Paper for Consideration by S-101PT11

Overscale in ECDIS

Submitted by:	Australia (and supported in principle by France)
Executive Summary:	Review the practical implementation of Overscale in ECDIS.
Related Documents:	Performance Standard for ECDIS_IMO_MSC.530(106)_November 2022; S-101 Product Specification Ed 1.0.0; S-52 PresLib Ed 4.0(.3) Part I; S-98 Ed. 1.0.0 Annex C; S-64 Ed 3.0.3
Related Projects:	Nil

Introduction / Background

- According to **ECDIS PS** (6.1.1), ECDIS 'should' provide an indication if:

  'the information is displayed at a larger scale than that contained in the ENC'

  Note: This is a simplistic statement probably aiming at one ENC with a unique CSCL.

- **S-52** expands this statement and develops different, more complex, scenarios where multiple datasets (with <> CSCL) are part of the ECDIS display. S-52 introduces the "Overscale Indication' factor and the 'Overscale Pattern' [AP(OVERSC01)] concepts in Section 10.1.10 of the document

- This requirement was 'migrated' to **S-98 Annex C** section C-12.1.2. Notable differences include:

  o Updating of terms (i.e. 'compilation scale' with maxDS)

  o A definition for 'Overscale' (C-12.1.2). Note that is not identical to the one in the Main Document (PS).

  o A new section C-12.1.3 'Scale Boundary'

  o Expanded wording in section C-12.1.4 'Overscale area at scale boundary'

  o Replaced 'must' with 'should' when referring to the need of displaying the 'Ovescale Pattern'' on the part of the display taken from the larger scale ENC *(where the ship location is?).* Figure C-1.

  ➢ Refer to Annex A for a more detailed comparison (red is new text) and some accompanying comments.

- Note that instructions on the performance of Overscale Indication and Pattern are also included in **S-101 PS** section 4.6 'Display scale range'. Note that, as written, the statement regarding 'Overscale Pattern' may be interpreted as required when MSVS >maxDS and not 2x maxDS as per S-98. See extract below:

  When the MSVS is larger than the value indicated by **maximum display scale**, the overscale indication, in the form of an overscale factor and pattern covering the area that is overscale, must be shown. When at own ship's position a dataset with a larger **maximum display scale** than the MSVS is available, an indication is required and must be shown on the same screen as the chart display.

A. **S-64** contains the following tests:

Test Reference	3.6.8.2	IHO Reference	S-52 10.3.4.1
Test description			
Scale boundary display			

Test Reference	3.6.8.3	IHO Reference	S-52 10.3.4.1
Test description			
Overscale pattern display			

Test Reference	3.7.1 a)	IHO Reference	S-52 10.1.10.1
Test description			
Display of overscale indication.			

Test Reference	3.7.1 b)	IHO Reference	S-52 10.1.10.2
Test description			
Display of overscale pattern.			

Test Reference	3.7.3	IHO Reference	S-52 10.1.9.1
Test description			
Boundaries between compilation scales.			

Analysis/Discussion

S-98 wording is not easy to read and it does not properly describe/cover a number of scenarios, particularly when several Data Coverages both, as unique datasets or parts of a dataset, intervene in the formation of the ECDIS display.

Similarly, it would be beneficial to clarify if Overscale indication and pattern should be displayed in Route Monitoring mode only or in Route Planning as well. If so, should the centre of the screen be used to 'simulate' the position of the ship and drive Overscale performance (i.e. no Overscale Pattern in that location) **or** should the Overscale pattern be shown anywhere on the screen whenever maxDS of a Data Coverage is => 2x MSVS.

In summary, we believe that:

- all 'key governing principles' affecting Overscale in ECDIS should be listed and agreed by the S101PT

- additional S-164 tests should be developed to cover some key missing scenarios

- ECDIS screenshots from all other possible scenarios should be compiled into a companion document and made available in the PT's Resources page (short term) or in an IHO Publication (medium term).

This would be very valuable for data producers when developing ENC schemas and for training institutions, as supporting material, when delivering IMO's ECDIS familiarisation courses.

Overscale in ECDIS - 'Performance requirements *(key 'governing principles')* – <u>Draft Proposal</u>

A. *Route Monitoring:*

- A section of an ECDIS display is considered Overscaled when the corresponding Data Coverage/s forming the screen image, at that location, are displayed at a MSVS that is larger than their maxDS.

- The position of the ship drives the calculation of the Overscale Indication factor. If a Data Coverage, different to the one the ship is navigating on, is displayed Overscaled, the Overscale Indication must not be shown (unless a 'mouse hover' function is implemented by OEM).

- Overscale Indication is to be shown when MSVS > maxDS.

- Overscale Indication is calculated as follows: maxDS /MSVS and expressed as a factor in the following format: xn.d (i.e. x1.7).

- The Data Coverage containing the position of the ship must never be covered by the Overscale Pattern.

- Overscale Pattern is to be shown on any Data Coverage feature forming the ECDIS display whenever their MSVS =< 2x MSVS (see exception above).

- The boundary between Data Coverages having a jump in scale of more than 3 maxDS steps (the 'steps' are taken from S-101 PS Table 3.1) must be depicted using the "Scale boundary' line symbology.

- When the boundary between Data Coverage is also the boundary between datasets, linestyle SCLBDY51 is to be used instead.

- When scale boundaries of smaller scale Data Coverage areas overlap larger scale Data Coverage areas, that portion of the scale boundary which intersects the larger scale Data Coverage area must not be visible.

B. *Route Planning:*
- Behave as per Route Monitoring using the centre of the ECDIS display window as if it was the position (Lat/Long) of the ship.
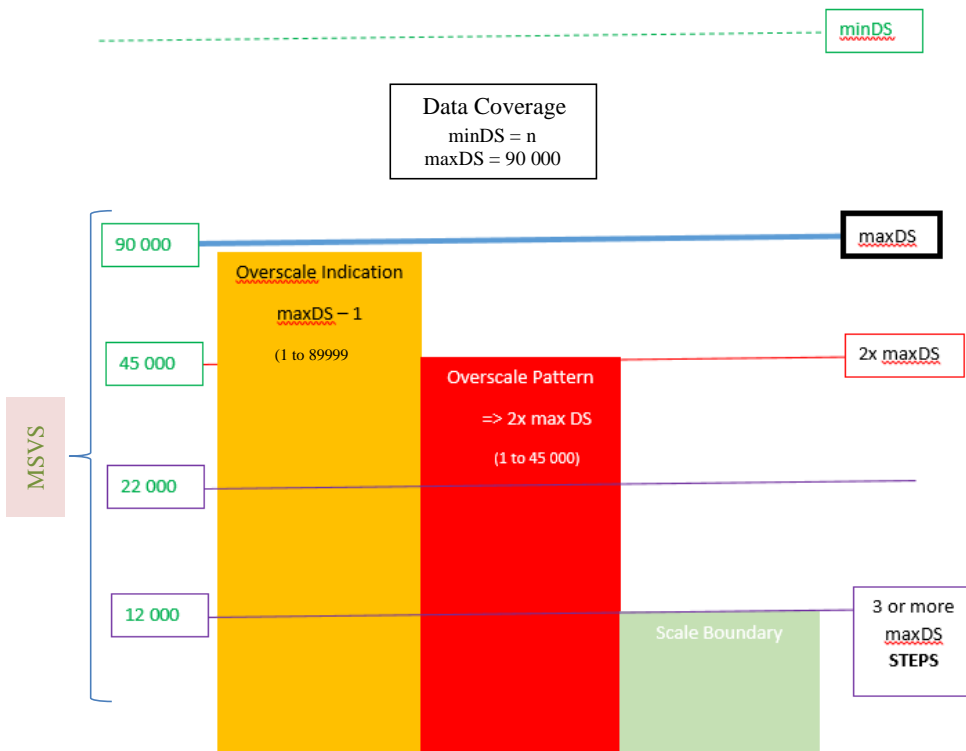

Figure 1 – Graphical example - relationship between MSVS and Overscale outputs in ECDIS

Conclusions

1. There is a need to further specify and standardise the way Overscale should work in ECDIS.

2. Key working principles should be agreed first and then incorporated into S-98 and S-164 in a user friendly way (including more graphics/screenshots).

3. Data producers, training institutions and mariners will appreciate and make good use of more detailed educational material.

4. It is important to note that currently in S-52 ECDIS, OEMs have not been able to implement Overscale in a fully standardised way. By clarifying requirements for S-101, emerging DF-ECDIS will have the opportunity to review current practices and harmonise performance.

Recommendations

1. S101PT to endorse the idea of standardising the behaviour of Overscale in ECDIS by clearly defining a list of key 'performance requirements' and use them to review S-98 and S-101 (PS & DCEG) content.

2. Endorse the list as presented in this paper or task the 'Scales' subWG with its review and final drafting.

3. If necessary, the S101PT to endorse, by correspondence, the final version of the list before the end of October 2023.

4. S101 Chair to submit an 'S-98 Change proposal request' to the upcoming S-100WG meeting in November requesting the review of sections C 12.1.2 to C-12.1.4 as per the agreed 'key governing principles'.

5. Task the PsWG to prepare a compendium of ECDIS screenshots representing all possible Overcsale scenarios (including clarifying notes). Submit to ENCWG for inclusion in educational document alongside S-101 ENC 'loading' scenarios (refer to paper ENCWG8 – *Proposal on a new S-101 educational guidance document on scales and Data Coverages*).

6. Task the PsWG to review the existing S-164 test cases o Overscale issues and, if required, recommend new entries to the S-164sWG.

7. Keep a close eye on the possible implementation of 'Optimum Display Scale' and the impact it may have on Overscale concepts.

Justificaηon and Impacts

Lack of clarity and room for interpretation on the behaviour of Overscale in ECDIS may impact in the way data producers scheme their S-101 products and/or negatively affect the effective training of mariners.

Action Required

The S-101PT is invited to:

    a.   discuss the content of this paper,

    b.   accept the recommendations

ANNEX A – Comparison between S-52 and S-98 Annex C sections on 'Overscale' principles.

~~10.1.10~~ **C-12.1.2 Overscale**

Overscale is where the mariner has zoomed larger than the largest maximumDisplayScale of the ENC data that is shown in the mariner's viewing window. **NEW**

~~10.1.10.1~~ **C-12.1.2.1 Overscale Indication**

The overscale indication is intended to remind the mariner that the size of chart errors is magnified when they increase the display scale. A 1 mm error at maximumDisplayScale of 1/20,000 becomes a 1.3 mm error at a display scale of 1/15,000 and a 2 mm error at 1/10,000.
The overscale factor must be calculated as [denominator of the ~~compilation scale~~ maximumDisplayScale] / [denominator of the ~~display scale~~ mariners selected viewing scale], expressed as, for example "X1.3", or "X2" (using the figures in the example above.)
This must be indicated on the same screen as the chart display, and treated as display base. Use colour SCLBR.
This overscale indication is required by IMO Performance Standards ~~(MSC.232(82))~~ (MSC.530(106)) whenever the display scale exceeds the ~~compilation scale~~ maximum intended viewing scale as indicated by maximumDisplayScale.
NOTE: If the display is compiled from more than one ENC of the same ~~compilation scale~~ maximumDisplayScale, and if the mariner deliberately chooses to zoom in so that the display scale exceeds the ~~compilation scale~~ maximumDisplayScale, then only the "overscale indication" must be shown. The "overscale pattern" (area fill OVERSC01) must not be shown.

C-12.1.3 Scale boundary **NEW**

This shows where the maximumDisplayScale of displayed **Data Coverage** changes and their values are significantly different. The ECDIS should warn the mariner of upcoming data scale change. Only the major changes in maximumDisplayScale resulting from the scale jumping more than three steps in maximumDisplayScales should be shown. The steps are given in S-101.The boundary between **Data Coverage** in a dataset, where the maximumDisplayScale of the data changes, must be symbolised on the ECDIS display by a solid 0.32mm wide line using colour token CHGRD. The display priority is 9; over-radar; standard display; viewing group 21030.When the boundary between **Data Coverage** is also the boundary between datasets, linestyle SCLBDY51 may be used instead. When scale boundaries of smaller scale **Data Coverage** areas overlap larger scale **Data Coverage** areas, that portion of the scale boundary which intersects the larger scale **Data Coverage** area should not be visible.

C-12.1.4 Overscale area at scale boundary

ECDIS displays all chart data at the same scale. In order to avoid leaving part of the display blank, the display may be rendered using data from multiple datasets. These datasets may contain one or more **Data Coverage** areas with varying maximumDisplayScales.
The area fill OVERSC01 must be used to indicate **Data Coverage** areas displayed {, X2 or more larger than} the maximumDisplayScale; provided that the area was displayed automatically by the ECDIS in order to avoid leaving that portion of the display blank.
NOTE: This symbol applies only to the automatic overscaling performed by the ECDIS in matching ENCs at different maximumDisplayScales. It should not be applied to an overscale display deliberately requested by the mariner, which should trigger the overscale indication required by IMO Performance Standard section 6.1.1.
A different overscale situation arises when the ship approaches a scale boundary from a larger to a smaller scale ENC, typically when leaving harbour. In combining data from the large scale and the small scale ENCs to generate a display at the larger scale, the ECDIS will have "grossly enlarged" the small scale data.
In addition to drawing the scale boundaries, the "grossly overscale" part of the display should be identified with area fill OVERSC01, as illustrated in Figure C-1.
In this context, "grossly enlarged" and "grossly overscale" should be taken to mean that the display scale is enlarged/overscale by X2 or more with respect to the ~~compilation scale~~ maximumDisplayScale. For example, at the left edge of Figure C-1 the display scale of 1/12,500 is X4 the ~~compilation scale~~ maximumDisplayScale of 1/50,000, and so the overscale

Commented [A1]: Is this trying to define 'Display overscale'?. Is it trying to say that 'Display Overscale' occurs when MSVS > than ANY Data Coverage making the display? Or is it trying to say that Overscale occurs when the situation happens at the location of the ship?? Note that ECDIS display can be made of <> ENCs or one ENC but with multiple Data Coverages or a combination of both.

Commented [A2]: If Overscale Indication is displayed even when the ship is not in an overscaled Data Coverage; Should not this paragraph specify how to calculate the overscale factor when multiple Data Coverages with different masDS make the screen? (i.e. use the largest maxDS present on the ECDIS display).

Commented [A3]: Needs updating

Commented [A4]: Should the overscale Indication display even when the position of the ship sits in a section (Data Coverage) of the display where MSVS =< maxDS ?? Needs clarification.

Commented [A5]: Maybe leave just for changes in datasets that have different Navigation Purpose (if this is exposed in the dataset) – this would align with the original definition of 'Scale boundary' in S-52 though (10.1.9).

Commented [A6]: Replace with '2 (or more) times larger than'

pattern is required.
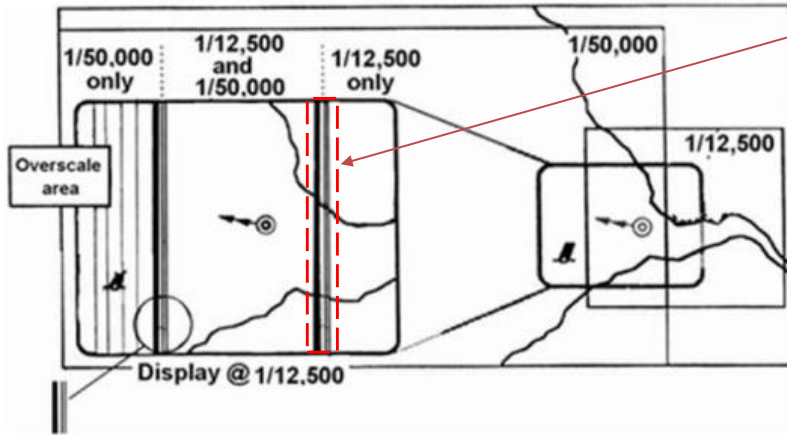
Figure C-1 - Illustration of overscale display

[The right hand side of the Figure shows the ENC layout with the screen window overlaid, and the left hand side is enlarged to show the ECDIS display on that screen.]

Note that in this situation the OVERSC01 area fill ~~must~~ should only be shown on the area compiled from the smaller scale ENC. If the area from the larger scale ENC is also overscale, this ~~must~~ should be indicated by the "overscale indication". The OVERSC01 area fill ~~must~~ should not be shown on the part of the display taken from the larger scale ENC. For example if the display scale of the situation in the **Data Coverage** diagram was 1/3,500 the area of compilation scale 1/12,500 would have an overscale indication of X 3.6 but would have no OVERSC01 area fill.