

Paper for Consideration by the S-100WG

Preconditions of IEC to consider inclusion of S-100 into the ECDIS standard

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| Submitted by: | Hannu Peiponen / IEC TC80 Chair |
| Executive Summary: | This paper informs about view of IEC about what is required in order to consider creation a type approval standard for S-100 based ECDIS. |
| Related Documents: | IEC 61174 Ed4 ECDIS |
| Related Projects: | N/A |

Introduction / Background

1. This paper is related only for SOLAS class vessel. What to do or not to do in case of non-SOLAS cannot be judged based on this paper.
2. IMO is the highest rule setter for SOLAS class vessel. Typically, IMO publish a performance standard to cover minimum functionality of an equipment. Often IMO also publish circulars and guidelines to set further rules or to guide about best practices. Role of IEC is to create technical interpretation of compliance including technical methods to test compliance.
3. ECDIS is a reserved word by IMO and it means a digital system capable to display official electronic nautical charts (ENC) and therefore capable to meet the carriage requirement set on SOLAS vessel to carry adequate and up-to-date charts for the intended voyage.
4. In the world of e-Navigation many are of the opinion that the ECDIS is the primary target of the digital versions of the Maritime Services for which a SOLAS vessel has obligation to implement either in a traditional (for example paper, voice, facsimile, etc.) or in a digital version.
5. ECS, Electronic Chart System, has been used to describe an equipment which is capable to show maritime related digital information, but which do not qualify for a reason or other of being the ECDIS.
6. IEC has published a type approval standard for ECDIS, IEC 61174. Latest edition is 4 from year 2015.
7. IEC has also published a type approval standard for ECS, IEC 62376. The standard was published in 2010 and withdrawn in 2013. Reason for withdrawal was a recognized need to update the content of it, but lack of motivation by the National Committees of IEC to participate to update process. A withdrawn standard in IEC terminology means that the standard is still available for buying or use by those who has bought it, but IEC has announced that there will be no new editions or revisions of the standard with that given number. Note that this leaves totally open if one day there is another standard with different number for same purpose.
8. This information paper is written only for the case of update of the IEC 61174 ECDIS standard of IEC to include S-100 concept.
9. In recent years as part of e-Navigation IMO has published following guidelines which should be taken into account when specifying technical details of new services and functionality of equipment using the new services.
 - Cyber security
IMO MSC-FAL.1/Circ.3 Guideline on maritime cyber risk management
 - Software Quality Assurance (SQA)
IMO MSC.1/Circ.1512 Guideline on SQA and HCD for eNavigation
 - Harmonized presentation
IMO MSC Interim Guidelines for harmonized display of navigation information received via communication equipment (NCSR-5, Feb 2018)

Analysis/Discussion

10. About Cyber security: The overall plan of IEC TC80 is to draft new standard IEC 63154 Cyber security which will set the minimum level of technical countermeasures against cyber risk. This standard is planned to follow the

principles set by the already published standard IEC 61162-460 for safety of IEC 61162-450 based Local Area Networks (LAN). For S-100 based Product Specifications this means that they need to support authentication of all data files being delivered onboard an SOLAS class vessel. For more information see separate input paper S-100WG3-9.3.1.

11. About SQA: The key point is that SQA is not limited to a single equipment, but it is seen to include also the supply chain of data files for consumption by the equipment. A standardized and harmonized alternative to secure legal source and to check integrity of data files is the principle set by the existing S-63. The original source provides a signature of the data content. This signature both authenticates the source and check the integrity of the content. IEC has noted that provision of signature has been declared as an option in S-100 clause 11-16.

12. Recent IMO NCSR-5, Feb 2018 agreed on content of “*Interim Guidelines for harmonized display of navigation information received via communication equipment*”. Next step in IMO process is approval and publishing by MSC-99, May 2018. This guideline includes following principles related to ECDIS and digital material used by ECDIS

- Display (or presentation or portrayal – whatever it is called) should be based on IMO resolution MSC.191(79) or IHO S-100. The IMO resolution MSC.191(79) includes basic symbols used by traditional instruments like Radar (for example own ship, heading line, tracked target, AIS target, range rings, cursor, measuring tools, etc.). It is assumed that every S-10X Product Specification will include related portrayal in order to facilitate the harmonized display. This means that although provision of portrayal is an option in S-100, the Product Specifications intended for use by ECDIS require that the portrayal is provided.
- Related functionality requires “*Ability of operator to manage information*” and “*manageable through the application of user preferences*”. These can be interpreted as a requirement that the portrayal include appropriate user-controlled selectors to tailor the display. For example, such as ‘*viewing group*’, ‘*text group*’ and ‘*independent mariner selections*’ concepts available in S-52 Presentation Library
- Related functionality also requires “*Geo-located and integrated with other navigation and charted information*”. This can be interpreted both as a requirement for interoperability and as a requirement to provide appropriate attributes to facilitate object level integration (for example, machine is able to detect that a charted object in S-101 ENC is same as an object provided by one of the S-10X for Nautical Publications. This might be facilitated by use of “*Maritime Resource Names (MRN)*” concept by IALA)
- Finally, the related functionality also requires “*Filtered according to the selected scale/display range of the display. Only critical information should be displayed at all ranges*”. This can be interpreted that there should be available a method to automatically reduce number of less critical information in order to avoid congestion of displayed symbols. This could be facilitated for example by providing different data content for use by different scale ranges or by providing ScaleMin style attributes

13. S-10X Products may wish to include functionality beyond “*just display*”. For example S-101 ENC charts might be required to provide “*safety contour*”-related alerts, S-101 ENC charts might be required to provide “*indications*” about areas with special conditions, S-122 MPA overlay might be required to provide “*whale migration*”-related alerts, S-412 Weather might be required to provide “*hurricane/typhoon*” related alert, etc..

14. Information about such functionality might be provided by machine-readable “*alerts and indication catalogue*”, which technically could be something similar as “*portrayal catalogue*” but intended for another kind of functionality than just display. This issue has been on the table for quite a long time, but so far nothing more than discussion has happened.

15. Without the machine-readable “*alerts and indication catalogue*” the required functionality will be described as human readable document. The consequence of human readable specification is that the test method for such a functionality shall also be described as human readable document for the inspector of compliance. In practice this means that IEC standard for type approval shall include all details of such functionality and their test methods as human readable document. Further this means that the IEC standard for type approval can only cover named S-10x layers available as matured concepts at the date of drafting of the IEC standard, for example S-101 and S-122 but nothing else. Any additional S-10x layer would then need a new edition of IEC standard.

16. IEC is neutral on “*alerts and indication*” issue. It is possible to include functionality beyond just display either by machine-readable method (paragraph 14) or by human readable method (paragraph 15). The difference is so called “*plug and play*” compatibility. Based on machine-readable method it is possible to type approve a generic S-100 management software which is able to handle new S-10x layers or new versions of already registered layers. This solution would future proof the ECDIS software. Based on human-readable method everything stays as it is

today for S-57/S-52/S-63 based ECDIS. Any change to rules would require new evaluation of the new situation and associated re-test of the software by the type approval certification body. IEC remember that former director of IHO, Robert Ward, has promised to maritime community that the S-100 concept will ease the ECDIS upgrade dilemma by making the ECDIS able to upgrade itself based on newer versions of data files.

17. IEC has noted that S-100WG have an extensive 9 phase test program before being in the position to claim that the initial proof of the S-100 concept has been passed and that the S-10x layers participated in the 9-phase test program are mature enough to move from testbeds towards real public service. IEC point of view is that passing the 9-phase test program is also a precondition for IEC to be in a position to publish the S-100 compliant version of the ECDIS standard. The coverage of such standard obviously depends what was the scope of the test in the final 9th phase.

18. Maturity of a Product based on S-100 is a combination what is available in S-100 baseline for every S-10X product and what is available in the Product Specification itself. Below is a draft check list to help evaluation if everything needed for SOLAS class use has been specified.

Expected functionality

- Is the functionality limited for “just display” ?
- Even “just display” requires selectors controlling what is displayed or how items are displayed
- Warnings and indications with time limits associated with the up-to-dateness of the data
- If required, alerts or indications based on the content of the product
- If required, requirements for pick reports
- If required, rules for interoperability (to be displayed together, how to display together, etc.)

Details of service

- File name and folder conventions
- Up-to-dateness information
- Authentication method, including method of pre-sharing of related key(s)
- If used, method of encryption and method of managing of decryption keys

Format of the S-10x product

- Machine readable feature catalogue
- Machine readable portrayal catalogue
- Machine readable schema
- If required, machine readable alerts and indications catalogue
- If required, machine readable interoperation catalogue

Test data and expected results

- Similar to style of “S-64”

Conclusions

19. Not applicable for this paper.

Recommendations

20. Not applicable for this paper.

Justification and Impacts

21. Not applicable for this paper.

Action Required of S-100WG

The S-100WG is invited to:

- a) note the information available in this paper.
- b) consider to establish a process to use check list of this paper to evaluate if a Product Specification is ready for public service to SOLAS class vessels