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### ANY OTHER BUSINESS

**Information about an intended proposal for a new output to amend the revised performance standards for ECDIS (resolution MSC.232(82)) to facilitate a standardized digital exchange of vessel route plans**

**Submitted by Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and EC**

#### SUMMARY

*Executive summary:* This document informs about an envisaged proposal for a new output to amend the revised performance standards for ECDIS (resolution MSC.232(82)) to facilitate a standardized digital exchange of vessel route plans.

Several e-navigation projects have studied exchange of route plans. Its positive effects, namely increased safety, reduced administrative burden and more efficient operations, combined with reduced environmental impact, have been validated.

An international standard format for route exchange has been developed and it is considered an appropriate next phase to also adapt the regulatory aspects to allow and facilitate standardized exchange of route plans.

*Strategic direction, if applicable:* 2, 3, 5 and 6

*Output:* 2.11, 3.2, 3.4, 5.1, 5.9 and 6.24

*Action to be taken:* Paragraph 34

*Related documents:* MSC.1/Circ.1593; MSC 102/24; NAV 59/INF.8; NCSR 1/INF.18; HGDM 2/5 and HGDM 2/10

#### Introduction

1 This document informs about an envisaged proposal for a new output to amend the *Revised performance standards for electronic chart display and information systems (ECDIS)* (resolution MSC.232(82)) to facilitate a standardized digital exchange of vessel route plans. The output proposal is envisaged to be submitted to MSC 104.

2 A two-way exchange, ship-shore and shore-ship, of route plans can act as an enabler for several of the 16 defined Maritime Services in the context of e-navigation (MSC.1/Circ.1595, annex, table 6; and MSC.1/Circ.1610, annex, pages 1 and 4 refer).

3 The proposal will rely on international standards, e.g. within the International Hydrographic Organization (IHO) and the International Electrotechnical Commission (IEC) domains, for technical details regarding how the exchange of route plans should be implemented.

4 The proposed digital exchange of route plan is envisaged to be used ship-shore and shore-ship in the voyage planning and execution phase. The proposal will not include ship-ship exchange for anti-collision purposes.

5 The proposed amendment to the performance standards for ECDIS would only apply to new installations.

## Background

6 As part of the outcomes from the European Union (EU)-funded MONALISA (2010-2013) and MONALISA 2.0 (2013-2015) projects, an industry standard for a route exchange format was developed. The route exchange format (RTZ) was standardized by IEC and included in the IEC 61174 ed.4 standard (*Electronic chart display and information system (ECDIS) – Operational and performance requirements, methods of testing and required test results*). This provided a standardized data format that could be used for exchange of routes (route information, route geometry and route schedule) between different systems on board as well as for exchange of information between ship-shore and shore-ship e.g. between ship and VTS, route optimization service providers, etc.

7 The outcomes of these projects have been reported to NCSR 1 in document NCSR 1/INF.18 (Italy and Sweden) on *Results and recommendations from the MONALISA and MONALISA 2.0 projects*, under agenda item 9 "Development of an e-navigation strategy implementation plan".

8 The route exchange format is currently being updated by an IEC Working Group to become S-100 compliant. The S-100 Standard is a framework document that is intended for the development of digital products and services for hydrographic, maritime and GIS communities.<sup>1</sup> The new standard, IEC 63173-1 *Maritime navigation and radiocommunication equipment and systems – Data Interface – Part 1: S-421 Route Plan Based on S-100*, is expected to be released end of 2021. However, there is no need for an amendment of the ECDIS performance standards to await the IEC 63173-1 standard being released as the existing route exchange format (RTZ) can also be referenced in the performance standards.

9 The EU-funded STM Validation Project (2015-2019) took the standard data format (RTZ) as a starting point but to reach the full potential of a standardized exchange of route plans it was necessary to specify not only what format (i.e. RTZ/S-421) the data should have but also how the exchange should be done. This is crucial in order to achieve interoperability in machine-to-machine communication which allows users to connect seamlessly even on their first encounter which is necessary in the shipping domain since shipping is often a series of first-occasion encounters, e.g. a ship visiting new terminals and ports. Accordingly a generic information service/Application Programming Interface (API) was developed that provides an interface for how the exchange of route plans should be performed. The standardized interface was implemented in the project testbed with approximately 400 ships and a dozen shore centres.

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<sup>1</sup> <https://iho.int/en/s-100-universal-hydrographic-data-model>

10 After refinement and validation of the effects in the project, IEC initiated the work on a new standard IEC 63173-2, Secure Exchange and Communication of S-100 based products (SECOM) that describes how the exchange of, e.g. route plans should be done. The standard, expected to be released towards the end of 2022, will enable wider technical interoperability where the same service interface can be used for exchanging information regardless of operational use. This can thus support the e-navigation SIP (*E-navigation Strategy Implementation Plan – Update 1* (MSC.1/Circ.1595)) of IMO and several of the identified Maritime Services in the context of e-navigation, as means of providing electronic information in a harmonized way.

11 As described in the above sections, the object has been on creating the technical ability for digital exchange of route plans and validate the effects. It is considered an appropriate next phase to also adapt the regulatory aspects to allow and facilitate standardized exchange of route plans. Standardized in this context is to be understood as electronic exchange, machine-to-machine, including cyber security measures to prevent unauthorized access.

### **Analysis of benefits**

12 As part of the improved provision of services to ships through e-navigation, maritime services have been identified as the means of providing electronic information in a harmonized way. The exchange of route plans could act as support and an integrated part of several of the Maritime Services (MSC.1/Circ.1595, annex, table 6; and MSC.1/Circ.1610, annex, pages 1 and 4 refer), namely VTS Information Service (INS), VTS Navigational Assistance Service (NAS), Traffic Organization Service (TOS), Port Support Service (PSS) Maritime Safety Information Service (MSI), Pilotage Service, Tug Service, Vessel Shore Reporting, Ice Navigation Service, Meteorological Information Service and Search and Rescue Service (SAR).

13 Currently, there are 16 IMO adopted Mandatory Ship Reporting Systems (MRS) and more than 100 VTSs in European waters where ships are required to report data to shore-based authorities. Most of the information is reported via voice communication and recorded by the coastal stations operators in their respective databases. The route plan of a ship must be reported to a coastal station in some of the MRS/VTS areas e.g. Great Belt, Sound. Digitally exchanged route plans shall be reused to minimize the reporting burden. This is tested under the "Facilitation of ship to shore reporting" pilot project which is executed under the EMSA "Interoperability Project". At an initial phase the route plan would be made available to coastal stations participating in the pilot project and at a later stage this data would be included in the Integrated Ship Report (ISR) which will be provided to Member States Authorities by the new Integrate Report Distribution system developed for the pilot project.

14 During discussions on Maritime Autonomous Surface Ships (MASS) it has been identified that it is crucial for other ships to know the intentions of MASS ships. Sharing of route plans between the ships could be one of the solutions.

15 The benefits, related to the Maritime Services in the context of e-navigation, in terms of safety, environmental improvements and efficiency have, as mentioned briefly above, been studied and validated in large-scale testbeds<sup>2</sup> with approximately 400 ships and a dozen shore centre systems from several different manufacturers. The benefits with implementation in real systems used in everyday operations is evident as it pushes the solutions developed to be as mature as possible, facilitates future implementation and safeguards that the chosen technical solutions are not proprietary, as they have to be accepted and approved by others.

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<sup>2</sup> <https://s3-eu-west-1.amazonaws.com/stm-stmvalidation/uploads/20190709125520/STM-Validation-Final-report.pdf>

16 As with the Maritime Services, mainly already existing services have been digitalized and distributed by new means in the testbeds. Examples of operational services, where digital exchange of route plans has been an enabler includes routes optimization (weather routing), pilot routes, ice routes, enhanced monitoring from shore, SAR search patterns, selected navigational warnings and Just In Time (JIT) port arrival times.

17 The findings mainly come from end-user feedback collected within the STM Validation Project and indicate that sharing of route plans both ship-shore and shore-ship can enhance situational awareness and improve port call processes. According to questionnaires and interviews with navigation officers and shore centre operators the exchange of route plans directly from ECDIS has been useful. For navigation officers the benefits of integrating information of higher quality (i.e. accuracy and timeliness) are similar for most services. For example, the route optimization services have been found useful to insert the optimized routes directly into an ECDIS without having to use stand-alone applications. This is also the case for winter navigation where ice-waypoints and ice routes are made available directly in the navigation system.

18 The operational benefits are related to easier route planning which generates reduced administrative burden, and human errors in form of misunderstandings. For example, an average of 75% of test-bed participants perceived navigational operational safety to be increased and 74% experienced that route exchange supported tools and services assisted their ordinary bridge duties.<sup>3</sup> At the same time, shore centres and VTS centres can improve the quality of services and information to ships.

19 Sharing route plans from ships to VTS clearly indicated a positive change in the work of the VTS. Given the possibility to review the intentions of the ships well in advance before entering the surveillance area of the VTS made it possible for the VTS to work more proactively. The fact that the same data, the route plan, is used on board and ashore, creates a shared situational awareness that can be used to make operations and monitoring more effective.

20 The service with the biggest potential impact on efficiency in terms of reduced costs is port call synchronization between ship and port, to achieve Just In Time arrivals. It has been demonstrated in testbeds by the possibility to provide updated arrival times in a digital two-way communication, which means that both the ship and port can inform each other about planned and preferred arrival times.

21 The arrival time of a ship is taken directly from the source in the route plan and presented in the planning system of the port. This has proven the ability to provide earlier information about ports earliest possible time to handle the ship. The information can be used to reduce the speed of ships to eco-speed, thereby reducing costs for bunker consumption, and at the same time reduce emissions of greenhouse gases (GHG).

22 A bi-directional exchange of route plans would also be able to provide and suggest real time ETA information to a wide variety of other functions such as Maritime Single Window and time slot allocation in dense traffic areas.

23 The underlying technology for the exchange of route plans could also facilitate and support transmission, receipt and response of information required for the arrival, stay and departure of ships, persons and cargo, including notifications and declarations for customs, immigration, port and security authorities, via electronic data exchange, making the transition

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<sup>3</sup> [https://s3-eu-west-1.amazonaws.com/stm-stmvalidation/uploads/20200225090150/STMVal\\_D2.6-D2.10-D2.12-Voyage-management-testbed-report-1.pdf](https://s3-eu-west-1.amazonaws.com/stm-stmvalidation/uploads/20200225090150/STMVal_D2.6-D2.10-D2.12-Voyage-management-testbed-report-1.pdf)

to full-fledged Maritime Single Windows. Further, the envisaged amendment proposal could contribute to other IMO initiatives such as the GreenVoyage-2050 Project as it would complement to a certain extent the project activities by encouraging JIT steaming and consequently less GHG emissions.

### **Analysis of implications**

24 The effects of standardized digital exchange of route plans have been studied in several e-navigation projects. Costs have been calculated by Cost Benefit Analysis (CBA) and validated in testbeds for e-navigation, where standardized digital exchange of route plans have been the main enabler for achieving the described benefits amongst the included actors. Such studies will be summarized in the envisaged output proposal.

25 The envisaged proposal for a new output to amend the performance standards for ECDIS aims to regulate the technical ability for digital exchange of route plans while the actual usage of the functionality is voluntary. It is the actual usage of the functionality rather than the technical ability that drives running costs, e.g. communication costs and user fees, while enhancing current performance standards would result in minimal additional costs to the maritime industry.

26 The envisaged performance standards for ECDIS amendment proposal would only apply to new installations. As a result, both benefits and implications arising from the proposal will be sequenced over a number of years. However, a voluntary industry driven retrofit could speed up the adoption process. Further, voluntary retrofit would also benefit from the stability provided by the performance standard for ECDIS referencing IEC standards as a stability assurance that the investment of shore actors and shipowners will not be lost.

27 IEC standards are often supported by maritime system providers even if they are not mandatory to implement. As an example IEC 61174 ed.4 standard (*Electronic chart display and information system (ECDIS) – Operational and performance requirements, methods of testing and required test results*) does not mandate route exchange capability. However if routes are to be exchanged between different proprietary devices on a bridge of a ship, e.g. radar and autopilot, the route exchange format (RTZ) is mandatory.

28 For manufacturers that already plan to support IEC standards, referenced by the performance standards for ECDIS, the envisaged proposed amendment would not add any additional need for development. However, if some ECDIS manufacturers would not implement the IEC standards on a voluntary basis, the amendment proposal would imply development work to support the new functionality. This development effort is decided by the status and architecture of current systems and therefore it is difficult to provide any generic figures but the development effort is expected to be low based on testbed experiences within the STM Validation project. Eventually these limited costs for the ECDIS manufacturers development work would be transferred to the end-customers, i.e. shipowners, but distributed per installed ECDIS they would thus be minimal.

### **Human element, training needs and legislative burden**

29 Risks associated with the introduction and misuse of technology as a new aid to navigation, for example so called radar and ECDIS assisted collisions and groundings, are well known and must be taken into account. The envisaged proposed digital exchange of route plans is meant to be used ship-shore and shore-ship in the exchange of the route plan of a ship. The proposal would not include ship-ship exchange for anti-collision purposes. Thus, the related navigational risks can be kept to a minimum, as have been validated in testbed safety assessments. The testbeds on exchange of route plans that have preceded the envisaged

amendment proposal has followed recommended Software Quality Assurance (SQA) and Human-Centred Design (HCD) principles to further minimize potential risks. These methods are described in IMO *Guideline on Software Quality Assurance and Human-Centred Design for e-navigation* (MSC.1/Circ.1512).

30 It is also recognized that harmonization of the user interface for navigation equipment and information used by seafarers to monitor, manage and perform navigational tasks will help to enhance situational awareness and consequently enhance safe and effective navigation.

31 For some functions, related to exchange of route plans, the variations across different equipment of manufacturers of ECDIS should be minimal. The functions should be incorporated as detailed in SN.1/Circ.243/Rev.2 on *Guidelines for the presentation of navigational-related symbols, terms and abbreviations*, amendments to the *Performance standards for the presentation of navigation-related information on shipborne navigational displays* (resolution MSC.191(79), as amended by MSC.466(101)) and also MSC.1/Circ.1609 on *Guidelines for the standardization of user interface design for navigation equipment*.

32 No revision of the IMO ECDIS model course (1.27) is considered necessary. However, a limited training need to be anticipated and ECDIS familiarization would need to include the new functionality of standardized digital exchange of route plan. The estimated time needed for familiarization and training for ship's officers is in the order of one (1) hour. No separate courses or training is anticipated.

33 Any associated legislative and/or administrative burden, such as making amendments to national legislation to include the envisaged amended/revised performance standards for ECDIS, should be minimal.

#### **Action requested of the Committee**

34 The Committee is invited to note the information provided.

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