UN/LOCODE Application Re-engineering

Presentation by
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Mayank Gupta (UNECE Consultant)
Overview of the presentation:

1. The (existing) UN/LOCODE Application
2. Assessment and Technical Steps (Development Platform, Target Software Revision)
3. The Work Plan (Critical Cyber Security Vulnerabilities)
4. Overview of Possible Improvements
   - Third-party services are required for interactive mapping and visualization of UN/LOCODE data and validation of geolocation data fields via (ESRI - ArcGIS, Google Maps, or Open Street Maps).
5. Proposed UI Wireframe of Re-engineered Front-end Application
6. Question and Answer (Q&A)
The current UN/LOCODE system, including its IT web interface, was developed almost two decades ago. Since then, IT systems, including cyber security needs have evolved considerably. This resulted in a situation where the UN/LOCODE web interface (i.e., the web-based online Data Maintenance Request application), was flagged by the Office of Information and Communications Technology (OICT) as non-compliant with UN cyber security requirements, and the rest of the system has not been audited. This was reflected in the UNECE Executive Secretary Compact assessment for 2021 as well as in para. 24 of UNLOCODE-AG/2022/INF.2.

The system comprises of three (3) sub-systems:


- UNECE has set a new target date of 30 December 2023 to resolve the cyber security risk and follow OICT Recommendations.

Issues with the current system can be categorized as:

- Critical Cyber Security Vulnerabilities
- Data Quality and Validation Errors
- User Friendliness
- Outdated Business Logic, Workflow and Technical Source Code

UNECE United Nations Economic Commission for Europe

28/09/2023

https://apps.unece.org/unlocode/
UN/LOCODE Application Re-engineering

Current UN/LOCODE Application

DMR Submission Form
https://apps.unece.org/unlocode/

- New Request, Change Request
- User Management
- Submission History

Update Directory & Referenced Data

[Diagram showing flow of data and processes]

Export to Excel Spreadsheet

Bulk Spreadsheet of Selected Submissions (criteria defined by the Secretary)

Google Sheet

Access Production & Publication Application

UN/LOCODE Maintenance Team (Google Sheet)

UNECE Bitbucket

HTML, TXT, CSV, MDB
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Assessment and Technical Steps

- Reuse of the existing application platform and infrastructure (Microsoft IIS and Microsoft SQL Server)
- Initial redevelopment of the application will be via a Local Development Infrastructure, the application will then be ported to the UNECE Infrastructure.
- The existing software SDK .NET Framework 4.0 will be migrated to the latest release .NET Framework 4.8.1.
- End user testing conducted by the UNECE Secretariat, UN/LOCODE Taskforce and interested user community members.
# UN/LOCODE Application Re-engineering

## Overview of the Work Plan

<table>
<thead>
<tr>
<th>Priority</th>
<th>Importance</th>
<th>Category</th>
<th>Sub-Category</th>
<th>Fix / Functionality</th>
<th>Impact Page(s)</th>
<th>Component(s)</th>
<th>Estimated time for Dev and Test (Days)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Critical</td>
<td>Security</td>
<td>SQL Injection</td>
<td>replace all in-line SQL code with the use of database stored procedures</td>
<td>all pages</td>
<td>web</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Critical</td>
<td>Security</td>
<td>user credentials</td>
<td>store the user password as hash (with a salt) in the database. Passwords cannot be retrieved (user will have to create a new password)</td>
<td>register edit user profile forget password</td>
<td>database</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Critical</td>
<td>Security</td>
<td>user credentials</td>
<td>enforce password policy (e.g., complexity rules)</td>
<td>register edit user profile forget password</td>
<td>web</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Critical</td>
<td>Security</td>
<td>Multi-factor authentication</td>
<td>user email multi-factor authentication (verify user’s email by user entering emailed random code and system verify it before allowing registration/editing user profile)</td>
<td>login register edit user profile</td>
<td>web</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Improvements</td>
<td>Security</td>
<td>website authentication</td>
<td>add ability to have asp.net forms authentication so that website pages are only accessible if user is authenticated It also possible restrict access of folders via web.config</td>
<td>all pages</td>
<td>web</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Improvements</td>
<td>Security</td>
<td>Error Handling</td>
<td>Any errors from the system (database and web) should not display the actual (sql) error in the web browser. Browser should only display the fact that an error occurred and display an error internal ID. The actual error and its details should be stored in a database table (internal ID, user, time stamp and technical error message)</td>
<td>login logout</td>
<td>database</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Improvements</td>
<td>Security</td>
<td>etrade user on database</td>
<td>set proper database server permission for the etrade user (in sql server)</td>
<td>N/A</td>
<td>database</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>latitude and longitude</td>
<td>add leading zero when necessary, based on expected format</td>
<td>new DMR request</td>
<td>web</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
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<tr>
<td>9</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>Latitude</td>
<td>validate expected format (ddmmN or ddmmS) where dd=degrees (00 to 90) and mm=minutes (00 to 59)</td>
<td>web</td>
<td>database</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>Longitude</td>
<td>validate expected format (dddmmE or ddddmmW) where ddd=degrees (000 to 180) and mm=minutes (00 to 59)</td>
<td>web</td>
<td>database</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>Subdivision</td>
<td>add check to make subdivision entry mandatory</td>
<td>web</td>
<td>database</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Improvements</td>
<td>web Link</td>
<td></td>
<td>this field is mandatory and uses regex to validate a web link</td>
<td>web</td>
<td>database</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>User Contact</td>
<td>check for mandatory fields and check for a valid email and phone</td>
<td>web</td>
<td>database</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>Latitude and Longitude</td>
<td>add ability to select coordinates by clicking on a map (using a pop-up window) and transfer selected coordinates to main new DMR form (formatted to degrees/minutes)</td>
<td>web</td>
<td>database</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>Subdivision</td>
<td>validation elements to show as dropdown list and data from database (SQL)</td>
<td>web</td>
<td>database</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>UN/LOCODE Code</td>
<td>drop down list to select the 2-tier country + a letter code for the location name. 3 characters will automatically include check to ensure 3 codes and one character are used. new DMR request user has checked that the coordinates are within country and sub-division. Button to select the coordinates for transfer to main form only enabled when both checkboxes are checked</td>
<td>web</td>
<td>database</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>UN/LOCODE Code</td>
<td>on the pop-up window where coordinates are selected by clicking on map, add checkbox to ask user confirmation that new DMR request user has checked that the coordinates are within country and sub-division. Button to select the coordinates for transfer to main form only enabled when both checkboxes are checked</td>
<td>web</td>
<td>database</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>Latitude and Longitude</td>
<td>check if DMR is a duplicate (already exists with the same coordinates and location name should be unique). Include checks for same coordinates but any similar name (i.e., requested name is contained in an existing location name)</td>
<td>web</td>
<td>database</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Improvements</td>
<td>Data Quality/Validation</td>
<td>Latitude and Longitude</td>
<td>all checks/data validation from existing javascript/jquery to be done in c#</td>
<td>new DMR request</td>
<td>web</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

This will require key/licence to be able to user web service from open source map (google map, bing map, etc.) and open source web service (geo names). The free open source service "geo names" is free, but requires user registration. The free version is restricted to 20000 web service calls per day per user and 10000 web service calls per user per hour.

| 20       | Improvements| Data Quality/Validation  | Latitude and Longitude | check that latitude and longitude should be within country/region or subdivision specified. Take into account other countries/land that are outside main country (e.g., UK and Gibraltar, France and French islands) | web            | database     | 10                                      |

| 21       | Improvements| Technical                | Source Code Improvement | all functions should be coming from database and displayed accordingly                             | new DMR request | web            | 2                                       |
| 22       | Improvements| Technical                | Source Code Improvement | check button (which gets list of existing data which included country and location) like the one trying to request should get the data from the database | new DMR request | web            | 5                                       |
| 23       | Improvements| Technical                | Source Code Improvement | add table - use html table and data grid instead of HTML                                          | new DMR request | web            | 5                                       |
| 24       | Improvements| Technical                | Source Code Improvement | Functions for border, fix the number from 8 to 8                                                   | new DMR request | web            | 1                                       |

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Overview of Possible Improvements

• Field Validation
• Integrated Geolocation Referencing
• Data Quality

• User Notifications
• Electronic Data Service
• Data Integration

Easier Geolocation Referencing

Form Field Validation

Two-Factor Authentication

Enter 6-digit code sent to your email address.

1 3 4 ...

CONTINUE
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Challenges

- Complexity in the source code and legacy software development pattern
- Cost of third-party services for mapping platforms, ext. i.e., API quotas QPM (request per day).
- Availability of reference data i.e., sub-division geographical data
- Data integration between the sub-systems
UN/LOCODE Application Re-engineering

Welcome to the UN/LOCODE Data Maintenance Request system.

This is an automated system which enables registered users to submit requests for new UN/LOCODE entries.

The system provides online functions for:
- registration of users and password retrieval
- issue of unique request identification reference number
- requests for single UN/LOCODE entries
- requests for certain changes in existing UN/LOCODE entries
- automatic checking to avoid location and code duplications
- archiving of requests
- a guide to explain the use of the system

If you have used this application earlier and received your username and password, please enter it in the login box and start your session.

If you are using this application for the first time, please click here to register. Registration is free of charge.

For general information on the management and principles of UN/LOCODE (UNECE Trade Facilitation Recommendation No.16) and its Manual, please click here.

Thank you for your interest in United Nations Codes for Trade and Transport Locations (UN/LOCODE).

If you have any questions or suggestions, please send an email to the UN/LOCODE Secretariat.

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Wireframe
DMR Submission Form

https://apps.unece.org/unlocode/
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Wireframe
DMR Summary Page
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This page will display previous requests received by the UN/LOCODE Secretariat from the year 2006 onwards, with unique request-reference numbers and dates of receipt.

Print-History of requests for new entries that marked as ‘Noted’.

No previous ‘Request for new entry’ history found.
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Wireframe
Edit Contact Details Page
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Wireframe
Request For Code Change Page
UN/LOCODE Application Re-engineering