

Welcome 😊

S-164 Sub WG

- Objectives:
- Session 1
 - Overall approach
 - Structure of Document
 - Release Notes on the draft v1.0.0 manual
 - Outstanding Questions from Release Notes
 - Data Layout/Scheming
- Session 2 – S-100 Operations.
 - General Loading and management
 - Encrypted, Authenticated and Service Elements
 - Alerts and Indications
- Session 3 – S-57, DF Mode, Datasets.
 - Portrayal
 - S-57 tests
 - Dual Fuel Mode
 - Dataset Requirements
- Wrap Up, Actions, Roadmap to publication.

S-64

IHO Test Data Sets in ECDIS

Edition 4.0 – ~~Xxxx~~ 2023

Instruction Manual for the Use of IHO
Test Data Sets in ECDIS

IHO



International
Hydrographic
Organization

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Overall Approach.

- Review S-164 draft with a view to finalising input prior to submission to HSSC
- **Define how ECDIS should “work” in terms of IHO standards and detail behaviour in S-164**
 - **S-164 clarifies how S-100 ECDIS should work according to S-98 and S-100 and includes current functionality**
- Focus Points
 - **Test dataset manual Scope, wording, detail**
 - **Extent of required testing for IMO/IEC testing**
 - **Mapping to IHO standards, S-98/S-100 (+others?)**
 - **Broad scope of required data content**
- Need to be confident S-164 is complete in terms of scope and sufficient depth for publication
- Progress so far is
 - Drafting v1.0.0
 - Define the “shape” of S-164
 - What data is required to support testing
 - Define the gaps to v2.0.0
 - What needs to be proposed for updates in S-98 and what assumptions are we making (S-100 and IEC61174)

Session Objectives

- Focus on reflecting in S-164 how the ECDIS is supposed to function in relation to IHO standards
- Bear in mind some elements of ECDIS functionality are historical!
- What does an S-100 ECDIS do?
 - Load and store from external sources, data and machine readable files
 - Portray various “data”
 - Interrogation
 - “various S-98 functions” (from Annex C)
 - “Safety” features for planning and monitoring
 - Current S-57 functionality alongside S-100 (DF mode)
- **Some aspects of these operations need to be thought about to make sure S-164 has the right content in it.**

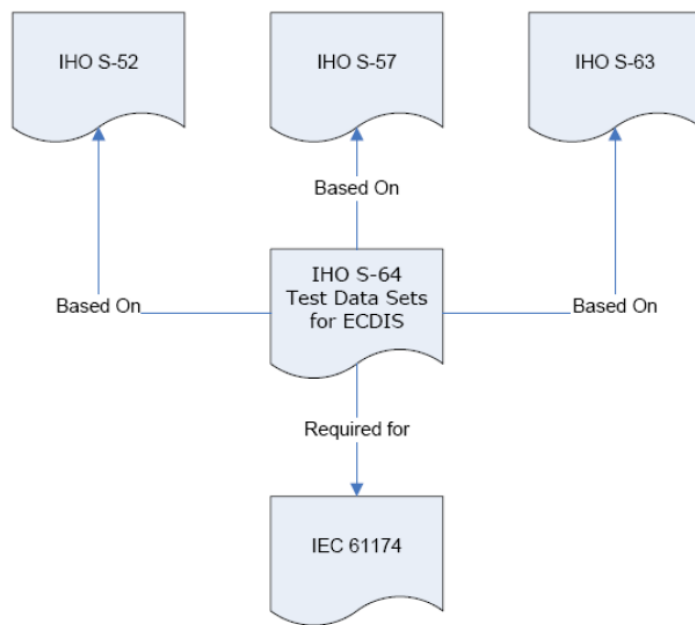
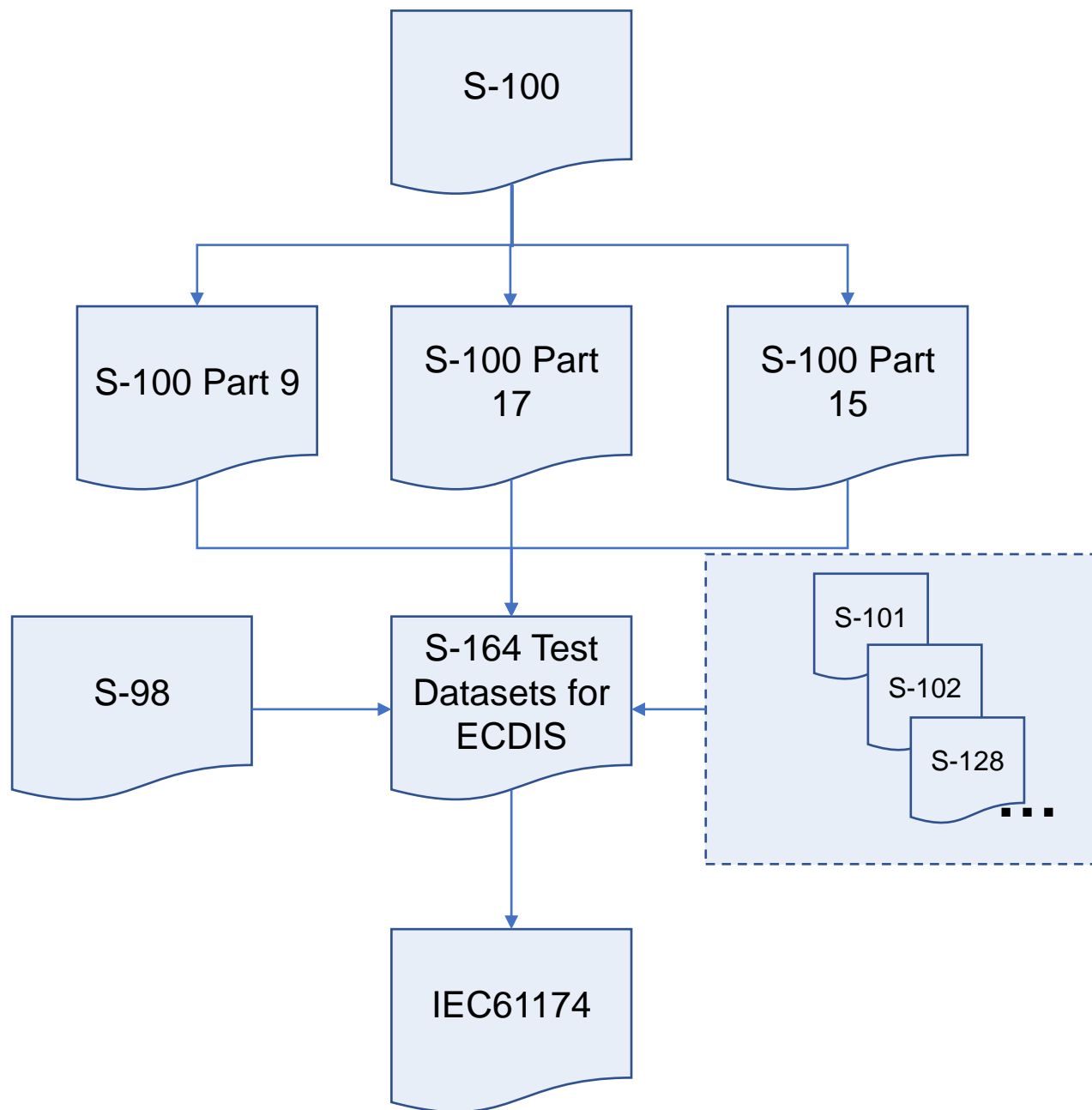


Figure 1 – The TDS and its relationship to other standards

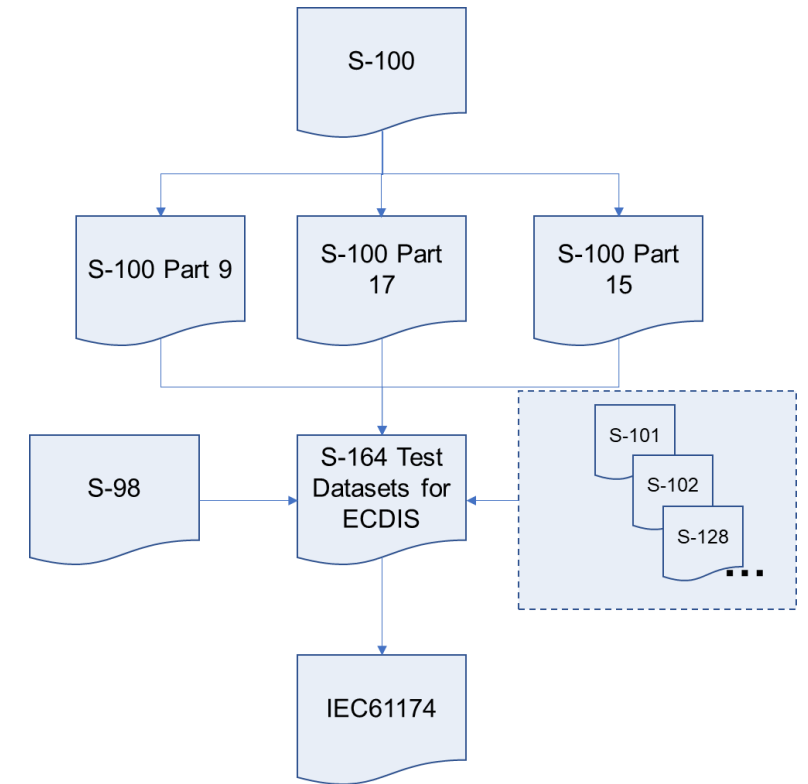


Overall Structure.

- Broad structure of S-64 is:
 - Loading and updating
 - Display
 - Chart Related functions
 - Alerts and Indications
 - Navigational Hazards
 - Special Conditions
 - Safety Contour
- Major Sections based on this structure for S-100
- **S-57 testing (required for DF ECDIS) is by reference to existing S-64**
- Specific tests for DF Mode.

So Structure of S-164 TDS Manual is:

- Introduction, preface, scheming, acknowledgments
- S-100 Operations
 - Loading and updating
 - Display
 - Chart Related functions
 - Alerts and Indications
 - Navigational Hazards
 - Special Conditions
 - Safety Contour
- S-57 Testing
- DF Mode Operations
 - Loading and Updating
 - Display
 - Chart Related Functions
 - Alerts and Indications



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Current Draft Contents/Structure.

Release notes for current version

1. The format, structure and much of the language mirrors the existing S-64.
2. Some text has been left in and greyed out (“greyed out”). This should be ignored but is sometimes useful to understand where elements are not required under the S-164 regime.
3. All the language in S-164 (with a few minor exceptions) is now S-100 based and refers to exchange sets, datasets, features/attributes and ENC.
4. Brand new tests have a **blue** background, old tests and modified/enhanced tests are traditional S-64 **green**. For final publication these colours will be harmonised.

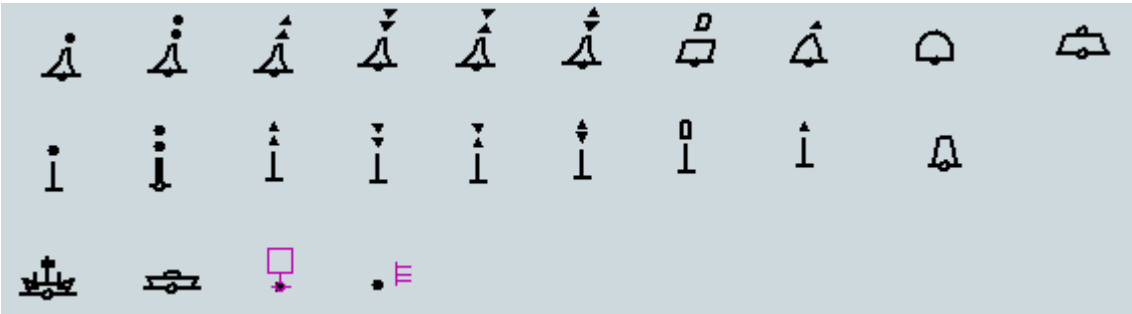
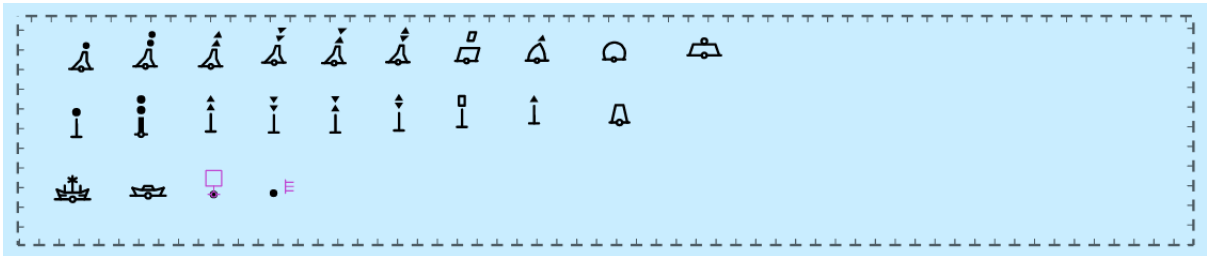
2.1.1 Initial Catalogues

Test Reference	InitialCatalogues	IHO Reference	S-98 Annex C C-21.1												
Test description															
Loading of initial catalogues. This test loads initial feature, portrayal and interoperability catalogues for the datasets included in this section.															
Setup															
Clear all ECDIS catalogues and data contents															
Action															
Load the exchange set PowerUpCatalogues															
Results															
Verify the version of the S-101 feature catalogue and portrayal catalogue is correct. The correct information is shown in the following table:															
<table><tr><th>Catalogue</th><th>Product</th><th>Version / Issue Date.</th></tr><tr><td>Feature Catalogue</td><td>S-101</td><td>1.0.1/20220610</td></tr><tr><td>Portrayal Catalogue</td><td>S-101</td><td>X.Y.Z / yyyymmdd</td></tr><tr><td>Interoperability Catalogue</td><td></td><td>1.0.0 / yyyymmdd</td></tr></table>				Catalogue	Product	Version / Issue Date.	Feature Catalogue	S-101	1.0.1/20220610	Portrayal Catalogue	S-101	X.Y.Z / yyyymmdd	Interoperability Catalogue		1.0.0 / yyyymmdd
Catalogue	Product	Version / Issue Date.													
Feature Catalogue	S-101	1.0.1/20220610													
Portrayal Catalogue	S-101	X.Y.Z / yyyymmdd													
Interoperability Catalogue		1.0.0 / yyyymmdd													

- 1. Screenshots:
 - 1. There are no new S-100 screenshots yet and many of the tests still have the existing S-64 screenshots in them.
 - 2. Currently neither the datasets nor the portrayal catalogues exist to produce these definitively. Some will be produced based on the existing data available but these will be informative until more development of the test datasets and final version of catalogues is complete.
 - 3. A reference implementation of a Dual Fuel mode capable system will be required for tests requiring dual fuel mode.
- 2. Tests are now named (using CamelCase) rather than numbered in the tables. This makes management of the document substantially easier

2.1.1 Initial Catalogues

Test Reference	InitialCatalogues	IHO Reference	S-98 Annex C C-21.1
Test description			
Loading of initial catalogues. This test loads initial feature, portrayal and interoperability catalogues for the datasets included in this section.			
Setup			



1. All data loading is done from named exchange sets. The existing S-64 requires install of individual datasets from named exchange sets (later...).
2. There is a question over how to deal with the concept of “unofficial data” as determined by the producer code (**later**)
3. “no data coverage” (S-101) does not exist in the S-100 world and those tests are no longer required.
4. There may be a better way of describing the individual portrayal settings for each test. Standardised language for these could be defined.

Test Reference	4.1 d)	IHO Reference	S-52 10.1.8
Test description			
No ENC data available.			
Setup			
As for test 4.1 a) Ship position as follows: 32°24.53'S 061°19.29'E (within ENC data coverage (M_COVR) where CATCOV = 2 (no coverage available)).			
Action			
Observe the display.			
Results			
Confirm that a “No ENC available” indication is provided.			

Test Reference	4.1 e)	IHO Reference	S-52 10.1.8
Test description			
No ENC data available.			
Setup			
As for test 4.1 a) Ship position as follows: 32°27.88'S 061°20.66'E (an area with no ENC)			
Action			
Observe the display.			
Results			
Confirm that a “No ENC available” indication is provided.			

1. A number of tests are no longer required in the “encrypted” dataset section (under S-57 service revision was almost entirely done within S-63), reflecting the simpler approach to service provision under S-100 (i.e. no PRODUCTS.TXT, SERIAL.ENC, STATUS.LST or large media support). As Part 17 implementations mature modifications may need to be made to S-164 tests.
2. The S-164 draft is supported by an extensive spreadsheet which maps the named tests to the exchanges sets required and notes the contents of these exchange sets (and their requirements). This gives an outline of dataset requirements for S-164 support.
3. SENC import requirements are greyed out. There is nothing, technically, to prohibit rewriting the SENC import tests using S-100 language. This requires further discussion within the S-100WG

Section	Test Name (Short)	Description	Exchange Set(s)
Catalogue Loading and System initialisation.	InitialCatalogues	successful initial loading of multiple catalogues.	PowerUPCatalogues
	InvalidCatalogues	Invalid feature catalogue	PowerUPCatalogues
	InvalidPC	Invalid portrayal catalogue	PowerUPCatalogues
			CorruptPortrayalCatalogue
	OutOfSequenceCatalogues	loading datasets for which no valid catalogue exists	PowerUPCatalogues
	UpdateCatalogues	successful updating of catalogues	UpdatedCatalogueData PowerUPCatalogues
	NewCatalogues	successful installation of new catalogues	PowerUPCatalogueUpdates PowerUPCatalogues
			NewProduct
loading of Unencrypted Datasets	InitialPowerUp	Loading initial datasets (all products)	InitialPowerUp

and...

1. References

1. IEC61174 and S-98 are still under development so the final references are not known in all cases.
2. These are being compiled separately and will be updated in the draft when complete.
3. A mapping of S-98 Annex C, S-100 Part 17 and S-100 Part 15 (and Part 9?) needs to be completed to ensure all new S-100 features are captured.
4. Final checks of SSE codes from the S-63 ones to those tested in S-164 need to be done.

Test Reference	InitialPowerUp (2.1.1)	IHO Reference	IEC 61174/ 4.4.1
Test description			
Loading of initial datasets and indication of own ship stationary position.			
Setup			
Load the following exchange set: InitialPowerUp 2.1.1 Power Up\ENC_ROOT\GB4X0000.000 2.1.1 Power Up\ENC_ROOT\GB5X01NW.000 with the following settings: <ul style="list-style-type: none">• Select Display Category Other• Set the Safety Contour value to 8 m• Set the Safety Depth value to 8 m• Select Symbolized Boundaries• Select all Text groups• Select Accuracy• Select Highlight info• Select Highlight date dependent• Select simplified points = false Ship position 32°29.66'S, 060°55.86'E Heading 234.0 degrees			
Action			
Load cells and view the chart display.			
Results			

Questions?

1. Service management tests – we don't have a complete view on how ECDIS imports data, given an exchange set. It “should” import everything it has a permit for, anything which is unencrypted and which is S-101 (in preference to S-57) but there is no explicit standard for this. This also includes the interaction with S-128 and its role in controlling service revision on the ECDIS. As S-128 matures these tests may need supplementing or changes and more clarification is needed to guide implementers.
2. The term “SENC” has been replaced by “System Database” – is this the correct term to refer to the internal database of the ECDIS? S-98 refers to SENC in many places (referring to MSC 232(82) which will need resolving.
3. Are the Skin of the Earth tests also intended for S-100/S-101? They have not been migrated, although they could be. As they address an individual anomaly within the S-57 topology/data structure it could be argued there is little justification for their inclusion in a generic S-100 ECDIS but this requires discussion and agreement within the S-164 SubWG and S-100WG.
4. **Is there a requirement for an S-100 ECDIS to load individual datasets, or just exchange sets? The S-164 tests show that it is possible to only refer to the loading of exchange sets. This isn't stated anywhere, possibly it should be added to S-98. (Later)**

Questions?

1. S-52 PL 8.5.1 (apparently) says OEMs can develop their own centred symbol algorithms. Where is this specified now?
2. There is a test of “complex portrayal” – this contained all the S-52 CSP features and exercised various aspects of them. Now the CSPs have been deleted from Part 9 is there a need to keep this test? It could hold tests of particularly complex portrayal (where lots of lua based processes are used, or where complex attribution determines portrayal behaviour). These should be discussed and agreed.
3. Where are mariner’s features and the detailed requirement for their implementation described?
4. **On S-57/S-63 ECDIS data which is digitally signed (and for which the CRC value in the CATALOG.031 is valid) but which can not be authenticated back to the SA is still installed but a permanent warning is shown to the user on import. Under S-100 there are no more CRC values so it should be decided whether data which can not be authenticated back to the SA should be imported (with similar error messages). Or, data can only be imported if it is digitally signed, unaltered and authenticated against the SA certificate on the system. (Later)**
5. Is this section still required? As the portrayal mechanism is brand new it probably shouldn’t, although it is possible we may need new specification of display parameters...

Test Reference	ComplexPortrayal 3.6.9	IHO Reference	S-52 10.3.4.1
Test description			
Display of features with priority affected by complex portrayal			
Setup			
As for test DifferentPriority			
Action			
View the features at position 32°21.850'S 61°23.150'E scale 1:5 000			
Results			
Confirm that items 1-12 display as shown in the graphic below :			
<p>The graphic illustrates display priority rules for CSP features. It is divided into two main sections: 'Lower Area object overlays higher Area object' and 'Higher Area object overlays Lower Area object'. Each section shows a grid of symbols for different CSP features (CS(DEPARE), CS(RESARE), CS(LCWHAZ)) under various display conditions. The symbols are shown in different colors and styles to represent different priorities. For example, in the 'Lower Area object overlays higher Area object' section, the symbols are shown in a way that indicates they are being overlaid by a higher area object. In the 'Higher Area object overlays Lower Area object' section, the symbols are shown in a way that indicates they are being overlaid by a lower area object. The graphic also includes a note at the bottom: 'Note: Manufacturers can use their own algorithms for calculating the position of centred symbols S-52 PL 8.5.1.'</p>			

Data Scheming and arrangement

- Datasets are split into different geographic areas.
- All tests are described using exchange sets, not individual datasets
- In general S-100 versions can be located in the same geographic region
- Types of cells
 - Cartographic cells
 - Exhaustive test cases
 - Other (Polar, Settings etc...)
- Dual Fuel exchange sets can be achieved by providing S-57 and S-101 versions in the same region
- New S-100 products (S-124, S-129, S-102, S-104, S-111) mostly located within the boundaries of the cartographic cells
- Exception to scheming is the alerts/indications datasets.
 - In order to produce combined DF routes, the datasets are located side by side

Generation of test manual

- Can be driven from github.
- Format is AsciiDoc (.adoc)
- Breaks manual up in individual tests/files in text
- Builds PDF and HTML versions
- Scalable and traceable with github.
- Images linked separately.

Generation of test manual

S-164-Sub-Group / manual / dev / tests / 3 / 3.1.2.adoc in main


<> Edit file

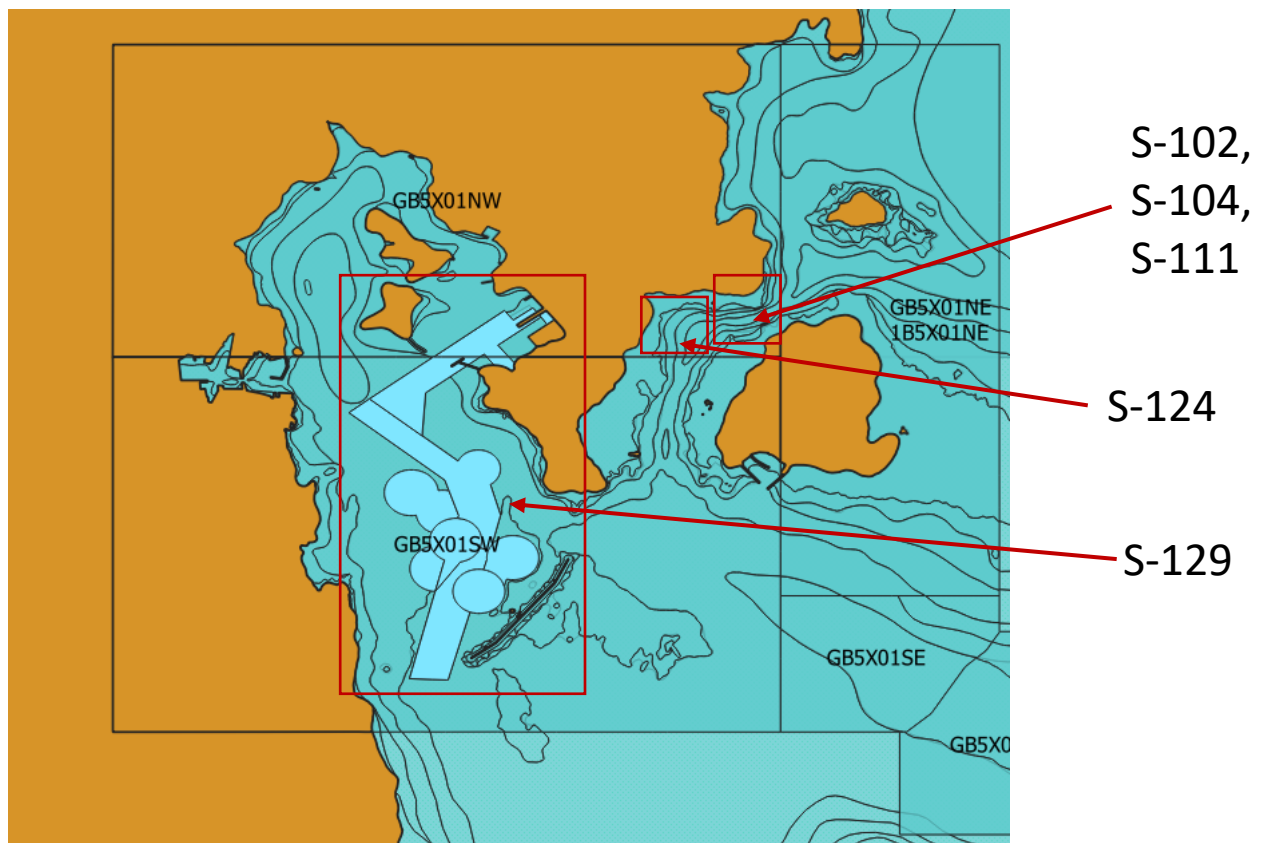
Preview

```
1 <<<
2
3 === Standard Display Category
4
5 [width="95%",caption="",stripes="odd"]
6 |=====
7 |Test Reference      | 3.1.2 | IHO Reference | S-52 14.3
8 |=====
9 [width="95%",caption="",stripes="odd"]
10 |=====
11 |Test Description
12 |The purpose of the test is to verify by observation that ECDIS correctly displays all ENC objects
13 |loading to ECDIS test S-57 cell and checking display against graphical plots.
14 |The test ENC cell AA5STNDR.000 contains depth and land areas from Display Base plus all ENC objects
15 |Library. The objects belonging to Standard Display are to be shown if Standard Display is selected
16 |Setup
17 |a| Load cell AA5STNDR.000 from 3.1 ENC Display\Standard\ENC_ROOT with the following settings:
18 |
19 | * Select Display Category Standard Display
20 | * Set the Safety Contour value to 10 m
21 | * Set the Safety Depth value to 10 m
22 | * Select Symbolized Boundaries
23 | * Select Simplified Points
24 | Action
25 | Switch on Standard Display. Check ENC symbols shown in ECDIS against graphical plot.
26 | Results
27 |a|* Confirm that depth and land areas from Display Base are shown
28 |* The ENC in the ECDIS should be shown as in the picture below (scale 1:70 000).
29 |
30 |.Test 3.1.2 image
31 |image::images/3.1/AA5STNDR.png[scaledwidth=80%,align="center"]
32 |=====
```

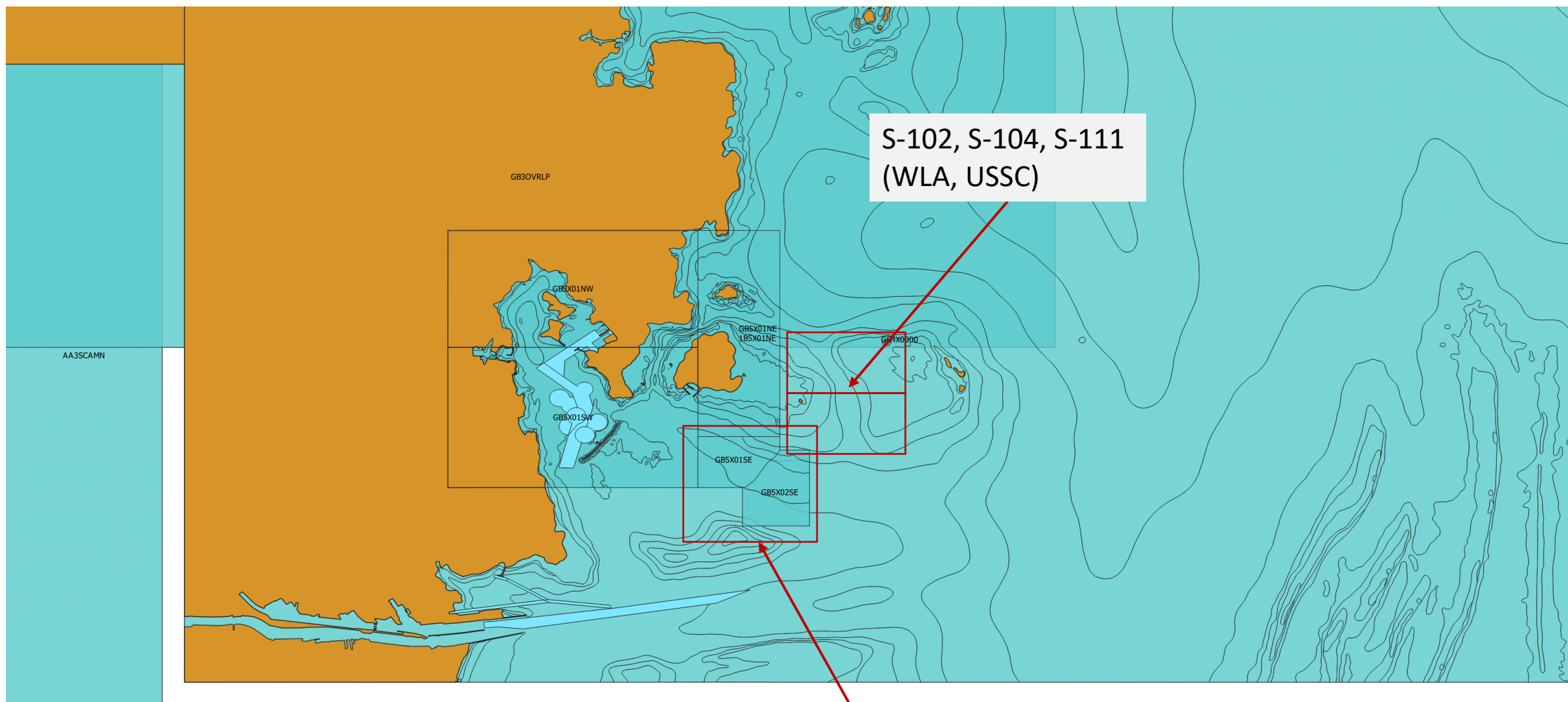
Standard Display Category

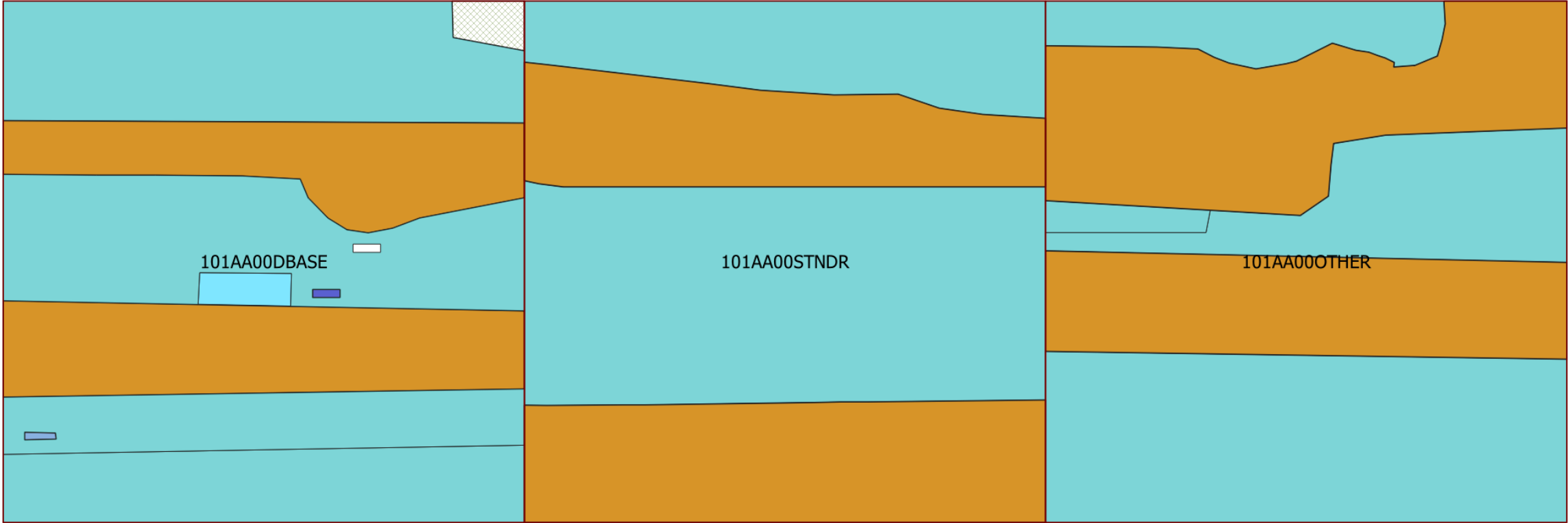
Test Reference	3.1.2	IHO Reference	S-52 14.3
----------------	-------	---------------	-----------

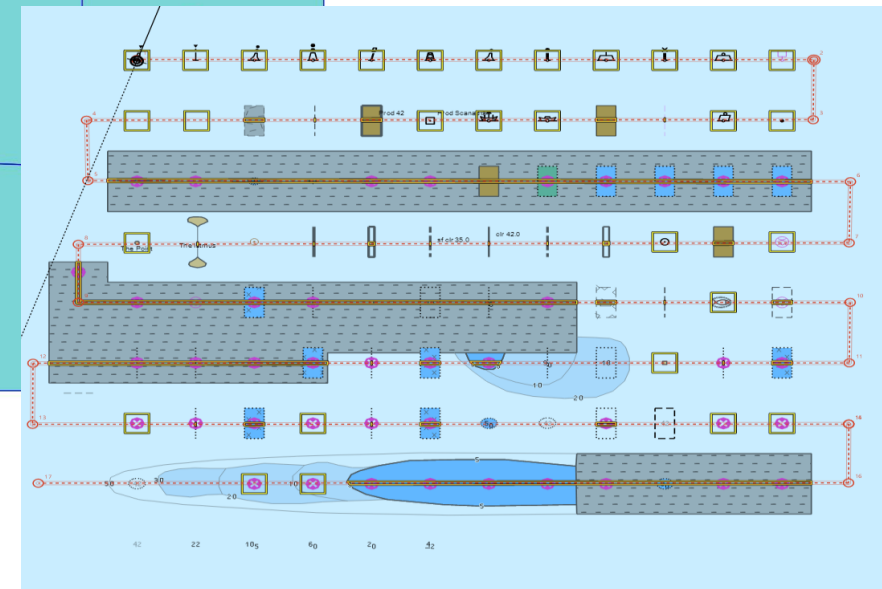
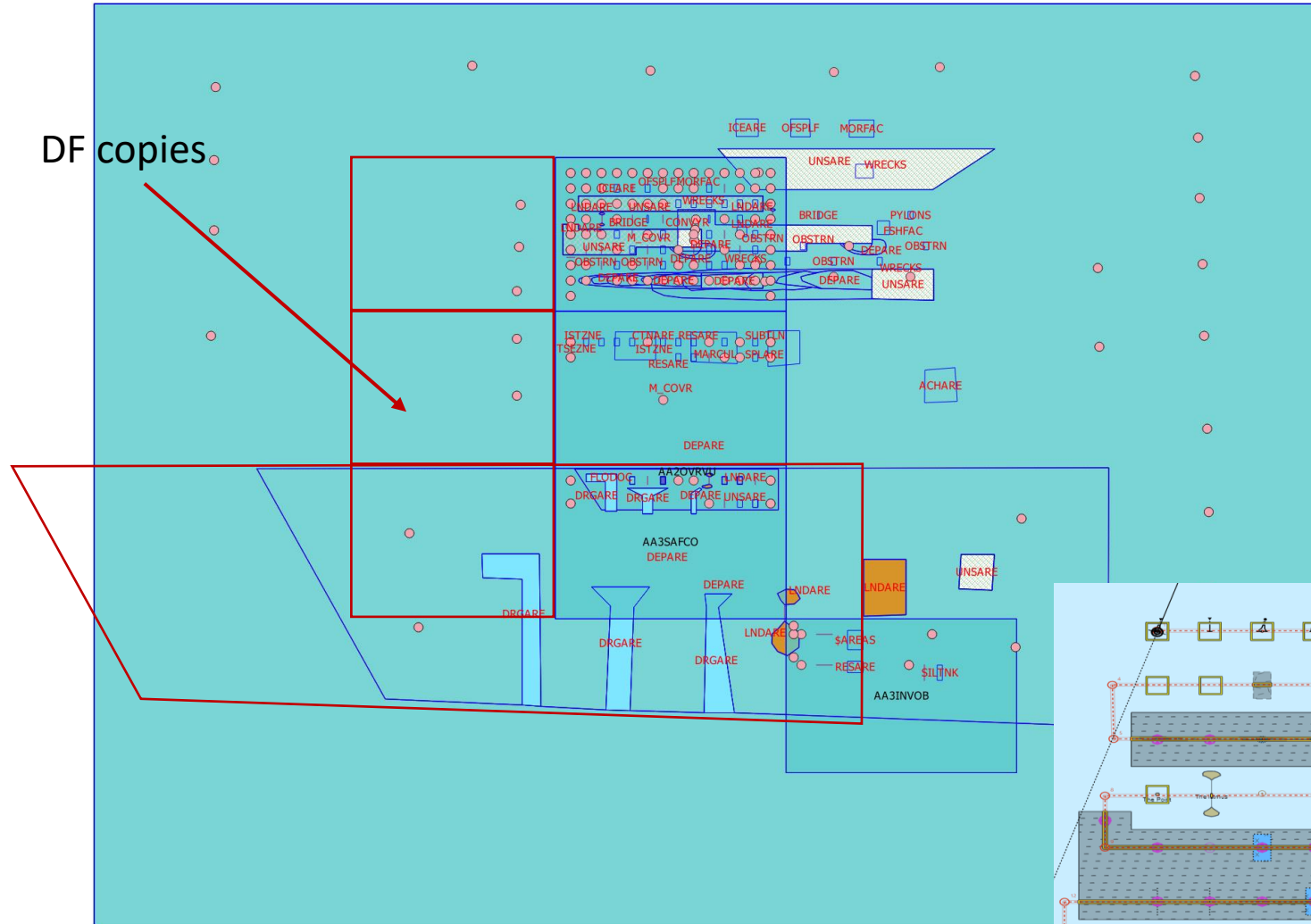
Test Description
The purpose of the test is to verify by observation that ECDIS correctly displays all ENC objects included in the IMO Standard Display category. The test is performed by loading to ECDIS test S-57 cell and checking display against graphical plots. The test ENC cell AA5STNDR.000 contains depth and land areas from Display Base plus all ENC objects belonging to Standard Display according to the IHO S-52 Presentation Library. The objects belonging to Standard Display are to be shown if Standard Display is selected in ECDIS HMI and should be disappearing in the Display Base mode.
Setup
Load cell AA5STNDR.000 from 3.1 ENC Display\Standard\ENC_ROOT with the following settings: <ul style="list-style-type: none">• Select Display Category Standard Display• Set the Safety Contour value to 10 m• Set the Safety Depth value to 10 m• Select Symbolized Boundaries• Select Simplified Points
Action
Switch on Standard Display. Check ENC symbols shown in ECDIS against graphical plot.
Results
<ul style="list-style-type: none">• Confirm that depth and land areas from Display Base are shown• The ENC in the ECDIS should be shown as in the picture below (scale 1:70 000). <div>AA5STNDR Figure 1. Test 3.1.2 image</div>



e.g.

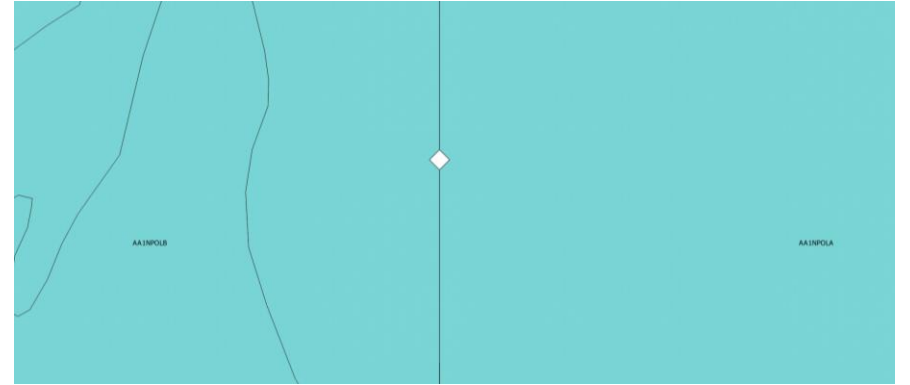
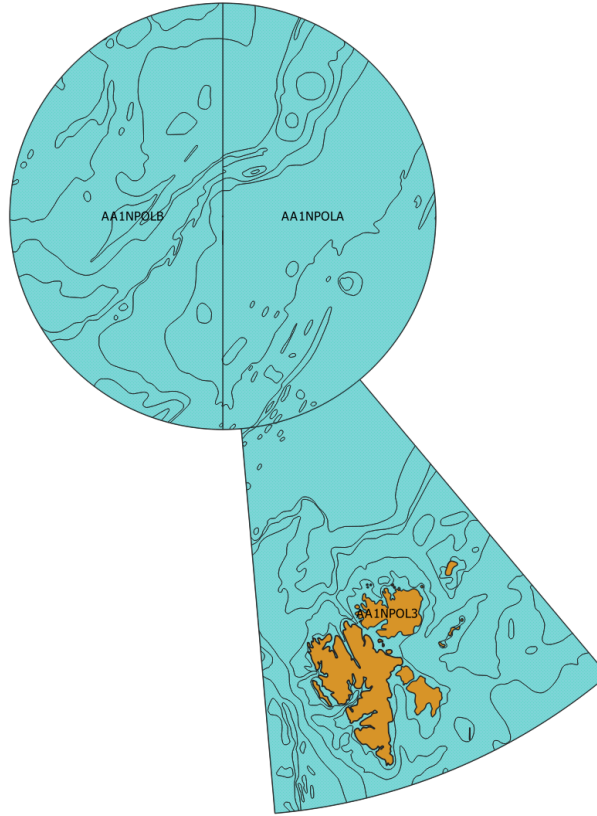






Polar datasets

- Reuse and make S-101 versions
- Combine to make DF versions.



Polar Stereographic (Arctic) 76° to 85° to ~89.95°

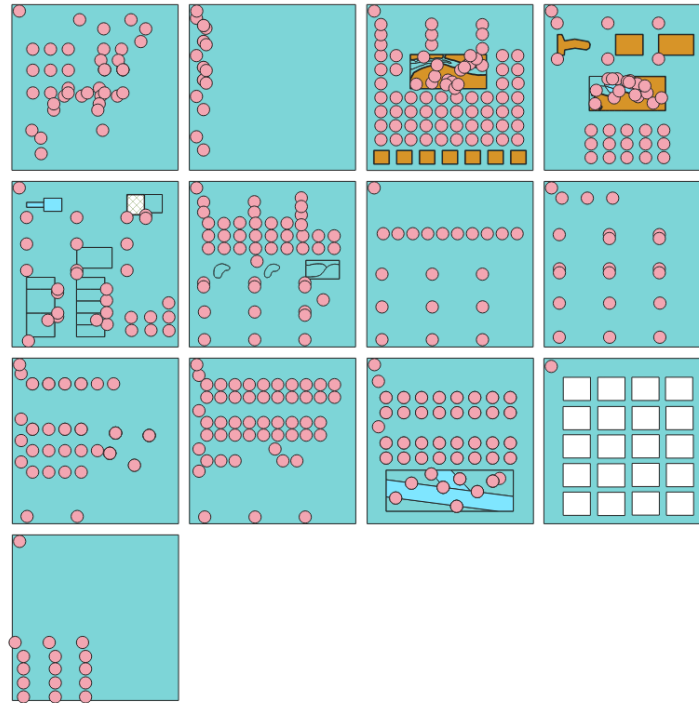


Chart 1

- We can make an S-101 Chart 1 based on the finished PC.
- Need to decide what goes into it.
- Or, do all products need a Chart 1?

Chart 1, -5°, 15°

C-20.7 Use of ECDIS Chart 1 and Colour Test Diagram

C-20.7.1 Specification for ECDIS Chart 1 and the Colour Test Diagram

C-20.7.1.1 Definition (for this specification only)

A Chart 1 dataset must be displayed so as to fill all of the standard ECDIS display area (that is, the minimum 270 x 270 mm chart area).

C-20.7.1.2 Description and purpose

The ECDIS Chart 1 and the Colour Differentiation Test are diagrams for use by the Mariner which are provided in the form of ENC-like files.

The ECDIS chart 1 is intended to familiarise the Mariner with the symbology used on ECDIS. The Mariner must be able to display each cell, and by cursor-pick get a read-out of the meaning of any symbol shown.

The Colour Differentiation Test diagram is intended for display using the day or dusk colour tables so that the Mariner can check that the ECDIS monitor is providing adequate colour performance. It is also used in type-approval testing. Instructions for its use are given in the sections below.

The ECDIS Chart 1 includes the CHKSYM which is intended for checking the correct size of the symbols during the type approval. The width and height of the CHKSYM is 5.0 mm.

The line width of the diagonal line in the Colour Differentiation Test diagram is specified as 0.6 mm wide. The line width must be checked during the type approval.

C-20.7.1.3 Mode of use

These diagrams are supplementary features of the ECDIS, intended for use off-line or during route planning. Because they occupy the entire display they must not be used during route monitoring. If the Mariner needs to find the meaning of a symbol during route monitoring, they must use cursor-picking.

The operation of these diagrams is not subject to the draw-speed requirements of route monitoring.

C-20.7.1.4 Content and Encoding

[Add description after the datasets have been updated for S-100.]

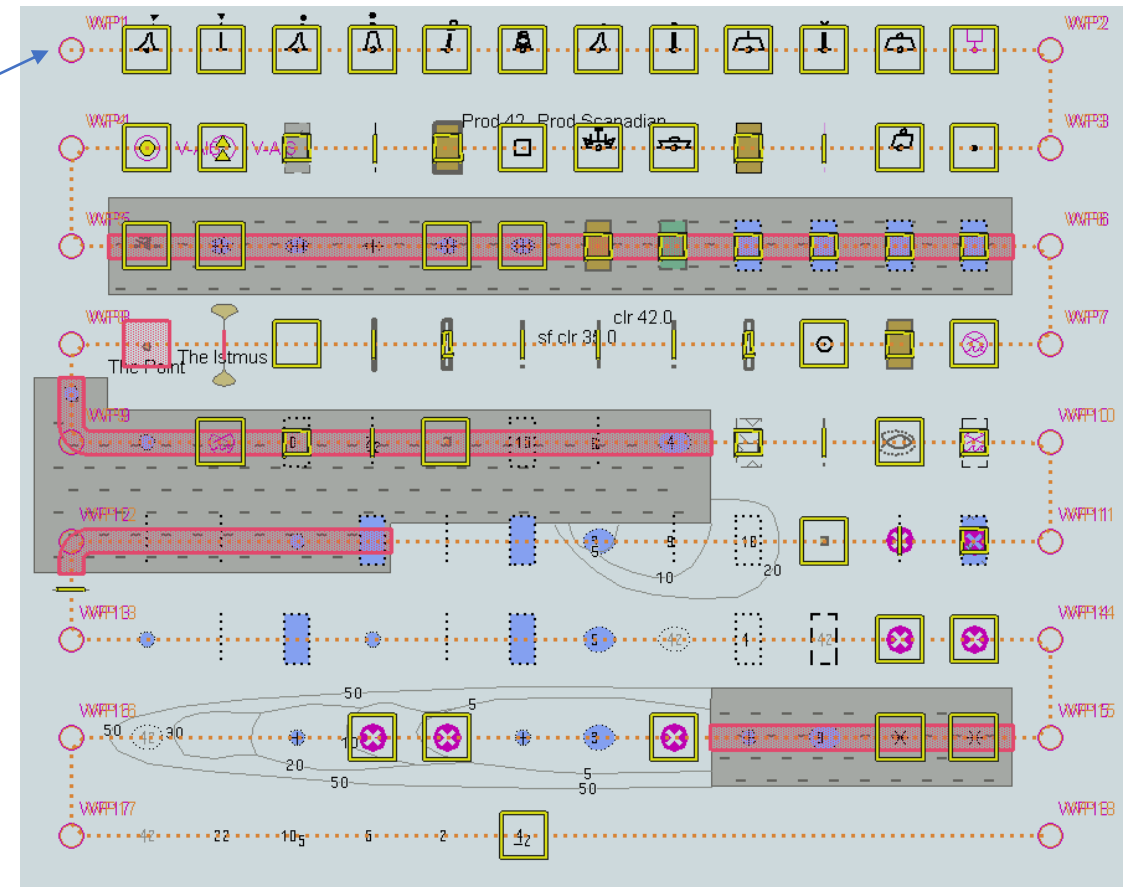
C-20.7.1.5 Revisions

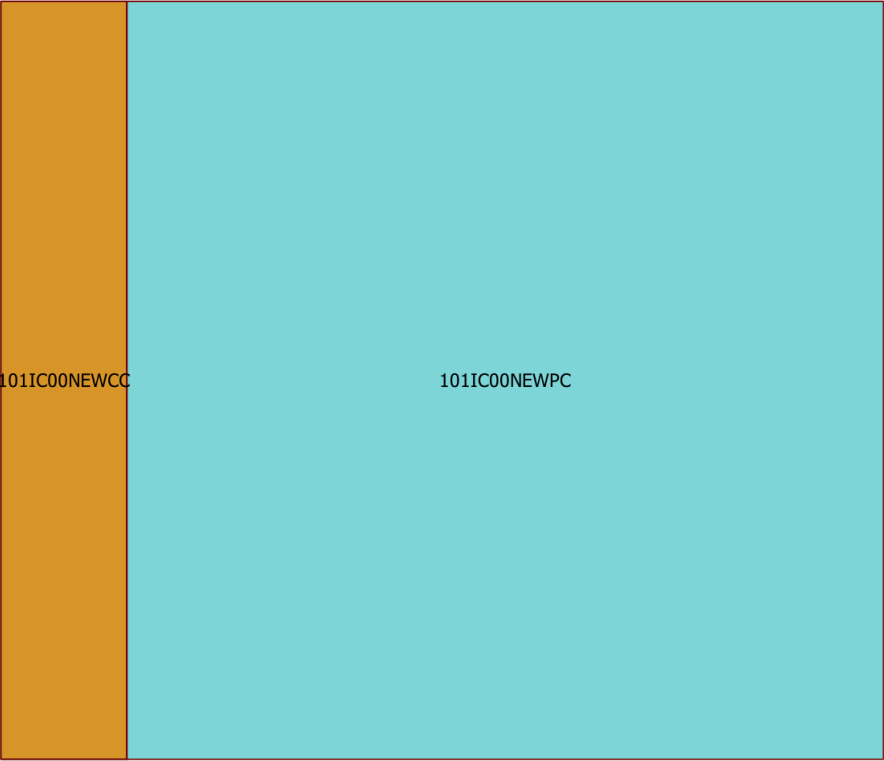
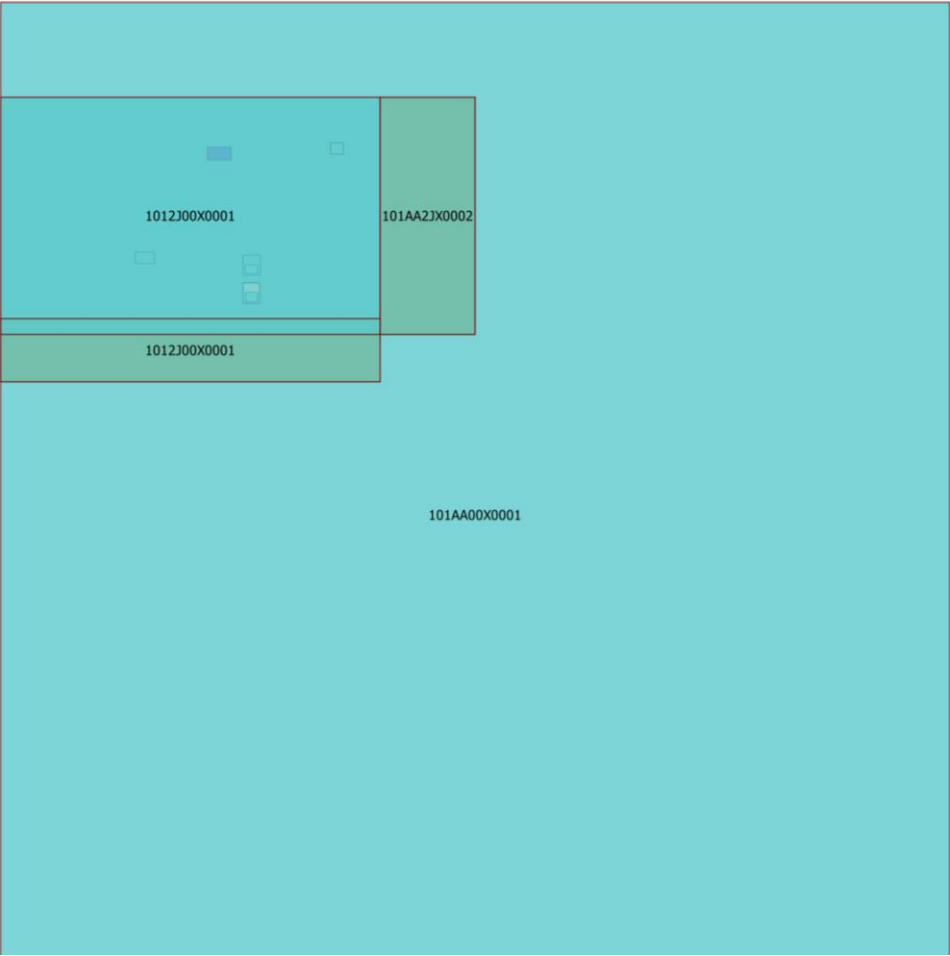
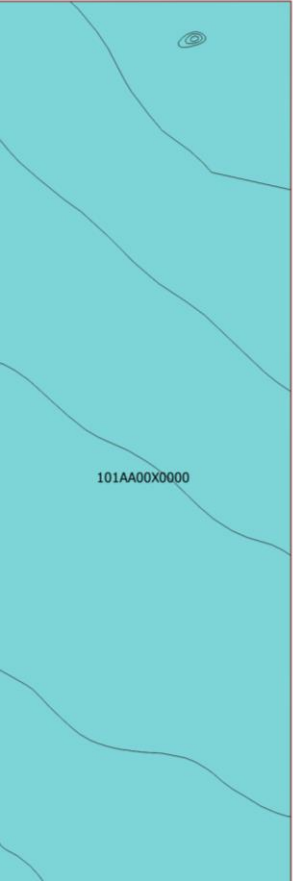
Revisions will be made by whole file replacement; that is, by issuing a new edition.

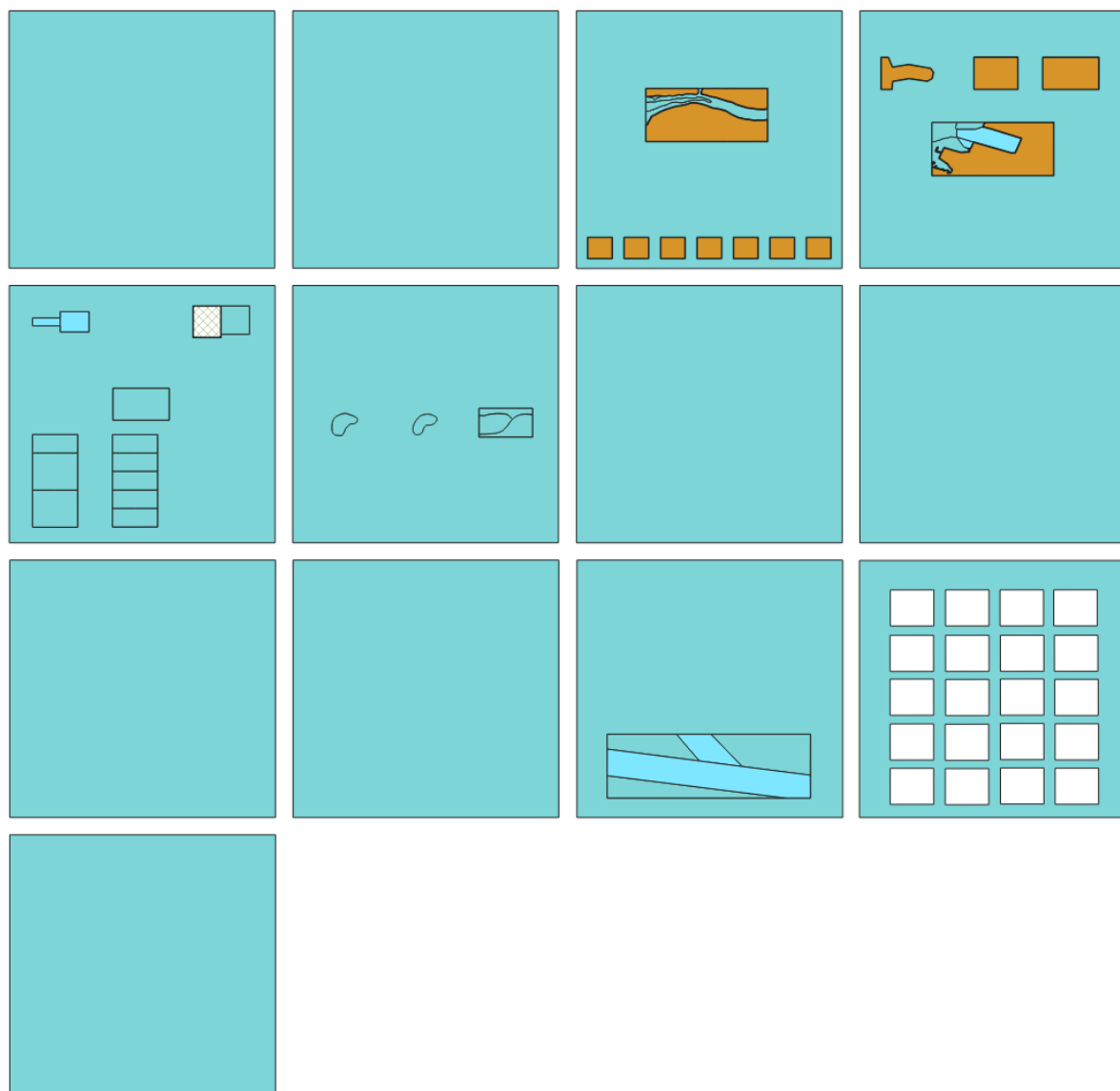
Note: The test above uses the black-adjust symbol for the purpose of a type approval test. The other purpose of the black-adjust symbol BLKADJ01 is to allow the Mariner to adjust the display for ambient illumination on the bridge of a ship. An ECDIS must have the black-adjust symbol displayed whenever the mariner is adjusting the display (that is, depending on the technology of the display brilliance, brightness, contrast, etc), as required by clause C-20.3.

In the existing S-64 Waypoints and annotations are done using NEWOBJ (and TE symbolisation). We have 2 options to replicate this.

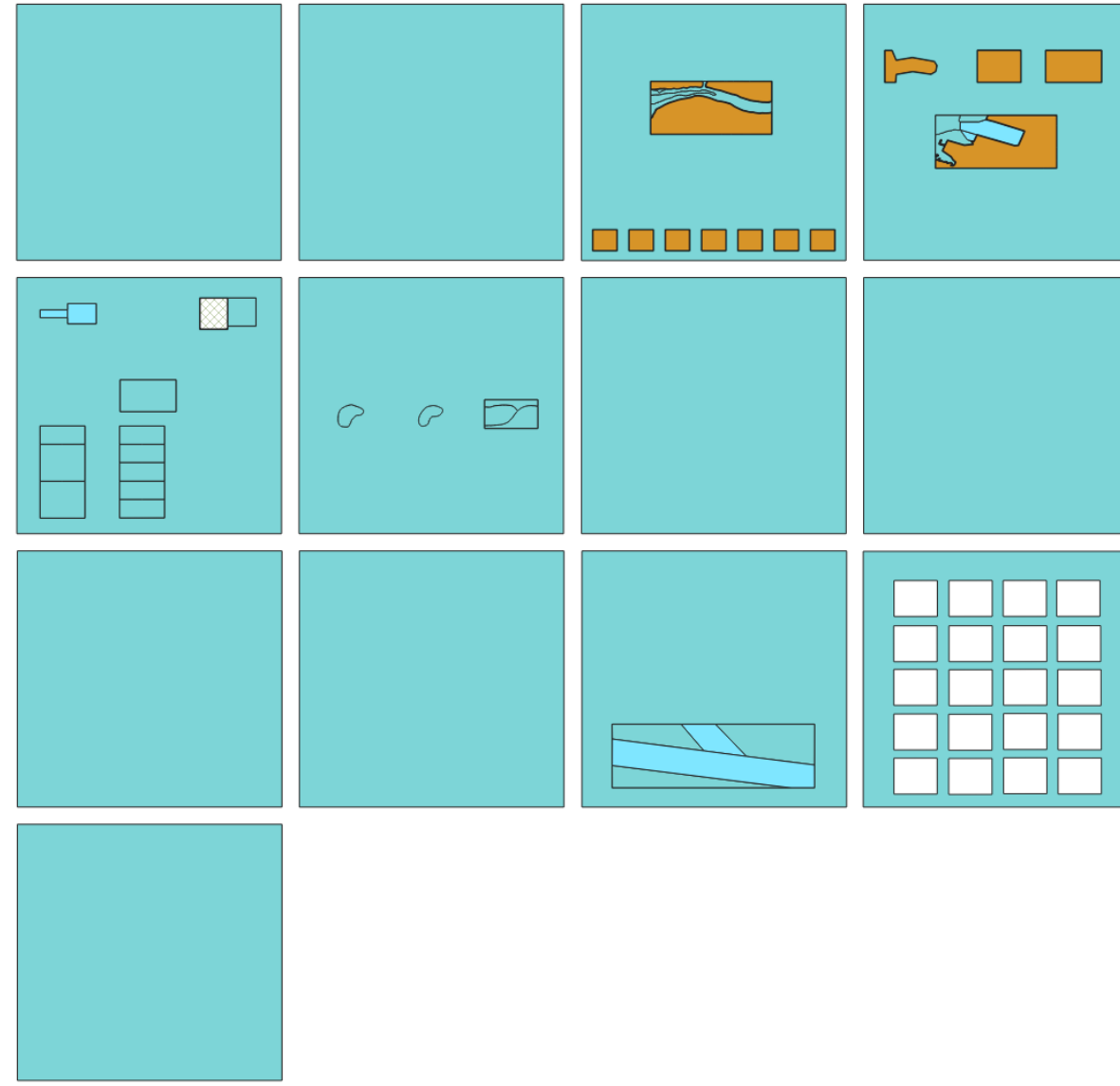
1. Extend an existing feature catalogue
2. Create a new “S-164” FC/PC containing waypoints check symbols etc etc...







S-101



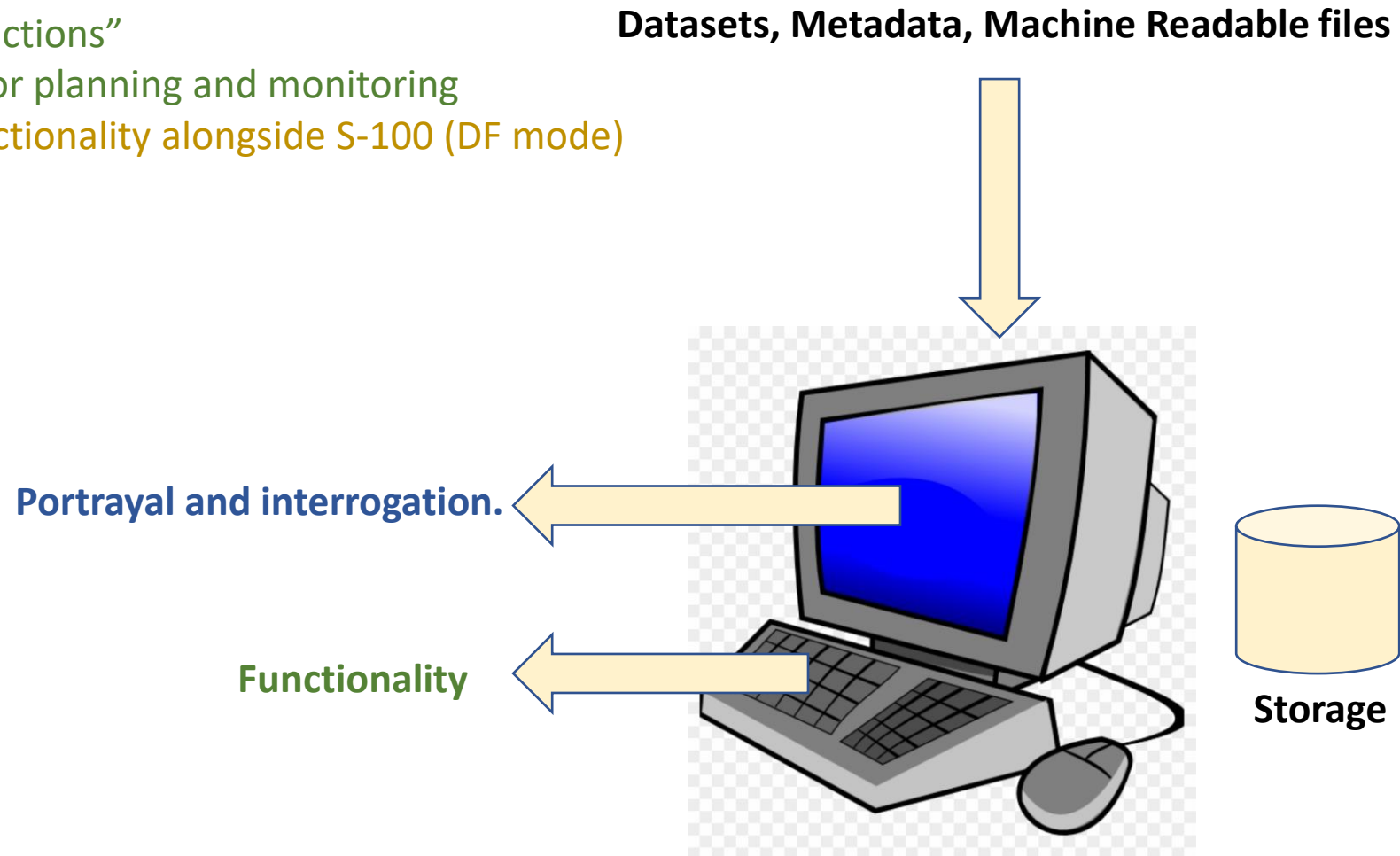
S-57

Chart 1

Data loading

What does an S-100 ECDIS do?

- Load and store from external sources, “data” and machine readable files
- Portray various “data”
- Interrogation
- “various S-98 functions”
- Safety features for planning and monitoring
- Current S-57 functionality alongside S-100 (DF mode)



Data Loading 1

- **Load and store from external sources, “data” and machine readable files**
 - Are catalogues which are loaded “persistent”? Stored in the System Database (was “SENC”)? Assumption “yes”.
 - Are certificates persistent? Assumption “yes”
 - This means
 - ECDIS must be able to establish unique catalogue(s) for each dataset
 - If it can’t it needs to report an error (Test)
 - Exchange sets don’t need to be “complete” (e.g. contain everything required for each dataset included) but the ECDIS must have everything it needs to correctly import the data.
 - Certificates. There is no security/integrity issue. Needs tests. Are all required with every exchange set? Assume no.
 - This is flexible for service providers (smaller/more efficient exchange sets) but at a cost of complexity
 - ECDIS needs to ignore when catalogues are contained in exchange sets which it already has.
 - This needs to be reflected somewhere – S-98 Annex C?
 - S-164 tests of “catalogue” install (and update) can be used to setup the ECDIS for other tests (e.g. ENC portrayal)
 - Agree? Not Agree? Discuss?

Data Loading 2

- S-57 ECDIS is able to load from 3 sources
 - Unencrypted ENC (.000) – S-64 uses “load dataset” language.
 - Encrypted ENC (S-63) – have digital signatures and revision information
 - SENC
- S-57 ECDIS behaviour (“*CRC stuff*”)
 - **CRC failure => Don't Load**
 - **S-63 with failed digital signature => Don't Load**
 - **S-63 with valid digital signature but not authenticated by IHO => Load but show warnings**
 - **S-63 with valid digital signature, authenticated by IHO => Load seamlessly**
- This isn't an IMO requirement.
 - There's no S-63 so all datasets are digitally signed (there's no CRC)
 - S-164 is described completely in exchange set terms so there's no requirement to load standalone unencrypted (and therefore unsigned) datasets.
 - S-98 contains flow diagrams for this. They can be revised (and should be).
- Agree/disagree? Discuss – consensus on how to deal with **CRC stuff**

Data Loading 3

- S-57 ECDIS distinguishes between official data and data which is “not official”
 - It does this by using the producer code of the dataset. The system doesn’t work well because S-62 updates are “difficult” for ECDIS.
 - Producer Codes are split into official/unofficial (by encoding 1st digit)
 - There is no IMO requirement to load non-”official” data (we believe it exists though)
 - If there is a need then we still need “data boundary” portrayal and a way for the ECDIS to distinguish between “official” and “non-official” data (and a message)
 - Two options if the need exists (draw data boundary around one of these):
 - **Retain use of data producer code by defining those which are “official” and those which aren’t (“2J00”, “AA00”, “00AA”). Clarify in S-98 the requirement and method for OEMs**
 - **Use the producer code MRN in the certificates with a role code. Official is a “data producer” role as authenticated by IHO. Needs expansion and clarify in S-98 through the flow diagrams.**
- Agree/disagree? Discuss? Choose...

CIRM

Hi Jonathan,

➤ Does the "unofficial" requirement still exists

Our view would be that it should be possible for ECDIS to distinguish between S-1xx data supplied from “official” and “unofficial” producers. This will allow ECDIS to support vessels that transition between SOLAS and non-SOLAS waters and should also encourage novel uses of the S-100 format.

Achieving “this using a different mechanism which wouldn't require the ECDIS to have another machine readable/updatable file delivered to it” is exactly our thinking. We are not experts in the S-1xx standards, but hoped that such a mechanism could be metadata embedded in the S-100 standard and thus be present in all S-100 data exchange sets.

Simon

Recommendations

1. Standardisation of X.509 certificate fields according to the following content (embedding the IHO producer code in the certificate common name). This should be implemented by the IHO as the SA but is not required for standardisation within Part 15 of S-100. It should be considered for the next edition of S-98 to clarify how certificates and authentication are processed by the S-100 ECDIS.
 - The following values are proposed:
 - C (Country) = **ISO Country Code of state making request**
 - ST (State or Province) = **A code reflecting the role of the subject**
 - O (Organisation) = **member state organisation name (text)**
 - CN (Common Name) = **IHO data producer code integer and alpha code (colon separated MRN).**
2. A commitment to the issuing of signed digital content by the scheme administrator and the responsibility of distributors to reproduce them in their entirety. This should also be implemented by the IHO Secretariat acting as the Part 15 SA.
3. The launch of the S-100 Data Protection scheme and creation of a single resource to support implementers on the IHO website.

```
Data:
  Version: 1 (0x0)
  Serial Number:
    96:28:2a:a9:cd:68:76:a1
  Signature Algorithm: dsa_with_SHA256
  Issuer: C=MC, ST=Some-State, O=IHO, CN=IHO Scretariat/emailAddress=jp@iho.int
  Validity
    Not Before: Sep 27 13:19:46 2022 GMT
    Not After : Aug 5 13:19:46 2032 GMT
  Subject: C=GB, ST=producer, O=IIC Technologies, Vancouver, CN=urn:mrn:iho:s62:iic:2C:key3
  Subject Public Key Info:
    Public Key Algorithm: dsaEncryption
    pub:
      7b:d1:62:
      66:67:c8:2c:6f:f7:e8:ca:cc:1e:83:05:30:30:ab:
```

- CN (Common Name) = **IHO data producer code integer and alpha code (colon separated MRN), e.g. urn:mrn:iho:aa:1810 or urn:mrn:iho:GB:540.**

Data Loading Tests.

B	C	D	E
Section	Test Name (Short)	Description	Exchange Set(s)
Catalogue Loading and System initialisation.	InitialCatalogues	successful initial loading of multiple catalogues.	PowerUPCatalogues
	InvalidCatalogues	Invalid feature catalogue	PowerUpCatalogues
	InvalidPC	Invalid portrayal catalogue	PowerUpCatalogues
			CorruptPortrayalCatalogue
	OutOfSequenceCatalogues	loading datasets for which no valid catalogue exists	PowerUPCatalogues
	UpdateCatalogues	successful updating of catalogues	UpdatedCatalogueData PowerUPCatalogues
	NewCatalogues	successful installation of new catalogues	PowerUpCatalogueUpdates PowerUpCatalogues NewProduct
Loading of Unencrypted Datasets	InitialPowerUp	Loading initial datasets (all products)	InitialPowerUp
	PowerUp	confirmation of information in System Database	PowerUp
	AdditionalCell	Loading an initial dataset (multiple products)	PowerUp AdditionalCell
	RemoveCell	Removal of a dataset (multiple products)	PowerUp AdditionalCell
	CorruptData	Successful rejection of invalid data	CorruptData
	CorruptUpdate	successful rejection of invalid data (multiple products)	PowerUP CorruptUpdates
	SequentialUpdate	Review of updates	PowerUp [SequentialUpdate1-5]
	InvalidSequence	Out of sequence updates	PowerUp InvalidSequence[1-5]
	NewerEdition	Successful application of an update to a dataset.	PowerUp NewUpdate GoodBaseCells
	OlderEdition	Successful rejection of an update to a chart of an older edi	GoodBaseCells OldUpdate
	Reissue	Successful processing of reissues	PowerUp Reissue001 ReissueX01SW Reissue004
	UpdateRejection	Manual rejection of an update	PowerUp SequentialUpdate
	ManualUpdates	Manual updates	PowerUp

Data Portrayal

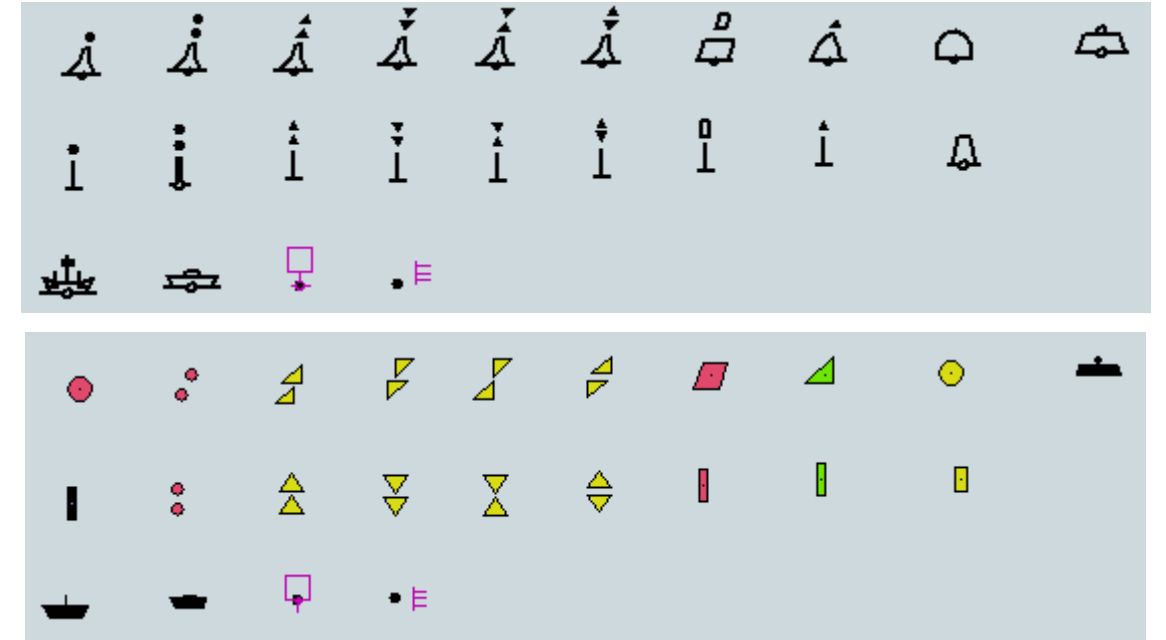
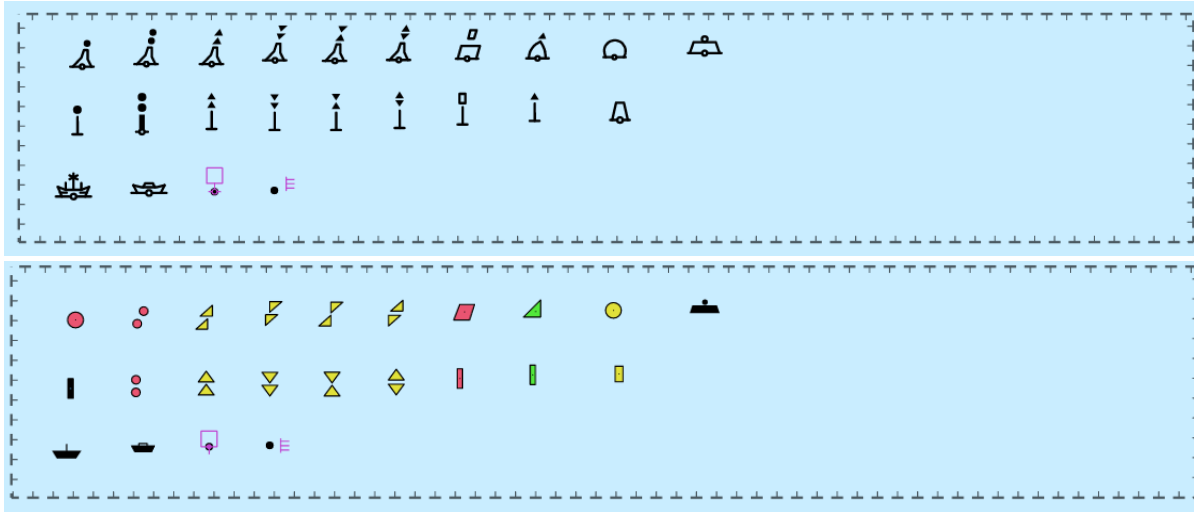
Tests for portrayal

- Most “portrayal” tests verify the screen of the EUT (equipment under test) against a screenshot in the manual
- These screenshots must reflect actual ECDIS portrayal of various datasets under S-100 and their content
- We can produce some (mostly ENC) ones but the final versions are likely to be only defined under edition 2.0.0 (and will need to be kept up to date as ECDIS implementations mature.
- We have two mature testbed implementations to use creating screenshots
- Most of the datasets will need to be enhanced with more content
- We don’t need many new tests for portrayal but we do need lots of enhancements to the datasets and systems to make the screenshots.
- So, most of the portrayal tests stay the same
 - Load exchange set
 - Set portrayal settings
 - Compare display with screenshot
- With this methodology we can test portrayal of all the different product specifications on top of S-101 ENC without rewriting the bulk of the new tests.

Portrayal Examples

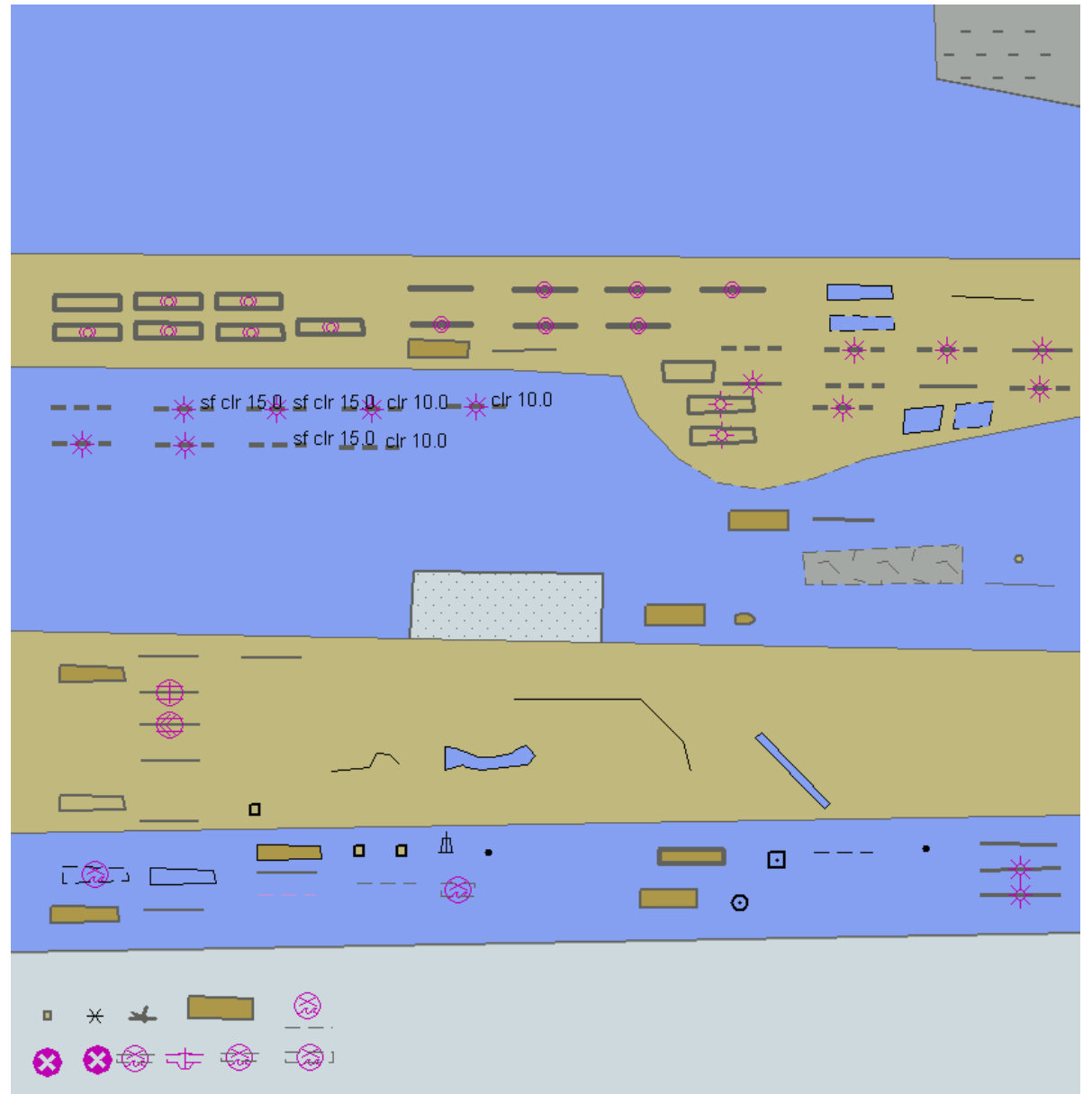
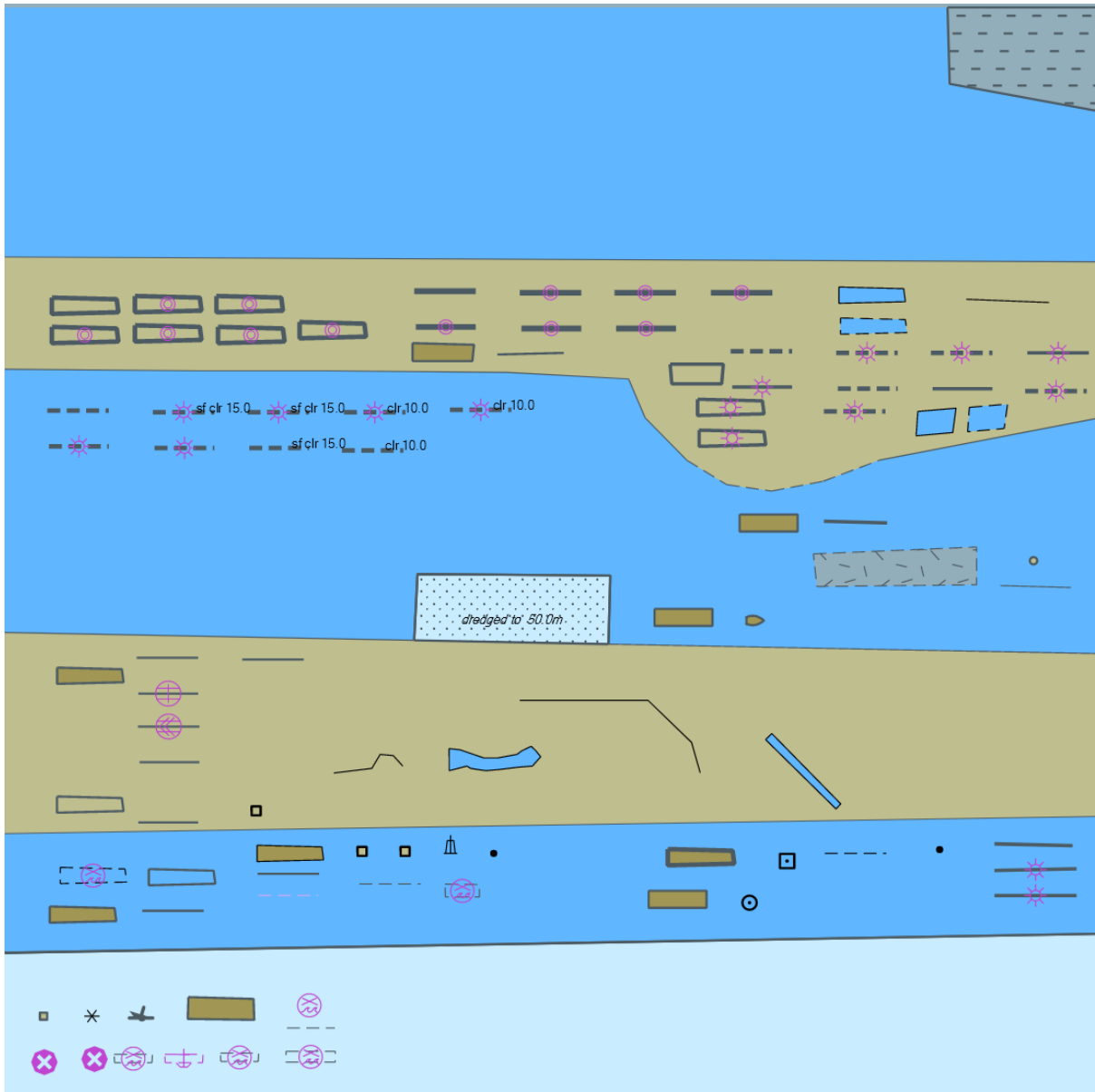
- Will include
 - Multiple products S-101, S-104, S-102, S-111 and S-124, S-129
 - Interoperability catalogue controls (off, L1 and L2)
 - User selected safety contour and water level adjustment portrayal
 - Data boundaries
 - Different portrayal settings as per S-64
 - Date dependent features
 - Extra information
- What else should we include? From S-98?

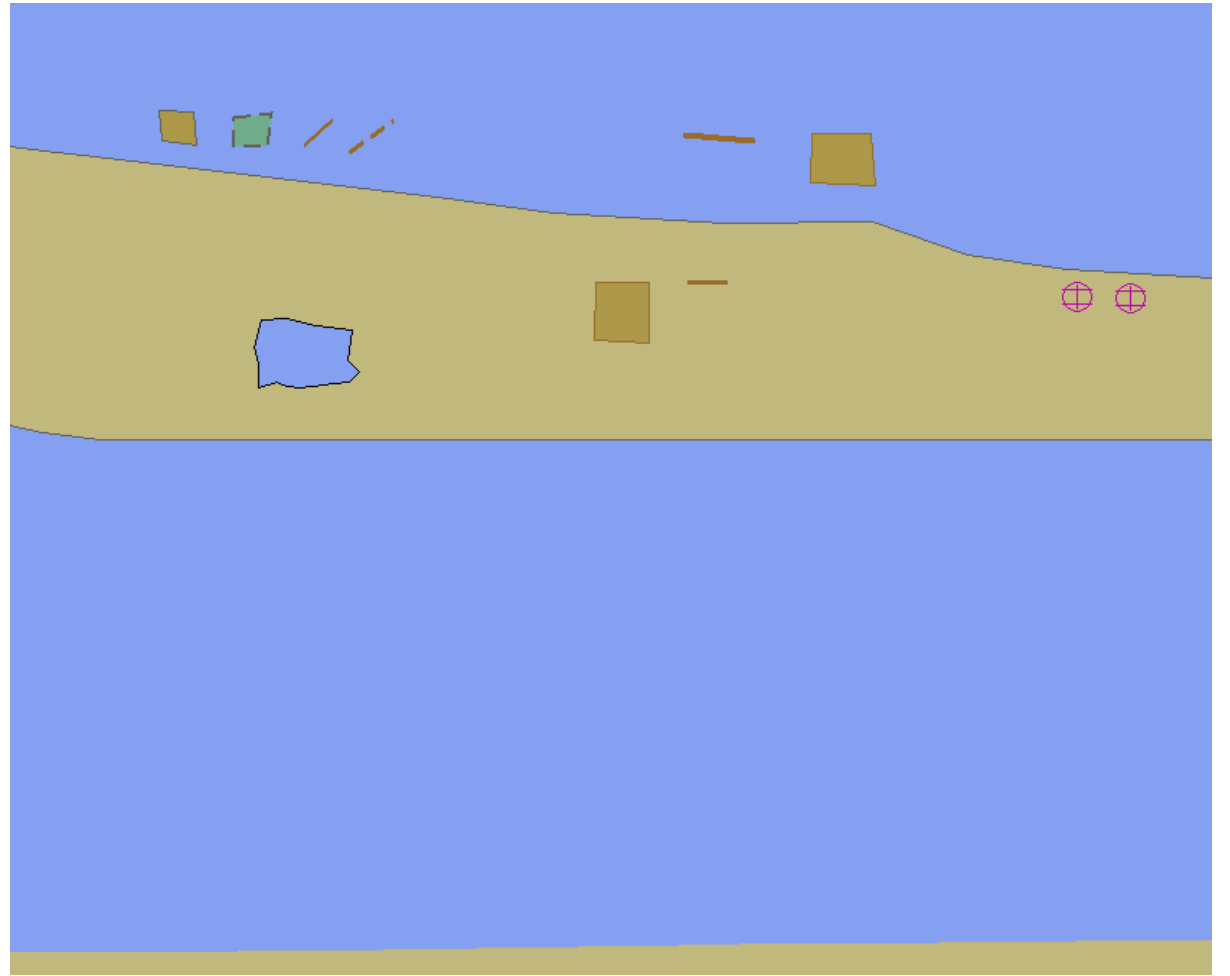
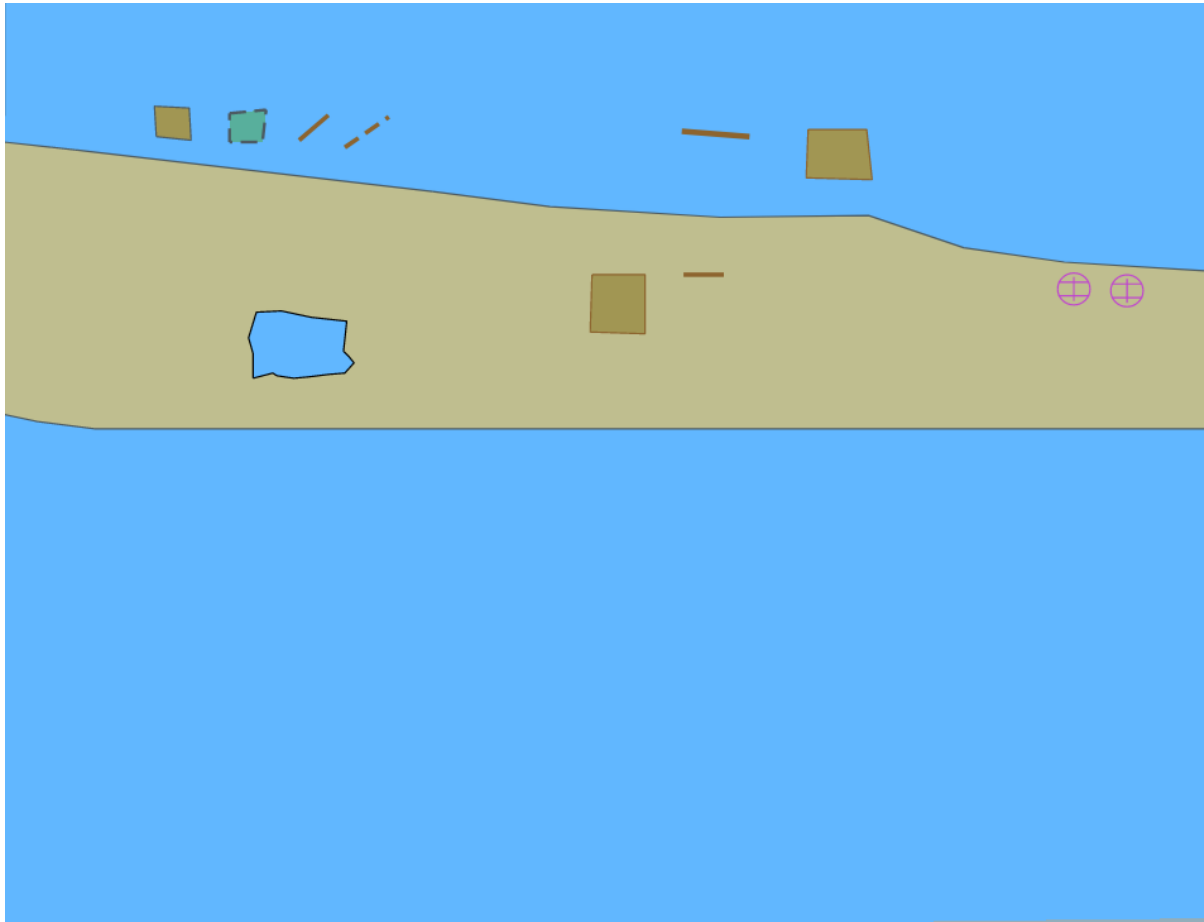
Example screenshots done so far...

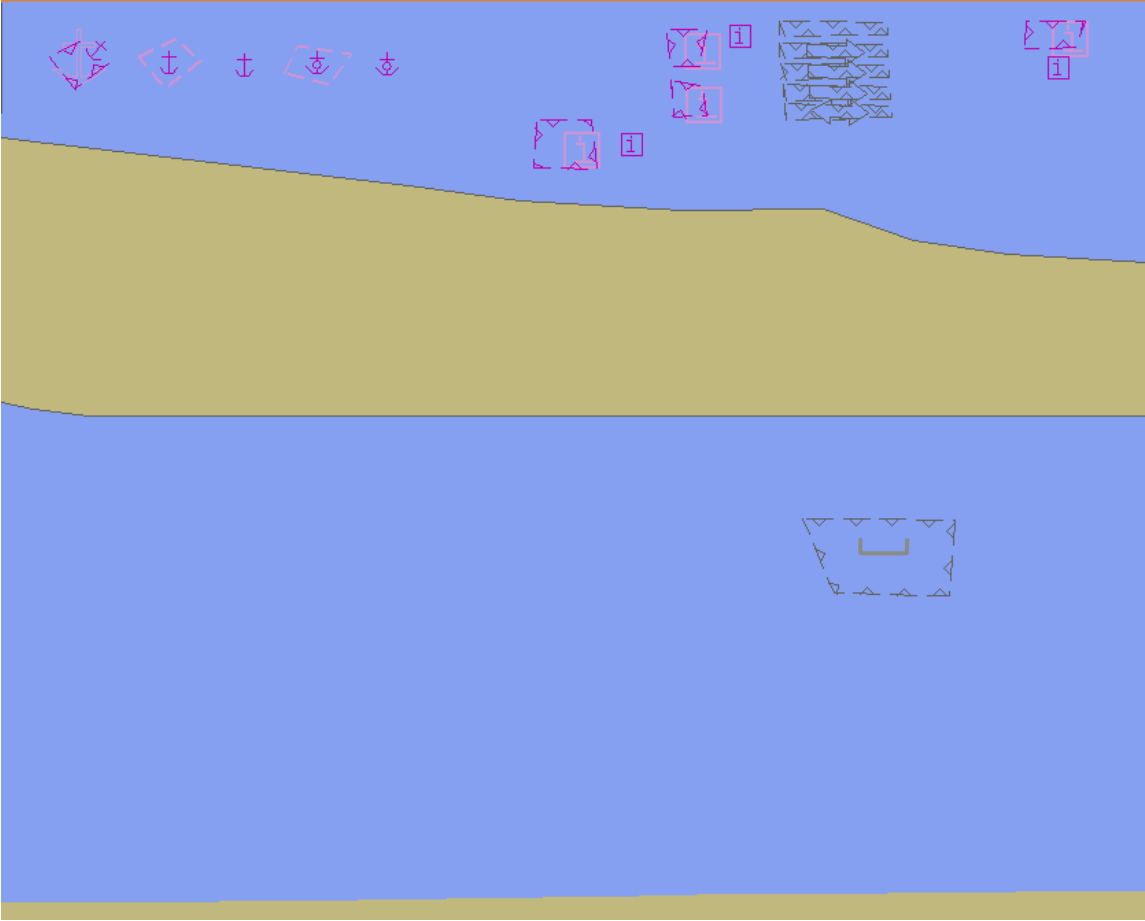
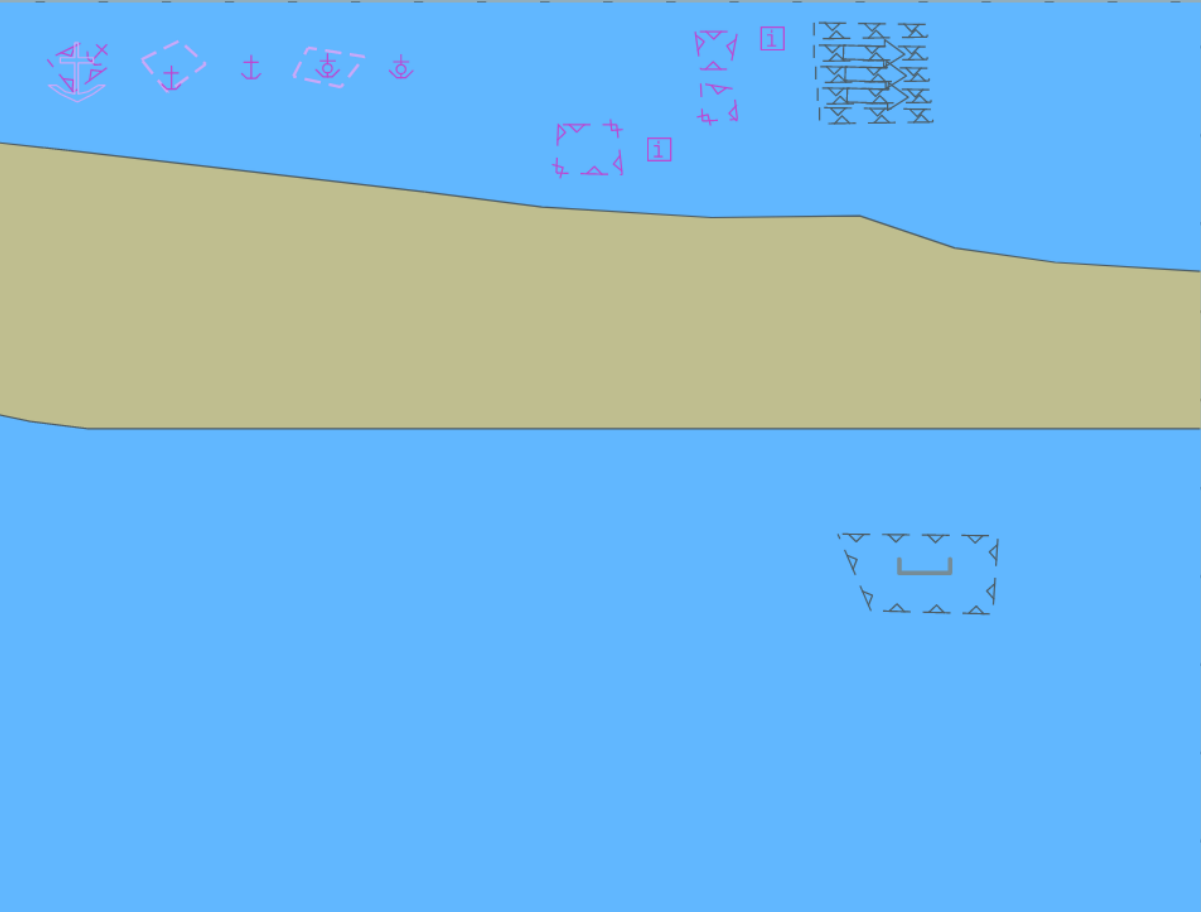


Proposal for v1.0.0

- Note which screenshots have been produced (ENC specific)
- Note that full screenshots will be produced for v2.0.0 where display systems are available
- Update test expected results as screenshots are produced.







“Service Management” Tests

Loading of Encrypted and Authenticated Datasets	InvalidPermit		InvalidPermitA
	IncorrectPermitFormat		InvalidPermitB
	InvalidPermitChecksum		ENCLicensingC1
			ENCLicensingC2
	MissingPermitSignature	New, PERMIT.SIG is not present	ENCLicensingH
	InvalidPermitSignature	New, PERMIT.SIG is invalid	ENCLicnecingI
	ExpiringPermit		ENCLicensingD
update name in doc	IncorrectUserPermit	wrong user permit in PERMIT.XML	ENCLicensingJ
	ExpiredPermits		ENCLicensingE
	PermitInstallation		ENCLicensingF
	MultipleDataServers		ENCLicensingG1
			ENCLicnecingG2
	PermitManagement		ENCLicensingG1
			ENCLicensingG2
	InstallSACertificate		Authentication1B
	MissingSACertificate		Authentication1C
	CertificateExpiry		Authentication1DExpired
			Authentication1DCurrent
	InvalidSACertificate		Authentication1E
	MissingCatalogueSignature	No CAT.SIG file	MissingCatalogueSignature
update name in doc			
	InvalidCatalogueSignature	invalid signature in CAT.SIG	Authentication3B
	NonSASignedData		Authentication2B
update name in doc	AuthenticationDomainCoordinator	Authentication along a chain of signatures (to SA)	AuthenticationDomainControllers
	InvalidDatasetSignature		Authentication2C
	CorruptedSignature		Authentication2D
	ContinuousAuthentication	Authentication of multiple signatures of same dataset	Authentication2E
	MultipleDataServers		Authentication2F
	MissingCertificate	No data server certificate found.	Authentication3C
	ExpiredPermits		DecryptionA
	ExpiringPermits		EncryptionB
	IncorrectCellKeys		EncryptionC
	DataIntegrity		EncryptionD
	DataManagement		DataManagementA1
			DataManagementA2
			DataManagementB
			DataManagementC1
			DataManagementC2
			DataManagementCancelBase
			DataManagementCancelUpdate
			CanceReplaceBase
			CanceReplaceUpdate
			DataManagementF1
			DataManagementF2
	Reissues		

- Was, encrypted, authenticated (S-63 tests).
- Now is Part 17, Part 15 and “service levels”

S-128 and data services handling.

The way of issuing data is the same as it was:

1. (Base) Entire service as of time t_0 (new customers) either for an area of interest or everything.
2. (Incremental 1) Delivery at time t_n = everything which has changed + all new datasets since t_0 (so, cumulative updates)
3. (Incremental 2) It should also be possible to deliver t_n = everything which has changed + all new datasets since t_{n-1} (incremental).
4. It shouldn't be possible to install data which is
 1. Out of sequence (updates) (won't load)
 2. Out of sequence S-128 for a service provider?

Principles of operation (including S-128)

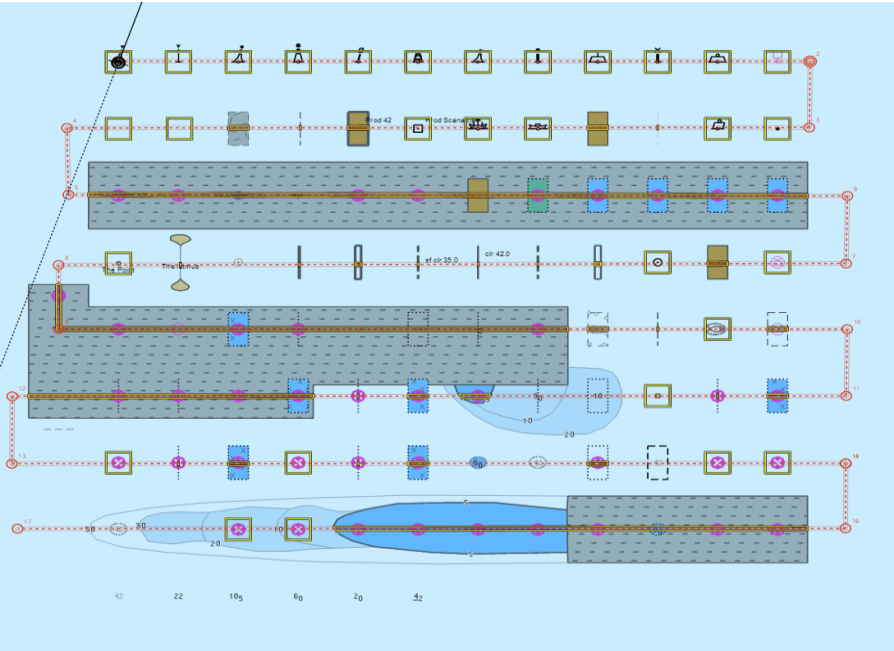
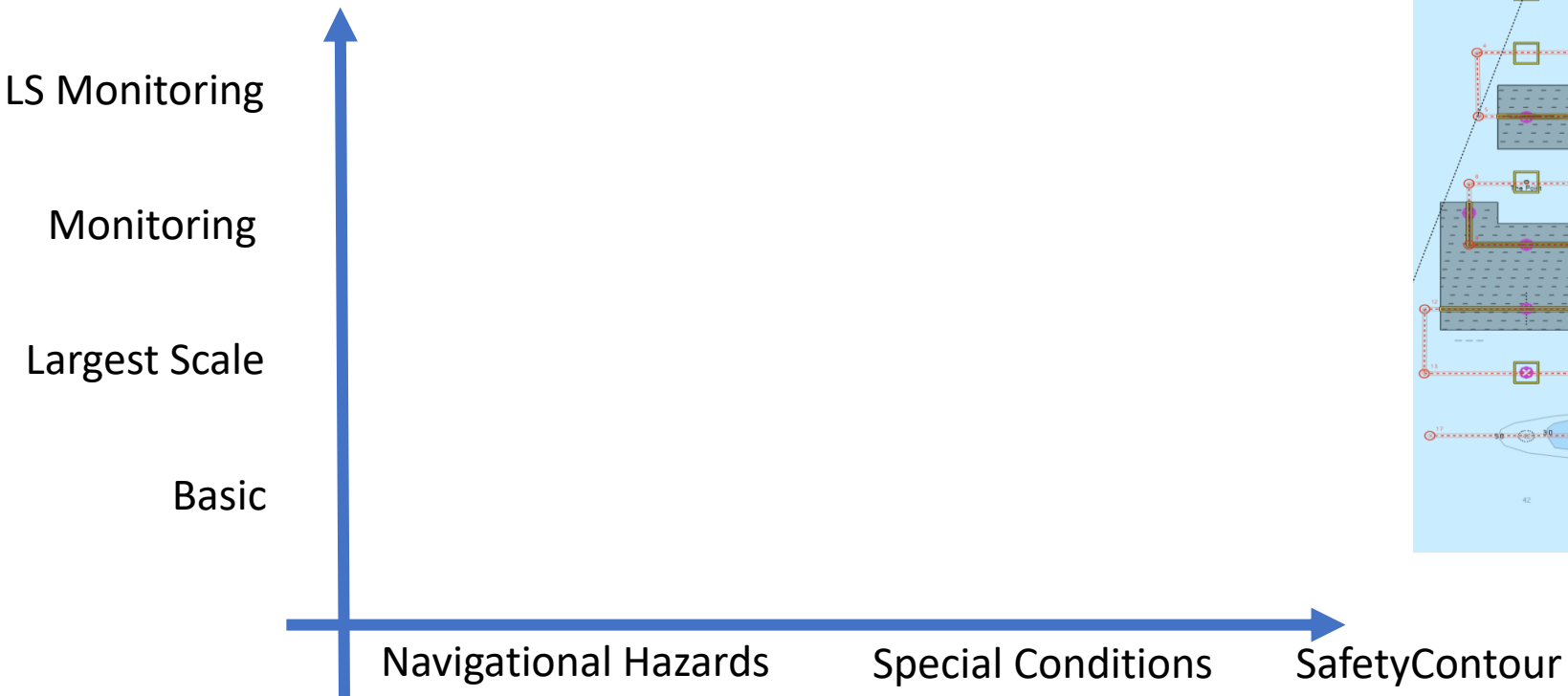
- S-128 reflects all or part of a service provider's "service". It can be the entire service or just a portion (e.g. an area of interest)
- S-128 controls the behaviour of the ECDIS update status report. The issue date of the S-128 is the reference date for the Update Status Report.
- S-128 information should match the contents of the delivered exchange set data in the CATALOG.XML (this should be a validation test). S-128 can (and normally does) include additional information for datasets not included in the exchange set delivery
- S-128 can be updated incrementally using edition and update numbers. As defined in Part 10b an S-128 update contains new or changed GML features only.
- Updates must be processed sequentially and be complete, e.g. there must be no missing updates (as per ENC updates)
- If S-128 is missing then the Update Status Report for that service provider will report all content as status "unknown"
- An S-128 update uses the same filename but is marked as an update in the CATALOG.XML. Multiple S-128 updates can be included in an exchange set (e.g. when an exchange set is cumulative). S-100 needs to clarify that unique filenames only apply to non-update GML files.
- Service Providers can choose whether to issue complete S-128 with each exchange set (incrementing the edition number each time or issuing a re-issue of the S-128 dataset) or updates (issuing a delta file). The ECDIS will apply the updates and use the resulting S-128 data to define the content of the update status report and (optionally) the chart catalogue.

- Incremental - Customer must load Week 1 + Week 2 + Week 3
- Cumulative - Customer can load only Week 1 + Week 3 or Week 1, then Week 2, then Week 3

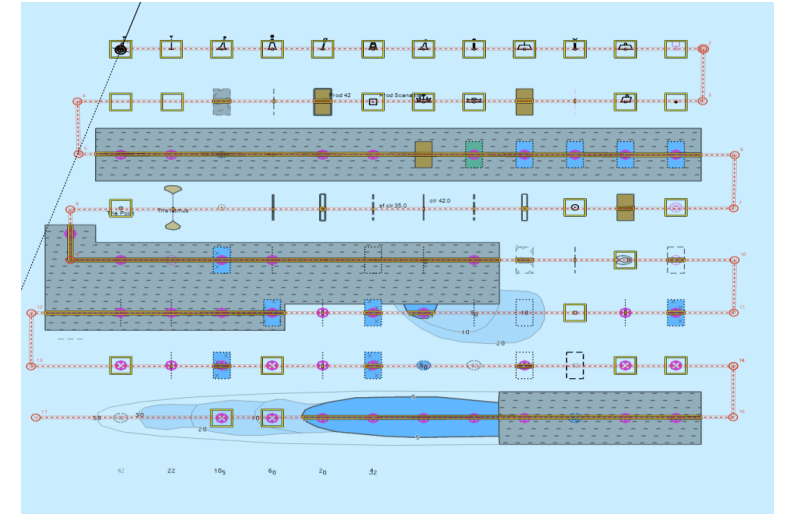
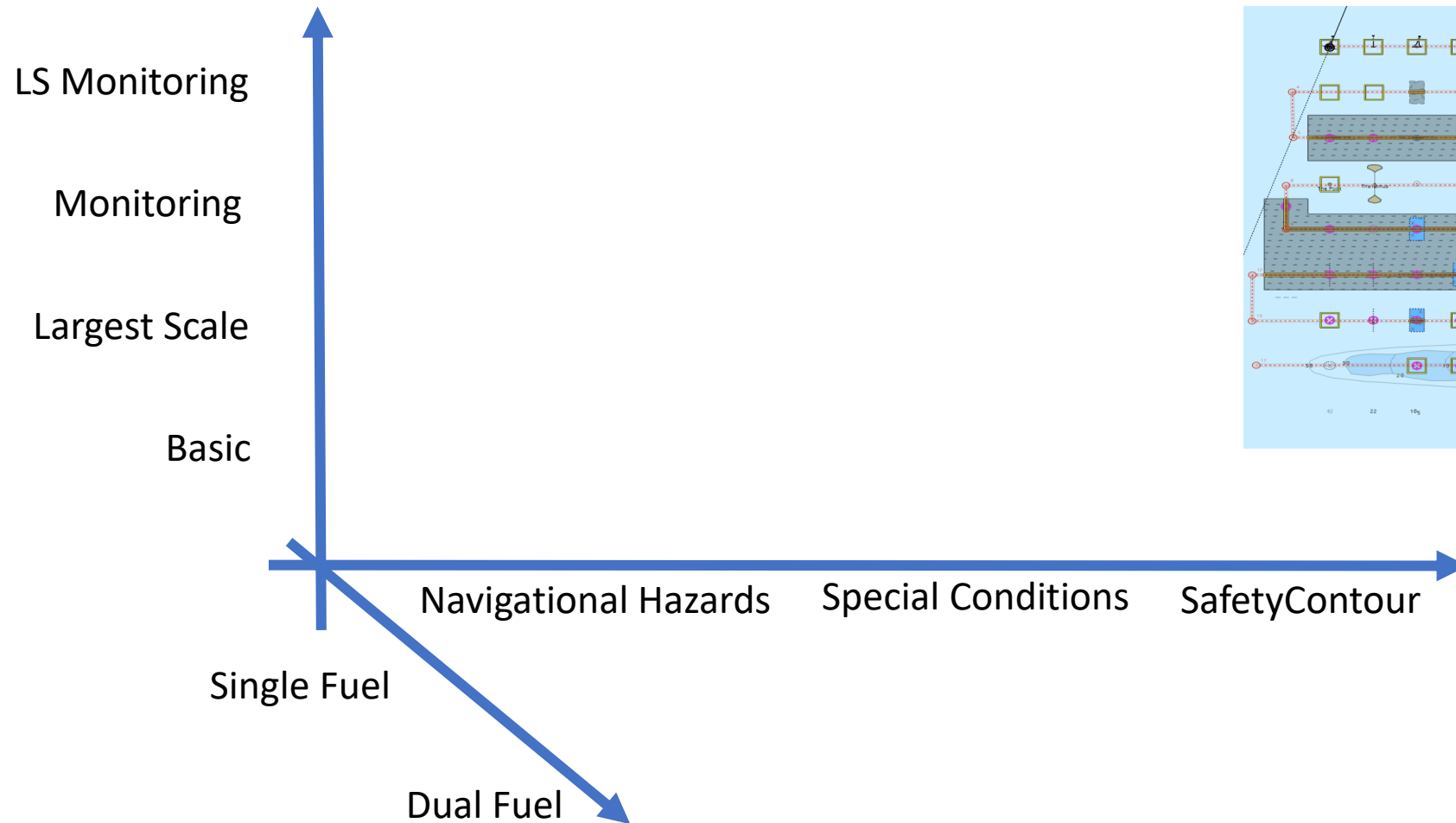
Scenario 1 - Basic service delivery and Update.

Base A	Week 0	S-101	101AA00DBASE.000	20220201	1	0	new	
		S-128	128AA00202302.GML	20220201	1	0	new	entry for 101AA00DBASE.000 and 101AA00STNDR.000
		CAT	S-101FC,PC,IC, S-128FC,PC	20220201	1	0	new	
Base B	Week 0	S-101	101AA00STNDR.000	20220201	1	0	new	
		S-128	128AA00202302.GML	20220201	1	0	new	entry for 101AA00DBASE.000 and 101AA00STNDR.000
		CAT	S-101FC,PC,IC, S-128FC,PC	20220201	1	0	new	
Base	Week 1	S-101	Dataset Name 101AA00DBASE.000	Issue Date 20230201	Edition 2	Update 0	new	contents
			101AA00STNDR.000	20230201	2	0	new	
		S-128	128AA00202302.GML	20230201	2	0	new	entry for 101AA00DBASE.000 and 101AA00STNDR.000
		CAT	S-101FC,PC,IC, S-128FC,PC	20230201	2	0	new	
Incremental	Week 2	S-101	101AA00DBASE.001	20230208	2	1	update	Update to DBASE
		S-128	128AA00202302.GML	20230208	2	1	update	new entry for 101AA00DBASE.000 only
Incremental	Week 3							New cell 101AA00OTHER
		S-101	101AA00OTHER.000	20230215	2	0	update	
		S-128	128AA00202302.GML	20230215	2	2	update	new entry for 101AA00OTHER.000 only
Cumulative 1	Week 3	S-101	101AA00DBASE.001	20230215	2	1	update	
		S-101	101AA00OTHER.000	20230215	2	0	update	
		S-128	128AA00202302.GML	20230215	2	1	update	new entry for 101AA00DBASE.000 only
		S-128	128AA00202302.GML	20230215	2	2	update	new entry for 101AA00OTHER.000 only
Cumulative 2	Week 3	S-101	101AA00DBASE.001	20230215	2	1	update	
		S-101	101AA00OTHER.000	20230215	2	0	update	
		S-128	128AA00202302.GML	20230215	3	0	update	Entry for 101AA00OTHER.000, 101AA00STNDR.000 and 101AA00DBASE.000

“Alerts and indications” Tests.... (Matrix Version)



“Alerts and indications” Tests.... (Matrix Version – DF mode)



Dual Fuel Mode Tests.

Dual fuel - Chart Loading and Update		DualFuelSimple	Basic DF mode loading	DualFuelSimple
	DualFuelSimpleUpdate		updating of a DF exchange set	DualFuelSimple
	DuelFuelPreference		Install - sucessful preference for S-101 over S-57	DualFuelSimpleUpdate
	DuelFuelUpdate		Updating DF exchange set (substituting S-101 for S-57)	DualFuelPreference
	DualFuelDisplay		Dual Fuel Portrayal (side by side and vertical)	DualFuelInitial
	DualFuelFeatureInformation		Integrated interrogation under DF mode	DualFuelUpdate
Detection and Notification of Navigational Hazards	NavigationalHazardsDF		Side by side DF mode portrayal Nav hazards	DualFuelInitial
	NavigationalHazardsDFLS		Correct processing of LS data - S-101/S-57 small scale	DualFuelInitial
				DualFuelInitial
				DualFuelInitial
	NavigationalHazardsDFMon		DF datasets used in monitoring	DualFuelInitial
	NavigationalHazardsDFMonLS		Correct processing of LS data - S-101/S-57 small scale	DualFuelInitial
Detection and Notification of Areas for which Special Conditions	SpecialConditionsDF		DF detection of Special Conditions	DualFuelInitial
	SpecialConditionsDFLS		DF use of largest scale	DualFuelInitial
				DualFuelInitial
				DualFuelInitial
	SpecialConditionsMonDF			DualFuelInitial
	SpecialConditionsMonDFLS			DualFuelInitial
Detection and Notification of the Safety Contour	SafetyContourDF			DualFuelInitial
	SafetyContourDFLS			DualFuelInitial
				DualFuelInitial
				DualFuelInitial
	SafetyContourDFWLA			DualFuelInitial
	SafetyContourDFMon			DualFuelInitial
	SafetyContourDFMonLS			DualFuelInitial
				DualFuelInitial

What do we need?

- Review and comment on S-164 document v1.0.0
- Input on scope of required tests
 - “Are you testing for ...”?
 - Configuration, Settings etc...
 - Groups of functionality (e.g. DF, Updates, services)
 - Running a service (S-128, exchange sets)
 - Coverage / layout
- Approx 100 integrated exchange sets required, each with S-128, CATALOG.XML, CAT.SIG, many with PERMIT.XML, PERMIT.SIG
 - Includes all catalogues and their updates
 - Need to be reviewed for content and agreed with stakeholders
- **ECDIS – testbed system for S-100/S-98 loading/update of exchange sets, updates, DF mode, interoperability and portrayal of multiple S-100 products (including S-128)**

Actions towards publication (v1.0.0)

- References in individual tests
- Updates to tests based on TSM discussions
 - Language conventions
 - Any new tests
 - Improve language in test expected outputs
 - Correct remaining S-57 terminology
 - Ensure context parameters and portrayal details reflect current PC contents (testbeds?)
 - S-128 outputs from discussions?
 - Persistence of catalogues and certificates (and S-128)
 - Data loading discussions
 - Non-official data boundaries?
- Input from SubWG members (post TSM)
- Landing Page Draft
- Encoding of manual to use metanorma/asciidoc and organisation of repository
- Formatting of document
- Meeting of S-164 SubWG, review and updates, submit to S-100WG (and HSSC), deadline for comments??