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Information Paper for Consideration by HSSC

Proposed Revision to S-57

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Executive Summary:	This paper discusses a functional change to S-57 to reinstate Appendix B1, Annex C - Recommended ENC Validation Checks and the use of these checks to validate ENC's in ECDIS
Related Documents:	1. S-58 Recommended ENC Validation Checks

Introduction

1. When S-57 was frozen in 2000 it was decided to create S-58 (replacing S-57 Appendix B1, Annex C) to enable the easy update and maintenance of ENC validation checks which has subsequently proved to be a judicious decision. Encoding bulletins were introduced to provide advice in place of Appendix B1 Annex A (Use of the Object Catalogue) and these became the source of change required for S-58.
2. More recently HSSC endorsed a proposal by TSMAD to restructure S-58 in order to create a more logical distinction between the classifications for critical errors, minor errors and warnings. HSSC also actioned TSMAD to investigate how a minimum set of checks can be implemented to ensure that ENC's do not contain errors which are navigationally significant or cause malfunction of the ECDIS thus establishing a minimum quality standard for all ENC's.
3. Some ECDIS kernels employ S-58 to validate ENC data during the SENC creation process. The pros and cons of this approach are discussed below.

Analysis/Discussion

S-58

3. Currently there are no regulations documented mandating validation of an ENC before it is loaded into an ECDIS. There have been incidents recorded where ECDIS have malfunctioned because of errors in data and these have caused serious issues with the navigation of the vessel. Theoretically any ENC producer can currently produce and distribute an ENC which has gone through no standardised validation and this presents a poor picture of the hydrographic community to ECDIS equipment manufacturers and end users of ENC data.
4. S-58 currently has no regulatory status in the ENC production process and resides outside the specific ENC/ECDIS regulations provided by IHO, IMO, IEC etc. Recent efforts to investigate and mitigate ECDIS anomalies have highlighted the wide disparity of data available from official providers and the variability in operation of data quality assurance tools. The clear benefits of a universal application of a subset of the S-58 tests have been clearly shown in these investigations.
5. In conjunction with the other changes being introduced to improve the quality of the validation process it would be more effective if S-58 reverted to being a component of the S-57 standard. This would also bring it into line with the recent unfreezing of S-57 Appendix B1 Annex A (Use of the Object Catalogue) which is the main driver of change to the validation checks. Currently Appendix B1 Annex C, titled ***Recommended ENC Validation Checks***, presents an impression that validating ENC's is optional rather than an essential part of their production. This must not be the case and reverting to the original configuration of S-57 will add more substance to the importance of delivering error free data.

ENC Validation in ECDIS

6. It is difficult to argue with the fact that ENCs containing critical errors can cause serious issues for the end user and validating data during the SENC loading process, as a last resort, might be perceived to be valuable. However, from observation and reports from users there are several issues with this approach:

- It perpetuates the dilemma which currently exists with ensuring all ECDIS are up to date to the latest versions of standards. S-58 has had numerous revisions, either because the world changes or to solve critical problems such as the EXPSON=2 saga. Given the infrequency of ECDIS updates across the large user base, it is highly likely that a significant number of users will be using out of date validation software versions whose results may conflict with more up to date validation software used by the data supplier. In extremis this could lead to perfectly valid ENCs being flagged as incorrect and being rejected by the ECDIS.
- Even for perfectly valid data (ie that which has been validated through by the issuing authority using S-58 checking software), the user is confronted with a list of errors and warnings which to anyone other than experts in the contents of S-58/S-57 is no more than gobbledygook. This only serves to cause confusion and concern to the mariner and gives them no indication of what, if any, action they should take. As such it does nothing but undermine the confidence of the user in the quality of the ENC data they are using.
- The use of validation severely lengthens the loading time of data (from minutes to hours in the worst cases) which again degrades the user experience and undermines the belief in the benefits of digital navigation.
- If the ECDIS rejects a cell that has passed validation ashore, what is the mariner supposed to do? In theory they could end up navigating on 'out of date' data or, in the case of a new cell that they do not already own, they may have no data at all to navigate on – for a paperless vessel what does it do?

7. I believe there is a compromise which can be achieved. One aspect of the revision to S-58 is to restructure and reclassify the checks to specify critical errors, minor errors and warnings. Critical errors are deemed to be those which threaten either safety to navigation or the correct functioning of the ECDIS. This subset of critical errors should be used by all service providers to determine whether the ENCs that they are delivering are fit for purpose. Any ENC failing these tests should be returned to the issuing nation for correction and the service provider would be responsible for ensuring that the exchange set they issue only contained cells that had passed these tests. This would alleviate the issues in the bullets in 6 above. The OEM would then only need to implement checks around data consistency and integrity (ie is the data corrupted and am I applying it in the right sequence?)

8. In support of this recommendation an IHO approved, open source, validation plugin should be developed, updatable with machine readable versions of the checks and made available to all service providers for implementation within their ECDIS. This is in line with move towards an S-100 based ECDIS and alleviates the issue in the 1st bullet in 6 above.

Recommendations

Action required of HSSC

9. HSSC is requested to: Note this paper and consider its implications prior to the eventual completion of the new version of S-58 in 2013.