Paper for Consideration by CSMWG15

Future of S-52 Presentation Library

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Executive Summary:	Synopsis about future challenges of the ENC Presentation authorised by IHO
Related Documents:	S52 Appendix 2 Ed. 4.2
	PresLib Ed. 3.3
Related Projects:	S-57 Edition 3.1, S-57 Edition 4

Current status

Over the years, S-52 and in particular its core, Appendix 2 including Annex A ñ the Presentation Library, have reached a consolidated and accepted state. It is fair enough to say that the basic techniques for the display of electronic chart information for ships navigation have been developed under the initiative of S-52/PresLib and all of the ECS/ECDIS manufacturers are still benefiting from this. By means of the S-52, Appendix 2, Edition 4.2 and PresLib, Edition 3.3 issued in March 2004 a number of smaller problems of the preceding editions have been solved by modifications, namely for colour tables and CSPs etc. A significant step forward was made by the inclusion of a fully paper based description of all S-52 symbols, lines and patterns mirroring the well known INT1 of the paper chart world. Moreover this addendum establishes the ìmissing hard-copy linkî between S-57 objects and their visualisation on an ECDIS screen.

Problems

The loudness of criticisms of the PresLib has decreased during the last years. It could well be that the opponents are more and more exhausted but there is some likelihood at the same time that the fundamental PresLib principles have convinced manufacturers and users. Even for newcomers in the ECDIS market S-52, the PresLibs provides a good foundation with a well described solution for ENC visualisation. However, there are still noted concerns which can be split into to the following topics:

Actual appearance:

- Experience has shown that some symbols are too dominant, e.g. magenta direction arrows of traffic separation zones or look ìuglyî, e.g. uncoloured traditional symbology

- missing colour table providing blue colour for deep water for daylight conditions.

- some constructions are too sophisticated, e.g. complex line styles.

- some area fill patterns produce too much clutter and should be substituted by centred symbols.

Adaptation to new symbolisation:

The introduction of ESSA, PSSA and ASL has shown the dilemma. The virtually ìold fashionedî technology of continually re-printed paper charts had no problem to introduce a set of new symbols for those purposes, whereas the ECDIS mechanism is much harder to update: First, new S-57 objects and attributes would have to be introduced, second the whole sensitive mechanism of S-52 ñ

lookup tables, colour tables, viewing groups, line styles and area patterns would have to be revisited for the matter and, third as the major problem, the software of ALL ECDIS already carried on board would have to be upgraded.

Customised solutions/enhanced possibilities

S-52/PresLib has a major competitor: the distinctively differing presentation used by individual makes of the ECS family. ECSs convince the user by complete data coverage in the first place (where official data is not always available) but adapt users perception of chart presentation to the individual style of the manufacturer at the same time. This ECS-familiarisation with electronic charts lowers the acceptance of the differing appearance of the PresLib ñthe users are simply used to another style of display which they subjectively prefer ñ mostly without serious reasons. This discussion usually ends up with the argument ìI like the presentation of ìthis companyî moreî. It is hard to counter this argument effectively with the features of the PresLib.

In fact the ECS is essential to the continued existence of the S-52/Preslib in that it provides a test-bed where innovative changes can be evaluated so that successful ones can be adopted by S-52. Without this continual upgrading the S-52 will become extinct.

The basics of the ENC content of S-57, Edition 3.1 have been developed along similar lines of the ìgood oldî paper chart ñ and so has the main influence of its visualisation by the PresLib. The basic characteristics are: Birds eye view, mercator projection, style of symbols mainly by adaptation of the INT1 symbology. Moreover, the computer and monitor technology taken into account was of the state of the art of the mid nineties. Since then, digital data management and computer technology has made significant steps forward. Visualisation of bathymetric data by means of 3D-view, performed on hardware originally dedicated to speed up computer games illustrates the kind of future options of navigation displays which need a totally different approach in terms of an ECDIS user interface. The PresLib in its current shape is far from this and a change of this magnitude would need a kind of expertise which is not available in classic cartographic divisions of the IHO members.

Politics

The upcoming IMO/NAV51-Meeting in June 2005 will seriously discuss proposals for a mandatory carriage requirement for ECDIS starting in 2008 for High Speed Craft and to be expanded for the majority of new ships being built for international voyages from 2010. Considering the efforts NAV has spent into a unified presentation of so called ìNavigational Informationî ñ in particular AIS information ñ on navigation displays, namely RADAR and ECDIS, there is no doubt that IMO will stick to the idea of a unified electronic chart display for safety reasons. Assuming this, from an IMO perspective only the IHO appears as an appropriate authority to perform this task. It seems unlikely that the IMO would accept that the IHO declines responsibility for the visualisation of ENCs.

Independent of the developments at IMO level, a number of IHO members have indicated a changed understanding of the role of a national hydrographic service. Data gathering, data integration and data provision as being core tasks, but excluding responsibilities for the appearance of an electronic chart display from the tasks of IHO/CHRIS. This position leads to the radical solution of giving more or less complete freedom for the electronic chart display to industry. In fact no one can do it halfway, there is no level of chart display definition in-between the complex description and the full absence of restrictions. The radical solution would have some advantages ñ IHO members could concentrate on data creation, management and data distribution and industry could invent advanced and customised electronic chart displays. However, the diversity of chart displays

would definitely grow and certification would become more complicated if not impossible. More importantly, there would be almost certain confusion and misinterpretation leading to navigation errors among mariners, particularly pilots, moving from one ship to another with a different make of ECDIS.

Considerations

It is well known even in the INT1 environment that many paper charts from different HOs still vary in appearance. This situation is obviously not critical but it does not serve as a counter argument against a unified appearance of an electronic chart display. Such an identical look and feel of charts/displays of different makers has definitely advantages for the safety of navigation:

- it eases ECDIS development (the Preslib is more popular on the programmers side than on mariners side)

- it eases certification (otherwise it would be almost impossible to state objectively whether this is a proper chart display)

- it eases education (important also for people who write text books about ECDIS ☺)

- it avoids ambiguity (think about the colours of buoyage systems A and B or VHF talk between ships)

- it eases operation (if everything else is different on the bridge of another ship ñ at least the chart appears identical)

But freezing of a standardised solution has disadvantages as well:

- it restricts hardware and monitor technology.

- to display a better chart than someone else is not an option and therefore is not a selling point. A standardised chart display consequently restricts the rapid introduction of new and better software solutions for chart display.

- it restricts competition between ECDIS manufacturers merely down to the layout of the user interface (and of course the pricing)

- it has to be maintained in very detail by people with very specific expertise ñ which is rare in HOs. This expertise is available in ECS/ECDIS-industry ñ but industry is reluctant to contribute to something what restrains themselves and transfers technological know how to potential competitors.

Future challenges

When S-57, Edition 4 is expected to be completed, by 2006/2007, some very new solutions for the display of hydrographic information will be possible. The expertise for designing 3D-Navigation, animated symbols including voice and video is beyond those experienced in traditional cartography. But even if visualisation changes are restricted to the scope of the current PresLib, S-57 Edition 4 will offer a number of new objects/attributes which have to be symbolised appropriately, and, consequently the current PresLib will have to be adapted.

Monitor colours remain a difficult topic:

- their definition relates to changes with the ever evolving display technology On the other hand their precise definition is essential to get the information right by sufficient contrast between foreground and background colours ñ especially during night display.

Assuming that the required new objects and attributes (e.g. for ESS, PSSA, ASL) could be defined on short notice and, assuming that further appropriate symbology could be rapidly and commonly agreed in conjunction with CSCPWG,

the technical problem of how to deliver the required software changes into the ECDIS onboard ship remains.

Ways forward

The anticipated request of IMO for the ongoing maintenance of a unified chart display on one hand and the expanding possibilities of computer technology on the other hand should not necessarily constitute an insuperable contradiction. The relatively conservative approach of the current PresLib construction ñ e.g. birds eye view, INT1 adapted or "INT1 based" symbology ñ could be maintained as a minimum requirement for navigational displays to be met by any IMO compliant ECDIS. At the same time IMO could announce freedom for all existing and future additional chart display modes, in particular 3D and others based on S-57 Edition 4 data ñ at least until more practical experience for a future standardisation has been gained.

This strategy would obviously result in the ongoing task for PresLib maintenance hosted specified by IHO. The event of the adoption of S-57 Edition 4 would offer a good opportunity to revise the current PresLib construction and its details:

1. The ECDIS symbol library, including the IEC navigation symbols,

    -   The paper based description of ANY symbol, combined with a reference to the INT1 for paper charts and to the pertaining S57 object has to be continuously maintained.

2. the ECDIS colour tables for day, dusk and night viewing,

    -   The definition of colours might be reduced to contrast values between foreground and background colours at day and night.

    -   Monitor colour calibration software is not needed to be maintained any longer if a digital monitor interface (DVI) becomes a requirement. The same applies to the colour differentiation test diagram which is not needed anymore.

3. Conditional symbology procedures are stable and still needed but CSMWG should be reluctant to invent more.

4. Symbolizing instructions for special cases e.g. north arrow and scalebar, manual chart corrections, etc., should be reduced to a minimum and reconsidered for possible redundancy.

5. mariners' navigational objects, as a citation of IEC standards and described in the same manner as chart objects

6. Declare the provision of the electronic form of ECDIS Chart 1 as an option - a cursor click will do better for educated mariners.

All of these measures could be appropriate to keep the PresLib as a minimum requirement for a unified chart display up to date but the real dilemma is that IHO members are unable to provide sufficient expertise to perform these action items satisfactory. In theory, other bodies could moderate this PresLib upgrade. IEC would be a candidate, but recent experiences with IEC working groups have shown that even qualified industry support is decreasing. Judging by this, it is unlikely that IEC would be able to perform such a complex task as the PresLib upgrade properly. It remains finally, that co-operation between the IHO and the ECDIS industry is the key. Hard- and software experts must be attracted either by their vital product interests or by money to be spent for consultancy. If CSMWG/CHRIS could basically agree about such a plan, when, for example a capable consultant should be hired for half/one year, travelling from one prominent manufacturer to another gathering their collective experience and making proposals for drafting of a consolidated revision. In a second loop the CSMWG could tentatively adopt the resulting modifications and accept them for

test trails . The evaluation of the test trails would result in final adoption of the necessary changes.

Some industry representatives have already indicated that they are in favour of such an approach and would be willing to contribute financially. Other manufacturers dislike the continuation of PresLib as whole. So In any case IHO funding has to cover a substantial part of the future costs of PresLib maintenance

The critical question are:

- How to make the PresLib better tuned to the needs of the Industry?

- How to make the complex construction of the PresLib providing the visualisation the complex content of a data base simple?

It is the most difficult thing to resolve complicated issues simply ñ and this is exactly the challenge with the maintenance, the simplification and the upgrade of the PresLib.

Finally there is the crucial challenge of software update of ECDIS at sea. This has definitely to be initiated by IMO. The IMO should be made aware that there are no longer dedicated devices named RADAR or ECDIS underway. Instead there are operational computers driving RADAR or Chart displays or combination of both. In an analogy to the mode of software upgrade ashore by means of the internet, comparable rules for software maintenance at sea should be required as mandatory. For safety reasons this remote maintenance should not be initiated by the user but the manufacturer, who should have steady options to dial in remotely. If this becomes a mandatory requirement the full advantage of modern hardware and software solutions will become reality onboard ship.

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