

The United States S-100 Testbed Software Development Project

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Outline

& Introduction

& S-100 Viewer Design V1.3

& Viewer Functionality

& Alternative “Lua” portrayal method

& Next steps

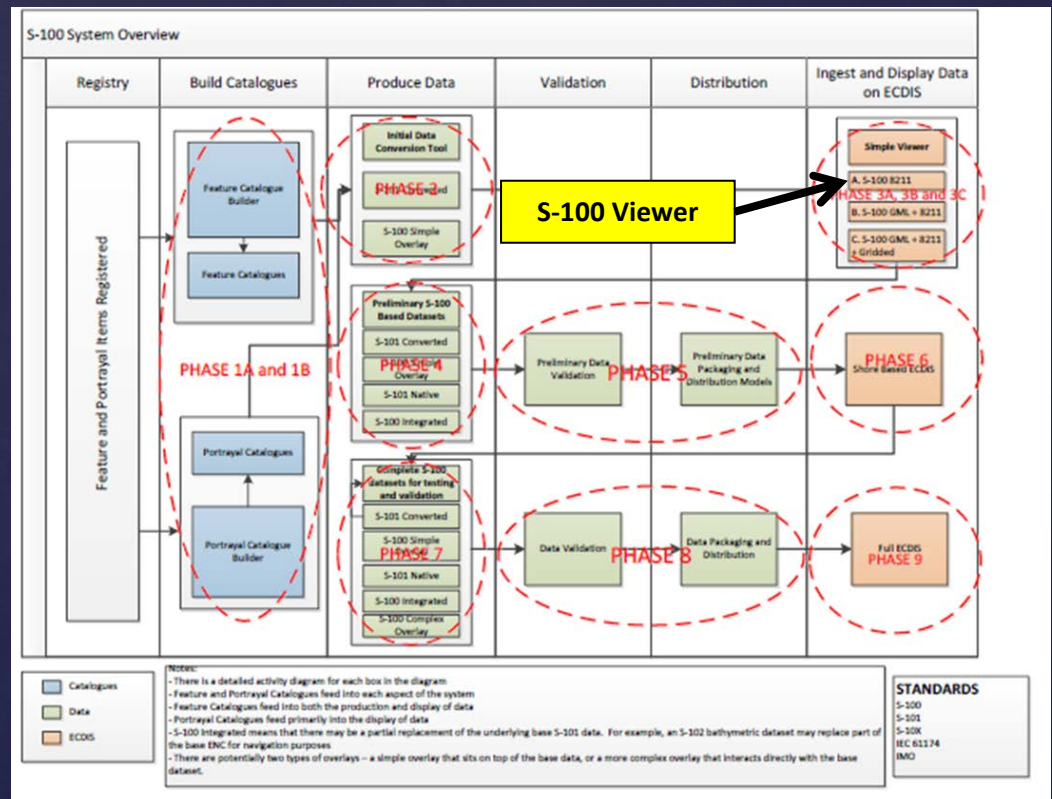
& Conclusion

& Acknowledgements

Introduction

- SPAWAR Atlantic is developing an S-100 Viewer application
- Sponsored by National Geospatial-Intelligence Agency (NGA) Maritime Safety Office
- Work is being coordinated with the IHO S-100WG and S-101PT

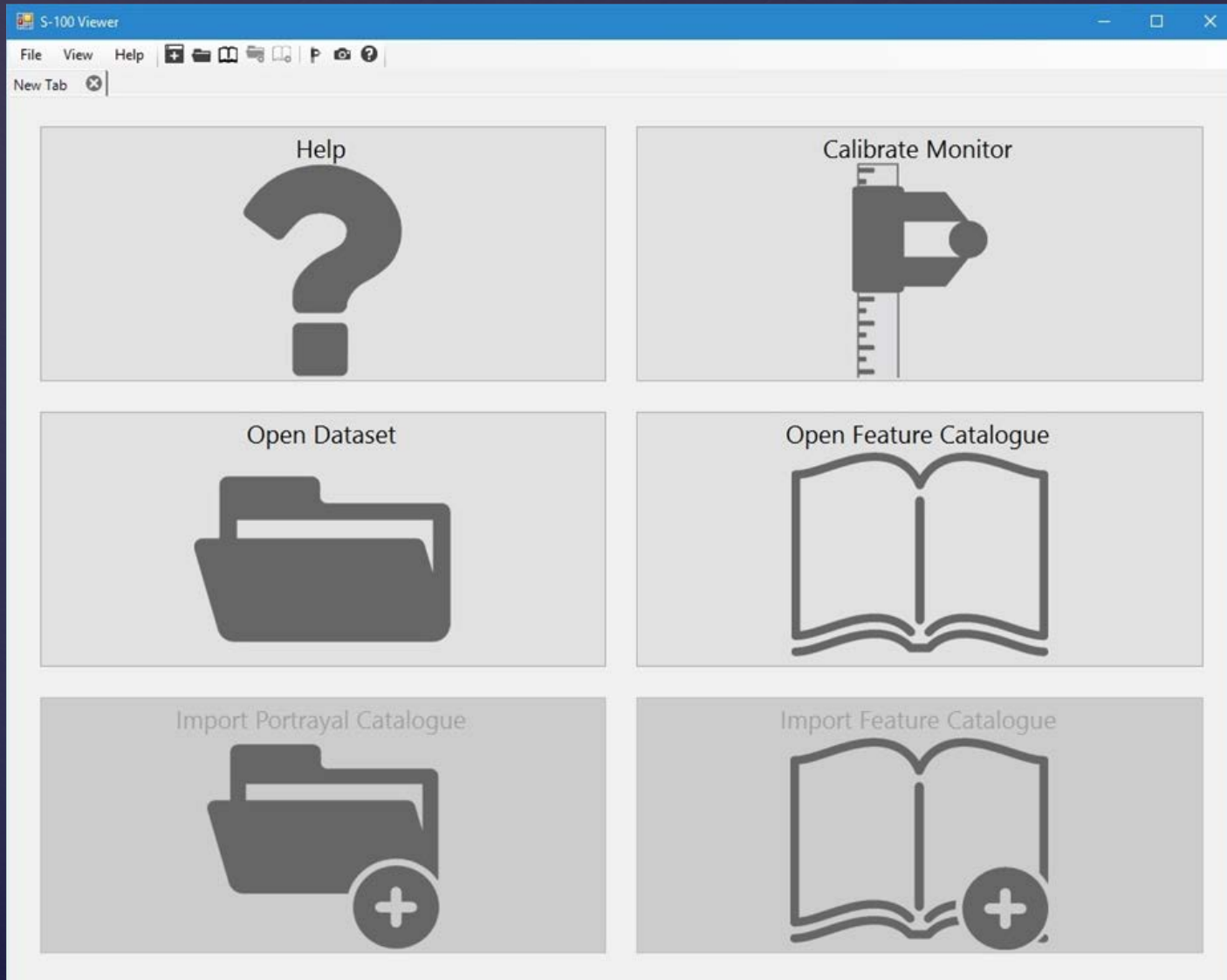
- Korean Hydrographic & Oceanographic Agency (KHOA) is also developing a viewer application



V1.3 Design Goals

- ⌘ Verify the consistency in content and language between S-100 and the various geospatial product standards that spawn from S-100; initially focusing on S-101 ENC
- ⌘ To better understand the portrayal requirements of S-100 and S-101, as well as verify that those requirements are properly partitioned and implemented
- ⌘ Verify the current XML, XSD, and XSLT files represent information taken from the feature registry and the portrayal registry
- ⌘ Verify that the specifications define a clear, unambiguous process for translating from a products dataset to a valid portrayal via automated generation of portrayal instructions
- ⌘ Verifying that all aspects of S-100 and the associated portrayal are 100% machine readable

Start up Screen



Catalogs / Inputs

Feature
Catalog 0.8.9

Portrayal
Catalog 1.0
Dec 2016

S-57 to S-101
Converter
0.8.19

ISO 8211 Encoding View

The screenshot shows the S-100 Viewer application window. The title bar reads "S-100 Viewer". The menu bar includes "File", "View", and "Help". The address bar shows "KR3G3B00_...000". A list of FRID (FeatureType) records is displayed, with "FRID (FeatureType):502" selected. The main pane shows the details for "FeatureTypeRecordIdentifier" with the following fields:

Field	Value
FeatureTypeRecordIdentifier	CTK.S100.Interchange.ISO8211.FeatureTypeRecordIdentifierField
FeatureObjectIdentifier	CTK.S100.Interchange.ISO8211.FeatureObjectIdentifierField
Attributes	(Collection)
InformationAssociations	(Collection)
SpatialAssociations	(Collection)
FeatureAssociations	(Collection)
ThemeAssociations	(Collection)
MaskedSpatialTypes	(Collection)
NumericFeatureTypeCode	102
RecordVersion	1
RecordUpdateInstruction	Insert
RecordName	100
RecordID	502
NameKey	128612

At the bottom, the "Diagnostics" pane shows several error messages:

S...	Time	Catego...	Details
W	2/1/2017 7:38:28 AM	Attribute	Enumerated value '9' is not in the list of permitted values for binding 'natureOfSurface' for FRID (FeatureType):1250 natureOfSurface
W	2/1/2017 7:38:28 AM	Attribute	Enumerated value '9' is not in the list of permitted values for binding 'natureOfSurface' for FRID (FeatureType):1249 natureOfSurface
W	2/1/2017 7:38:28 AM	Attribute	Enumerated value '9' is not in the list of permitted values for binding 'natureOfSurface' for FRID (FeatureType):1248 natureOfSurface
W	2/1/2017 7:38:28 AM	Attribute	Enumerated value '9' is not in the list of permitted values for binding 'natureOfSurface' for FRID (FeatureType):1247 natureOfSurface
W	2/1/2017 7:38:28 AM	Attribute	Enumerated value '9' is not in the list of permitted values for binding 'natureOfSurface' for FRID (FeatureType):1246 natureOfSurface

Data Model View

The screenshot displays the S-100 Viewer application window. The title bar reads "S-100 Viewer". The menu bar includes "File", "View", and "Help". The toolbar contains icons for file operations and navigation. The main window shows a list of features on the left, with "Obstruction502 (Surface)" selected. The right pane displays the metadata for this feature.

Feature List:

- Shoreline construction:497 (SimpleCurve)
- Shoreline construction:498 (CompositeCurve)
- Coastline:499 (CompositeCurve)
- Coastline:500 (CompositeCurve)
- Shoreline construction:501 (CompositeCurve)
- Obstruction502 (Surface)**
- Shoreline construction:503 (SimpleCurve)
- Shoreline construction:504 (CompositeCurve)
- Shoreline construction:505 (CompositeCurve)

Feature Metadata:

Property	Value
AssociatedFeatures	AssociatedFeature[] Array
FCType	Obstruction
FeatureUseType	geographic
FeatureTypeBindings	FeatureTypeBinding[] Array
PermittedPrimitives	S100_FC_SpatialPrimitiveType[] Array
PrimitiveTypes	point, curve, surface
InformationTypeBindings	InformationTypeBinding[] Array
IsAbstract	false
AttributeTypeBindings	AttributeTypeBinding[] Array
Name	Obstruction
Definition	In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel.
Code	Obstruction
Remarks	The term is usually used to refer to an isolated danger to navigation.
Alias	String[] Array
AssociatedSpatial	AssociatedSpatial[] Array
ID	502
SimpleAttributes	SimpleAttribute[] Array
ComplexAttributes	ComplexAttribute[] Array
AssociatedInformation	AssociatedInformation[] Array

Diagnostics Log:

S.	Time	Catego...	Details
W	2/1/2017 7:38:28 AM	Attribute	Enumerated value 'F' is not in the list of permitted values for binding 'natureOfSurface' for FRID (FeatureType) 1250 natureOfSurface
W	2/1/2017 7:38:28 AM	Attribute	Enumerated value 'F' is not in the list of permitted values for binding 'natureOfSurface' for FRID (FeatureType) 1249 natureOfSurface
W	2/1/2017 7:38:28 AM	Attribute	Enumerated value 'F' is not in the list of permitted values for binding 'natureOfSurface' for FRID (FeatureType) 1248 natureOfSurface
W	2/1/2017 7:38:28 AM	Attribute	Enumerated value 'F' is not in the list of permitted values for binding 'natureOfSurface' for FRID (FeatureType) 1247 natureOfSurface
W	2/1/2017 7:38:28 AM	Attribute	Enumerated value 'F' is not in the list of permitted values for binding 'natureOfSurface' for FRID (FeatureType) 1246 natureOfSurface

Feature Catalog View

The screenshot shows the S-100 Viewer application window. The title bar reads "S-100 Viewer" and the menu bar includes "File", "View", and "Help". A "Feature Catalogue" button is highlighted in the top-left corner. The main area is divided into three panes:

- Tree View (Left):** Displays a hierarchical list of feature types. The "AttributeTypeBindings" section is expanded, showing three entries: "distanceUnitsOfMeasurement", "referenceLocation", and "waterwayDistance". The "waterwayDistance" entry is selected and highlighted in blue.
- Property View (Bottom-Left):** Shows the details for the selected "waterwayDistance" feature type. It lists:
 - Name: Measured distance value
 - Definition: The distance value indicated on a distance mark, or the distance
 - Code: measuredDistanceValue
 - Remarks:
 - Alias: String[] Array
- Table View (Right):** A table showing the value type for various properties of the selected feature type.

Property	Value Type
AllowedEnumerationValues	EnumerationValue[] Array
Name	Waterway distance
Definition	
Code	waterwayDistance
Remarks	
Alias	String[] Array

Portrayal Catalog View

S-101 Portrayal Catalogue 0.9.1

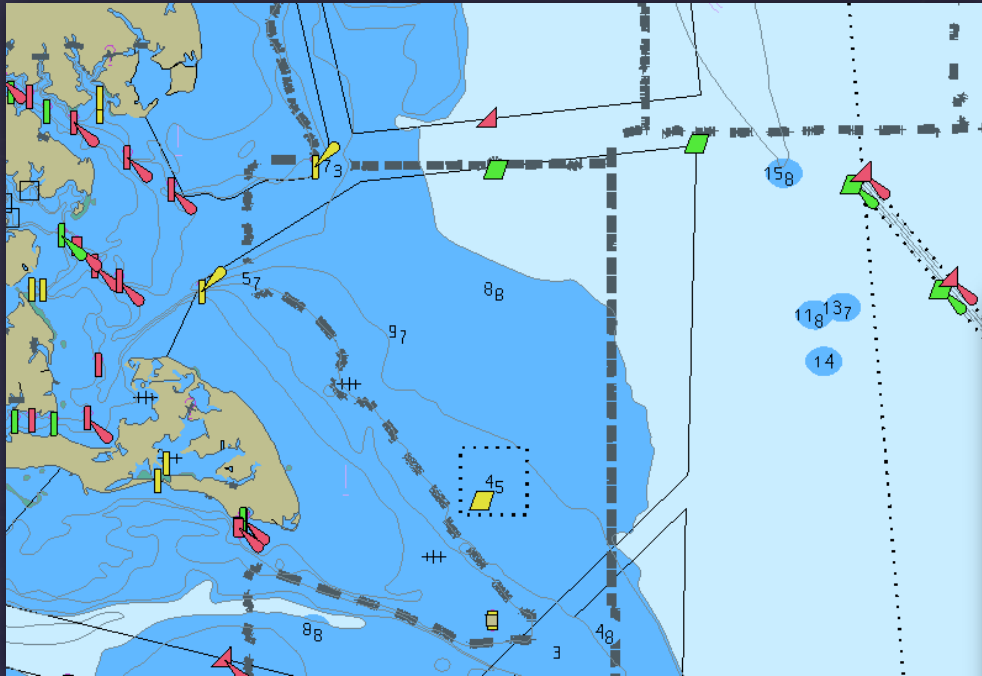
- Color Palette
 - ColorPalette Day
- Context Parameters
 - DEEP_CONTOUR 30
 - SAFETY_CONTOUR 30
 - SAFETY_DEPTH 30
 - SHALLOW_CONTOUR 30
 - SHALLOW_PATTERN False
 - SHOW_ISOLATED_DAMAGE False
 - TWO_SHADES True
- Display Mode
 - DisplayMode Standard
- Top Level Template
 - TopLevelTemplate main_PaperChartLeaf
- Viewing Group Layers
 - 1 - Base Layers On
 - 2 - Drying Line On
 - 3 - Buoys, beacons, aids to navigation On
 - 3.1 - Buoys, beacons, structures On
 - 3.2 - Lights On
 - 4 - Boundaries and limits On
 - 5 - Prohibited and restricted On
 - 6 - Chart scale boundaries On
 - 7 - Cautionary notes On
 - 8 - Ships' routing system On
 - 9 - Archipelagic sea lanes On

DisplayMode
Specifies the set of layers used to generate the portrayal

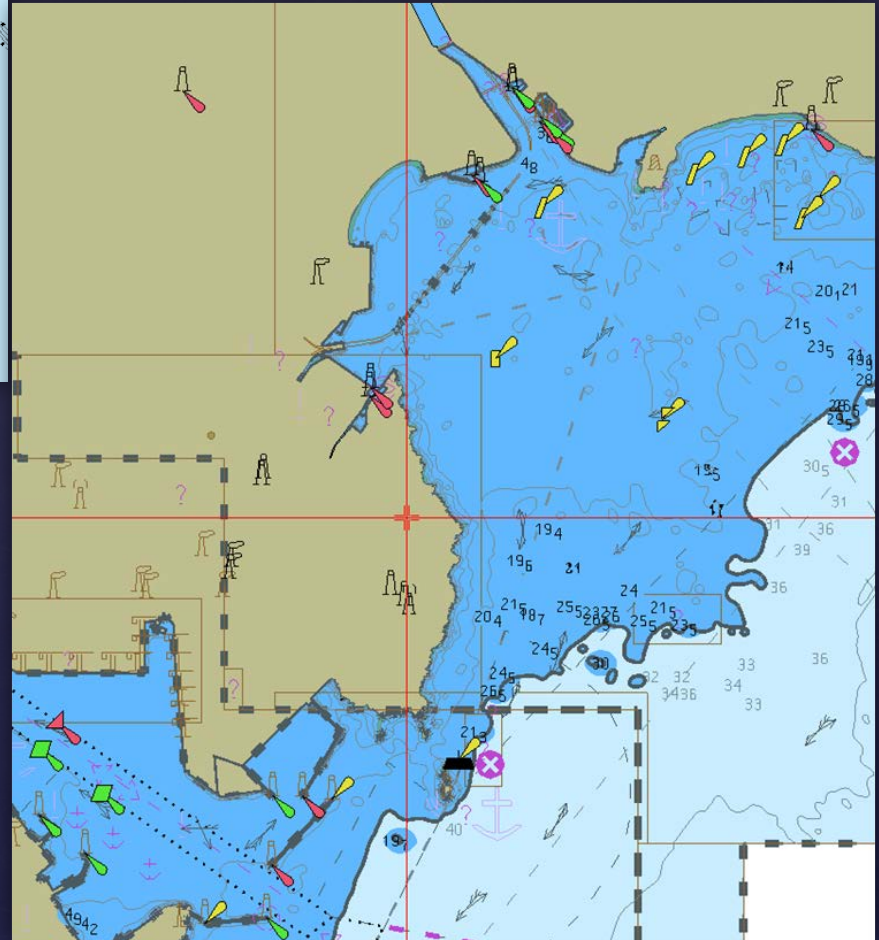
Diagnostics Performance

S...	Time	Category	Details
W	2/1/2017 7:46:39 ...	Attribute	In IRD (InformationType)13, dataset contains 0 value(s) for attribute textualDescription, but must contain at least 1...
W	2/1/2017 7:46:39 ...	Attribute	In IRD (InformationType)13, dataset contains 0 value(s) for attribute information, but must contain at least 1...
W	2/1/2017 7:46:39 ...	Attribute	In FRD (FeatureType)2630, dataset contains 0 value(s) for attribute waterLevelEffect, but must contain at least 1...
W	2/1/2017 7:46:39 ...	Attribute	In FRD (FeatureType)2620, dataset contains 0 value(s) for attribute waterLevelEffect, but must contain at least 1...
W	2/1/2017 7:46:39 ...	Attribute	In FRD (FeatureType)2628, dataset contains 0 value(s) for attribute waterLevelEffect, but must contain at least 1...

US4VA40M



KR5G3B33



Lua for Portrayal

Why Lua?

S-52 Conditional Symbolization Procedures (CSPs) are implemented as currently specified

- Leverages well known CSPs without revalidation of rules

Rules are implemented procedurally and well understood

More concise than XSLT (avg. 50% smaller)

Lua is easier to write and validate

Will run on a wider variety of platforms (hardware and software)

Portrayal Input Schema is no longer needed within S-100

Remove Input Schema

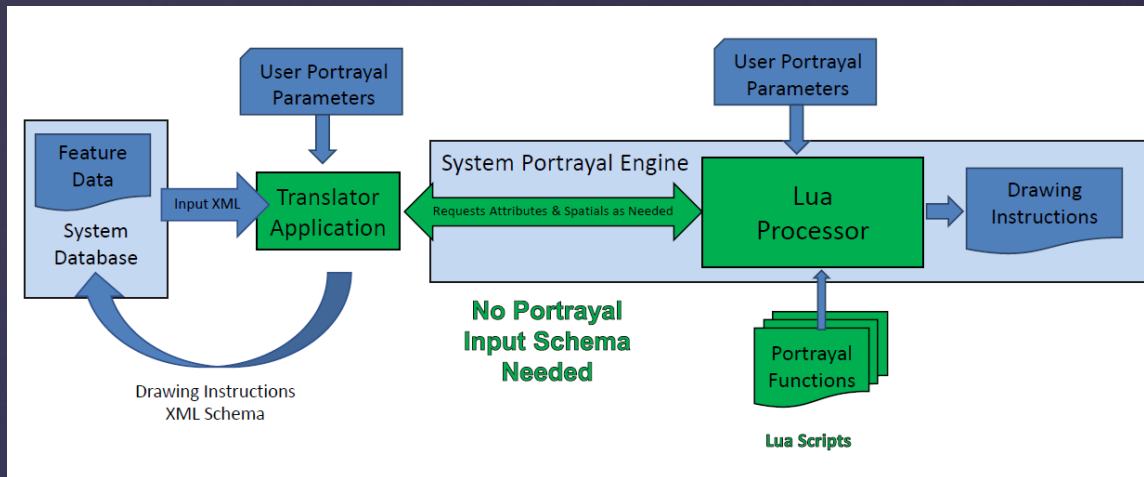
Implement XSLT rules as Lua scripts

Support files are unchanged

Output is (optionally) unchanged



Lua for Portrayal



More Lua S-100 Opportunities

Alarms and Indications

Product Intraoperability/Interoperability

Extended Dataset Validation

Recommendations

- Replace the use of XSLT within the S-100 portrayal with Lua as described
- Update S-100 Part 9, including removal of the portrayal input schema
- Add a new part for S-100 Lua Scripting support, supporting development of Alarms and Indications, Interoperability, and other script based extensions to the main functionality described in S-100

Next steps...

Work Ongoing...

- Masked Edges
- Refined validity testing for catalogs
- Extend portrayal for GML and HDF5 encoded products
- Waiting for updates to the S-100 Exchange Set so we can implement import functions, decryption and digital signature verification
- Design and coding of Phase 6 Shore Based “ECDIS”

Conclusions

- ⌘ **S-100 is maturing as the Universal Hydrographic Data Standard**
- ⌘ **Ed. 4 in 2019 will offer XSLT and Lua portrayal mechanisms**
- ⌘ **The goal is for feature and portrayal catalogs to be machine readable**
- ⌘ **S-100 Viewer V1.3.0.0 is available at basecamp, and we welcome review and comment**

Acknowledgements

- ⌘ **Design team: Mikan Stamenkovich, David Grant, Seairth Jacobs, Joe Massey, Scott Rising, Dr. Ed Weaver**
- ⌘ **NGA Maritime Safety Office: John Lowell, Mark Opdyke, Scott Reeves**
- ⌘ **S-100WG Chairperson: Julia Powell (NOAA)**