Paper for Consideration by TSMAD 29
Status Brief for SPAWAR's S-100 Testbed Software: Phase 3 Simple Viewer (S-View)

Submitted by:	United States (SPAWAR Atlantic)
Executive Summary:	Status update and technical discussion of the progress of SPAWAR S-100 Testbed Software Simple Viewer (S-View), as well as technical issues encountered during initial development
Related Documents:	S-100 2.0.0 (January 2015) S-101 1.0.0 (July 2014) TSMAD28DIPWG6-11.2A
Related Projects:	KHOA S-100 Testbed Project

Introduction

As reported in the TSMAD28DIPWG6-11.2A paper, the United States National Geospatial-Intelligence Agency (NGA) Maritime Safety Office has recognized the need to transition away from the current Vector Product Format (VPF) based Digital Nautical Chart (DNC) navigation datasets, and companion datasets such as Tactical Ocean Data (TOD), to maritime geospatial data products based on the IHO S-100 specification. This will facilitate collaboration with S-101 co-production and maintenance, reducing the burden for NGA to maintain a world wide database for the US Department of Defense (DOD). In order to achieve this transition, NGA has recognized the requirement to design and build an S-100 Testbed to support the development and testing of S-101 and other S-10x based geospatial data products.

This paper will report the status of development of the S-100 Simple Viewer (S-View), which represents Phase 3 of the S-100 System Overview.

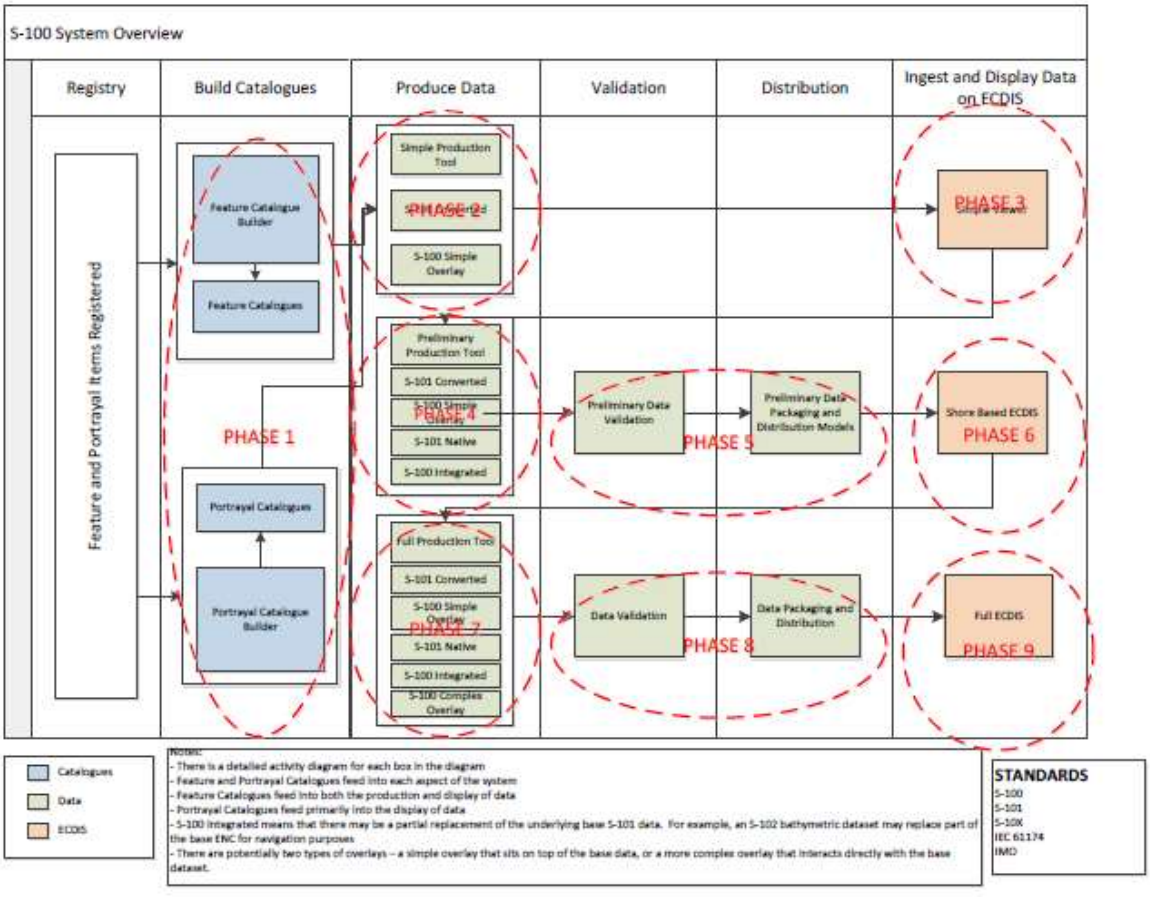

Figure 1 – S-100 System Overview with Phases 1-9

The US S-100 Testbed will provide the capability required in phases 3, 6 and 9. All of these capabilities will be based on redesigning the Common Geospatial Extensible Navigation Toolkit (COGENT) software to create a new version of COGENT (3.x).

The COGENT 3.x software will maintain the open architecture and modular software design. The design goal is to allow display and operation with any compliant S-10x data product encoded in ISO 8211, GML, and HDF5 for S-102. In addition, there will be a single source code configuration that can be compiled in either Windows or Linux. The new design will leverage modern software tools such as the SpatiaLite database, C#, UML, XML and GML, resulting in reduced lines of source code to achieve comparable functionality for geospatial data display and operation. The COGENT 2.x architectural complexity – which grew over time from adding features to meet new requirements - will be simplified from the current design, allowing for easier maintenance and enhancement

S-View Status

The current goals of S-View are:

- To better understand the portrayal requirements of S-100 and S-101, as well as verify that those requirements are properly partitioned.
- Verify the current XML, XSD, and XSL files that represent information taken from a feature registry and portrayal registry.
- Verify that the specifications define a clear and concise process for translating from the data contained in an ISO8211 file to portrayal instructions.

Within S-View, the portrayal process is fairly straight forward:

- Open a S-101 data set (ISO8211 file).
- Translate the feature data from the data set into XML (hereafter, *FeatureXML*).
- Perform XSL transforms on the FeatureXML, which generates XML containing draw instructions (hereafter, *DrawXML*).
- Feed the DrawXML into the portrayal engine, which translates the instructions into native platform draw instructions.

To facilitate this effort, we used the XML, XSL, and XSD files that were provided in the following archive files:

- schemas.zpMar.20.2014.zip
- Root.zpOct03.2014.zip
- Attachments_2014107.zip

The file “schemas.zpMar.20.2014.zip” contains the following files of interest:

- schemas\S101Data.xml, which appears to represent a sample dataset
    - Expressed as XML instead of ISO8211
- schemas\S101DataModel.xsd, which is the schema for the S101Data.xml
- schemas\result.xml, which appears to represent the output of an XSL transform

The file “Root.zpOct03.2014.zip” contains the following files of interest:

- Root\Rules*.xsl, which is the set of XSL templates that would be applied to a dataset (S101Data.xml, above) to generate drawing instructions (result.xml, above).

The file “Attachments_2014107.zip” contains the following file of interest:

- S-101_FC_0.8.8.xml, which appears to represent a sample XML serialization of an S-101 feature catalog.

Due to the experimental nature of these files, we encountered the following of issues:

- A sampling of the XSL files (e.g. DepthArea) showed that they were expecting a different element structure than was found in the S101Data.xml file.
- The same XSL files were also generating output XML that differed from that found in the results.xml file.
- The feature types defined in the S101DataModel.xsd file did not match the feature types defined in the S-101_FC_0.8.8.xml file.
- The XSL files are not valid, due to missing quotes in various *match* expressions, as well as missing expression values in some cases.
- We were not able to find a general set of rules for converting data in ISO8211 into XML.

To work around these issues, we performed the following actions:

- Skipped the step which converts an ISO8211 data set into FeatureXML.
- Manually created our own FeatureXML that conformed to S101DataModel.xsd.
- Modified a subset of the XSL files (fixed quotes, expressions, etc.) for the features in FeatureXML.

The results (for a single Cardinal Buoy feature) are:

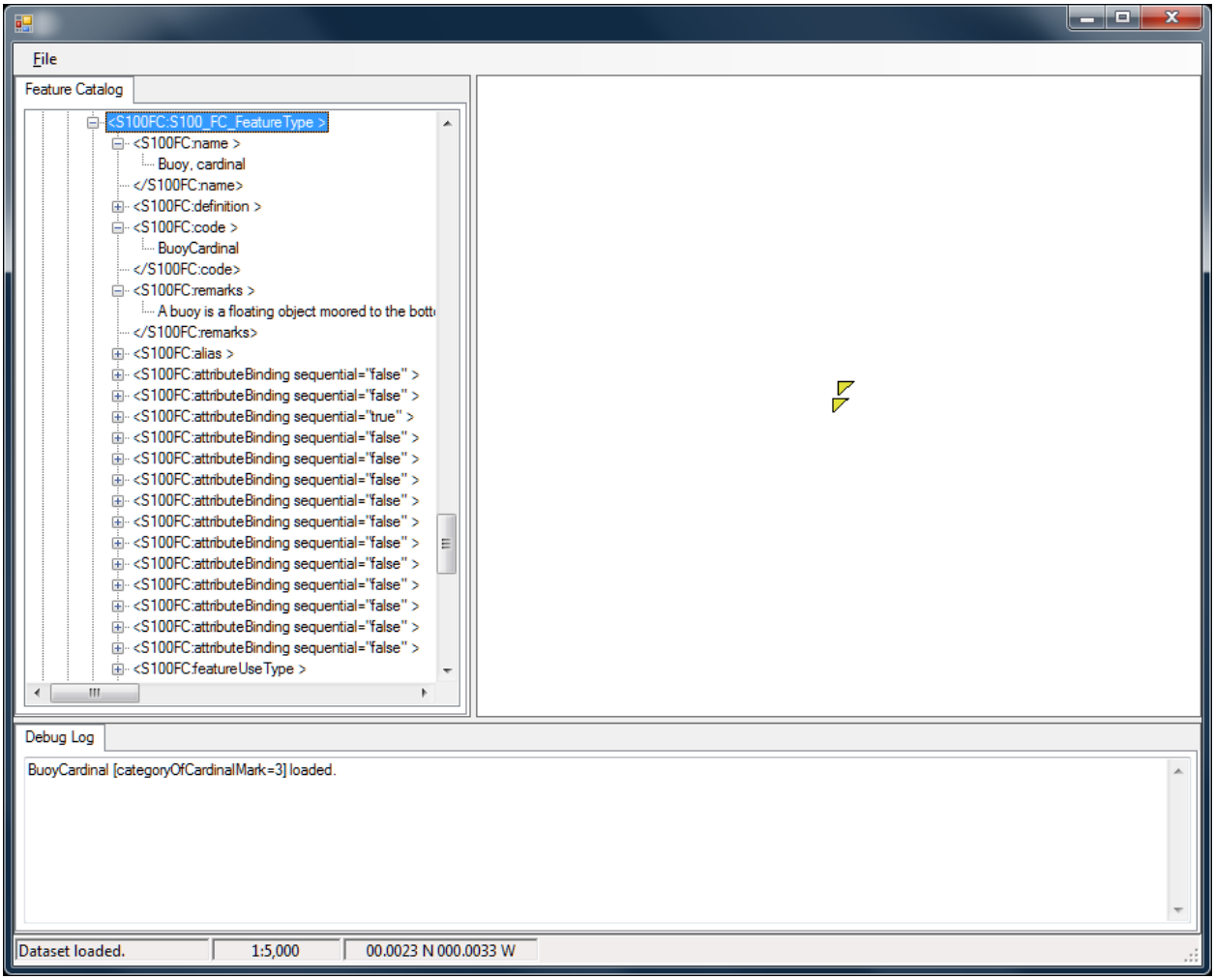

Figure 2 – S-100 Viewer Screenshot (showing Cardinal Buoy)

In order to move forward on S-View, we believe that the following issues must be resolved:

- Make the XSL files valid. This includes adding required quotes and adding appropriate comparison values in match expressions.
- Clearly distinguish between the XSDs that are part of the specification versus the XSDs that are retrieved from the registries. To further clarify, for instance, schema definitions for specific feature types (e.g. BuoyCardinal, DepthArea, etc.) should be separate from specification-related schema definitions (e.g. Feature, Dataset, etc.).
- Define concise rules for translating data from an ISO8211 (or, more generally, data that's described by a feature catalogue) into the portrayal input XML.

Justification and Impacts:

The S-100 Simple Viewer is being developed as part of the US S-100 Testbed project. This work is being executed to achieve the following goals:

A. Assist TSMAD in development of S-101 and other S-10x geospatial data products
B. Facilitate the United States transition to S-100 data products for maritime utilization

The TSMAD is invited to:

A. **Endorse** the continued development of the S-100 Simple Viewer (S-View), part of the US S-100 Testbed project.
B. **Discuss** and explore how the US S-100 testbed could benefit IHO.
C. **Include** the US S-100 Testbed project as part of the TSMAD Work Plan.