

## Paper for Consideration by S-102PT

### Feedback from related specifications and working groups on issue #29

<b>Submitted by:</b>	Sweden
<b>Executive Summary:</b>	This is a continuation on <a href="#">Change Proposal</a> presented at S102PT13 (Agenda item 1.2, GitHub issue #29). The paper investigates possible bearings the proposed changes may have on other related specifications and working groups i.e. S-100, S-98 and S-104. Note! Any impact on portrayal is not included in this paper. There is a sub-group within S-102PT working on this issue currently.
<b>Related Documents:</b>	GitHub issue #29, S-100 part 8-6.2.8 Grid cell structures, S-98 Annex C section C-4-1.2
<b>Related Projects:</b>	None

### Introduction / Background

The ongoing GitHub issue (#29) identifies two main questions within the product specification (PS) that needs addressing:

1. The grid cell representation as center node versus cell area.
2. The bounding box versus the data coverage discrepancy and the absence of a definition for how to handle NoData/FillValue.

During S-102PT13 the [Change Proposal](#) was discussed and it was concluded that further investigation/discussion/analysis is needed. SMA was tasked to lead this continued work with the intent to show the findings during S-102PT14.

This paper presents the feedback SMA got from related specifications and working groups in regards to the issues discussed. All project team members are highly encouraged to contribute and give feedback in GitHub issue #29 once published.

### Feedback from related specifications and Working groups

Based on the work thus far in relation to this ongoing issue, the assessed closest related specifications and working groups are: S-100, S-98 and S-104. Representatives from each group have been presented with the issues at hand and have been asked to give their perspective and opinion on the subject. They have all taken part of the initial Change proposal on this issue.

#### *S-100 (Raphael Malyankar)*

S-100 sees no major conflict or failure with compliance between the two specifications/documents based on the proposed changes. S-100 reasons that the current S-102 specification complemented with already available functionality in S-100 can potentially solve the Cell area- and Bounding box issues. S-100 identified that a new interpolation type could be beneficial to add into S-100 via a maintenance proposal for edition 5.2/6.0, but for now present interpolation types can be used.

#### *S-98 (Jonathan Prichard)*

S-98 sees no conflict between the two specifications and fully supports the cell registration being cell area. S-98 have themselves put a lot of time and effort into this issue. They have tried to use both node positions and cell areas in their trails creating the safety contours. Their conclusion is that cell areas are the only viable option. Cell areas/grid cell extents preserve the integrity of the safety contour much better.

They also specified that interpolation would be fixed between points. The depth within each grid square is precisely the value at the center of the square and that value is constant within the extent of the grid square. They list the following advantages for using cell areas over nodes:

1. It is easy to show that the safety contour generated is sound and unbroken. With a point-to-point approach this is much harder in a general case.
2. The implementation is extremely simple. This is an issue of profound importance for OEMs who do not wish to take excess risk when programming something as safety-critical as a safety contour depiction.
3. The issue of single points is solved (so, isolated points still have a polygon safety contour, even though they can be small and require care with rendering) - from an implementation perspective this is crucial

Note: FOR REASONS OF ECONOMY, DELEGATES ARE KINDLY REQUESTED TO BRING THEIR OWN COPIES OF THE DOCUMENTS TO THE MEETING

4. No interpolation functions need to be programmed to draw the safety contour - in order to keep the display within performance limitations this is very important. Contours can be drawn by rendering grid square perimeters only.

S-98 realized working on this that S-102 may have other more flexible interpolations and grids but for ECDIS purposes only, the grids MUST be restricted to the square/rectangular ones. S-98 argue that data producers need to be aware of the implications of releasing the S-102 and how it will behave with a range of safety contour settings. In practice they hope most S-102 data resolutions are large enough (i.e the data is sufficiently detailed) to mean the contours are always intuitive to the mariner.

*S-104 (Christopher Jones)*

There was no additional input to the proposals from S-104WG. However, it was expressed that the points raised are reasonable and should not largely affect S-104 (or if they do, S-104 can follow along). Hydrodynamic models do calculate the physical equations at certain locations (nodes) in the model grid, but the uncertainty from the model forecast guidance of water levels and surface currents would be higher than the uncertainty resulting from the difference between centre of a cell and across the whole cell. Therefore, for navigation it is definitely best to go with S-102's proposed approach.