**S-100WG9**

## Paper for Consideration by IHO S-100 Working Group

## S-401 and interoperability with S-101

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| ***Submitted by:*** | Inland ENC Harmonization Group (IEHG) |
| ***Executive Summary:*** | IEHG is developing S-401, the Product Specification for Inland ENCs that is based on S-101 but is containing additional inland specific features. As maritime vessels are navigating on inland waterways (e.g., Rhine, Danube) it is important to ensure interoperability.  S-100WG9 is invited to consider the options to ensure interoperability. |
| ***Related Documents:*** | S-401 1.0.0, S-98 |
| ***Related Projects:*** | Development of future versions of S-98 |

## Introduction / Background

The Inland ENC Harmonization Group (IEHG), which has been recognized as an NGO by IHO, has published a Product Specification for Inland ENCs that is based on S-57. IHO has confirmed that it is possible to have a certified maritime ECDIS that is also capable of displaying Inland ENCs, although currently most maritime ECDIS are not able to display Inland ENCs correctly. Due to carriage requirements on some sections of inland waterways maritime vessels that are using those waterways need to invest in a second application (e.g., ECS or “Inland ECDIS”).

The IEHG has closely followed the development of S-100 from the beginning, as the S-100 data model appeared to be the solution to the display problems mentioned previously. To ensure compliance with the standard, the IEHG has provided input to various IHO working groups and committees and has been constantly aligning the drafts of S-401 with the latest editions of S-101. The European Union has supported this process with considerable funds in various R&D projects. The idea was that a S-100 based application will be able to display any S-100 based product correctly if the Feature Catalogue and the Portrayal Catalogue are delivered together with the product itself, but if several products should be displayed at the same time, an interoperability standard is also needed.

The first edition of the interoperability standard S-98 only covers those products that are explicitly required by IMO. Informal contacts have indicated that there are different opinions as to whether it will be possible to integrate S-401 in a future version of S-98.

## Analysis/Discussion

Do maritime vessels need a possibility to display Inland ENCs?

Maritime vessels are not only accessing ports that are situated on inland waterways but are often using the lower sections of the big inland waterways (e.g., the river Rhine up to Duisburg, 220 km, the river Danube up to Belgrade, 1100 km).

The use of Inland ENCs is mandatory on some inland waterways. The official Inland ENCs for those waterways, which are larger scale than S-101 ENC’s, are published by the competent authorities and contain a lot of detailed information using inland specific features.

Under the current S-98 proposal, maritime vessels would therefore not be allowed to use some inland waterways without the capability to display Inland ENCs and could therefore miss out on the ability to utilize that detailed information.

The IEHG, following discussions with IHO personnel and IHO committee and working group chairs, has developed three possible options:

Option 1, inclusion S-401 into a future version of S-98

Pros:

* Ensures that every S-100 based maritime ECDIS can display and utilize all features and attributes within S-401 Inland ENCs.
* No maritime vessel would need two applications.
* No legally questionable situations when a vessel is moving from the maritime to the inland waterway area.
* S-401 Inland ENCs include larger scale, more detailed information in areas where maritime and inland chart coverage overlap and would serve as a complimentary layer to S-101.

Cons:

* Will potentially increase the workload of the IHO working groups that are dealing with the topic of S-98.
* Would require an upgrade of the IEC standard
* Dynamic water levels must also be covered by inland

Option 2, integration of S-401 elements in S-101 (replacing the need for S-401)

Pros:

* Ensures that every S-100 based maritime ECDIS can display and utilize all features and attributes in both ENCs and Inland ENCs.
* No maritime vessel would need two applications.
* No legally questionable situations when a vessel is moving from the maritime to the inland waterway area.
* Larger scale more detailed information would be available in areas where maritime and inland chart coverage overlap (different usage bands).

Cons:

* The integration of S-401 in S-101 will potentially increase the workload of the IHO working groups that are dealing with the topic of S-101.
* Landlocked countries would have to accept a standard from an organization in which they cannot become members and do not have voting rights; IHO member states are represented by their HO, not by the inland authorities.
* IEHG has always been quicker and more flexible than IHO due to size and non-political nature.

Unknowns:

* How would portrayal rules be triggered, e.g. rules for AtoNs are different?
* Would dynamic water levels be compatible with the inland sloped reference water levels?

Option 3, development an inland-specific Data Interoperability (e.g., S-498)

Pros:

* Ensures that every S-100 based Inland ECDIS can display and utilize all features and attributes within S-101 ENCs and S-401 Inland ENCs.
* Nothing prohibits a type approved ECDIS from reading S-401 outside of areas where IMO regulations apply.
* The creation of an inland-specific Data Interoperability standard would require minimal support from IHO working groups that are dealing with the topic of S-98.

Cons:

* Maritime vessels would need two applications to view larger scale, more detailed information in areas that overlap coverages.
* Legally questionable situations would exist in areas where a vessel is moving from the maritime to the inland waterway area.
* Creates an interoperability standard which is nearly duplicative of the existing S-98 standard.
* Will increase the workload of the IEHG.
* If “S-498” would have same structure as S-98, ECDIS could read it, but Annex C is not machine readable and would therefore be excluded

Timeline: The IEHG recognizes the importance of the 2026 IMO deadline for S-101 implementation, and although a decision from the S-100 WG on how to proceed is requested, it is not anticipated that S-401 will be included in S-98 or in S-101 prior to that implementation date.

## Conclusions

From the point of view of IEHG, the integration of S-401 in a future version of S-98 is a logical solution to help ensure safe and efficient navigation on all waterways, regardless of type. The guaranteed capability of maritime ECDIS to be used on inland waterways would justify the additional efforts of the IHO working groups, and IEHG commits itself to provide the necessary input for this development.

If IHO decides that S-98 will stay restricted to the products that are required by IMO for the maritime area, IEHG would need such a decision as a starting point to develop an interoperability standard for inland waterways.

## Action Required of S-100WG9

The S-100WG is invited to:

a. note this paper

b. consider the proposal of the IEHG to consider Option XXX as the best solution to ensuring data interoperability.

c. determine whether Option YYY or Option ZZZ should be used to ensure data interoperability if Option XXX is not accepted.