Paper for Consideration by TSMAD

Scale Independent and Scale Dependent Analysis

Submitted by:	UK/Jeppesen
Executive Summary:	This paper reports on the progress of work to investigate the issues around SI/SD data in S-101. It includes details of work to investigate the use of SCAMAX on SI data and presents a viewer which can also be used to support the development of S-101 display and loading.
Related Documents:	1. S-101 Draft Product Specification
Related Projects:	1. S-101

Introduction / Background

1. At the 2nd S-101 Stakeholders Workshop OEMs commented that if we are going to use the Scale Independent/Scale Dependent approach it should be addressed earlier in the phased S-101 plan. At TSMAD 20 it was agreed that this should be moved to phase 2 and a range of questions were identified. The UK and Jeppesen took an action to investigate the issues around SI/SD data and report back to TSMAD.

Analysis/Discussion

2. The justification for the SI cell approach is that it improves vertical consistency and reduces the updating burden to benefit both HOs and users. It would also reduce data volumes. The US posed objections to this approach but on the basis that SI/SD data could be produced from flat files as well as from database solutions TSMAD agreed to look at addressing some of the issues identified.

3. Questions
At TSMAD 20 the following issues were raised, comments in blue are thoughts on these so far;

a) How will distribution work?
b) How will updates work?
c) Sometimes an update will affect both SI and SD data – are they packaged together and released simultaneously? What happens if the end user only gets updates to the SI data and not the SD data?

In principal the distribution and updating will work as it does with S-57, but with the added complexity of more files to contend with. This further increases the need for a common framework or guidelines to which all participants in the supply chain work towards. The supply chain is expected to remain rightly as today with hydrographic offices who will make the data using systems that automatically separate the data to the files/products as needed then using their distribution systems they send the data to RENCs or directly to service providers, who verify the data before packaging and productizing the data for delivery to end users

d) Would TSMAD consider multiple SI cells grouped by different themes? E.g. An SI cell that contains only TSS information and a SI cell that contains Aids to Navigation. These would have to be related in some way.

Separating SI cells along themes, was considered and debated, but at the present time, any benefit with multiple SI cells, seem to also be possible using other methods like for example themes for viewing groups, quality metadata using practices established in S-57 and so on. It is therefore suggested that only one SI cell is needed for ENC purposes and to avoid further complexity.

e) Can the same association cover two different datasets?

Associations will be much as they are today but the SENC will build these associations together.

What features should be included for Scale Independent content?

Need to provide a list of recommended features for SI datasets.

f) Can the perceived benefits be achieved in another way?

Various alternative approaches exist, these include allowing the ECDIS using defined rules to generalize a single best scale cell for the optimum viewing of the data for the given situation, or to having multiple geometries on the feature in a 'single cell' approach. All have advantages and disadvantages; SI/SD seems to offer the best balance at this time.

4. Tasks;

Following discussion the following tasks were assigned based on the questions laid out and the need to identify how portrayal of SI/SD data would be managed. The main focus of this work was to define the features and prove the application of SCAMIN and SCAMAX so that SI/SD data would display in the same was as traditional cells in the viewer.

- Define the features for the SI Dataset.. List at Annexe A
- Identify how SCAMIN/SCAMAX would be applied to deal with decluttering and display through the scales. See Annexe B
- Demonstrate sample SI/SD data in a modified S-57 ECDIS. With a view to identify issues of using SI/SD data alongside traditional cells. Presentation to include demonstration of sample data displayed in a viewer.
- Display Priorities – To Complete

Conclusion

5. This work has produced a list of feature to be included in SI datasets and demonstrated the application of SCAMIN and SCAMAX to SI data. Through the viewer it has demonstrated how this can be applied in ECDIS to ensure SI/SD datasets display as would be expected. More work is required particularly in the areas of distribution and display priorities but work so far indicates that the SI/SD approach is feasible for S-101.

Action Required of TSMAD

- Note the progress of the UK and Jeppesen in progressing the work on Scale Independent and Scale Dependent Data in S-101
- Comment on the work to date

Annexe A

List of recommended features to be included in Scale Independent Datasets

Beacon, cardinal	BCNCAR
Beacon, isolated danger	BCNISD
Beacon, lateral	BCNLAT
Beacon, safe water	BCNSAW
Beacon, special purpose/general	BCNSPP
Buoy, cardinal	BOYCAR
Buoy, installation	BOYINB
Buoy, isolated danger	BOYISD
Buoy, lateral	BOYLAT
Buoy, safe water	BOYSAW
Buoy, special purpose/general	BOYSPP
Checkpoint	CHKPNT
Coastguard station	CGUSTA
Control point	CTRPNT
Current - non-gravitational	CURENT
Daymark	DAYMAR
Deep water route centerline	DWRTCL
Deep water route part	DWRTPT
Distance mark	DISMAR
Fog signal	FOGSIG
Light	LIGHTS
Light float	LITFLT
Light vessel	LITVES
Offshore production area	OSPARE
Pile	PILPNT
Pilot boarding place	PILBOP
Radar reflector	RADRFL
Radar station	RADSTA
Radar transponder beacon	RTPBCN
Radio station	RDOSTA
Recommended route centerline	RCRTCL
Rescue station	RSCSTA
Retro-reflector	RETRFL
Signal station, traffic	SISTAT
Signal station, warning	SISTAW
Spring	SPRING
Submarine transit lane	SUBTLN
Topmark	TOPMAR
Traffic separation line	TSELNE
Traffic separation scheme boundary	TSSBND
Traffic separation scheme crossing	TSSCRS

Traffic separation scheme lane part	TSSLPT
Traffic separation scheme roundabout	TSSRON
Traffic separation zone	TSEZNE
Two-way route part	TWRTPT
Underwater/awash rock	UWTROC
Archipelagic sea lane	ARCSLN
Archipelagic sea lane axis	ASLXIS

Annexe B

S-101 Rules for SCAMIN and SCAMAX for Scale Independent Datasets

These rules are based on the S-101 Product Specification loading guides. These rules only apply to Scale Independent datasets.

SCAMIN

Compilation Scale of the Smallest Scale Charted = SCSCALE

SCAMIN = (SCSCALE-1) + Number of Steps up SCAMIN Values table

Eg Light SCSCALE=90000

349999 = (90000-1) + 4 Steps

SCAMAX

Compilation Scale of the Largest Scale Charted = LCSCALE

SCAMAX = (LCSCALE - One step down Standard Scales) - 1

Eg Light LCSCALE=45000

21999 = (45000- 1 Step) – 1

Test Datasets

	GB Cell	BA Chart	Location	CSCALE
A	GB55022B	3526	Khawr Fakkan	12000
B	GB55022A	3526	Fujairah	12000
C	GB45022A	3526	Fujairah Anchorages	45000
D	GB350220	3520	Overview	90000

Test Cases

	Khawr Fakkan	A 12000	B 12000	C 45000	D 90000	SCAMAX	SCAMIN
1	Pilot Boarding Place	X	X	Y	Y	21999	259999
2	Safe Water Mark	Y	X	Y	Y	7999	259999
3	Buoys Inner	Y	X	X	X	7999	44999
4	Buoys Outer	Y	X	Y	X	7999	179999
5	Light	Y	X	X	X	7999	44999

SCAMIN Values

1:19,999,999
1:9,999,999
1:4,999,999
1:2,999,999
1:1,499,999
1:699,999
1:499,999
1:349,999
1:259,999
1:179,999
1:119,999
1:89,999
1:59,999
1:44,999
1:29,999
1:21,999
1:17,999
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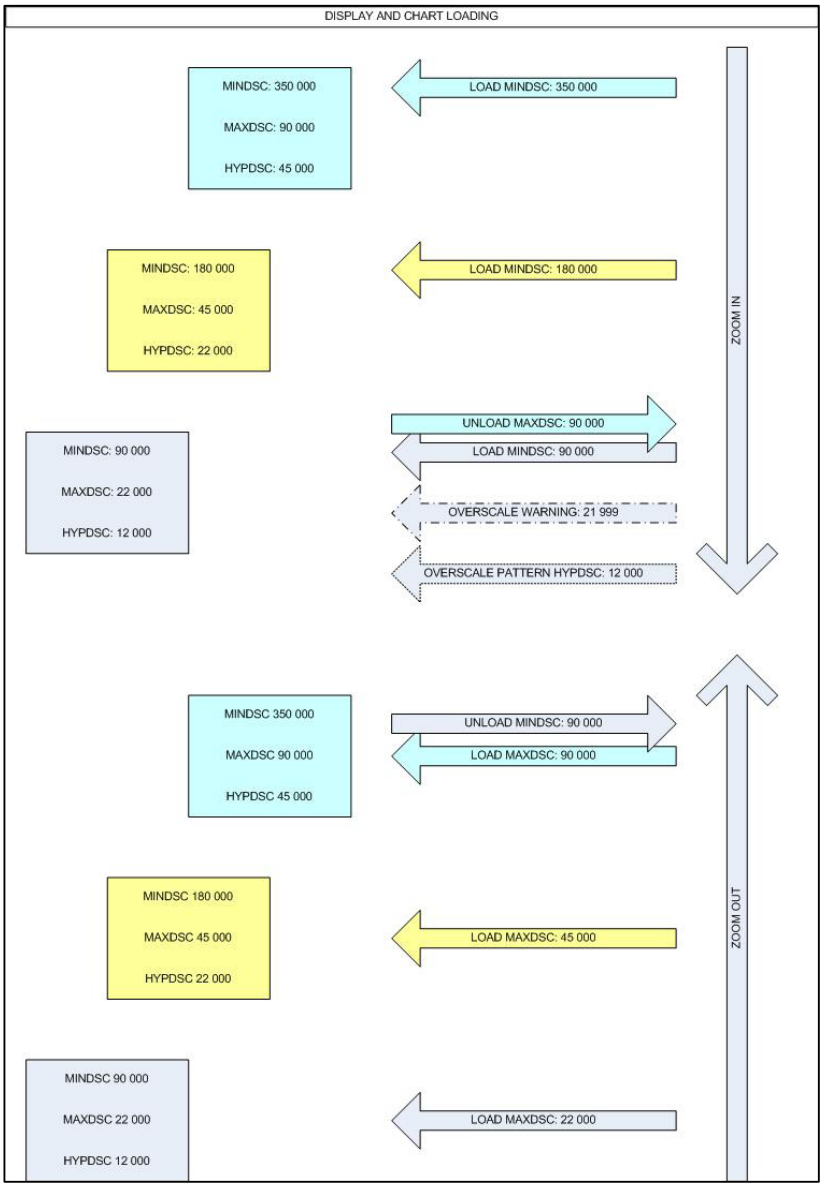

Standard Scales

Selectable Range	**Standard radar scale (rounded)**
200 NM	1:3,000,000
96 NM	1:1,500,000
48 NM	1:700,000
24NM	1:350,000
12 NM	1:180,000
6 NM	1:90,000
3 NM	1:45,000
1.5 NM	1:22,000
0.75 NM	1:12,000
0.5 NM	1:8000
0.25 NM	1:4000