Design and implementation of automation tools for DSMM diagrams and reports

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OneStop: Data Discovery and Access

- **OneStop** supports NOAA's efforts by leveraging existing catalog and access technologies to develop an improved data access framework.

- The framework will be based on improved discovery, access, and visualization services for the data.

- One of the project activities is to provide transparent dataset quality information to users.
Data Stewardship Maturity Matrix (DSMM)

Each dataset is evaluated in 9 areas and assigned scores.

Preservability
Accessibility
Usability

Production Sustainability
Data Quality Assurance
Data Quality Control/Monitoring

Data Quality Assessment
Transparency/Traceability
Data Integrity

Level 5

- Archived by NCEI, which is NOAA designated repository. NOAA is compliant to NARA standards.
- Metadata following ISO 19115-2 standards.
- Compliant to OIAS RM
- Plans to update metadata to ISO 19115-1 at a later date
- Using NCEI Silver Spring Archive Management System, AMS.
DSMM Graphics - Star Rating Diagram & Scoreboard

- Great tools for summarizing DSMM.
- Used to manually generate them from a pptx template.
Coloring is fun but ...

- Scoreboard: 9 x 2 = 18 table cells; 7 color choices
- Star Rating Diagram: 90 places; 3 color choices

\[
\text{Right Click > Format Shape > Shadow > Color > More Colors > Custom > Red, Green, Blue (3) > OK (10 clicks)}
\]

\[(18 + 90) \times 10 = 1,080 \text{ clicks for coloring two diagrams!}\]
Can we do better?

- Embedded a macro inside the pptx template file.
- Users would enter 9 scores to the template and run the macro. Done!
- This was the start of the DSMM automation tools.

<table>
<thead>
<tr>
<th>Table A: Maturity Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preservability</td>
</tr>
<tr>
<td>Accessibility</td>
</tr>
<tr>
<td>Usability</td>
</tr>
<tr>
<td>Production Sustainability</td>
</tr>
<tr>
<td>Data Quality Assurance</td>
</tr>
</tbody>
</table>
Flow of DSMM Data

DSMM Results
Google Form
Google Spreadsheet

To be replaced by a web application

DSMM Automation Tools
- Report template
- DSMM diagrams
- DSMM diagram templates
- ISO metadata templates

DSMM Reports
ISO Metadata Records
Sample Report

Automated:

• Text placement
• Diagrams
• Summary of ratings
• Assessment revision history table
• Abstract if available
• Assessment tables
• References
LibreOffice API for MS Office Files

- LibreOffice Suite ~ Microsoft Office.

- LibreOffice is free and available with source code.

- Originates from StarOffice of Sun Microsystems.

- LibreOffice 4.3.7 - over 7.2 million lines of C++, Python, and Java codes.

- We use Java + LibreOffice API for report automation.
LibreOffice is Imperfect

• Issues we have worked around:
  – A page break disappeared. Fixed at XML level.
  – Table width and column widths not preserved. Fixed at XML level.
  – Image replacement at the zip file level.

• Issue still to be fixed:
  – Determining page numbers for diagrams and tables is problematic. When the template is opened with LibreOffice writer, table bodies are detached from captions and displayed on next page.
Flow of DSMM Data

- DSMM Results
  - Google Form
  - Google Spreadsheet

- DSMM Automation Tools
  - Report template
  - DSMM diagrams
  - DSMM diagram templates
  - ISO metadata templates

- DSMM Reports
- ISO Metadata Records

To be replaced by a web application
Let’s Use CEdit

• Google Forms - very easy to create and collect information to a spreadsheet.

• However, it is not for retrieving and editing information already entered.

• Is there an alternative? - CEdit!
  – CEdit is a metadata editor developed by NCEI.
  – Located at https://www.ngdc.noaa.gov/cedit/.
  – Stores user data in XML.
  – Requires to write XML and XSLT files.
Integration with CEdit

DSMM in XML

model.xml

submit.xsl

form.xsl (create, edit)

view.xsl

HTML FORM

HTML

CEdit RESTful API

DSMM Automation Tools
Conclusions & Outlook

• We built DSMM automation tools:
  – Generation of DSMM drafts to be published to NOAA Institutional Repository.
  – Production of ISO metadata records.

• We are working to complete the CEdit integration:
  – Provides a central source of DSMM results.
  – Enables metadata content editors to retrieve and edit DSMM.

• Extend CEdit to support revision history.
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  – Thomas Jaensch

• CEdit
  – Rich Fozzard
  – Marty Aubrey
www.ncei.noaa.gov

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Structure of DOCX File

- A zip file contains more files.
- Contents:
  - word/document.xml
  - Embedded images: word/media/image1.png
  - word/media/image2.png
  - etc.
Details on DSMM Report Generation

• We used placeholders like {DSMM_DATASET_SHORT_NAME} throughout the template to mark where to place a text string.

• Tables do not need a placeholder. They are structured and easy to identify.

<table>
<thead>
<tr>
<th>DSMM Key Component</th>
<th>Stewardship Maturity Rating, Justification, and Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preservability</td>
<td></td>
</tr>
<tr>
<td>Accessibility</td>
<td></td>
</tr>
</tbody>
</table>
Problem Directly Working with XML

• Suppose we want to search and replace text.

• Could walk through XML nodes to find the target text.

  Paragraph <w:p>
   Run <w:r>
     Text <w:t>

• BUT what if our search string crosses a run boundary?
The information about dataset and stewardship maturity assessment is summarized in Table 1. The data stewardship maturity ratings are displayed as the scoreboard (Figure 1) and rating diagram (Figure 2) with the detailed justifications in Table 2.