

MINUTES OF MEETING

5TH EAHC CHARTING AND HYDROGRAPHY COMMITTEE MEETING 19TH TO 21ST OCTOBER 2016 SINGAPORE

WELCOME AND OPENING ADDRESS

1. Chair (CHC) Dr Parry Oei opened the meeting, welcoming all delegates and expressing his gratitude towards the delegates for their participation in the meeting. The List of Delegates appears as **Annex 1**.
2. Chair (CHC) noted that the EAHC has been actively promoting coordination and cooperation among the MSs. He added that besides working on the development of ENC's, the EAHC actively monitors developments in technologies, such as Satellite Derived Bathymetry and the e-MIO, which affect the work of the CHC.
3. Chair (CHC) emphasized that the primary focus of the meeting is to work towards enhancing navigational safety. He added that the impact of climate change on the marine environment is also an important issue that the hydrographic community cannot dismiss and must work towards being able to respond to the challenges ahead in this area.
4. Vice Chair (CHC), Rear Admiral Daryanto addressed the delegates and announced that he will be retiring in the middle of November this year. But during his tenure as Chief Hydrographer of Indonesia, he expressed pride and gratefulness to have worked with the EAHC CHC. He hopes his successor will continue to work closely with the EAHC.

ADOPTION OF AGENDA

5. The Meeting adopted the amended agenda and the approved agenda appears as **Annex 2**.

MATTERS ARISING FROM CHC4

UPDATE BY EAHC PERMANENT SECRETARIAT

6. Japan, as the Permanent Secretariat (PS) presented updates on the EAHC website to further promote the works of the EAHC. The presentation appears as **Annex 3**. The key updates covered in the presentation are:
 - (a) Publication of EAHC news from 2014

- (b) Addition of news articles from the 4th CHC Meeting
- (c) Addition of the link to the TRDC website
- (d) Addition of a movie page on the EAHC website which currently consists of two videos from IHB and GEBCO

7. Japan emphasized that MSs are encouraged to submit news articles and reports to be updated on the EAHC website such as the appointment of new Chief Hydrographers, reports of EAHC meetings and training courses and introduction of new technologies.

8. Singapore as Chair (TRDC) said that the recordings of TRDC trainings and seminars are placed in the TRDC website, which was linked to the EAHC website.

9. Chair (CHC) noted that one of the reasons for including TRDC training videos and seminars in the EAHC website is to share the courses conducted, eg. the development and conduct of Cat B and C training for cartographers. He added that this would be especially useful to demonstrate the reach of our capacity programme and could further support future applications for funding support in capacity building.

10. Singapore suggested also posting on the EAHC website the presentation slides and findings from the Emergency Disaster Response Workshop, subject to the Steering Committee's approval.

Summary of Actions:

s/n	Action item	Responsible Party
1	MSs are encouraged to send regular updates and articles to the PS for publication on the EAHC website	MSs
2	MSs to post papers on the EAHC website prior to CHC meetings	MSs and PS

SOUTH CHINA SEA (SCS) AND EAST ASIA (EA) ENCs

11. Chair (CHC) opened the discussion by noting that there was a Circular Letter by Indonesia regarding the proposal to have a single naming of the SCS and EA ENC.

12. Indonesia added that their proposal through EAHC Circular Letter dated 19 April 2016, proposed to change the name of the SCS ENC to, collectively, the East Asia (EA) ENC, with the aim of improving navigational safety in the region. He emphasised the importance of cooperation between MSs, citing the example of the

successful joint Malacca and Singapore Straits ENC, where all band cells were included under one common name.

13. Chair (CHC) asked MSs if they had expressed or wish to express their reservations or support for the proposal, and for their views on the matter.

14. China asked if the proposal would involve any change in content of the ENC. Chair (CHC) clarified that the only change would be collectively naming of the ENCs to EA ENC, and that the proposal does not entail any change in the content of the ENC.

15. Chair (CHC) understood that there has been no response to the Circular Letter and asked MSs to express their views in order to provide direction so that we could work towards the goal.

16. Singapore opined that there were merits administratively to having a single name for the ENCs rather than two separate names, since the bands that the ENCs cover are part of the East Asia area.

17. China requested to consider the proposal after production of the band 1 EA ENC, which is currently partially completed.

18. Chair (CHC) understands from the Indonesia's proposal is that the multiple name of the ENCs may confuse mariners, as both ENCs cover the same areas.

Proposed EA ENC Base Chart and Geographical Naming

19. Chair (CHC) said that to move the EA ENC production forward, he had made a proposal during the last Steering Committee Meeting to produce a base chart which MSs can use to incorporate their geographical names. He added that a second proposition was to have all geographical names included in the ENCs, and that the main concern with this was whether the attributes have the capacity to hold the multiple names. The third option was to omit all geographical names from the ENCs.

20. China explained that since the launch of the first edition of the SCS ENC in 2004, which included names contributed by MSs, there had been no objections towards the geographical naming. China suggested not changing any names in the 2nd Edition SCS ENCs.

21. China proposed 3 options to consider, in moving forward with the issue:
a) Update the 2nd Edition SCS ENC to the 3rd Edition using the current names used in the 2nd Edition SCS ENC.

- b) Continue to maintain and update the 2nd Edition SCS ENC without any changes in geographical naming or any new editions.
- c) Establish a Working Group chaired by Chair (CHC) to study the issue and propose possible technical solutions.

China added that a combination of these options may be considered and adopted.

22. Singapore commented that there was little difference between options a) and b). In response to Singapore's query, Hong Kong (China) replied that the 2nd Edition SCS ENC was released in October 2008. They added that there were 246 incremental updates. They cautiously added that the large number of incremental updates made it difficult to maintain and may likely cause the ECDIS to crash. They concluded that the best option was a 3rd Edition SCS ENC.

23. Chair (CHC) remarked that a key issue was navigational safety as mariners have been accustomed to the SCS ENCs and it was imperative for the ENCs to be regularly updated. He emphasised that an early recommendation or decision on the matter was prudent.

24. In response to query on the number of SCS ENC cells that have been downloaded over the last few years and whether there has been an upward or downward trend. Hong Kong (China) replied that up until 19 October 2016, there were 8495 registered users.

25. With regards to the three options proposed by China, the Meeting noted that option b) would have a large number of incremental updates for the 2nd Edition.

26. The Meeting agreed that deliberating the three options in the absence of other MSs would not be appropriate and agreed that this issue be brought up to the Steering Committee.

27. Chair (CHC) said that while some MSs present do not have the mandate to make a decision during the meeting, further delay would not benefit the mariner. Furthermore he added that the CHC had earlier raised this issue at SC3 and the Chair (CHC) would have to report at the next Steering Committee would in February 2017.

28. To move forward with the discussion and examining the pros and cons for options proposed by China a discussion group was formed.

29. Arising from a lengthy deliberation, the shortlisted options were considered:

- a) No changes in geographical naming. This option was similar to the earlier options proposed by China.

- b) Having two or more names displayed in the ENC.
- c) Highlight names to show that there are more than one name.
- d) Omitting the geographical names from the ENC.

30. The meeting considered that due to the amount of number of updates not been effected and there was no consensus on the naming issue the current edition of SCS ENC was deemed unfit for the purpose of safe navigation. In view of this concern, most member states proposed to temporarily suspend the SCS ENC until a solution was found.

31. Chair (CHC) noted that these concerns. He would then raise this recommendation at the Steering Committee meeting in February 2017. He stressed that only the SC had the mandate to approve suspension of the SCS ENCs.

32. In response to Hong Kong (China)'s comment on which data set would be suspended, ie SCS or EA ENCs. As this would allow them to reassign resources, it was agreed that it would be 2nd Edition of the SCS ENCs.

Summary of actions:

s/n	Action item	Responsible Party
3	Recommend the temporary suspension of the 2 nd Edition SCS ENC to the Steering Committee during the next Steering Committee Meeting in Feb 2017.	Chair (CHC)

Confirmation of the EA ENC Administrator

33. On the issue of the EA ENC Administrator, Hong Kong (China) explained that Hong Kong's Hydrographic Office took over the work of maintaining and updating the EA ENC after the retirement of the previous EA Administrator, Mr K C Ng. As such Hong Kong (China) requested the CHC to decide on the appointment of the EA ENC Administrator as soon as possible.

34. Chair (CHC) emphasised that although Hong Kong (China) has taken up the work of continuing to update the EA ENC, the decision to appoint an Administrator must be made soon to ensure the continued duty of the Administrator in updating the EA ENC, even while discussions over the SCS ENC and EA ENC naming issues are on-going.

35. Chair (CHC) proposed appointing an EA ENC Administrator as an interim solution, subject to a consensus. He also added that another consideration is whether a person or an organization should be appointed the Administrator. He further proposed to appoint Hong Kong (China) as the Administrator to continue the work of updating the EA ENC.

36. The Meeting considered to appoint an organisation as the Administrator rather than a person, as this would ensure better continuity of the work of updating the EA ENC, especially when the officer retire or move to another position. Malaysia, Japan and Brunei Darussalam stated that they would need their managements approval on the appointment of the EA ENC Administrator. The meeting agreed that a Circular Letter to MSs by the Chair of EAHC to recommend the appointment of the EA ENC Administrator.

37. The Meeting agreed on the importance of providing adequate up-to-date information to mariners which warrants the need for an interim EA ENC Administrator. This would not only ensure continuous updating of the ENC, but would also be fair to the officially appointed EA ENC Administrator when the task is handed over.

38. Hong Kong (China) stated that they are ready to continue to work on the EA ENC Administrator and that the priority is to keep the ENC fit for use for safe navigation. They added that to pause or stop updating the ENC would not only inconvenience mariners but would also give an inappropriate impression of the EAHC. Chair (CHC) said that although the ENC is being updated, it would not be released. He added that there is thus a need to urgently reach a decision on the appointment of an EA ENC Administrator as soon as possible.

39. Malaysia, on behalf of Chairman EAHC, requested for the MSs to respond to the Circular Letter regarding the appointment of interim EA ENC Administrator within one month.

40. Chair (CHC) stressed that this is separate from the SCS ENC and EA ENC naming issue, and this appointment of an Administrator was a necessary and pressing issue. He also proposed sending the Circular Letter by 24th October 2016 and for MSs to reply by 25th November 2016. He added that MSs who do not respond by the deadline would be assumed to have no objection.

Summary of actions:

s/n	Action item	Responsible Party
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4	Send out circular letter by 24 th October to confirm appointment of an interim EA ENC administrator and MSs to reply by 25 th November 2016.	Chair EAHC and MSs
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Hosting of RECC and Hong Kong's Proposal

41. Hong Kong (China) presented their proposal to host the RECC, and was supported by Singapore and Thailand during the last SC meeting. Their presentation appears as **Annex 4**. The key points covered in their presentation were:

- a) Background of the RECC
- b) Hong Kong (China)'s proposal to host the RECC
- c) Considerations for the Steering Committee
- d) Preparation for the RECC

42. Hong Kong (China) said that they have submitted their proposal to host RECC and expressed that Hong Kong was ready to host the RECC.

43. Some MSs stated that they have not studied Hong Kong (China)'s proposal to host the RECC. Hong Kong (China) invited MSs to study the proposal for a clearer picture about the hosting of the RECC. The main objective of the RECC is to harmonise the ENCs of EAHC member States, which other RENCs do not carry out.

44. Chair (CHC) requested MSs to consider this proposal carefully and hopes that during the next Steering Committee meeting, there would be a clear indication of whether the MSs are interested. Chair (CHC) emphasised the RECC is about the harmonization of ENCs from the region.

45. Chair (CHC) said that a unanimous decision is not required, but MSs should join RECC if they are interested. He highlighted some of the benefits of joining and functions of the RECC, such as validation of ENCs and harmonisation of data.

46. Chair (CHC) highlighted that the trend of chart sales is shifting towards ENCs and that by 2018, all new builds SOLAS class vessels are required to carry ECDIS. He added that this stresses the need for an entity for MSs to coordinate and harmonise their data.

47. Indonesia expressed their appreciation towards Hong Kong (China) for their proposal to host the RECC in an effort to improve the capability and cooperation between MSs, and that they in principle support Hong Kong's proposal, but noted that the RECC should focus on the harmonisation of ENCs and improving the capability of EAHSMS in ENC validation

48. Brunei Darussalam supported Hong Kong (China) to host the RECC.

49. ROK asked Hong Kong (China) to clarify the process of harmonisation of data when MSs provide their data sets to the RECC. Hong Kong replied that the process of harmonisation would be similar to the production of the SCS ENC and that the objective of harmonisation was to minimise differences in compiling standards.

50. Japan pointed out that the process of harmonisation of the RECC was not clear and that it was important to investigate in detail the process of data harmonisation.

Summary of actions:

s/n	Action item	Responsible Party
5	Member states to study the proposal by Hong Kong (China) to host the RECC and respond by the next SC Meeting.	MSs
6	Hong Kong (China) to clearly define its role and provide details on the data harmonisation process at the next SC meeting.	Hong Kong (China)

PROJECT UPDATE ON THE PROPOSED TECHNICAL SOLUTIONS TO RESOLVE OVERLAPPING ENCs

51. Chair (CHC) highlighted that at the WENDWG meetings, there has always been the obstacle of overlapping ENCs. He added that according to IHO specifications, there should be no overlapping of ENC cells. He further added that some countries, for example, ROK, have moved to using grid based ENCs, which ensure no overlapping.

52. Chair (CHC) explained that overlapping of ENCs between countries always exists. He highlighted that it was difficult to find a political solution to overlapping ENCs and that at the previous WENDWG meeting, Singapore had suggested looking into technical solutions to resolve this matter.

53. Singapore presented on the issues arising from IRCC8 and on overlapping ENCs. The presentation appears as **Annex 5**. The key points covered in the presentation were:

- a) The background on the issue of overlapping ENCs

- b) Findings and observations from CIRM tests of overlaps in the MSS
- c) Issues arising from IRCC8
- d) Derived ENC's for Leisure Market

54. Hong Kong (China) said that they also carried out test of overlapping ENC cells on 4 different types of ECDIS. The test ENC's consisted 3 ENC's of the same scale but different names and overlapped them. They observed that the cells were displayed according to descending order of the cell names. They agree with Singapore that there should be a solution to address the problem of names being overlapped based other criteria such as scale, date of survey or CATZOC.

55. Singapore explained that this highlights the role of an Administrator would be required to harmonise the data sets from the various MSs because the above mentioned meta information should be encoded into the ENC's so that the ECDIS could perform the function of displaying the "best" quality cell.

56. Chair (CHC) noted that a more rigorous solution is needed to select and prioritise which cell is displayed on the ECDIS,. He added that the adoption of different methodologies by different OEMs also needed to be addressed.

57. Malaysia asked the way forward for this project. Singapore expressed that at the CHC level, there was a lack of expertise to single-handedly solve this issue. Singapore advised focusing our efforts regarding overlapping ENC's to the WENDWG.

58. Singapore noted that, as explained by CIRM President Mr Michael Bergman, that no serious issue has occurred due to overlapping ENC's. The Meeting noted that regions where overlapping occurred, coincided with heavy shipping traffic.

59. Chair (CHC) emphasized that although there have been no incidents or issues occurring due to overlapping ENC's, the EAHC should adopt a preemptive and proactive view in coming up with a solution to overlapping ENC's before it does lead to problems.

UPDATE ON MALACCA AND SINGAPORE STRAITS ENC AND SURVEYS

60. Malaysia presented on the updates of the joint hydrographic survey in the MSS. Their presentation appears as **Annex 6**. The key points covered in the presentation were:

- a) Background of the joint survey
- b) Survey area (5 UKC critical areas)
- c) Survey systems used
- d) Survey results

e) Final outcomes and conclusions

61. Singapore commented that this was a good presentation on the different kinds of equipment, systems and processing software available. They added that it would be useful to share and identify any special features in these systems as well as the key differences between the available systems.

62. Chair (CHC) shared that reason for waiting until November 2016 to release the ENC's was because the individual countries wanted to perform sea trials with the high density ENC's produced. Sea trials had to be carried out to examine how the ECDIS handles high density ENC's and requested MS's to share the results of the sea trials.

63. Singapore noted that this was the first time that bathymetric ENC data will be incorporated in the 5 UKC critical areas. Because of this, the sea trials were especially important and as part of the sea trials, the different ECDIS systems among the different countries were tested as well to ensure that the contours were properly displayed.

64. Singapore and Indonesia noted that they did not observe any anomalies when the ENC's were tested with their systems.

65. Indonesia commented that they were able to observe sand waves in the multibeam data. They suggested studying the phenomenon of sand waves in the MSS in the next phase. Malaysia agreed with Indonesia and highlighted that sand movement can be observed in the morphology in Cape Rachardo, where the difference in the contours of the existing and new ENC's suggest heavy sand movement.

66. Chair (CHC) explained that Phase 2 will be carried out by a third party with representatives of the three Littoral States on board overseeing the conduct of the survey. He added that with regards to sand waves, regular surveys during monsoonal seasons should be conducted in order to make proper long term assessment of sandwave movements.

67. Singapore highlighted that under the CHC, there was earlier intention for Japan to hold a one-day workshop on the different kinds of charting systems which different hydrographic offices have used. The proposed workshop was to share the advantages and disadvantages of these systems. They added that this is especially useful because digital data is being increasingly used to update charts.

68. Chair (CHC) highlighted that most hydrographic offices have been using Caris and that as job scopes and user bases expand, the system could not adequately

cope with the growing demands other than nautical charting. He cited that Singapore HO's other functions included surveys for monitoring reclamation, dredging and foreshore developments.

69. Chair (CHC) shared that the vision for the next survey system where it could simultaneously perform surveying and processing. He also suggested investing with Telecom partners to build up offshore infrastructure so as to allow sending the survey data wirelessly back to shore.

70. Chair (CHC) encouraged MSs to continuously look out for better, improved systems and to share experiences with these systems with other MSs. Chair (CHC) also suggested looking into laser topography systems, when integrated with multibeam survey systems could simultaneously collect both sets of data.

71. Chair (CHC) summarised the following observations from this discussion:

- a) Cooperation and coordination between hydrographic offices is an important factor in the success of joint surveys.
- b) Sea trials are important in validating the high density ENC's before they are released.
- c) Sharing of experiences with equipment and systems used is beneficial to all hydrographic offices.
- d) Bathymetric data are useful in other aspects in addition to charting.

e-MIO SUB-WORKING GROUP

Summary of e-MIO Project – Progress and Plan

72. ROK presented the e-MIO project and the presentation appears as **Annex 7**. The key points covered in the presentation were:

- a) Background of e-MIO Working Group
- b) Major research results of Phase 1
- c) Major plans for Phase 2
- d) Implications to EAHC MSs

e-MIO Project Phase 2 (S-100) – Update on Test Bed Project

73. ROK presented their update on the e-MIO project Phase 2. The presentation appears as **Annex 8**. The key points covered in the presentation were:

- a) Process of developing S-100 PS
- b) Current status of S-122 Marine Protected Area
- c) Draft version of e-MIO data model based on S-100
- d) Future plans

74. Chair (CHC) requested ROK to further elaborate how they derived the model for S-100 and S-10X Product Specifications and what they were testing. ROK explained that there was a need to first understand the concept of S-100. They highlighted that one major difference between S-57 and S-100 is that S-57 data model does not allow the addition of more than one national name while S-100 allows. They added that S-57 has many limitations and through the e-MIO project, there was a need to identify the advantages of S-100 over S-57.

75. Chair (CHC) explained that S-57 is an exchange format, where each object is coded and that although it was very advanced in terms of specifying individual objects. However, there is restriction because the boundaries are defined clearly and could not be further expanded. He added that S-100 was more flexible. Chair (CHC) then asked about how S-100 was connected to producing specific products and how it was defined. He also asked ROK what challenges they faced in Phase 2.

76. ROK replied that there was a need for discussion to come to an agreement of the data model on the e-MIO, as every MS has different requirements. He added that if they could define what e-MIO meant, they could provide comments and information and draft an agreed data model for the region, which made the development of a product specification easier.

77. Chair (CHC) noted that PSSA may be an issue because each PSSA has different considerations. He asked ROK how they would address this issue and whether they are trying to achieve a universal model to address all PSSA or specifically East Asia. ROK replied that the scope of the product needs to be defined and the boundaries of the standard needs to be decided.

78. Hong Kong (China) thanked ROK for their work on the S-100 development. They asked, that even though the standard is underdeveloped, in terms of capacity building, whether ROK could suggest areas for MSs to look into and focus on to prepare for the new standard. ROK replied that they will introduce the current status of the KHOA S-100 test bed project and share on the preparation for S-100.

79. Chair (CHC) asked ROK to clarify what MSs need to understand about S-100 and where they can start in preparing for the new standard. ROK explained that in this project, KHOA have produced test data sets on each product specification and the tangible results help give an understanding of the S-100 product specifications.

80. Singapore explained that they are presently migrating their data to a single integrated database. They noted that as long as data is kept in open format, they do not foresee any major problems in converting data to support S-100.

81. Thailand stated that the conversion of S-57 to S-100 is a fundamental transition and asked how MSs can collectively prepare for the S-100. ROK replied that software has been developed to convert S-57 database to S-100, which will be contributed to IHO for MSs to use at no charge. Chair (CHC) noted that as long as the hydrographic officers maintain basic, common formats for their database, there should not be an issue with conversion to S-100.

82. ROK proposed for the establishment of a discussion group to discuss what MSs want to be included in e-MIO and what their requirements are, so that KHOA can design the data model based on those requirements. ROK replied that they would need source data from the MSs to develop test data sets as well as the MSs' requirements with regards to symbology. Chair (CHC) added that ROK should specify what is required and how the data provided will be utilised.

83. Singapore suggested developing a timeline for the e-MIO working group. ROK replied that they request requirements from MSs by the end of 2016.

Summary of actions:

s/n	Action item	Responsible Party
7	Member States to provide their requirements for this data model and source data to develop a test data model, as well as their requirements for symbology.	MSs
8	ROK to come up with their requirements for the data model. This is to be circulated to MSs by 15 November 2016,. This will be done through correspondence.	ROK

S-100 STUDY GROUP

Report on IHO S-100 Activities

84. ROK reported on the updates on the IHO S-100 Activities. The presentation appears as **Annex 9**. The key points covered are:

- a) New edition of S-100 (UHDM)
- b) Development of S-100 interoperability specifications
- c) Updates on the S-100 GI registry
- d) Web-interfaces of the S-100 portrayal register
- e) Progress of S-101 ENC product specification
- f) S-100/S-101 test strategy and test bed
- g) KHOA proposal to 1st IHO Assembly

85. Chair (CHC) summarized that the current procedure under resolution 2/2007 is too vague and that ROK is proposing details on how the test bed should be conducted, who will be conducting it and the sharing of results. He asked whether the S-100 working group or HSSC approves the test beds. ROK replied that the S-100 working group is tasked to approve test beds.

86. Chair (CHC) asked ROK what role they see commercial and hydrographic offices having in improving standards, what example they can give of significant change and what they mean by a high level procedure. ROK replied that the implementation of test beds with commercial players needs to be discussed with the relevant working groups. They added that the significant changes are not in terms of the data, but in the software and process that triggers S-64, S-52, S-57 and GI registry. They further added that is relevant standards change, every ECDIS has to be approved again because of big changes and redevelopments of ECDIS software.

87. Japan noted the strong need for a validation process in terms of S-100 and expressed concern of the strict validation process slowing progress of the new standard. ROK replied that a reasonable level of validation is needed and expressed their intentions to raise regular validation processes which are required to release the standards to the hydrographic community

88. Singapore agreed on the importance of having a validation process and recalled that when the S-57 ENC's for Singapore were produced, they had to purchase two validation software to ensure the data met the S-57 standards. They added that this validation process will help hydrographic offices convert and produce S-100 data for ENC's.

89. Singapore enquired whether there has been a consideration for the approval process involving more stakeholders and whether these stakeholders will be able to adapt to the frequency of changes. ROK clarified that they are proposing the validation process for product specification, not data validation. ROK agrees that more stakeholders have to be involved in the development of technical standards which can be used by hydrographic offices, ECDIS OEMs and software companies.

90. Chair (CHC) enquired whether the amendment to the resolution 2/2007 affects other IHO working groups. ROK replied that if the need for this proposal is recognised at the Assembly Meeting, some working groups need to discuss in detail on how to implement the proposal.

91. Chair (CHC) commented that resolutions are crafted to be more general and expressed that proposing an amendment to the resolution may not be the best way forward. He added that it would be better to use the resolution to argue the case for working groups to consider new standards. He further expressed concern over having too many amendments that standards have to keep changing.

92. ROK is proposing for CHC to support their proposal. Chair (CHC) added that papers have to be submitted by December and that may not be in time for the Steering Committee to approve the proposal. He suggested sending this proposal by circular letter to the MSs for their support.

94. Chair (CHC) noted that there is merit in ROK's proposal and that the objectives are clearly articulated. He advised examining the impact of the proposed amendment and whether the objectives warrant an amendment to the resolution.

95. ROK responded that they will prepare a paper explaining clearly the purpose, objectives and contents of the proposal, for circulation among the MSs. Chair (CHC) added that MSs who support the proposal could contribute to the paper or sponsor the proposal.

96. Thailand requested for a clear description of the advantages and disadvantages of the proposal for MSs to understand more about the proposal and make a better decision on whether to support the proposal or not. Thailand also requested for ROK to keep the paper simple for MSs to understand. ROK responded that they will identify the advantages and disadvantages and draft them in the paper.

97. Chair (CHC) proposed submitting proposal papers online on the EAHC website so that they are accessible to technical groups who can better understand and explain the technical aspects of the proposal.

Summary of actions:

s/n	Action item	Responsible Party
9	CiROK to request Chair (EAHC) to send a circular letter requesting for MSs' support for the amendment to resolution 2/2007.	ROK MSs
10	Prepare paper explaining the purpose, contents and advantages and disadvantages of ROK's proposal for circulation among MSs	ROK

Introduction of Korean e-Navigation Project

98. ROK presented on their e-navigation project. The presentation appears as **Annex 10**. The presentation covered the following key points:

- a) Key elements of e-Navigation

- b) SMART navigation services and project
- c) ROK's specially designed services
- d) Strategy of SMART navigation
- e) Roadmap of SMART navigation project
- f) Benefits of SMART navigation

99. Japan observed that one of the key requirements for SMART navigation is access to high speed internet. Japan enquired of there is enough equipment and infrastructure to cover the entire coast of ROK and whether the 300kbps internet speed would be enough for future advancements of the project. ROK replied that ROK has three communications companies and that the planning stage simulated the coverage of the entire marine communication network, which confirmed that the 4G network could cover ROK's entire shoreline area.

100. China enquired how ROK implemented the SMART navigation project and which organization was responsible for the project. ROK replied that the Ministry of Ocean and Fisheries funded this project and KRISO was selected as the leading organisation of the project. ROK offered to provide China with the official contact point officer for China to enquire more on the project.

101. Malaysia enquired what ROK meant by special maritime environment and whether they sought advice from any consultants in undertaking this project. Malaysia further asked about the impact and cost to ship owners in terms of purchasing additional equipment to utilise SMART navigation. ROK replied that 80 percent of marine accidents in ROK involved small vessels whilst the IMO focussed on SOLAS vessels. With regards of the cost to ship owners, ROK replied that the standard for e-navigation is CMDS, which will be developed based on S-100. They added that since current ECDIS cannot cover S-100 data for e-navigation, ship-owners would have to upgrade their equipment to be compatible with e-navigation services. ROK stated that they are also considering web-based nautical chart service which allows mariners with mobile devices to utilize the service without having to buy new equipment.

102. Japan asked ROK how charting information is transferred to small vessels in real-time. ROK explained that they are considering using ECS, and using a nautical chart map service which provide nautical chart images to mariners using mobile devices.

103. ROK announced that SMART navigation will be tested in 2020 and would be operational from 2021.

104. Chair (CHC) enquired whether ROK are considering the possibility of launching their own satellite for navigation purposes. ROK replied that they are considering this.

KHOA S-100 Test Bed Project

105. ROK presented on their KHOA S-100 test bed project. Their presentation appears as **Annex 11**. The key points covered were:

- a) Background of the S-100 test bed project
- b) Major contents of the S-100 test bed project
- c) Major contents of the 2016 project
- d) Future plans

106. Singapore commented that S-100 was not ready and that S-101 would only be ready in 2019 and asked whether the test bed has started or whether it would start when then standard is available. ROK replied that the S-100 standard version 2.0 is valid, which will be updated to version 3.0 next year. They added that the infrastructure is not ready for operation. They further explained that although the S-101 product specifications are not ready, the data model (application schema) and encoding guide (DCEG) was developed and that they can develop S-101 ENC test data sets.

107. Chair (CHC) asked if there are plans to share this as the IHO Assembly or HSSC meeting. ROK replied that at the 1st Assembly Meeting, KHOA is considering a demonstration at the exhibition.

108. Chair (CHC) asked what the difference between developing the ECS standards and ECDIS standards are and whether the developed tools can be exported to any part of the region, citing MSS as an example. ROK explained that the main difference between ECS and ECDIS is that ECS is not type approved. They added that ROK would not have the authority in that area and that if the first trial proves successful, a further discussion on this can be held.

109. Singapore commented that ROK has put in a lot of effort into the development of the product specifications for bathymetry, tide and surface current. They asked if ROK will be sharing the results of the test bed with the EAHC MSs. ROK replied that KHOA will present the progress of the project and is deeply involved in the S-100 test bed project for IHO.

110. Malaysia asked if there were any shortcomings identified from the test bed and whether they can anticipate any improvements that need to be done. ROK explained that when the portrayal of S-101 is finalised, there may be a need to the S-100 test bed system.

REPORT ON IHO 1ST UNDER KEEL CLEARANCE MANAGEMENT PROJECT TEAM (UKCMPT) MEETING HELD IN SINGAPORE FROM 30 AUG TO 1 SEP 2016

111. Singapore presented their summary on the 1st UKC Management Project Team meeting. The presentation appears as **Annex 12**.

112. Chair (CHC) noted that the next UKCMPT meeting is intended to be held back to back with the S-100 meeting early next year.

113. Chair (CHC) asked ROK whether they could provide assistance to the UKCMPT to avoid duplication of work to ROK's S-100 Test Bed Project. ROK replied that they are already considering the issue of UKC management in their project and will coordinate the efforts.

MSDI

IHO MSDI Industry Demonstration Workshop and Open Forum, 7th Meeting of MSDI Working Group

114. Japan presented a summary on their IHO MSDI Industry Demonstration Workshop and Open Forum, 7th Meeting of MSDI Working Group. Their presentation appears as **Annex 13**.

Sharing of National MSDI Plans

115. Singapore presented a summary of their Singapore MSDI plans. The presentation appears as **Annex 14**.

116. Japan asked where the dense bathymetry data go in the MSDI and whether the conversion of datum will cause a step at the coastline between the land and marine data. Singapore responded that there is some usefulness in including the high density bathymetry data in the MSDI, where they can be used in applications such as numerical modeling and environmental studies, where charted data would not be sufficient. With regard to the second question, Singapore noted that there is a challenge in converting the datum as the land datum is about 2.5m above the chart datum. They added that when this data is given to land authorities, it is indicated that all the maritime data can only be used for purposes other than navigation.

117. Singapore showed an example of the 0.5m grid bathymetric data and laser topography data which are incorporated into the national MSDI database. Singapore noted that they are working with the land authority to harmonise the land and sea datum, which is not easy as the different agencies have different requirements. Singapore stated that it hopes to harmonise the land and marine data to develop a 3D model of the whole of Singapore.

118. Indonesia shared that as part of their MSDI programme, they are currently developing a Hydrographic Data Centre.

SATELLITE DERIVED BATHYMETRY (SDB)

119. Japan presented on their recent progress on the satellite derived bathymetry study. The presentation appears as **Annex 15**. The key points covered were:

- a) Principles of SDB
- b) Framework of SDB study
- c) Analysis of SDB experiments
- d) Trial SDB areas and objectives
- e) Error assessment
- f) Comparison of SDB with LiDAR and multibeam
- g) Results of SDB analysis

120. Indonesia suggested that the data from SDB be compared with multibeam data be compared for quality control. They added that SDB would be useful to Indonesia, where it is not possible to conduct surveys in very shallow waters.

121. Singapore asked if the coastline, as seen from satellite images, is used for charting as well. Japan replied that before carrying out the SDB, the coastline and land area from satellite images can be eliminated. They added that satellite imaging is only used for artificial coastlines and not natural coastlines because natural coastlines at high water level cannot be seen by satellite imaging.

122. Chair (CHC) asked Japan how they intend to follow up with the next phase of their SDB study. Japan replied that the study will end at the end of this fiscal year and that they have no plans beyond that yet. They added that they would like to use SDB for hydrographic services which do not require high accuracy, such as preliminary surveys for planning of full scale surveys and rapid surveys during emergencies. Japan further added that SDB should not be used for charting yet because of the large error.

123. Indonesia supported Japan in their SDB study and expressed their confidence that the technology will improve in the future to be used for charting purposes. Singapore shared similar views and noted that SDB would be useful in disaster response, where quick an overview of inaccessible areas is important.

124. Chair (CHC) stated that CHC looks forward to their final report on their SDB study at the next meeting.

Summary of Actions:

s/n	Action item	Responsible Party
11	Japan to present the final report on their SDB study at the next SC Meeting	Japan

HARMONIZATION OF STANDARDS AND SPECIFICATIONS OF ECS AND ECDIS

125. Singapore presented on the Electronic Chart System (ECS). The presentation appears as **Annex 16**. The main points covered were:

- a) AMEC AIS & NaviPro ECS
- b) PC Panel
- c) ECS management system

126. Malaysia asked what data format is used for the ECS. Singapore replied that the ENCs, as well as the updates is in S-57 format and when the server pushes the update files into the ECS, the ECS will convert the data into SENC format.

127. China asked whether the ECS updates are automatic and whether it is possible to identify which harbor craft has updated the ECS and which have not. Singapore replied that that the updates are done automatically via WiFi from the three WiFi hotspots at three jetties around Singapore. They added that other options for harbor craft operators include using a mobile device as a hotspot or subscribing to a 3G or 4G system to receive updates. Singapore further added that when harbor crafts receive updates, the server is able to recognize which harbor crafts have updates the ECS.

128. Hong Kong (China) asked, given the ECS and ECDIS are not amendatory for harbor and pleasure crafts, whether any laws need to be amended to make them mandatory and whether there has been resistance by harbor craft operators in adopting the ECS. Singapore replied that beginning next year, there will be a requirement for all harbor crafts to carry AIS-B and ECS, so that large vessels will be able to identify the smaller vessels to further enhance port safety. They added that ECS will allow smaller crafts better situational awareness. With regard to the resistance in adopting the ECS, Singapore attributed the difficulty in implementing

ECS to the lack of knowledge on the operation of ECS and highlighted the need for regular training on the use and updating of ECS.

129. Chair (CHC) noted that despite the resistance from harbor craft operators, it is important to highlight the benefits of ECS and to make the use of ECS simple.

130. Thailand asked Singapore whether there were any repercussions to harbor craft operators who switch off their AIS-B. Singapore explained that if operators are found to have intentionally switched off their AIS-B, they will face a fine.

COLLABORATIVE PROJECTS

POSSIBLE COLLABORATIVE PROJECTS

Proposed Concept Study of Tides and Sea level in the SCS – Status of CG

131. Singapore presented on the background of the proposed concept study of tides and sea levels in the SCS which was first presented in 2014. The presentation appears as **Annex 17**. The key points covered were:

- a) Objectives of the study
- b) Key outcomes to be discussed
- c) Benefits of the study

132. ROK presented on the concept study of tides and sea levels in the SCS. The presentation appears as **Annex 18**. The key points covered were:

- a) Background of the study
- b) Benefits of tidal study
- c) Overview of the concept study
- d) Main content of concept study
- e) Request to EAHC MSs for data information
- f) Progress and achievements and future plans

133. ROK requested MSs to provide data until mid-November 2016 to allow the research to move forward.

134. The Meeting supported the project and recognised the benefits of allowing the production of useful numerical models, e.g. for disaster management.

135. China stated that they would support the project and would participate in the working group. China also suggested reducing the coverage of the study to the critical areas for navigation. They added that it may be difficult to provide 20 years' worth of data due to legal limitations. China further added that some institutes in China have carried out similar studies and will investigate the possibility to share the information from those studies.

136. Chair (CHC) requested ROK to share the scope of study so that MSs can understand the type of data they are required to provide.

137. Thailand supported China's view to focus the research area of this project to cover the coastline and major shipping routes in the SCS and proposed to send out a Circular Letter to seek confirmation from respective MSs. They further proposed that the results from their own tidal study to be compared with the study by ROK.

Summary of actions:

s/n	Action item	Responsible Party
12	ROK to provide a brief write-up on the scope of the study and the requirements for data.	ROK
13	Request Chair (EAHC) to send a circular letter to MSs for confirmation of support and contribution of data.	Chair EAHC

Possible Collaborative Programme for Developing ENC's for Timor Leste

138. Chair (CHC) mentioned that Timor Leste wanted to produce ENC's and was looking to collaborate with EAHC MSs. Chair (CHC) mentioned that this should be an East Asia effort.

139. Malaysia mentioned that they are arranging a visit to Timor Leste as part of the EAHC Technical Visit under the IHO Capacity Building Programme. Timor Leste has acknowledged the intention but has not given any approval yet. Malaysia proposed that the collaborative programme could be discussed during the visit subject to the approval by Timor Leste.

140. Indonesia stated that they support the possible collaborative programme for the development of Timor Leste and agree with Malaysia on the technical visit to Timor Leste. Will offer some options. Chair (CHC) stated that it would be good to arrange the visit to Timor Leste and wished for this to be a collective effort. Proposed that if chair and vice chair go to Timor Leste, can make an offer for this project to be a collective effort.

141. Chair CHC mentioned that one other issue that will come up will be capacity building in terms of survey. He suggested the approach would be for countries to pool resources provide assistance for them to carry out surveys and then produce ENC's, and subsequently the maintenance of the ENC's. MSs agreed to support the

proposal. Singapore mentioned that the technical visit to Timor Leste will be funded by IHO for capacity building in this year's budget.

REPORT ON IHO COMMITTEES/WORKING GROUPS AND OTHER RELATED MEETINGS

Report on IRCC8 Relating to RHCs

142. Malaysia mentioned that EAHC Chair had requested for all MSs to respond to Circular Letter 15/2016 regarding the following 6 items. The Circular Letter appears as **Annexs 19A** and **19B**.

- a) RHC Chairs to present updates of the IHO Work Program
- b) RHC Chairs to encourage the attendance of MSs and Observers at WWWNWS-SC meetings
- c) EAHC to submit the previous Technical Visit reports
- d) RHC Chairs to invite MSs to provide scanned versions of any of the missing sheets to the IHB for inclusion in the online digital archive
- e) RHC Chairs to invite MSs to send updated information to the Secretariat with respect to IHO Publication C-55 and P-5 on an annual basis
- f) RHC Chairs to send IHB a copy of their regulations regarding the designation of MSs selected to occupy the seats at the IHO Council

The EAHC Chair would like MSs to respond by the end of November 2016.

WENDWG

143. Hong Kong China enquired if they were still appointed the EAHC representative at the WENDWG. The Meeting noted that there was still a need for a representative especially on the data harmonisation of the ENC's in the region. Chair (CHC) proposed and the Meeting agreed that Hong Kong (China) continue to take up the role of the EAHC representative at the WENDWG

ANY OTHER MATTERS

144. The meeting noted that the TRDC meeting would be held back-to-back with the SC Meeting on 21st Feb 2017, in Tokyo, Japan.

145. Indonesia proposed that the CHC consider risk assessment as an agenda item because it benefits all MSs in managing their hydrographic survey planning for updating of nautical charts. Chair (CHC) said that under IMO Audit Scheme, one of the most important criteria are services offered by HO's in terms of charting and aids to navigation. He suggested that this be included at the next CHC meeting. Singapore suggested tabling this at Steering Committee meeting in February 2017 to

create awareness at Steering Committee level. Indonesia and Singapore could take the lead in presenting this agenda item.

146. The Meeting noted that all presentations attached in the annexes were provided by the respective presenters to facilitate the illustration of their project/concept only.

DATE AND VENUE OF NEXT MEETING

147. Japan expressed that they are willing to host the next CHC meeting.

ADOPTION OF MINUTES OF MEETING

148. The Minutes of Meeting was adopted.

CLOSE OF MEETING

149. The Chairman closed the 5th EAHC CHC Meeting and thanked the EAHC Member States for their active participation in the CHC Meeting.

150. Cdr. Mohd Syahir thanked the EAHC MSs for their participation in the CHC meeting and thanked the hosts Maritime and Port Authority of Singapore for excellent preparations, arrangements and warm hospitality.