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The Marine Electronic Highway Project in Straits of Malacca and Singapore: Observation on the Present Development

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ABSTRACT: Implementation of the Marine Electronic Highway (MEH) project in Straits of Malacca and Singapore will complement the efforts taken by Malaysia, Indonesia and Singapore as littoral states in enhancing safety of navigation and the prevention and control of marine pollution in the Straits. The Project Steering Committee meetings of the MEH indicate that, the progress in the implementation of its activities is in the midst of many challenging conditions. The efforts is a testament that the littoral states are working together to ensure the implementation of this project is running smoothly since the donor agencies, user States and the maritime industry have great expectations on its success. The MEH project consists of four important components such as Hydrographic Survey and Electronic Navigational Charts (ENCs) production, Environment Marine Information Overlays, Baseline Survey and Information Technology Structure. This paper will address the current status of the implementation of the four key components highlighting the development of ENCs as a vital tool to sustain the safety of navigation along the straits. The discussion in this paper is based on some preliminary survey findings and from reports of the Project Steering Committee meetings.

1 INTRODUCTION

The Marine Electronic Highway (MEH) in Straits of Malacca and Singapore is an innovative marine information and infrastructure system that integrates environmental management and protection systems and maritime safety technologies for enhanced maritime services, higher navigational safety standards, integrated marine environment protection and sustainable development of coastal and marine resources. The key of the MEH is precision navigation and will utilize a network of Electronic Navigational Charts (ENCs) in conjunction with Electronic Chart Display and Information System (ECDIS), Differential Global Positioning System (DGPS), Internet Broadband and other maritime technologies (K.Sekimizu, 2003).

2 PROJECT BACKGROUND AND STATUS

2.1 *Background and objectives*

Straits of Malacca and Singapore are a historically important sea route for international and local maritime trade as well as being one of the world's busiest sea lanes, a unique and rich tropical estuarine environment, a major shipping route for petroleum oil tankers, and one of the highly vulnerable waterways used for international navigation with a high incidence of marine casualties and oil spills. Geographically, the Straits extend more than 900 km between Peninsula of Malaysia, Indonesia and Singapore. The narrowest point is the Philips Channel which is 1.3 nautical miles wide and 23 meters depth. The Straits have many more chokepoints particularly at One Fathom Bank and Batu Berhenti. These chokepoints are critically important to the oil and natural gas trade. Consequently, the large ships of 200,000 ton and above or VLCC have to rush for the channel during high tide period (Hiroshi Sekine, 2006).

Since 1980s, several initiatives for the Straits were undertaken, which covered various aspects of maritime activities, safety of navigation and marine environment protection. The fruition of those initiatives is mainly through the Co-operative Mechanism on Safety of Navigation and Environment Protection. Project. Then in late 1990s, the concept of MEH has been introduced. This new concept having concerned that the high risk of ship accidents along the congested water in the Straits.

Safety and security of navigation and environmental protection are the main concern. Therefore the MEH project aims to provide a practical demonstration in the Straits of the potential for digital information networks that can provide environmental and related information in real time to both mariners

transiting the Straits as well as other agencies and interested parties. The Project includes obtaining high-quality hydrographic surveys of some of the most limiting depth areas in the Straits, the development of ECDIS compatible with Marine Information Overlays (MIOs), the establishment of a unified data centre to provide real time information and updates, and the establishment of a number of environmental monitoring stations including tide gauges and current meters.

The MEH was designed in two main stages namely demonstration and full scale. Demonstration project will cover parts of the Straits, mainly the area of the Traffic Separation Scheme. The second stage or full-scale project, which will follow after this initiative, will cover the whole Straits including the coastal waters of the Littoral States. The demonstration stage aims to show how environmental data related to the Straits, such as the nature and extent of environmentally sensitive areas can be accessed by the relevant authorities using a common database; how new or revised routing instructions or prohibited areas can be broadcast to ships taking part in the demonstration; and how Mariners can receive other environmental information such as real-time tidal observations, tidal streams, sea conditions and wind, in ECDIS via MIOs.

2.2 *MEH Time line*

Table 1.The MEH Progress (Hartmut Hesse, 2008)

Important Event	Date
Established Project Management office at Batam, Indonesia	May, 2007
1st Project Steering Committee Meeting – Batam, Indonesia	29-31 May 2007
Hydrographic survey bidding	October 2007
Bid evaluation report	January 2008
1st Technical Committee on Survey and ENCs meeting at Penang, Malaysia.	14-15 April 2008
2nd Project Steering Committee Meeting – Kuala Lumpur, Malaysia	3-5 June 2008
Full demonstration phases	Expected Mid of 2009

3 MEH KEY COMPONENTS

During the 2nd Project Steering Committee Meeting at Kuala Lumpur, the member considered four key components, namely the hydrographic survey, ENCs production, the Environment Marine Information Overlays (E-MIO) and the Information technology structure and data centre. The current statuses of these components are presented in the Table 2.

Outcome of the 1st Technical Committee Meeting held in Penang, Malaysia from 14-15 April 2008, the members had agreed that to reduce the scope of the survey to the prioritized areas as shown in Table 3. Having considered Area 1 of the Traffic Separation Scheme (TSS) as the most important of the 8 prioritized areas, the Meeting agreed that Area 1 met the holistic objective of the MEH project and therefore should be surveyed. This area is from One Fathom Bank to Tanjung Piai with an area of 621.28 km^2 or 14.38% of the prioritized areas as its first priority for survey.

Table 2. The current status of the MEH main components.

MEH Main Component	Current Status	Remarks
Hydrographic survey and Electronic Navigational Charts (ENCs) production.	Hydrographic survey activity has been in the pipeline for over a year, including the tendering aspect, which has rejected due to insufficiency funds.	Reduction of scope of service (SOS) areas based on the eight (8) prioritized areas (refer to Table 3), beginning with Area 1. The additional areas will be considered options and may be surveyed subject to availability of funds. Ongoing negotiations with contractor.
Environment Marine Information Overlays. (E-MIO)	The Terms of References (TOR) for the E-MIO consultancy had agreed during 2nd PSC Meeting, June 2008 in Kuala Lumpur	The dynamic E-MIO data within the Straits agreed as bellow: Dynamic tide data. Real time notification of new restricted areas and routes. Real time environmental monitoring (such as wind, current and temperature.
Information Technology structure and database centre.	The fundamental principle of MEH Data System had been presented by IT consultant during TC-SIF meeting in September 2007 in Singapore.	The MEH Data system was based on Data format (open format using xml format file), Security of data (SSL protocol), Reliability (redundancy of all servers), Scalability and Sustainability.

Table 3. The Estimate Cost for 8 Prioritized Areas (Report of 2nd Project Steering Committee Meeting– Kuala Lumpur, Malaysia, 2008).

Survey area	No# of Ship Wrecks	KM^2	Estimated cost(bid)/ USD	Estimated days(ops)
Area 1	5	621.28	2,754,719	44.32
Area 2	2	140.15	584,548	14.67
Area 3	3	127.83	712,155	19.93
Area 4	0	10.65	163,966	2.65
Area 5	5	85.59	241,569	5.79
Area 6	2	33.61	173,315	3.02
Area 7	0	47.23	824,155	25.09
Area 8	2	279.91	824,155	25.09
Total	19	1,346.2	6,278,582	140.56

4 ENC AND E-NAVIGATION

4.1 *ENC production*

Electronic Chart Display and Information Systems (ECDIS) embraced the entire navigation system and have made it possible to concurrently address maritime safety and environmental protection management both at sea and ashore. However, in order to produce precise of charts, data and information needs to be made available. The mandatory carriage of ECDIS seem to be enforced, with reports from IMO's NAV54 subcommittee meeting confirmed that members have reached a consensus in favour of making the technology a required fit for ocean going vessels especially in highly traffic and congested water like Straits of Malacca and Singapore (Digital Ship, 2008). In view of that, the development of ENC and the require infrastructure have to be expedited.

According to the report from Singapore representatives during 2nd Project Steering Committee Meeting in Kuala Lumpur (2008), the latest edition of Singapore ENC consists of 14 cells and is produced in accordance with the IHO S-57 Edition 3.1 specifications. The Singapore ENC covers Singapore Waters and its approaches. It contains chart information necessary for safe navigation and supplementary information in addition to those in the paper charts. Monthly incremental of Singapore ENC updates are available over the Internet as well as through appointed ENC distributors.

4.2 *E- Navigation Strategy*

Precision navigation shall be the backbone of the MEH upon which all the technological platforms would be integrated commencing with the ENCs-ECDIS. Precision navigation consists of onshore, sea based and ship-based facilities from which information and data flow into the network. Such facilities include transponders such as an Automatic Identification System (AIS) and onboard access to the Internet or broadband (K.Sekimizu, 2004). With AIS, real time information can be automatically provided to or received from appropriately equipped shore facilities or other ships. With enhanced AIS, hydrographical and oceanographic data including weather conditions can be transmitted or received, thereby facilitating ship movement, particularly in restricted or congested waterways as well as during inclement conditions (Digital Ship, 2008). Currently, AIS is mainly for basic ship information exchange.

In addition to acquiring, managing and achieving data in digital form, it is now apparent that common protocols necessary for optimum data transfer and sharing. Hence, the Littoral States's VTS and the MEH Data Center in Batam (Indonesia) need to use identical database software as a database engine to achieve the desires functionality. Currently, Singapore and Malaysia VTS use ORACLE 10g. However, Indonesia has not yet built its VTS and could easily use the same platform.

However, future developments may include other relevant information such as weather data. AIS or similar facility, information flow could be real time, forecast, archived data, and monitoring/time lag data. The presence of a network of meteorological centers such as the South East Asian Centre for Atmospheric and Marine Prediction (SEACAMP) could provide higher resolution local weather conditions or forecasts that could be transmitted through the AIS allowing mariners to evaluate the weather conditions along their route. All of these strategies and technologies will be designed in order to achieve the aim of MEH as stated below:

- Facilitate vessel traffic monitoring and management,
- Facilitate communication and data exchange,
- Improve efficiency of transport and logistics,
- Effective operation of contingency, response and SAR,
- Provide human-machine interface, and
- Manage user workload and support decision making.

5 DISCUSSION AND CONCLUSION

5.1 *Towards A Successful End Product*

Based on the current status of the MEH project it is obviously indicated that the progress in the implementation of its activities is in the midst of many challenging conditions. According to Sally Burningham (2008) from World Bank in Jakarta, the MEH project has been under implementation with fund available since June 2006 but very little of the funds had been disbursed. Despite of this, the project actually needs more fund and strategies in order to accomplish. Thus, some of necessary steps to ensure success and expedite the MEH project shall include:

- Ensuring financial sustainability.
  Financial sustainability will only be achieved through an overall commitment of the governments of the respected countries, the oil and gas major transporters, fishing and shipping interests. Therefore, the US $8.68 million which provided by the Global Environmental Facility (GEF) is not sufficient enough due to certain escalations in cost in some elements of the Project (Ahmad, 2008). In addition, without extra fund from other parties or sponsors the MEH Projects encountering difficulties in adhering to the original scope and plan.
  Based on the suggestion made by Sasakawa

(2007), he issues an invitation to the Straits user to agree to a voluntary payment of US 1 cent per ton for every vessel that transit through the Straits. Since annually more than 4 billion tons of cargo that passes through the Straits, these would raise 40 million dollar a year. This amount would more than enough to eliminate the excessive burden by the Littoral states (B.A Hamzah, 2008).

- Cooperative mechanism between littoral states and other straits user.

  In November 2004, the IMO Council at its 93rd meeting considered that the Straits of Malacca and Singapore as specific and vital shipping lane. Following that decision, in September 2006, three littoral states (Malaysia, Indonesia and Singapore) together with Japan and other industry representatives such as INTERTANKO and ICS had developed the Cooperative Mechanism for maintaining safety of navigation and environmental protection of the Straits.

  Subsequently, the industry and other Straits user are encouraged to participate in the Cooperative Mechanisms by making voluntary contributions to the Aids of Navigation Fund or either participating in the Cooperation Forum (R.Beckman, 2008). As major beneficiaries of safe and secure passage through the Straits, fairness and justice dictate that industry and other users should participate in the Cooperative Mechanisms.

- Involving public, private sector and academics stakeholders.

  Reference in Article 43 of UNCLOS to user States does not preclude participation by industry or other private sectors. This Article avoids the legal problems that would arise if the Littoral States established mandatory tolls or charges. However, the private sector does not need to justify burden sharing and to undertake Corporate Social Responsibility (CSR) just because the Article 43 omits mention of the private sector. This is because cooperation in promoting common good is requiring under international law. Thus, the CSR role of the private sector especially for oil major companies and shipping interest should go beyond monetary contribution. The concept of CSR dictates that the private sector should recognised the shared responsibility to ensure safe and secure passage through vital international shipping lanes.

  Beside that, scholars, academia, researchers and scientist from universities and institutions are encouraged to share idea, research finding and consultation on issues of common interest in the Straits. In recognizing the role they could play, the Littoral States and the MEH Project Steering Committee (PSC) should facilitate the concrete and practical cooperation methods. In this respect, the cooperation forum will be useful platform for the Littoral states and PSC to gather feedback. In addition, some fund should be allocated for research grant in order to make fruition of information through research finding.

5.2 *Conclusion*

The establishment of MEH Project is significantly important to the maritime industry. The efforts through Cooperative Mechanism and actively participated in PSC meeting are the testament that the littoral states and other stakeholder are working together to ensure the implementation of this project is running smoothly since the donor agencies, user States and the maritime industry have great expectations on its accomplishment.

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