ExchangeSet>

 <S124:DataSet>
   <!-- NW1 in-force -->
  <imember>
    <S124:NWPreamble gml:id="NW1">
      <!-- Preamble of NW1 -->
      <!-- ... -->
      <theWarningPart xlink:href="NW1.1"/>
    </S124:NWPreamble>
  </imember>
  <imember>
    <S124:NavigationalWarningFeaturePart gml:id="NW1.1">
      <!-- Part 1 -->
      <!-- ... -->
    </S124:NavigationalWarningFeaturePart>
  </imember>
 </S124:DataSet>

 <S124:DataSet>
   <!--  NW2 in-force -->
  <imember>
    <S124:NWPreamble gml:id="NW2">
      <!-- Preamble of NW2 -->
      <!-- ... -->
      <theWarningPart xlink:href="NW2.1"/>
      <theWarningPart xlink:href="NW2.2"/>
    </S124:NWPreamble>
  </imember>
  <imember>
    <S124:NavigationalWarningFeaturePart gml:id="NW2.1">
      <!-- Part 1 -->
      <!-- ... -->
    </S124:NavigationalWarningFeaturePart>
  </imember>
  <imember>
    <S124:NavigationalWarningFeaturePart gml:id="NW2.2">
```

```
            <!-- Part 2 -->
            <!-- ... -->
        </S124:NavigationalWarningFeaturePart>
    </imember>
  </S124:DataSet>

</S124:ExchangeSet>
```

5.6.3.1 Preamble

Global information of the message

```
<S124:NWPreamble gml:id="PR.AVURNAV_LOCAL_BREST.1002.21">
  <id>NW.AVURNAV_LOCAL_BREST.1002.21</id>

  <messageSeriesIdentifier>
    <nameOfSeries>AVURNAV Local Brest</nameOfSeries>
    <warningNumber>1002</warningNumber>
    <warningType>LOCAL_NAVIGATIONAL_WARNING</warningType>
    <year>21</year>
    <language>fr</language>
    <productionAgency>CECLANT</productionAgency>
    <country>FR</country>
  </messageSeriesIdentifier>

  <publicationDate>2021-01-30T14:05:00Z</publicationDate>

  <generalArea>
    <locationName>
      <text>Finistère</text>
    </locationName>
  </generalArea>
  <locality>
    <locationName>
     <text>La gamelle</text>
    </locationName>
   </locality>


  <warningHazardType>RESEARCH_OR_SCIENTIFIC_OPERATIONS</warningHazardType>

    <theWarningPart xlink:href="#NW.AVURNAV_LOCAL_BREST.1002.21.1"/>
</S124:NWPreamble>
```

Identifier	Description	Matching with PING modelisation
S124:NWPreamble	The identifier is built like : 'PR.#SERIE#.#WARNING_NUMBER#.#YEAR#' Remark : escape spaces or special characters in the series name Example : 'PR.AVURNAV_LOCAL_BREST.1002.21'	`PR. Warning.serie.name (fr) || Warning.serie.international Name (en) . Warning.warningNumber . Warning.yearNumber`

id	A message identifier : NW.AVURNAV_LOCAL_BREST.1002.21
	(later, we should use URN)
		`NW.`
		`Warning.serie.name (fr) || Warning.serie.internationalName (en) .`
		`Warning.warningNumber .`
		`Warning.yearNumber`

messageSeriesIdentifier	Message information in its series	-
publicationDate	The publication date	`Warning.publicationTime`
generalArea	A set of general areas	–
locality	A set of localities	-
warningHazardType	The general type of the message	`Warning.warningHazardTypeGeneral`
theWarningPart	A link for each parts (with # before the id) <theWarningPart xlink:href="#NW.AVURNAV_LOCAL_BREST.1002.21.1"/> <theWarningPart xlink:href="#fNW.AVURNAV_LOCAL_BREST.1002.21.2"/>	-

5.6.3.2 Message Series Identifier

```
<messageSeriesIdentifier>
    <nameOfSeries>AVURNAV Local Brest</nameOfSeries>
    <warningNumber>1002</warningNumber>
    <warningType>LOCAL_NAVIGATIONAL_WARNING</warningType>
    <year>21</year>
    <language>fr</language>
    <productionAgency>CECLANT</productionAgency>
    <country>FR</country>
</messageSeriesIdentifier>
```

Identifier	Description	Matching with PING modelisation
nameOfSeries	The name of the series	`LANG=fr : Warning.serie.name` `LANG=en : Warning.serie.internationalName`
warningNumber	The number of the message	`Warning.warningNumber`
warningType	The type of the message	`Warning.warningType`

year	The year of publication	`Warning.year`
language	The current language	`LANG`
productionAgency	The production agency	`Warning.productionAgency`
country	The country	`Warning.maritimeService.country`

5.6.3.3 General Area & localities

```
<generalArea>
  <locationName>
    <text>Finistère</text>
  </locationName>
</generalArea>
```

Identifier	Description	Matching with PING modelisation
locationName	All general areas in the given language (if several generalArea we put several generalArea tags)	`Warning.generalAreas`

```
<locality>
  <locationName>
    <text>La gamelle</text>
  </locationName>
</locality>
```

Identifier	Description	Matching with PING modelisation
locationName	All l;ocalities in the given language (if several localities we put several locality tags)	`Warning.localities`

5.6.3.4 Feature parts

```
<S124:NavigationalWarningFeaturePart gml:id="NW.AVURNAV_LOCAL_BREST.1002.21.1">
  <id>NW.AVURNAV_LOCAL_BREST.1002.21.1</id>
  <geometry>
    <S100:pointProperty>
      <S100:Point>
        <gml:Point>
          <gml:coordinates>53.731420,7.397681</gml:coordinates>
        </gml:Point>
      </S100:Point>
    </S100:pointProperty>
  </geometry>

  <areaAffected />

  <S124:fixedDateRange>
    <timeOfDayStart>12:00:00</timeOfDayStart>
    <timeOfDayEnd>17:00:00</timeOfDayEnd>
    <dateStart>
      <date>2021-04-02</date>
    </dateStart>
    <dateEnd>
      <date>2021-05-02</date>
    </dateEnd>
  </S124:fixedDateRange>

  <S124:warningInformation>
    <warningType>HYDROGRAPHIC_SURVEY</warningType>
    <information>Relevés hydrographiques</information>
  </S124:warningInformation>

  <header xlink:href="#PR.AVURNAV_LOCAL_BREST.1002.21"/>

</S124:NavigationalWarningFeaturePart>
```

Identifier	Description	Matching with PING modelisation
S124:NavigationalWarningFeaturePart	The identifier is built like :	NW.

	'NW.#SERIE#.#WARNING_NUMBER#.#YEAR#.#NUMERO#'
	Remark : escape spaces or special characters in the series name
		`Warning.serie.name (fr) || Warning.serie.internationalName (en) .`
		`Warning.warningNumber .`
		`Warning.yearNumber .`
		`Warning.featureParts[i].position`

id	An identifier of the part	NW.
		`Warning.serie.name (fr) || Warning.serie.internationalName (en) .`
		`Warning.warningNumber .`
		`Warning.yearNumber .`
		`Warning.featureParts[i].position`

geometry	The geometries of the part	-
areaAffected	The affected areas geometries of the part	-
S124:fixedDateRange	The fixed date ranges of the part	-
S124:warningInformation	The information field of the part	-
header	A link to the message preamble (with # before the id)	

5.6.3.5 Geometries

```
<geometry>
  <S100:pointProperty>
    <S100:Point>
      <gml:Point>
        <gml:coordinates>53.731420,7.397681</gml:coordinates>
      </gml:Point>
    </S100:Point>
  </S100:pointProperty>
</geometry>
```

Identifier	Description	-
geometry	Put several geometry tags if there are several geometries in the part	
S100:pointProperty	The description of a point in S100 format = representation in gml: Point in an S100 tag: pointProperty	

	<S100:pointProperty> <S100:Point> <gml:Point> <gml:coordinates>53.731420,7.397681</gml:coordinates> </gml:Point> </S100:Point> </S100:pointProperty>
S100:surfaceProperty	The description of a polygon in S100 format = representation in gml: Polygon in an S100 tag: surfaceProperty <S100:surfaceProperty> <S100:Surface> <gml:Polygon srsName="EPSG:4326"> <gml:outerBoundaryIs> <gml:LinearRing> <gml:coordinates>60.53,18.307 60.53,18.35 60.50,18.35 60.50,18.307</gml:coordinates> </gml:LinearRing> </gml:outerBoundaryIs> </gml:Polygon> </S100:Surface> </S100:surfaceProperty>
S100:curveProperty	The description of a linestring in S100 format = representation in gml: LineString in an S100 tag: curveProperty <S100:curveProperty> <S100:Curve> <gml:LineString> <gml:coordinates>40.740002,152.449997 38.849998,149.130005 38.119999,145.110001</gml:coordinates> </gml:LineString> </S100:Curve> </S100:curveProperty>

Plus tard

The information concerning the geometries will be completed with in particular the point or feature labels.

5.6.3.6 *Affected area*

```
<areaAffected>
  <S100:pointProperty>
    <S100:Point>
      <gml:Point>
        <gml:coordinates>53.731420,7.397681</gml:coordinates>
      </gml:Point>
    </S100:Point>
  </S100:pointProperty>
</areaAffected>
```

Identifier	Description	-
S100:*	Same format as geometries	

5.6.3.7 *Fixed dates range*

```
<S124:fixedDateRange>
  <timeOfDayStart>12:00:00</timeOfDayStart>
  <timeOfDayEnd>17:00:00</timeOfDayEnd>
  <dateStart>
    <date>2021-04-02</date>
  </dateStart>
  <dateEnd>
    <date>2021-05-02</date>
  </dateEnd>
</S124:fixedDateRange>
```

Identifier	Description	Matching with PING modelisation
timeOfDayStart	Start time	`Warning.featureParts[i].fixedDateRanges[j].timeOfDayStart`
timeOfDayEnd	End time	`Warning.featureParts[i].fixedDateRanges[j].timeOfDayEnd`
dateStart	Start date in a date tag	`Warning.featureParts[i].fixedDateRanges[j].dateStart`
dateEnd	End date in a date tag	`Warning.featureParts[i].fixedDateRanges[j].dateEnd`

5.6.3.8 Warning Information

```
<S124:warningInformation>
    <warningType>HYDROGRAPHIC_SURVEY</warningType>
    <information>Relevés hydrographiques</information>
</S124:warningInformation>
```

Identifier	Description	Matching with PING modelisation
warningType	All detailed types of the part (Warning Hazard Type Detail) (multiple warningType tags if multiple type)	`Warning.featureParts[i].warningHazardTypeDetails`
information	the information of the part as a text in the given language	`Warning.featureParts[i].information`

5.6.3.9 References

You can also add references to other messages (canceled messages for example)

TODO

The addition of references will be completed later. Each reference is described according to a messageSeriesIdentifier.

```
<S124:References gml:id="references">
  <messageSeriesIdentifier>
    <nameOfSeries>Navigational Warnings</nameOfSeries>
    <warningNumber>20</warningNumber>
    <warningType>LOCAL_NAVIGATIONAL_WARNING</warningType>
    <year>2019</year>
    <productionAgency>000</productionAgency>
  </messageSeriesIdentifier>
</S124:References>
```

Identifier	Description	-
messageSeriesIdentifier	The id of the message in the series	-

5.6.4 A simple example

```
<?xml version="1.0" encoding="UTF-8"?>
<S124:ExchangeSet xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:S100="http://www.iho.int/s100gml/1.0" xmlns:S124="http://www.iho.int/S124/gml/cs0/0.1"
xmlns:xlink="http://www.w3.org/1999/xlink">

 <S124:DataSet>
  <imember>
    <S124:NWPreamble gml:id="PR.AVURNAV_LOCAL_BREST.1002.21">
      <id>NW.AVURNAV_LOCAL_BREST.1002.21</id>

      <messageSeriesIdentifier>
        <nameOfSeries>AVURNAV Local Brest</nameOfSeries>
        <warningNumber>1002</warningNumber>
        <warningType>LOCAL_NAVIGATIONAL_WARNING</warningType>
        <year>21</year>
        <language>fr</language>
        <productionAgency>CECLANT</productionAgency>
        <country>FR</country>
      </messageSeriesIdentifier>

      <publicationDate>2021-01-30T14:05:00Z</publicationDate>

      <generalArea>
        <locationName>
          <text>Finistère</text>
        </locationName>
      </generalArea>
      <locality>
        <locationName>
          <text>La gamelle</text>
        </locationName>
      </locality>

<warningHazardType>RESEARCH_OR_SCIENTIFIC_OPERATIONS</warningHazardType>

      <theWarningPart xlink:href="#NW.AVURNAV_LOCAL_BREST.1002.21.1"/>
    </S124:NWPreamble>
```

```
  </imember>
  <imember>
      <S124:NavigationalWarningFeaturePart
gml:id="NW.AVURNAV_LOCAL_BREST.1002.21.1">
        <id>NW.AVURNAV_LOCAL_BREST.1002.21.1</id>
        <geometry>
          <S100:pointProperty>
            <S100:Point gml:id="pnt1">
              <gml:pos>53.731420 7.397681</gml:pos>
            </S100:Point>
          </S100:pointProperty>
        </geometry>

        <areaAffected />

        <S124:fixedDateRange>
          <timeOfDayStart>12:00:00</timeOfDayStart>
          <timeOfDayEnd>17:00:00</timeOfDayEnd>
          <dateStart>
            <date>2021-04-02</date>
          </dateStart>
          <dateEnd>
            <date>2021-05-02</date>
          </dateEnd>
        </S124:fixedDateRange>

        <S124:warningInformation>
          <warningType>HYDROGRAPHIC_SURVEY</warningType>
          <information>Relevés hydrographiques</information>
        </S124:warningInformation>

        <header xlink:href="#PR.AVURNAV_LOCAL_BREST.1002.21"/>

      </S124:NavigationalWarningFeaturePart>
  </imember>

</S124:DataSet>
```

```
</S124:ExchangeSet>
```

5.7 Available series

TODO

The list of series available in S: 124 format does not exist for the moment.

5.7.1 The request

S-124 request to present all available series

GET /nw/v1/Get_NW_Series

5.7.2 Response status

5.7.2.1 Nominal case

Status	Message	Description
200	TO_DEFINE	List of available series

5.7.2.2 Error cases

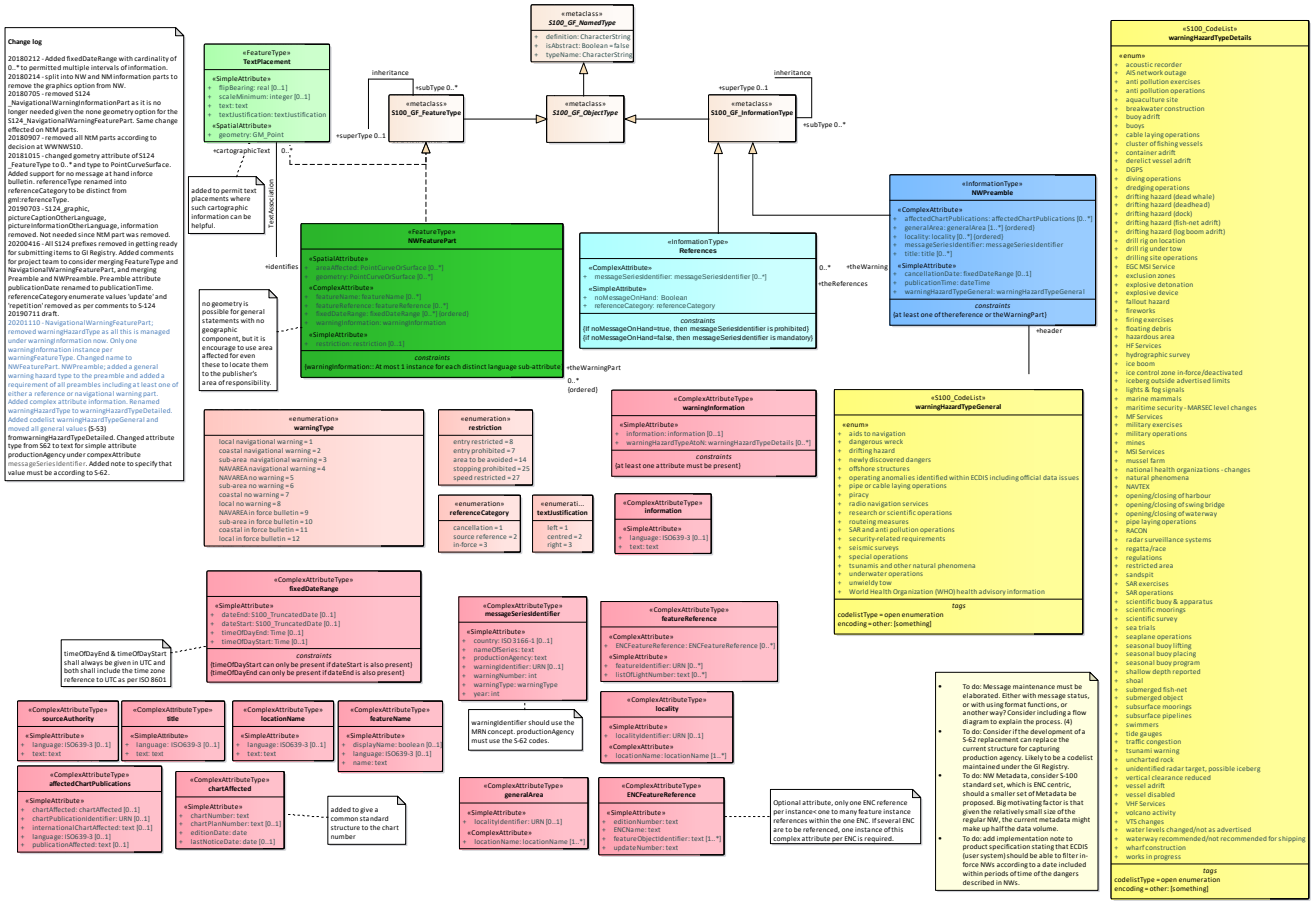
Status	Message	Description
500	Internal server error	Error occured while fetching series

5.7.3 Result description

TODO

The format is to be confirmed, it could be represented by the following example:

Annex A - Draft S-124 data model dated 13th November 2020



Note: the enumerations warningHazardTypeGeneral and warningHazardTypeDetails are under construction within the S-124 PT. PING uses new values that are not the ones presented in this diagram.