Paper for Consideration by HSSC

Unified S-100 symbology to enable direct paper chart output from Electronic Navigational Charts (ENC)

Submitted by:	Canada, United States and Denmark
Executive Summary:	**Proposed guidelines for automated paper chart output from ENC**
Related Documents:	HSSC11-05.4D, NCWG5-06.1C
Related Projects:	Any related projects that may impact upon considerations

Introduction / Background

The IMO considers paper nautical charts to be an adequate independent back-up for ECDIS. 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 is impractical to attempt to automate a paper reproduction following existing cartographic IHO standards of all information available on an ENC, we must consider a minimum standard for those who wish to continue to rely on paper for backup navigation. Unified symbology is key to ensure a safe transition from ENC to paper in the event of system failure. Some Hydrographic Offices already have plans to use this technology in a national context. In order to ensure maximum uniformity for global shipping, the IHO can play a role in standardizing automated paper chart output.

Analysis/Discussion

Member States are starting to offer ENC data that is presented at a scale that is too large for presentation on paper, and the possibilities for electronic information in the S100 era quickly invalidate the possibility of mirroring all capabilities on paper. It is also reasonable to assume that there are a variety of options for a back up to ECDIS that do not include paper, including laptops, tablets, smartphones, and possibly an A0 sized screen to show a full sized ENC driven automated image output. As part of our obligation to keep paper options easy to manage, budget conscious, easy to produce, consistent with ENC data, and safe for limited navigation, a minimum paper chart standard is needed.

Recognizing that the world has nearly achieved full ENC coverage and that S-61 was developed as a first attempt to meet the requirements of electronic navigation, it is time to freeze the S-61 standard.

The limited navigation charts that are being proposed intend to assist vessels that have experienced an ECDIS failure, be used for situational awareness, or as a recreational aid to navigation.

Proposed Properties of an automated paper chart output from ENC.

The specification should, for the most part, allow official hydrographic offices to determine which features must be included and the quality to which they are printed. However, some basic guidelines should be recommended for small craft navigation or to ensure a safe ship movement while ECDIS system failure is being addressed. This list is a set of examples, not considered comprehensive or all mandatory.

1) Charts should be a minimum of 1:320,000 but hydrographic offices may choose to mandate larger scale
2) Should include a blue tint at a depth threshold relevant to the vessel using the chart
3) Must include a compass rose or north arrow that indicates magnetic variation
4) Must include scale bar and graticules appropriate for use with a GPS and visual and/or radar lines of position
5) Must be red light readable
6) Must include soundings, contours, wrecks, obstructions, and other hazards to navigation
7) Land areas, elevation points, navigation aids, and waterways should be labelled with name and relevant characteristics for navigation
8) Notes, titles, authorities, print dates and metadata may be printed outside the neat line
9) Charts should include a print date and should be updated with all hydrographic office updates at time of printing

10) Charts should include a specific intended use for example, "this chart suitable for emergency ECDIS / ECS only and should not be used has a primary navigation tool."

Hydrographic offices and national authorities may choose to add requirements for automated paper chart output from ENC.

Conclusions

The investments being made by Hydrographic Offices 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, indicate that it is time to reduce the burden on mariners and hydrographic offices with regard to paper charts. In many cases, paper charts now have a backup role and are less safe than ENCs. A key step toward this is providing a minimum set of guidelines to produce paper charts directly from ENC data.

Recommendations

Acknowledging that this issue has been discussed in the past and that the NCWG is investing substantial time in considering the future of the paper chart, the next step is to aim at unified symbology that will support S-100 and the automated paper chart output. Supplementary concessions should be made by IMO to allow (and promote) laptop, tablet, A0 size screen and smartphone backup with guidelines to insure reliability.

It is recommended that the IHO produce a specification that outlines the minimum set of features that are included in an automated paper chart output from ENC.

Justification and Impacts

These new criteria would reduce the maintenance burden on mariners and Hydrographic Offices, most notably with notice to mariner corrections.

Hydrographic Offices would be able to use new capacity to improve ENC and start S-100 production.

The aviation industry has successfully transitioned to a fully digital environment. They likely have practices and procedures that mariners could benefit from.

The next generation of mariners prefers digital products. Backup paper charts must be designed to be compatible and in agreement with ECDIS.

Mariners who are not comfortable with electronic navigation can still use paper (existing detailed IHO specification) where it is available.

Action Required of HSSC

The HSSC is invited to:

a.   note this Paper;

b.   endorse, as a priority, the need to accommodate a new standard for paper charts based on S-52 (S-100 unified symbology v1); Following S-100 process, S-52 could be rebranded S-100 unified symbology 1.0

c.   consider re-tasking the NCWG to focus exclusively on S-100 unified symbology 2.0 (operational) for adoption at HSSC-13.

d.   engage IMO in technical discussions regarding ECDIS digital backup arrangements;

e.   Freeze the raster standard S-61.