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Paper for Consideration by CSPCWG/NCWG

The Future of S-4 as the IHO Chart Specification

Submitted by:	CSPCWG Chair
Executive Summary:	With the full review by the CSPCWG of S-4 Part B completed, it is timely that the CSPCWG/NCWG begins to consider “what next” in regard to S-4 as the IHO nautical cartography charting specification. This paper is intended to promote discussion within the CSPCWG/NCWG with the aim of considering possible new Work Items for the NCWG Work Program for approval of the HSSC.
Related Documents:	<ol style="list-style-type: none"> 1. S-4 – Regulations of the IHO for International (INT) Charts and Chart Specifications of the IHO; 2. S-101 Data Classification and Encoding Guide; 3. NCWG Work Program.
Related Projects:	S-4 Maintenance; S-101 Development.

Introduction / Background

Since its publication in 1984, the Regulations of the IHO for International (INT) Charts and Chart Specifications of the IHO (S-4 (formerly M-4)) has been the principle Specification used by the nautical cartographer for compiling and maintaining charts. From its formation in 2003 to the publication of S-4 Edition 4.5.0 in October 2014, the CSPCWG carried out a full systematic review of S-4 Part B. As part of this review, the CSPCWG reflected the intent of S-4 Part B to be applicable to both paper charts and ENC, however the presentation of Part B remains, principally for historical reasons, very paper chart centric. This has resulted in a degree of misinterpretation of S-4 by many nautical cartographers and within the IHO itself as a “paper chart” specification.

Additionally, there remains outstanding work to review S-4 Parts A and C; and discussion required as to the possible future direction of S-4 as ENC continues to emerge as the primary nautical charting product used in navigation.

Analysis / Discussion

This paper is intended to facilitate discussions within the CSPCWG/NCWG as to a future programme of work for S-4. The points raised below reflect the opinions of the CSPCWG Chair in relation to discussions that have taken place within the AHS – the CSPCWG/NCWG is asked to consider any additional issues regarding the future direction of S-4.

S-4 Part B: While the CSPCWG has achieved a major goal in completing a full review of S-4 Part B for general updating, consistency and the requirements of modern marine navigation, this review was conducted, by necessity, using the existing historical presentation of the document. Therefore almost all the graphics in S-4 are INT1 or paper chart presentation. Additionally, the generic use of the term “nautical chart” (or just “chart”) has been used throughout the document, but in many cases the guidance is specific to the paper chart, and has no (or in some cases different) relevance for ENC. A further review of S-4 Part B is suggested to include additional graphics related to ECDIS portrayal (ECDIS Chart 1?); and to review the use of the generic terms “nautical chart” and “chart” to fully reflect the intent of S-4 as the specifications for nautical charting, regardless as to the form the chart takes.

S-4 Parts A and C: The Regulations of the IHO for International (INT) Charts (S-4 Part A) and the Chart Specifications of the IHO for Small-Scale International (INT) Charts (S-4 Part C) have not been subject to a full CSPCWG review as has taken place for Part B. As a consequence there have been no substantive changes made to these Parts to incorporate additional specifications relevant to ENC. The closest approximation to S-4 Parts A and C that exist at present from an ENC perspective are the WEND (Worldwide ENC Database) Principles, and sections of S-65 (ENC Production, Maintenance and Distribution Guidance). There may be scope to incorporate much of the information in the WEND Principles and S-65 into S-4 as a component of a full review of Parts A and C. At present there is no Work Item on the NCWG Work Program for a revision of S-4 Parts A and C.

S-4 and increasing focus on ENC: The future of the paper chart as a primary navigation product is the subject of much conjecture and will be discussed as a separate agenda item at CSPCWG11/NCWG1. However this discussion may directly impact the future direction, and perhaps the relevance, of S-4 as the contemporary IHO specifications for charting. In order to provide ENC coverage as quickly as possible, Hydrographic Offices generally derived their ENC portfolio directly from their paper charts through a direct one for one conversion process. However, as technological advances have been made in regard to databases as a “single source” of nautical chart data (i.e. single source for multiple product streams) utilising S-57 as the database format, Hydrographic Offices may increasingly evolve their production processes to deriving their paper charts from “corresponding” ENC data.

In terms of ENC, nautical cartographers are required to reference both S-4 and S-57 Appendix B.1, Annex A – Use of the Object Catalogue for ENC (UOC), when compiling ENC datasets. S-4 is used for ENC, as for the paper chart, as the specification that provides “An explanation of the general concepts and rationale behind the portrayal of features on charts,” (S-4 – B-100.3), while the UOC is the “how to” encoding guide for inclusion of these features in an ENC. As such, the UOC contains references to the relevant clauses in S-4 throughout the document, so as to provide the nautical cartographer with the contextual framework from which to determine the appropriateness for the inclusion of features in an ENC. As ENC increases in prominence as the preferred nautical charting product for use in navigation, the question may be asked as to the requirement for the nautical cartographer to have to refer to two separate IHO standards in order to compile an ENC (or populate an S-57 based source database) from original source data. From this perspective, much of the “general concept and rationale” information included in S-4 has been added to the draft S-101 Data Classification and Encoding Guide, which is the equivalent for S-101 ENC’s to the S-57 UOC, in an attempt to provide a “one stop shop” for ENC compilers (S-101 will be the new ENC Product Specification within the IHO S-100 Framework, and is likely to eventually supersede the S-57 ENC Product Specification). This is a fundamental shift from the intent of the UOC as just the “encoding guide” for ENC, and may have significant impact on the future of S-4, which could possibly evolve to become just “A contemporary community specification for paper charts,” (S-4 – B-100.3). The NCWG should take an active role in the discussions of the S-101 Project Team (a Project Team under the S-100WG) to influence the development of the S-101 Data Classification and Encoding Guide in relation to the future intent of S-4 as the principle IHO specification for nautical cartography and charting.

Conclusions

While the CSPCWG is to be commended for the major body of work completed in conducting a full review of S-4 Part B, there is still a lot of work to be done. The Part B review conducted between 2003-2014 focussed by necessity on updating the Specifications for general updating, consistency and the requirements of modern marine navigation, and as such retains its historic paper chart look and “feel”. This has resulted in a misconception by many that S-4 is a “paper chart” specification only. The NCWG must now begin to look ahead to fully incorporate ENC as a form of “chart” into S-4 in addition to completing a full review of Parts A and C. Alternatively, the NCWG should begin to investigate the possible future direction of S-4 taking into account the emergence of ENC and the activities related to the development of S-101 ENC product Specification.

Recommendations

Based on the above, and noting an intent to retain S-4 as the single specification for charts (regardless of what form the chart takes), the following recommendations are presented for consideration of the CSPCWG/NCWG:

- 1) To consider a new Work Item to commence a further review of S-4 Part B to fully incorporate ENC in terms of content, presentation and language;
- 2) To consider new Work Items to review S-4 Parts A and C, taking into account the content of other

IHO specifications such as the WEND Principles and S-65;

- 3) To discuss the possible future direction of S-4 taking into account the emergence of ENC and the activities related to the development of S-101 ENC product Specification, with possible further discussions with the S-101 Project Team within the S-100WG.

Justification and Impacts

If S-4 is to remain the authoritative IHO nautical charting specification, it must continue to evolve so as to fully specify to the nautical cartographer the requirements for all forms of nautical chart. Such evolution will also serve to remove any interpretation of S-4 as just the “paper chart specification”.

The main impact of the recommendations in this Paper is on resources. The CSPCWG review of S-4 Part B has required considerable resources over an extended time period, and based on this a further prolonged resource commitment from IHO Member States would be required.

Action required of CSPCWG

The CSPCWG is invited to:

- a. **Note** this Paper;
- b. **Discuss** in terms of the recommendations;
- c. **Consider** possible new Work Items related to S-4, for submission to the HSSC for inclusion in the NCWG Work Plan;
- d. **Determine** other appropriate actions (if any).