

Paper for Consideration by COUNCIL 6

Guidelines for ENC derived Paper Charts

Submitted by:	United States, Australia, Denmark, Germany, New Zealand, Republic of Korea
Executive Summary:	Proposed guidelines for automated paper chart output from ENC
Related Documents:	HSSC11-05.4F, HSSC13-5.4B, NCWG7-6.7B, HSSC12-5.4C, HSSC14 Decisions and Actions, S-4
Related Projects:	NCWG's Common Baseline Symbology

Introduction / Background

The IMO considers paper nautical charts to be an adequate independent back-up for ECDIS when produced and updated according to the S-4 standard. Recognizing that the information and capabilities of ENC and ECDIS have surpassed that which can be captured on a sheet of paper and that it requires significant effort to automate a paper reproduction following existing cartographic IHO standards of all information available on an ENC, we must consider establishing guidelines for minimum content for those who wish to continue to rely on paper for route planning, training, certification (Licensure, pilot certification) situational awareness, and backup navigation or where hardcopy requirements still exist. Consideration of the changing use cases for paper nautical charts is needed, including the possible adjustments to IMO resolution A.817(19), as amended or resolution MSC.232(82) to allow for the use of a minimal product. Some Hydrographic Offices already are developing solutions that enables mariners to generate paper chart-like products from up to date ENCs in a national context for specific use cases. In order to ensure maximum uniformity for global shipping, facilitate mariner's training and assist Hydrographic Offices (HOs) with their transition away from current, resource intense, paper chart compilation and maintenance methods, the IHO should play a role in developing guidelines for automated paper chart output.

Analysis/Discussion

Member States are starting to offer ENC data that at a scale that is too large for effective use on paper charts, and the possibilities for electronic information in the S100 ECDIS ecosystem quickly invalidate the possibility of mirroring all capabilities on paper.

Nations are responsible for the delivery of hydrographic products and services to support safe and efficient navigation in national waters. HO's are obligated to keep paper options easy to manage, budget conscious, easy to produce, consistent with ENC data, and fit for purpose. Consequently, we are of the opinion that a new generation of paper chart-like products should be standardized to enable the HO's transition from the traditional paper chart production processes. These new paper chart-like products would support basic or limited navigation, should meet the IMO carriage requirement regulations (i.e. back-up, planning, updated) and could be automatically generated on demand by the user from an up to date ENC database through an online portal or easily made available for use when updated by the HO.

The new role and production methodology will require flexibility in the way these new products will look and feel and therefore they won't adhere completely to existing paper chart standards (i.e. S-4). Therefore, a new set of minimum standardised requirements for content and portrayal will be required.

The need for new internationally agreed guidelines and/or specifications to support the generation of paper charts from ENC was initially identified by Australia in 2019 and submitted to HSSC11 as paper HSSC11-05.4F. This paper also identified the need for a more flexible definition of 'Back-up' chart in the IMO instruments. The main objective of these type of charts should evolve from:

ensuring 'safe navigation for the remaining part of the voyage in case of ECDIS failure' (IMO resolution A.817(19), as amended or resolution MSC.232(82))

to

'enabling safe navigation while proceeding to 'a safe waiting place' (open sea or an anchorage) while undertaking repairs or to a pilot boarding ground for subsequent guidance into port'.

These 'Back-up' charts should be used in case of emergency only and would not be suitable as the primary means of navigation under SOLAS (berth to berth planning and monitoring may not be supported).

In 2020, a version of this paper was presented at HSSC12 by the US, however, due to the condensed nature of the meeting it was referred to the Nautical Cartography Working Group for consideration as part of the Future of the Paper Chart investigation. Recognizing that in that same report NCWG recommended that there wasn't a need to develop a separate specification for simplified or back-up nautical charts at this time, and that much of the work was focused on creating a "Common IHO Baseline Symbology", the sponsors of this proposal still recognize a need for a simplified specification or annex set of guidelines to S-4 on how to automate and print paper chart output from ENCs.

It is increasingly recognized that there are several parts to developing paper charts derived from ENC data. The portrayal requirements are being dealt with in part by the NCWG Baseline Symbology Project Team, but there is also the need for requirements that deal with printing the chart to be usable for various use cases need to be considered. For example, minimum (fit for purpose) content (i.e. similar to S-52 Standard Display), quality and scale of the printed product, maintenance regime and methodology, etc.

Conclusions

The investments made by HOs to provide data and technology that cannot be captured on paper, coupled with the trend to prefer ENCs as the product of choice for navigation and the user expectation for HOs to implement a range of new navigational products under the S-100 framework, indicate that it is time to reduce the burden on mariners and hydrographic offices with regard to paper charts. In many cases, paper charts that are not fully up-to-date now have a backup role and are less safe than ENCs. A key step toward this is providing a minimum set of requirements and guidelines to produce paper charts directly from ENC data.

While prototyping ENC derived paper charts, it has been found that without an appropriate guideline it is difficult to (1) reliably allow customers to create custom charts for route planning, situational awareness, and backup navigation, or (2) for HOs to uniformly curate paper charts derived directly from ENC to support basic navigation

It should also be noted that a version of this paper was introduced at HSSC14, where it was decided that "noting that nothing prevents national HOs from developing bespoke solutions for automated paper chart production from ENC content database from meeting their national requirements, HSSC did not support a new task on NCWG, however invited the United States to keep the NCWG informed (HSSC 14/56). While the original submission did not ask to directly task the NCWG to develop these guidelines, there is still a strong need for international standardization for ENC derived paper charts.

Recommendations

It is recommended that the Council ask HSSC to consider options and task the Nautical Cartography Working Group, accordingly to create a minimum guideline for ENC derived paper charts. The co-authors of this paper will provide support for the development of this work item.

Noting that marine pilots now predominantly use Portable Pilotage Units, plus ENC, plus local products and knowledge for active pilotage, with paper charts now of limited value, a change of thinking might enable the IHO to recommend to the IMO a reduced paper charting requirement for ports where pilotage services are available. In this way, a paper chart could be considered adequate if it enables a ship to get to a place where either system or pilotage assistance is available. This, in turn, would allow the role of the paper chart to evolve, in content and look, and allow it to be re-engineered so it can be easily produced from officially (and content-richer) published ENC data.

It is recommended that this work be completed by 2024.

Justification and Impacts

These new criteria would provide the basis of a specification or supplemental guideline that can lead to successful printing of paper charts derived from ENCs.

Action Required of COUNCIL

The Council is invited to:

- a. note this Paper;
- b. endorse, the need for specifications relating to printing ENC derived paper charts.
- c. Task the Nautical Cartography Working Group via HSSC to create a minimum guideline for ENC derived paper charts. The sponsors of this paper will prepare the initial draft for consideration.
- d. Consider investigating the different possibilities and limitations with an ECDIS 'Back-up' system, when provided by paper charts, e.g. if it should not be required to support berth to berth navigation.