Paper for Consideration by TSMAD

S-58 Restructure

Submitted by:	UK
Executive Summary:	This paper outlines an approach to including text placement information in S-101 ENCs. It follows discussions at TSMAD 22 and proposes an approach using complex attributes.
Related Documents:	1. S-58
Related Projects:	1. S-101

Introduction / Background

1. HSSC 3 approved the restructure of IHO S-58 in order to make it clearer and to make the applicability of the tests more explicit. In addition, because of the decision to enforce the running of a subset of the tests across all ENCs the standard is to be split up into a number of different sections containing mandatory and "optional" tests.

Analysis/Discussion

2. The proposed categorisation of the existing S-58 tests is as follow:

- Section 1 - Tests which must be carried out on all ENCs. These tests have a deterministic quality where an answer can be derived from the cell contents and require no cartographic judgement for assessment. These tests govern the basic structure, formatting and attribution of the ENC objects.
- Section 2 - Tests which identify elements of an ENC where a hydrographic office need to examine whether the identified condition is an error or not. This may require contextual assessment, cartographic judgement or examination against source material to make this assessment and should therefore be carried out by the producer nation.
- Section 3 - ECDIS specific tests. These tests define the minimum set of tests the ECDIS should carry out on import in order to assess the integrity and basic formatting of an ENC cell[1]. These tests are small in number and designed to be basic so they can be carried out quickly. The tests in Section 1 can be assumed to have passed by the ECDIS to avoid needless repetition.

3. In addition to the re-categorisation of the tests a number of format changes are required to make the test definition more specific and unambiguous. Perhaps the largest of these format changes is the move to describe the S-58 test conditions using a procedural language rather than plain english (previous experience has shown that implementers of S-58 tests by software manufacturers can vary). The procedural language to be used is yet to be defined but will probably be an XML based rules language where the structure, conditions and expressions are clearly defined.

Mandatory application of S-58 tests by IHO Member States

4. HSSC 3 approved in princple the adoption of a mandated subset of the existing S-58 tests to be applied to all ENCs from all providers. This section examines the practicalities of this principle to be reached by all ENC producer nations and suggests a way that this can be achieved. The requirements are:

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[1] Ultimately we would expect to mandate the application of this minimum set of tests on the ECDIS through iec61174.

- Application of a subset of S-58 tests (which may change over time as standards are reviewed) to be applied to all ENCs during compilation. This is to present a known quality level to end customers and ECDIS OEMs a minimum level of data validation and consistency prior to import (These tests are those identified in Section 1 above).
- The ability for hydrographic offices to implement checks as a part of their normal production methods without undue impact.
- A migration plan from the current arrangement to one where all ENCs on ECDIS have the minimum standard guaranteed.

5. In the current ENC production regime globally hydrographic offices are responsible for implementing international standards themselves and distribution of ENCs occurs in a number of different ways with a number of parties involved in the chain. The difficulty therefore is in providing an end user (and their ECDIS!) with an assurance that ENC data has passed the relevant tests. This is not difficult for small numbers and volumes of data but, as experience has shown, repeated manual processes are prone to error and, given that data is produced on a weekly basis by many hydrographic offices in a wide variety of production systems environments, errors can slip through and mere self-certification by hydrographic offices may not be robust enough to provide a guaranteed level of data quality to the ongoing data chain.

6. This paper proposes that an extension to the existing IHO digital signature mechanism is used to provide an indelible "stamp" on all ENC data which certifies it as having passed the required number of S-58 tests.

The proposed method is as follows:

- The existing IHO data protection scheme is expanded to include "data checkers". These are newly signed up participants to the IHO scheme and represent the authors of tools for performing S-58 checks on ENC data. The IHO will appoint and accredit Data Checkers and their software to ensure the validity and completeness of their applications. They will then issue a certificate to the author of the data checking software.
- There are only a small number of existing providers of such checking tools including both COTS and bespoke systems. These providers will join the IHO certification scheme and will receive a certificate from the IHO only when their tests are shown to be correctly implemented.
- The certificate received from the IHO will allow a digital signature to be constructed on ENC data which passes S-58 tests which is (a) specific to that data checker's software and (b) authenticated by the IHO.
- The software tool author implements functionality to output a digital signature of ENC data when the minimum set of S-58 tests are run and passed satisfactorily. This signature is provided along with the data checker's IHO certificate and provides an IHO-accredited authentication that the data meets the necessary requirements.The cell signatures will be stored separately from the ENC data and distributed along with it as it passes through the supply chain to the end user.
- If data validation is done independently then intermediaries such as RENCs can also produce validation certificates on behalf of member states (by agreement with the RENC).
- Once the cell is certified it can be validated at any step in the chain.

7. Once this basic scheme is in place every ENC will have a permanent certificate of S58 compliance which can be transmitted along with the data to show it has passed S-58 testing from one of the IHO authenticated providers of checking tools. Note that this scheme is independent of S-63 and places no obligation on member states to encrypt or otherwise sign their data for distribution – The only reason for extending the IHO scheme to include checkers is because of the existing signature technology which is known to be reliable and secure and for which the IHO has an infrastructure in place.

8. Once these signatures are being produced then the aim, ultimately, will be to get the ECDIS to recognise and validate checked data signatures prior to import and to provide a more integrated solution for the future by including these elements in future standards.

9. Indeed, in the longer term, a pre-requisite to S-57 being recognised as ENC by the ECDIS could be the existence of an IHO authenticated certificate to show it has been checked by (or on behalf of) the relevant producer nation.

Issues:

10. The following are likely to be issues in the implementation of the scheme as detailed here.

1. Member state commitment to processing all ENC data.
2. Implementation time.
3. Accreditation of checking tool providers by IHO
4. Revocation of certificates as standards are updated.