Non-developers Guide to Building Web-based Interactive Mapping, Access and Discovery Tools

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Geospatial Centre
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Building Interactive Mapping and Discovery Tools

Opportunity
• How can we engage the digital user?
• Which resources can be shared online?
• What will the access and discovery experience be like?

Feasibility
• Focus on light weight interactive mapping applications
• Use open source web applications with limited requirements for developer
• Use all resources available in-house (e.g. software, staff, data)
University of Toronto Libraries: Representative Poetry Online Collection on Map
Yale University: Environmental Performance Index

Performance scores range from 0 to 100; Trend Scores range from -50 (the worst trend score) to 50 (the best), with 0 representing no change.
University of Portsmouth (UK): Old Maps Online
Survey of English dialects
Andreas, Isle of Man
Andreas, Isle of Man
John laments the loss of traditional farming techniques since the introduction of farm machinery such as the tractor and combine harvester.

Play this recording
Before

• A long list of printed aerial photograph descriptions
• Users were uncertain about geographic coverage
• Staff had to check the entire collection each time to answer the coverage related questions

After

• Users know our collection coverage before visiting the center
• Staff save time in not having to answer coverage related questions
• Resource for students, researchers, government staff and consultants
Waterloo Region Historical Map

Before

• **Captures information available via library catalogue**
• No map preview function
• No precise coverage information
• Unable to connect historical and current features (and changes in them)

After

• **Can preview map**
• Can determine the map’s exact geographical coverage
• Can connect historical and current features
• Can provide a direct link to map’s PRIMO record
• Increase map’s interest and usage to a wider audience
Municipal Open Data Websites

**Before**
- A list of open data portal websites
- No additional information for the data layers (e.g. number, data type, metadata etc.)

**After**
- One stop shop for all Canadian users – easy to have it organized and keep track of what is available
- Records shown in both map and tabular views
- Has additional information
- Open data website can be found by browsing the map, selecting a subject and searching by keyword
Mapping Application Development Road Map

- Municipal Open Data Website (2011)
- Upper Canada Historical Map (2012)
- Waterloo Region Historical Map (2013)
- Map Catalogue Project (2014)
- [Map Catalogue Project Image]
Development Principles

• Open source
• Light weight
• Supports niche tools and collections
• Low maintenance
• Catered for entry level html developers
Municipal Open Data Website

• Addresses user needs for Canadian municipal geospatial data
• Built on Simile Exhibit API and its map extension
• Inspired by this Simile Exhibit example (Courtenay Interactive Parks and Recreation Map)
• Developed in Summer 2012
SIMILE Exhibit

• An open source publishing framework enables web site developers to create dynamic exhibits of their data without the need to use complex database and server-side technologies.
• Only two files are needed: a html file and a text file which stores the data
• Key elements: Views, Facets and Lenses
SIMILE Exhibit Views

- Billionaires in History
- Timeplot
- Timeline
- Runway
- Multiple View (thumbnails, table, and timeline)
Steps to Develop A SIMILE Exhibit

• Prepare an Excel spreadsheet
• Learn to build a simple SIMILE Exhibit
• Build the exhibit application by copying and modifying html code
• Run and test your SIMILE application
Waterloo Region Historical Interactive Map

To view map properly, you need to install Google Earth Plug-in.

Select a Map

<table>
<thead>
<tr>
<th>Map Description</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map of North Dumfries Township</td>
<td>1877</td>
</tr>
<tr>
<td>Map of the County of Waterloo Half A</td>
<td>1861</td>
</tr>
<tr>
<td>Map of the County of Waterloo Half B</td>
<td>1861</td>
</tr>
<tr>
<td>Map of the Town of Berlin</td>
<td>1879</td>
</tr>
<tr>
<td>Map of the Village of Galt</td>
<td>1867</td>
</tr>
<tr>
<td>Map of the Village of Waterloo</td>
<td>1855</td>
</tr>
</tbody>
</table>

Map Transparency Slider: 100%

- Toggle Street Layer

PROJECT DOCUMENTATION

Map of the Village of Waterloo (1855)
A historical map of the Village of Waterloo and part of the town of Berlin. Scale indeterminant.
Historical Map Development Summary

• Inspired by Brock University Library’s War of 1812 in Maps project
• Developed in 2012 Fall term with the help of two co-op students
• Html codes built on Google Earth API and Javascript
Four key elements

- Historicmap.html (built on Javascript and JQuery)
- Historicalmaps.js (built on Google Earth API)
- List table
- Data - SuperOverlay KMLs
<table>
<thead>
<tr>
<th>Year</th>
<th>Map Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1853</td>
<td>Town of Berlin</td>
</tr>
<tr>
<td>1856</td>
<td>Town of Berlin</td>
</tr>
<tr>
<td>1875</td>
<td>Berlin</td>
</tr>
<tr>
<td>1879</td>
<td>Berlin</td>
</tr>
<tr>
<td>1908</td>
<td>Map of North Dumfries Township</td>
</tr>
<tr>
<td>1914</td>
<td>City of Greater Berlin</td>
</tr>
<tr>
<td>1923</td>
<td>City of Kitchener and Town of Waterloo</td>
</tr>
</tbody>
</table>
Historicalmaps.js

switch (layerKey) { // Switch statement to deal with multiple cases of layerKey.
    case 1:
        la.set(43.458930, -80.493497, 0, ge.ALTITUDE_RELATIVE_TO_GROUND, -49, 3, 5658);
        textjection = "<b>Town of Berlin (1853)</b><br/>A historical map of part of the Town break;

Reference:
https://developers.google.com/kml/documentation/kmlreference#lookat
Data Preparation

- Scan a historical map piece by piece
- Mosaic scanned images (with Photoshop)
- Georeference the map (with Esri ArcMap Desktop)
- Create a super-over KML layer (with Google Earth Pro)
Prepare a Super-Overlay KML file

<table>
<thead>
<tr>
<th>Name</th>
<th>Date modified</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1855_Waterloo_CW.kml</td>
<td>11/26/2012</td>
<td>KML File</td>
</tr>
<tr>
<td>1855_Waterloo_CW_9 317_141.kmz</td>
<td>11/26/2012</td>
<td>KMZ File</td>
</tr>
<tr>
<td>1855_Waterloo_CW_10 635_282.kmz</td>
<td>11/26/2012</td>
<td>KMZ File</td>
</tr>
<tr>
<td>1855_Waterloo_CW_10 635_283.kmz</td>
<td>11/26/2012</td>
<td>KMZ File</td>
</tr>
<tr>
<td>1855_Waterloo_CW_11 1271_565.kmz</td>
<td>11/26/2012</td>
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<tr>
<td>1855_Waterloo_CW_11 1271_566.kmz</td>
<td>11/26/2012</td>
<td>KMZ File</td>
</tr>
<tr>
<td>1855_Waterloo_CW_12 2542_1131.kmz</td>
<td>11/26/2012</td>
<td>KMZ File</td>
</tr>
<tr>
<td>1855_Waterloo_CW_13 5084_2263.kmz</td>
<td>11/26/2012</td>
<td>KMZ File</td>
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<tr>
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<td>11/26/2012</td>
<td>KMZ File</td>
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<tr>
<td>1855_Waterloo_CW_14 10170_4527.kmz</td>
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<td>11/26/2012</td>
<td>KMZ File</td>
</tr>
</tbody>
</table>

Super-Overlays: https://developers.google.com/kml/documentation/kml_21tutorial#superoverlays
Airphoto Index Map Summary

- Provides the library's 55,000 aerial photography and photomap coverages
- Developed in 2011 and updated in 2012
- The code is based on OpenLayers
- Data in KML format
Three key elements

- **Index.html** – contains JavaScript to run on Openlayers and Google Maps APIs
- **KML files** – coverage boundaries
- **Data.js** - the data table. It indicates the URL to each KML, set the default view extent when selecting the index and shows the label in the dropdown menu.

```javascript
var data = {
    "index": [
        {
            "link": "Airphoto_KML/AP1930s.kml", "label": "Airphoto Indexes: 1930's",
            "bottomleft_x": -9003859.55, "bottomleft_y": 5207360.11,
            "topright_x": 8776787.06, "topright_y": 5432855.03,
        },
        {
            "bottomleft_x": -9003752.20, "bottomleft_y": 5322703.32,
        },
    ]
};
```
KML File Preparation

- Use a digital camera to capture all air photo index maps’ images
- Georeference the map index (ArcGIS)
- Delineate coverage polygon shapefiles (ArcGIS)
- Convert shapefiles into KML files (ArcGIS)
- Simple HTML coding on KML file (Google Earth)
Impact Seen from Google Analytics Statistics
(September 1, 2012 - March 1, 2013)

- The traffic accounts for 4% of the total number of Geospatial Center’s page visits
- Users spent more time on these three websites
- Users found the information and had no need in visiting other pages

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page path level 4</td>
<td>Pageviews</td>
<td>Unique Pageview</td>
<td>Avg. Time on Page</td>
<td>Bounce Rate</td>
<td>% Exit</td>
<td></td>
</tr>
<tr>
<td>/photos/airphoto_index.html</td>
<td>455</td>
<td>338</td>
<td>289.94</td>
<td>70.25%</td>
<td>69.45%</td>
<td></td>
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<tr>
<td>/digital/historicmaps.html</td>
<td>373</td>
<td>223</td>
<td>253.65</td>
<td>63.11%</td>
<td>42.09%</td>
<td></td>
</tr>
<tr>
<td>/digital/tutorials.html</td>
<td>681</td>
<td>537</td>
<td>250.71</td>
<td>77.53%</td>
<td>65.05%</td>
<td></td>
</tr>
<tr>
<td>/cart/fire_plans.html</td>
<td>238</td>
<td>208</td>
<td>216.67</td>
<td>72.36%</td>
<td>60.50%</td>
<td></td>
</tr>
<tr>
<td>/digital/opendata.html</td>
<td>1077</td>
<td>708</td>
<td>188.74</td>
<td>62.29%</td>
<td>47.63%</td>
<td></td>
</tr>
<tr>
<td>/digital/MapsAtlasesOnline.html</td>
<td>3289</td>
<td>2879</td>
<td>168.76</td>
<td>84.55%</td>
<td>73.82%</td>
<td></td>
</tr>
</tbody>
</table>
Development Guidelines

• Build first and refine later
• Separate data from code
• Light weight application
• Understand your capability
• Involve others
Needs Assessment

- Is there unique information that you want to share online?
- Is there a better way of sharing information with the user?
- Who will be in your project group and in what role? (e.g. sponsor, stakeholder, project manager)
- Do you have the resources (e.g. staff, software, hardware)?
- Do you need help from other departments?
- Is there any website design standard that you must follow? (website template, web accessibility)
Data Development

• Are your data in digital format?
• How many data do you have?
• Do you need to transform the digital data format?
• What software is required for data transformation?
• Where do you park the data?
Code Development

- View (table, map, timeline, chart)
- What open source API will be used?
- Who will be the developer?
- What is the time frame?
- Is it easy to maintain?
- Do you have code documentation?
Thank you

Questions?