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Global Maritime Digital Route Transition (GMDRT)  
: Paving maritime digital routes

# Summary

GMDRT is an initiative to pave maritime digital routes globally by linking national and regional maritime digital routes. KRISO proposed GMDRT to achieve route-centric digitalization which connects nodes to nodes beyond node-oriented digitalization which mainly focus on national or regional maritime routes. GMDRT will provide stakeholders on the globe with technical resources and confidence to digitalize maritime route. As a global maritime technical society, we believe, IALA is the best place to coordinate and steer works of GMDRT. This document proposes IALA to consider taking the leadership to pave the global maritime digital route.

# Background

International Maritime Organization (IMO) adopted an e-Navigation strategy for maritime digitalization in 2006. It developed a strategy implementation plan (SIP) for e-Navigation that presented five prioritized solutions for implementing e-Navigation and the necessary tasks to provide them.

Tasks can be largely divided into those related to the onboard system, those related to the quality of the e-Navigation system, and those related to the e-Navigation service. The tasks in the first category cover human-centered design of e-Navigation systems, S-mode. The tasks in the second category cover software quality assurance (SQA) and built-in integrity test (BIIT). The tasks in the last category cover the specifications or standards of data, communications, and services.

Efforts at the IMO level were embodied in the development of e-Navigation-related standards and guidelines of international organizations in the maritime sector such as International Hydrographic Organization (IHO) and International Association of Lighthouse Authorities (IALA). In keeping with these efforts, many numbers of e-Navigation-related R&D projects have been carried out around the world, including ACCSEAS, EfficienSea, STM VP, SMART-Navigation and SeSame leading to important technical achievements.

Main achievements include: (1) Guidance on the definition and harmonization of the format and structure of maritime services in the context of e-Navigation (IMO Res. MSC.467(101)), (2) CMDS based on S-100 such as S-421, (3) Maritime Connectivity Platform (MCP), and (4) e-Navigation services in operation locally or regionally such as SMART-Navigation services in Korea and STM services via NAVLINK.

Despite the strategic efforts at the IMO level and the efforts of each international organization and individual countries, digitalization in the maritime sector faces various challenges. Some of them are old but some of them are new. It is time for e-Navigation community to consider a new initiative to overcome them.

# The challenges facing maritime digitalizaton

The first challenge that maritime digitalization or e-Navigation faces is that the maturity of the strategy implementation is not sufficient from the user perspective. Although, for example, it has passed 16 years since IMO members agreed to adopt the e-Navigation strategy, standardized and automated reporting has not yet been applied to real world navigation. Integration and harmonized presentation of maritime information on graphic displays have not been achieved either. In the context of e-Navigation, some maritime services are only available in certain countries or regions. This can be said to be the result of the immaturity of e-Navigation service-related standards, the absence of onboard equipment for service consumption, and inadequacy of service provision (technical) environment.

Second, the focus of R&D activities in the maritime sector has moved from e-Navigation to new global agendas such as greenhouse gases (GHG) reduction strategy and maritime autonomous surface ship (MASS). A new agenda means the emergence of new R&D needs, which causes a reduction in existing R&D activities. The e-Navigation strategy, which has been 16 years since the adoption decision, is accepted as a boring agenda, although it is not everyone's opinion. Therefore, a new momentum is need, focusing on completion of strategy implementation.

Third, there is a need to align the e-Navigation strategy itself with the newly emerging global agendas. It can be expressed as e-Navigation for MASS and e-Navigation for greener shipping. The new agendas will create new tasks, which inevitably affect existing tasks. Therefore, efforts and specific measures are needed to make sure that the achievements and/or ongoing tasks created in the e-Navigation strategy implementation process can be actively utilized in the new global agendas.

Finally, efforts are needed to evolve e-Navigation. Since the e-Navigation strategy was first adopted in 2006, although it has not yet reached global deployment and usage of e-Navigation services, it cannot be denied that various technological achievements have been accumulated. These technological achievements need to evolve in accordance with changes in the technological environment and user requirements that have changed from the time of development.

# Global Maritime Digital Route Transition as a New Initiative of IALA

For the achievement of the e-Navigation strategy to contribute to the e-Navigation purpose (of “to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment”) and to cope with the new technological, economic, and social challenges faced by the maritime community and shipping industry, a new and concrete initiative is needed.

Global Maritime Digital Route Transition (GMDRT) is a new initiative to globally achieve maritime digitalization by route-centric digitalization approach connecting nodes to nodes beyond node-oriented digitalization which has been carried out so far by country and region clusters. Development of technologies for maritime digitalization can be carried out at the node level, but for the technologies to be applied to real world navigation, which is the goal of technology development, the value of the technologies must be demonstrated in “berth to berth navigation” in real world.

Route-centric digitalization aims to build a maritime digital pavement that faithfully reflects the basic properties of navigation, i.e., connecting nodes and nodes. The national maritime digital route (NMDR) is constructed by connecting elementary maritime digital routes (EMDRs), connecting NMDRs to each other to build regional maritime digital route (RMDR), and connecting RMDRs to each other to build global maritime route (GMDR) finally. GMDRT means the whole transition activities to build EMDRs, NMDRs, RMDRs and GMDR. Each EMDR or NMDR may have a digital connectivity environment and maritime service portfolio (MSP) of different levels or contents, and these contents are reflected in planning of digital route construction.

In this way, by redefining the existing concept of route as “maritime digital route”, the achievements of maritime digitalization made so far can be integrated and utilized from a holistic perspective. Navigation routes around the world will be provided with digital connectivity. Digital maritime information services will be converted into available digital routes. Through this, information delivered in an analogue method is transmitted in a digital manner, and the latest navigation information can be provided in an online.

# needs and opportunities

GMDRT was proposed as an action plan to digitalize maritime services to meet user needs focusing on global deployment of e-Navigation technologies. Its concept has been shared within the e-Navigation community through workshops that IALA and Ministry of Oceans and Fisheries (MOF) of the Republic of Korea coordinated, conferences, and technical committee meetings.

It provides an opportunity for maritime digitalization to take place on a global scale. Global scale maritime digitalization has some barriers. Many geographical areas are included in a route planning. All needed standards are not finalized yet. With GMDRT, standards can be finalized more efficiently, and lessons learnt from numerous testbeds can be shared globally and openly, which will deliver more confidence on maritime route digitalization to users.

GMDRT can also provide an opportunity for a variety of maritime services to be simultaneously utilized and further developed. It is possible to develop and demonstrate a newly identified service that has not been included in the projects carried out so far or in the initial descriptions of maritime services in the context of e-navigation.

In addition, GMDRT can be used as a measure to attract partners for non-mandatory maritime services. This is because non-mandatory services must have a solid business case to succeed. The global digital route created through GMDRT can be used as a platform for global maritime time digitalization that exists with consumers, providers, and facilities.

By clearly defining the target and level of digitalization, GMDRT can allow the development of new connectivity and MSPs to take place independently (i.e. MSP for MASS in NMDR of Korea). Thus, route-centric digitalization provides an environment for immediate and practical resolution of new technical challenges.

Lastly, in addition to technical needs and business-related opportunities, GMDRT could provide a concrete measure, which provides international standard framework for open science in the maritime community, to support open science policy in the UNESCO recommendation. GMDRT can enable scientific collaborations and knowledge creation for maritime digitalization in such a way to contribute to reducing the digital, technological and knowledge divides existing between and within countries.

# scope

GMDRT covers global coordination and standardization of digital maritime data, digital connectivity, and maritime digital information services.

Many types of maritime digital data standards for digital navigation are in an incomplete state, and accordingly, the standard development for related maritime digital information services is also in a stagnant state. Standard requires procedural accuracy, rigor, and stability. Therefore, it has properties that cannot be enacted or revised within a short time. From the standpoint of business-related stakeholders, developing a product without a standard specification is the same level of difficulty as creating a new market without it. These points cause a chain reaction, making it difficult to globalize digital navigation.

By sharing the GMDRT initiative, tests focusing on real world application of maritime digitalization technologies will be organized. Berth-to-berth navigation scenarios, that cover global coordination of maritime digital data, digital connectivity, and maritime digital information services will be used for the tests. Results of tests will be open and shared to provide users and stakeholders with scientific and technical evidence of efficacy of maritime digitalization for safer and greener navigation. This will enable more efficient standardization of them, more active acceptance by users of maritime digitalization technologies and, at the end of the day, digital transformation in maritime sector.

# steering and coordication

GMDRT will provide a framework for global cooperation and coordination for digitalization of maritime routes. For the GMDRT initiative to succeed, it is necessary to establish a steering group to collect the opinions of all stakeholders, who are sharing the vision, the goals and the scope of GMDRT. The geographic spread of the stakeholders can mean different perspectives, which should be collected, steered and coordinated. As a global maritime technical society, we believe, IALA is a perfect place to steer and to coordinate works. Under the umbrella of IALA, global scale tests of maritime services can be coordinated. Results can be reported and shared to build up global capacity to digitalize maritime routes.

# Action requested of the Committee

The Committee is requested to take actions appropriate.

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