University of British Columbia
School of Library, Archival and Information Studies
Master of Library and Information Studies

LIBR 594 - Assignment 3

IIIF: Use Cases for UBC Open Collections

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Introduction

This project aims to explore the potential uses of the International Image Interoperability Framework for UBC Open Collections. IIIF provides an interoperable technology and community framework for image delivery. It provides uniform access to images hosted in different repositories, and enables viewing, comparing, manipulating and annotating images through a variety of image viewing clients. Its main value consists in enabling collaboration with other institutions and making possible linked data initiatives. IIIF comprises four APIs:

1. Image API: enables access to image pixels and image manipulation.
2. Presentation API: structures images and metadata for a human viewing (e.g. informs the sequence of the pages of a book). In this API content is brought together from distributed systems via annotations. That content might include images, often with an IIIF Image API service to access them, audio, video, rich or plain text, or anything else.
3. Authentication API: restricts or enables differential access to resources.
4. Search API: provides search within resources, on the annotation layer that may include full text, transcriptions, translation, commentary, description, tagging or other annotations about the object.

The table below summarizes the IIIF features that are currently implemented in UBC Open Collections.

Table 1 - IIIF Features implementation in Open Collections

	Implemented	**Not implemented**
Image API	- Fast, rich, zoom/pan delivery of images. - Manipulation of size, scale, region of interest, rotation, quality and format. - Cite and share (stable image URIs). - Embed images in blogs and web pages.	
Presentation API	- UBC enhancement for word positions, for highlighting search results.	- Images annotations.

Search API	The search API is not implemented, but our custom viewer has a search feature that allows: - Searching OCR generated text within a textual resource. - Searching transcribed content, provided by scholars.	- Searching multiple streams of content, such as the translation or edition, rather than the raw transcription of the content, to jump to the appropriate part of an object. - Searching on sections of text, such as defined chapters. - Searching for user provided commentary. - Discovering similar sections of text to compare either the content or the object. - Providing autocomplete for search queries.
Authentication API		- Restricts/allows for differentiate access to resources (login).

This report describes the development process of some proof of concept web applications created to demonstrate the potential applications of IIIF to OC, and provides references for further examples of applications possible with that technology.

Comparing images

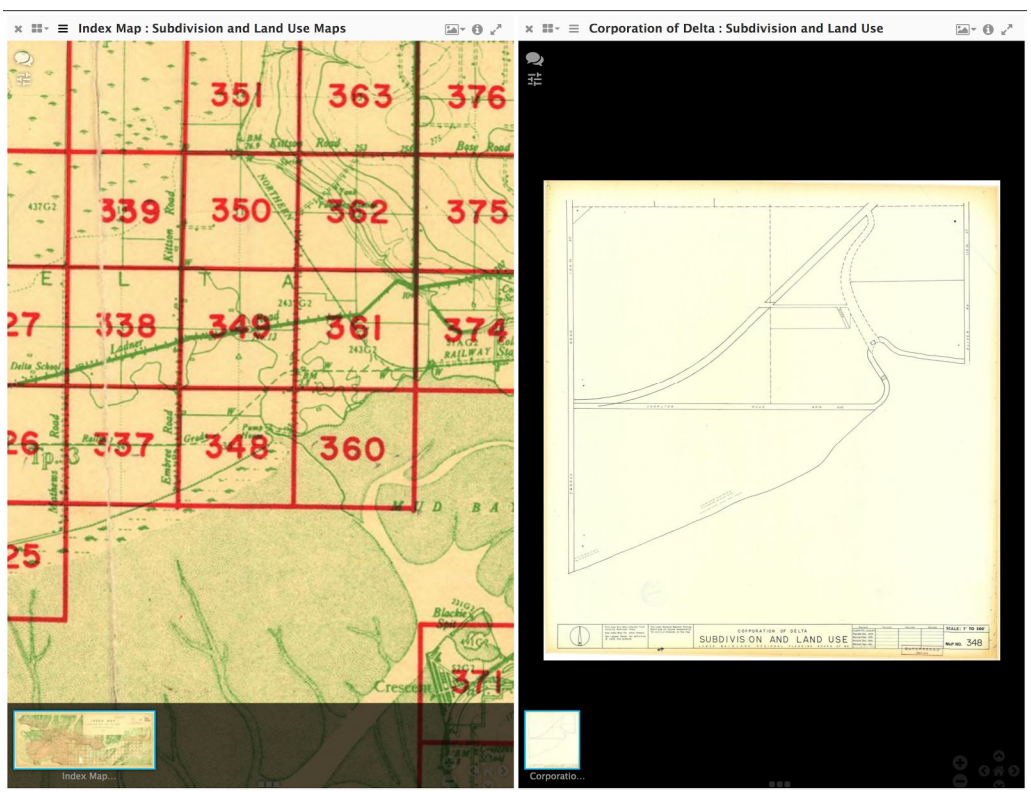
[Greater Vancouver Regional District Planning Department Land Use Maps]

This collection contains maps of the metro Vancouver region. There are two index maps that serve as a reference to localize the detailed sections:

- [Index Map : Subdivision and Land Use Maps]
- [Index - Land Use Series]

Multiple slot viewer

A multiple slot viewer such as Mirador could load the index map and the detailed section simultaneously, making it easier for the user to understand the context of each subdivision map. The example below shows, on the left slot, the region of the index map that contains the detailed section number 348, depicted on the right slot.



How to do it:

This demo was built using Mirador demo: http://projectmirador.org/demo/.

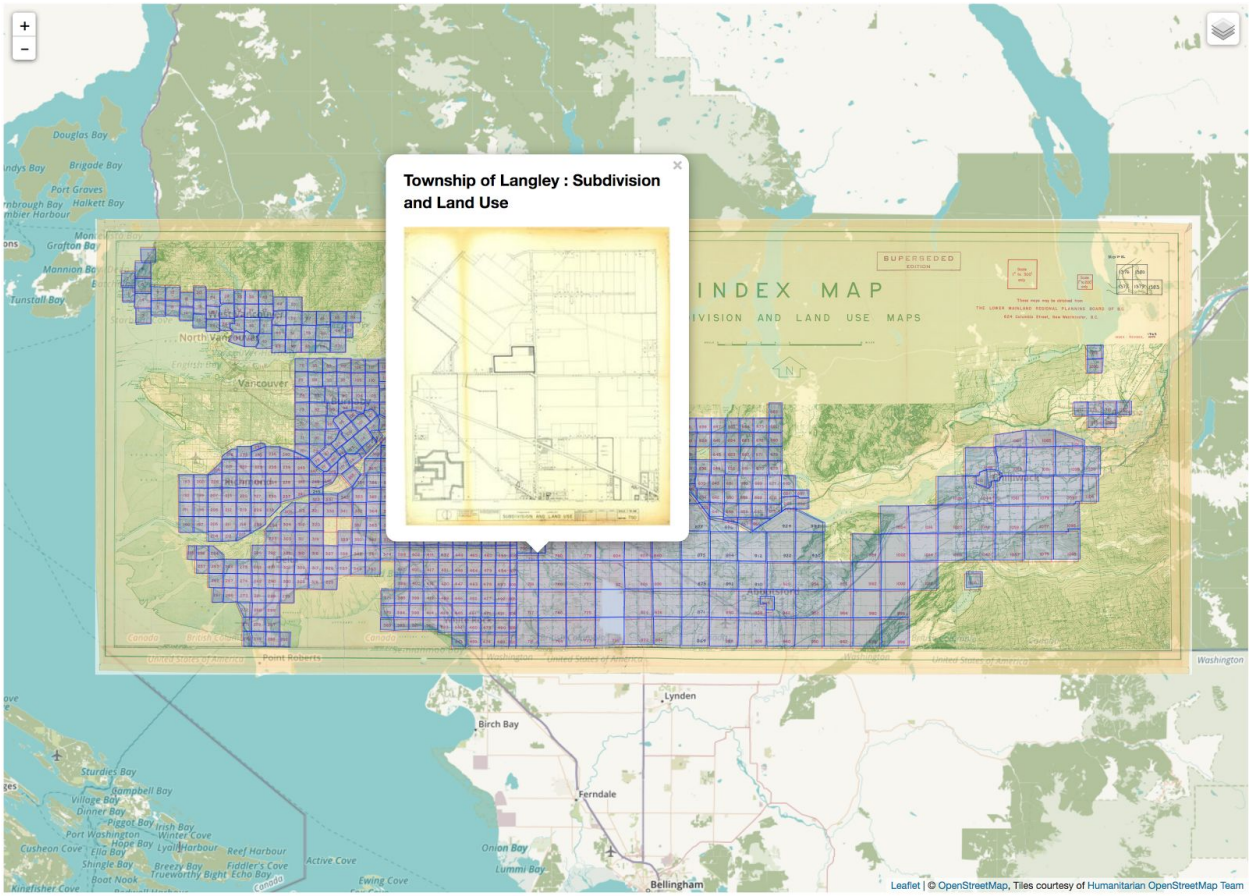
Images can be added by clicking on the upper left slot icon > replace object > Add new object from URL > Enter the manifest URL for the object. The manifest URLs of Open Collections items under the Embed tab on the item's page.

Interactive Index Map

Leaflet-IIIF could be used to build an interactive index map such as the one in this demo:

Link for the demo (UBC on campus VPN connection only):
https://leaflet.library.ubc.ca/

GitHub Repository:
https://github.com/carolamigo/ubc_gvrd_maps



How to do it:

- Install QGIS (http://www.qgis.org/en/site/).
- Georeference the Index Map image following the instructions on this link: http://www.qgistutorials.com/en/docs/georeferencing_basics.html.
- Create a vector layer with an attribute “map_id”, following the instructions here: http://docs.qgis.org/2.18/en/docs/training_manual/create_vector_data/create_new_vector.html#basic-fa-the-layer-creation-dialog
- Draw polygons digitizing the tiles information on the Index Map (red lines). On the vector layer, toggle the edit on on the top bar (pencil icon) and click on the “Add Feature” button. Use “control” to close the polygon. Use the attribute map_id to identify the polygons according to the tile number.
- Toggle the edit off on the pencil icon. Left-click on the vector layer name on the left sidebar and save as GeoJSON, CRS (EPSG:4346, WGS 84). Name the file gvrd_partial.

- Open the GeoJSON file gvrd_partial in Open Refine, parsing data as line based text files.

- Rename Column 1 to “feature”. We want now to extract the map_id from each line. Add a new column named “map_id” based on this column, using the following expression:

  ```
  value.replace(/[^\d]/, " ")
  ```

- Trim leading and trailing whitespaces of the “map_id” column by selecting “Edit cells” > “Common transforms” > “Trim leading and trailing whitespaces”.

- On the “map_id” column, select “Edit cells” > “Split multi-valued cells”. The separator is “ ” (empty space) and select maximum of two columns. Delete the second column from the split, keeping just the first one with the map ids. Rename it to map_id.

- Delete the number “1” value from the first cell, since it is not a map id. This spreadsheet is ready to use.

- Download collection metadata using the Open Collections Research API. A php script to batch download is provided at OC API Documentation page > Download Collection Data. This script returns a folder containing one RDF file per collection item (or XML, JSON, any format preferred). We are going to use N-triples because the file is cleaner (no headers or footers), what makes the merging easier later. Edit the script following the instructions on the documentation page and run it using the command:

  ```
  $ php collection_downloader.php --cid gvrdmaps --fmt ntriples
  ```

- Merge the files using the Unix cat command:

  ```
  $ cat * > merged_filename
  ```

- Convert merged file obtained to a tabular format. Import project in Open Refine using the RDF/N3 files option. No character encoding selection is needed.

- This dataset has more than one set of maps, so we need to filter just the ones that belong to the index map we are working with. Facet column “http://purl.org/dc/terms/publisher” by text. Filter only "Lower Mainland Regional Planning Board of B.C." values.

- To extract just the map numbers, create a new column named “map_id” based on the column “http://purl.org/dc/terms/identifier”, using the expression:

  ```
  value.replace(/[^\d]/, " ")
  ```

  Check the results by faceting the column. Just unique values should show up, no numbers missing.

- To reconcile the values of the geojson spreadsheet with the current spreadsheet, create a new column named “geojson” based on the column “map_id” using the expression:

  ```
  forEach(cell.cross("gvrd_partial",
  "map_id"),r,forNonBlank(r.cells["feature"].value,v,v,"")).join
  ("|")
  ```

- Build IIIF image urls. Create a new column named “iiif_url” based on the column “http://www.europeana.eu/schemas/edm/isShownAt”, using the expression:

  ```
  "http://iiif.library.ubc.ca/image/cdm.gvrdmaps."+value.substri
  ng(10,19).replace(".","-")+".0000" +
  "/full/300,300/0/default.jpg"
  ```

- Remove double quotes and @en from title. Create a new column named “title” based on the column “http://purl.org/dc/terms/title”, using the expression:

  ```
  value.replace("\"", " ").replace("@en"," ")
  ```

- Add all values to geojson string. Split column geojson by using separator “,“, maximum 3 columns. Transform split column 2 cells using the following expression:

  ```
  value.replace(" }", "") + " , \"subject\": \"" +
  cells["subject"].value + "\" , \"title\": " +
  cells["title"].value + " , " + "\"purl\": \"" +
  cells["iiif_url"].value + "\" }"
  ```

- Merge the three columns back together by creating a new column named geojson_code using the following expression:

  ```
  cells["geojson 1"].value + " , " + cells["geojson 2"].value +
  " , " + cells["geojson 3"].value
  ```

Check the results by faceting the column. Any error on the syntax will prevent the application of working.

- Export the geojson_code column back to the original geojson text file. Export > Custom tabular exporter. Select only the geojson_code column, do not output column headers or empty rows. On the download tab, select "Excel" and click download. Open the excel file, remove the comma from the end of the last line, copy the column, and paste it in the appropriate position in the original geojson text file, replacing the old code. Save it as gvrd_full.geojson. This file can be debugged with the help of a geojson debugger such as https://jsonlint.com/.

- Set up leaflet in your machine, following the instructions here: http://leafletjs.com/download.html (Building Leaflet from the Source).

- Use the code provided on Appendix A (also on the GitHub repo) to run the application.

Challenges:

The scanned index map doesn't match exactly the digital map used as a basis for this web application. QGIS provide us with the option of distorting the image to make it fit the map as best as possible. However, as we wanted to use IIIF for all images involved in this web application, this would mean replacing the original map image by the distorted one in Open Collections. Although the distortion would be minimal, the digital representation would not be as true as possible to the cultural heritage object we have in our stacks anymore. We opted for a combined approach, using the original image but drawing the polygons following the contours of the deformed map. The user has the option to turn the index map view off to better see the map under it.

Another challenge was related to the digitization of the polygons. As the index map doesn't follow a regular grid, they had to be drawn by hand, one by one. This potentialized the human error factor in this project, with some degree of imprecision on the drawing and misnumbered polygons.

Finally, debugging the geojson file was tricky since some lines had duplicate values, extra {} or misplaced commas. The debugger tool mentioned in the process description was very useful to help us spot the problematic lines and fix them.

References:

https://maptimeboston.github.io/leaflet-intro/
http://joshuafrazier.info/leaflet-basics/

https://geekswithlatitude.readme.io/docs/leaflet-map-with-geojson-popups
http://leafletjs.com/examples/quick-start/
https://github.com/Leaflet/Leaflet/blob/master/debug/map/image-overlay.html
http://leafletjs.com/reference-1.2.0.html#imageoverlay
http://www.qgistutorials.com/en/#
http://leafletjs.com/examples/geojson/

Aggregating collections

WWI & WWII Posters

This collection contains fifty nine posters, broadsides, and ephemera from World War I and II, published in Canada, Belgium, England, France, Germany, and the United States. There are similar collections across the web also using IIIF that could be aggregated in a web application, such as:

- World Digital Library War Posters
  https://www.wdl.org/en/search/?additional_subjects=War%20posters

- University of Washington War Poster Collection
  https://content.lib.washington.edu/postersweb/index.html
  http://digitalcollections.lib.washington.edu/cdm/search/collection/posters

There are collections about WW Posters available online that do not use IIIF, making them harder to integrate with collections from other institutions. Some examples:

- https://umedia.lib.umn.edu/warsearch
- http://www.library.unt.edu/collections/government-documents/world-war-posters

For our demo we integrated the collections from World Digital Library (which contains collections from Library of Congress, British Library, among others), University of Washington and University of British Columbia, using Mirador viewer. The WW Posters collection from University of Washington is made available on a OCLC hosted CONTENTdm website and is using the built in IIIF implementation of CONTENTdm.

Link for the demo (UBC on campus VPN connection only):
https://mirador.library.ubc.ca/

GitHub Repository:
https://github.com/carolamigo/ubc_mirador_WWposters

Change Layout Full Screen

Close

Filter objects: Add new object from URL: http://... Load

Lend him a hand, buy liberty bonds
University of British Columbia 1 item

Proclamation. Le Gouverneur du Hainaut. Aux autorités et fonctionnaires de l'Etat et de la Province, aux administrations communales, aux habitants de la
University of British Columbia 1 item

Americans all poster, United States, World War I
University of Washington Libraries 1 item

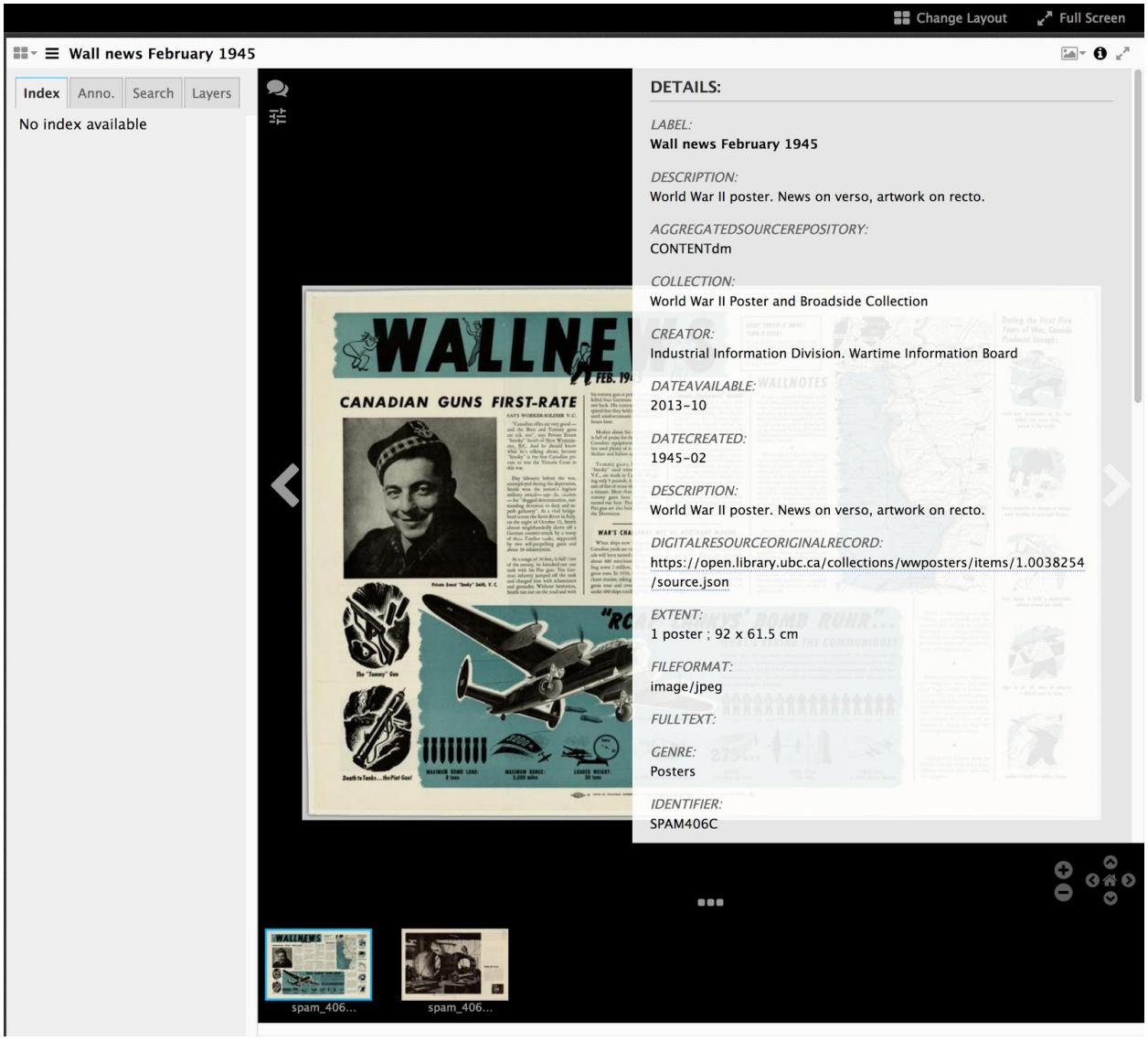
Avis. Circulation. Pour circuler sur le territoire du canton, les habitants doivent s'adresser à l'autorité locale pour des "laissez-passer" ...
University of British Columbia 1 item

Save for the brave poster, Great Britain, World War II
University of Washington Libraries 1 item

Down with Bolshevism. Bolshevism Brings War and Destruction, Hunger and Death
World Digital Library 1 item

Subscribe to the War Loan! The Army and Navy Expect it from You!
World Digital Library 1 item

The Battle of Marijampolė
World Digital Library 1 item



How to do it:

- Install Mirador viewer following the instructions here: https://github.com/ProjectMirador/mirador

- Go to the root folder of the Mirador installation in your machine and open the file index.html (https://github.com/ProjectMirador/mirador/blob/develop/index.html). We need to replace the manifests of this template file with the manifests of our collections.

- To get manifests for UBC collection, download collection metadata using the Open Collections Research API. A php script to batch download is provided at OC API Documentation page > Download Collection Data. This script returns a folder containing one RDF file per collection item (or XML, JSON, any format preferred). We are going to use N-triples because the file is cleaner (no headers or footers), what makes the merging easier later. Edit the script following the instructions on the documentation page and run it using the command:

  ```
  $ php collection_downloader.php --cid wwposters --fmt ntriples
  ```

- Merge the files using the Unix cat command:

  ```
  $ cat * > merged_filename
  ```

- Convert merged file obtained to a tabular format. Import project in Open Refine using the RDF/N3 files option. No character encoding selection is needed.

- Build IIIF manifests. Create a new column named “manifest” based on the column “http://www.europeana.eu/schemas/edm/isShownAt”, using the expression:

  ```
  "https://iiif.library.ubc.ca/presentation/cdm.wwposters."+valu
  e.substring(10,19).replace(".","-")+".0000" + "/manifest"
  ```

- Create the code line ready to be inserted in the index.html file by creating a new column named “manifest_code” based on the “manifest” column, using the expression:

  ```
  "{ \"manifestUri\": \""+value+"\", \"location\": \"University
  of British Columbia\"},"
  ```

- Export the “manifest_code” column by clicking on Export > Custom tabular exporter. Select only the “manifest_code” column, do not output column headers or empty rows. On the download tab, select “Excel” and click download. Open the excel file, copy the column, and paste it in the appropriate position in the original index.html file, replacing the old code.

- To get manifests from the University of Washington Collection, get page source code from the link http://digitalcollections.lib.washington.edu/cdm/search/collection/posters, and import as line based data in OpenRefine.

- Create a new column named “item_id” using the expression below to extract item IDs:

```
value.match(/.*item_id=\"(\d\d).*/).join("")
```

- Trim leading and trailing whitespaces of the “item_id” column by selecting “Edit cells” > “Common transforms” > “Trim leading and trailing whitespaces”.

- Build the manifest code by creating a new column named “manifest_code” based on the “item_id” column using the following expression:

```
"{ \"manifestUri\":
\"http://digitalcollections.lib.washington.edu/digital/iiif-in
fo/posters/"+value+"\", \"location\": \"University of
Washington Libraries\"},"
```

- Export the “manifest_code” column by clicking on Export > Custom tabular exporter. Select only the “manifest_code” column, do not output column headers or empty rows. On the download tab, select “Excel” and click download. Open the excel file, copy the column, and paste it in the appropriate position in the original index.html file, below UBC manifests.

- To get item ids from the Library of Congress collection, use the following microdata extractor http://microdata-extractor.improbable.org/ on the following URL: https://www.wdl.org/en/search/?additional_subjects=War%20posters. Import the resulting JSON file to Open Refine.

- Create a new column names “item_id” based on the column “_ - properties - url - url”, using the following expression:

```
value.replace(/[^\d]/, " ")
```

- Trim leading and trailing whitespaces of the “item_id” column by selecting “Edit cells” > “Common transforms” > “Trim leading and trailing whitespaces”.

- Build the manifest code by creating a new column named “manifest_code” based on the “item_id” column using the following expression:

```
"{ \"manifestUri\":
\""+"https://www.wdl.org/en/item/"+value+"/manifest"+"\",
\"location\": \"World Digital Library\"},"
```

- Export the “manifest_code” column by clicking on Export > Custom tabular exporter. Select only the “manifest_code” column, do not output column headers or empty rows. On the download tab, select “Excel” and click download. Open the excel file, **remove the comma from the end of the last line**, copy the column, and paste it in the appropriate position in the original index.html file, below University of Washington manifests.

- Open the index.html file on your browser to see the final result. Click on Add item to see the menu with options.

Challenges:

For obtaining University of Washington item ids, we looked initially for an API that would provide us with the items metadata. It looks like CONTENTdm OCLC hosted websites have an API, according with the following links:

- https://www.oclc.org/developer/develop/web-services/content-dm-api.en.html
- https://www.oclc.org/support/services/contentdm/help/customizing-website-help/other-customizations/contentdm-api-reference.en.html

But there is little documentation available and we could not find out how to access it. So the solution was to scrape the website data extracting item IDs from the source code of the collections page.

Another challenge was regarding the manifest URL pattern. The manifest URLs were initially built using the syntax provided here:
https://www.oclc.org/developer/news/2017/image-open-access.en.html

Resulting on: http://digitalcollections.lib.washington.edu/digital/iiif-info/posters/70

However, when on the server, the Mirador application would not read those URLs and as a result the objects from University of Washington were not showing up. We opened one of the manifests and found out that they had a different @id, following another URL pattern:

https://cdm16786.contentdm.oclc.org/digital/iiif-info/posters/70/manifest.json

Our second try with the new URL pattern was successful.

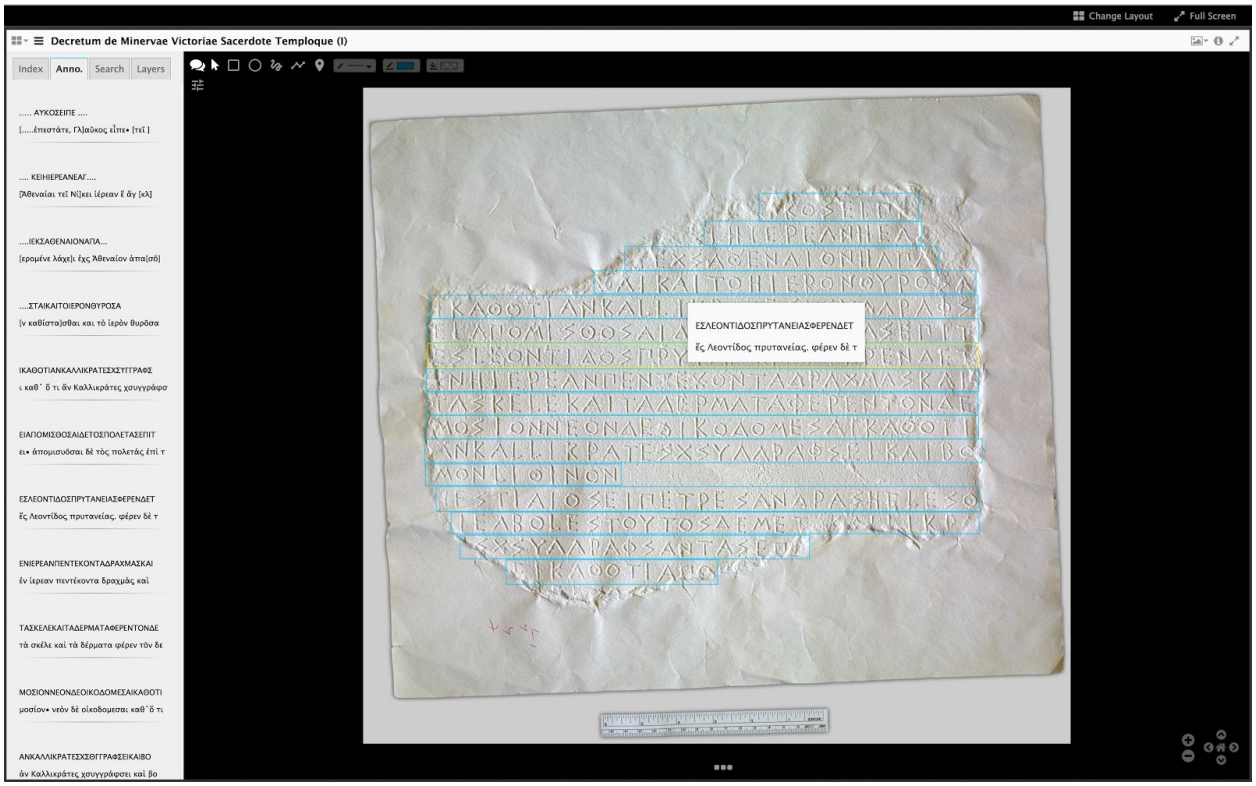
Annotations

[Epigraphic Squeezes - Decretum de Minervae Victoriae Sacerdote Temploque (I)]

Annotations could be used to show translations directly on the image for the collection above. The same could be some with other OC collections such as [Royal Fisk Gold Rush Letters] and [Emma Crosby Letters].

Link for the demo (UBC on campus VPN connection only):
https://epigraphic.library.ubc.ca/

GitHub Repository:
https://github.com/carolamigo/ubc_mirador_epigraphic



How to do it:

- Install Mirador viewer following the instructions here: https://github.com/ProjectMirador/mirador

- Set up a local web server using Node, following the instructions here: http://ronallo.com/iiif-workshop/preparation/web-server.html

- Run the server on the terminal by going to directory where it is installed and entering:

  ```
  http-server -p 3000 --cors
  ```

- Get the manifest for the item to be annotated by going to the item page in Open Collection and clicking on the IIIF manifest link in the "embed" tab:

  http://iiif.library.ubc.ca/presentation/cdm.squeezes.1-0050935/manifest

- Save the manifest as a JSON file in the folder where Mirador and the web server is running. Open the JSON file using a text editor such as Sublime or Atom. Replace everything on line 351 and below for this code (check appendix B or GitHub repo for complete json file edited):

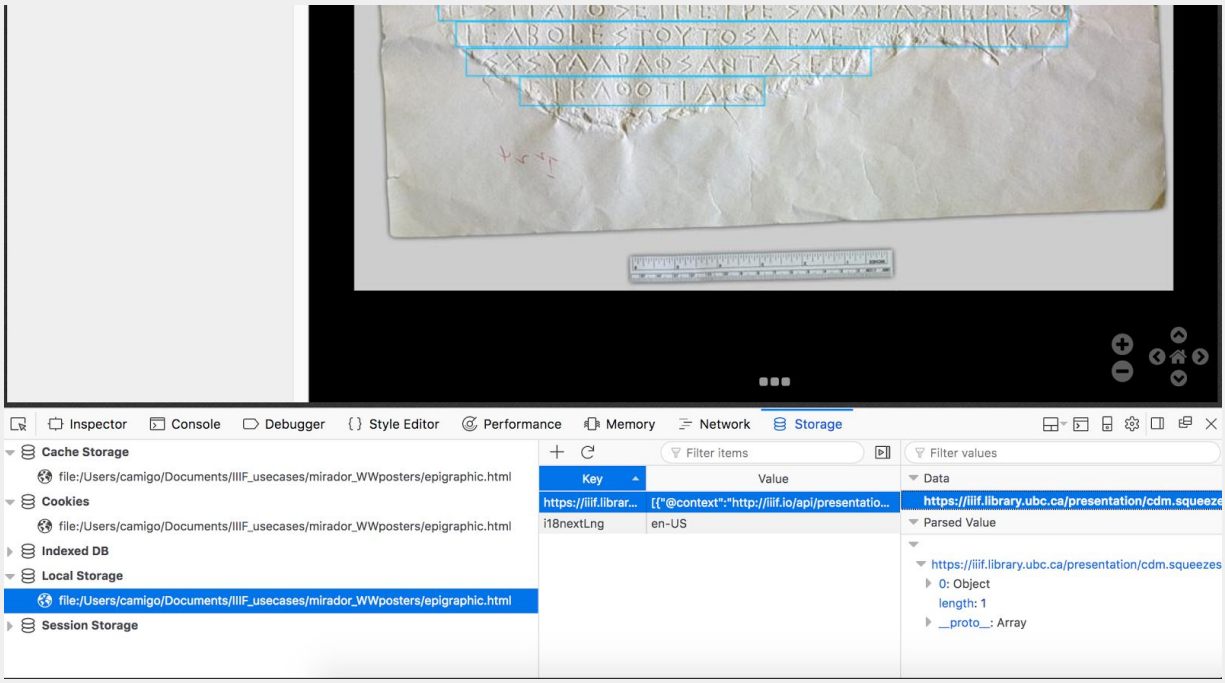
```
            "on":
"https://iiif.library.ubc.ca/cdm.squeezes.1-0050935/canvas/p0"
            }
            ],
            "otherContent": [
            {
            "@id": "http://localhost:3000/annotation_list.json",
            "@type": "sc:AnnotationList",
            "label": "Text of this page"
            }
            ]
      }
      ]
      }
  ],
  "description": "[No description]",
  "@context": "http://iiif.io/api/presentation/2/context.json",
  "@id": "http://localhost:3000/epigraphic_manifest_edited.json",
  "@type": "sc:Manifest"
```

```
}
```

- By using a text editor such as Sublime or Atom, create an HTML file named “epigraphic.html”. Paste in the code available on Appendix C (also on the GitHub repo).

- Open “epigraphic.html” on your browser. Click on “add item”, open the item, and toggl annotations on (button on the left upper corner). Draw your annotations on your image using this feature of Mirador.

- The annotations will be stored in the local cache of your browser until it is closed. We need to retrieve the annotations from the local cache. In Firefox, on the Mirador window with the annotations, go to Tools > Web Developer > Inspector > Storage tab > Local storage. Select the value line and then the data line on the right. Copy and paste the data on a text editor such as Sublime or Atom, saving it as a JSON file named “annotation_list.json”. Remove the URL at the beginning of the code, the double quotes and square brackets (from beginning and end), as the code has to start at `{"@context` (...). A version of the final annotation code, easier to read, is available on Appendix D (also on the GitHub repo) for reference.



- Open the epigraphic.html file on your browser to see the final result. Click on Add item to see the menu with options.

Challenges:

Finding the easiest way to add annotations to the image was the main challenge of this project. After some research it became clear that using the annotation tool of Mirador would be the best option, but we needed to find a way to extract the data from the local storage of the browser in order to build the annotation_list.json file. We first tried to extract annotations from Mirador using a parsing tool provided here (http://www.darthcrimson.org/hacking-mirador-workshop/annotate.html), but it did not work as expected, probably because we were working on a local server. The solution found was to extract the data manually from the browser using the inspector tool. Note that, although the syntax is correct, the code extracted from the local storage doesn't follow exactly the same pattern of the annotation code suggested in the tutorial we used as a reference, available in this link:
http://ronallo.com/iiif-workshop/presentation/image-annotation.html.

References:

http://ronallo.com/iiif-workshop/presentation/image-annotation.html
http://iiif.io/api/presentation/2.1/#image-resources
http://darthcrimson.org/hacking-mirador/
http://www.darthcrimson.org/hacking-mirador-workshop/annotate.html

Annotation Use Cases

The examples below show how annotations could be useful for STEM, music sheets and medieval manuscripts.

Cellxplorer on Mirador

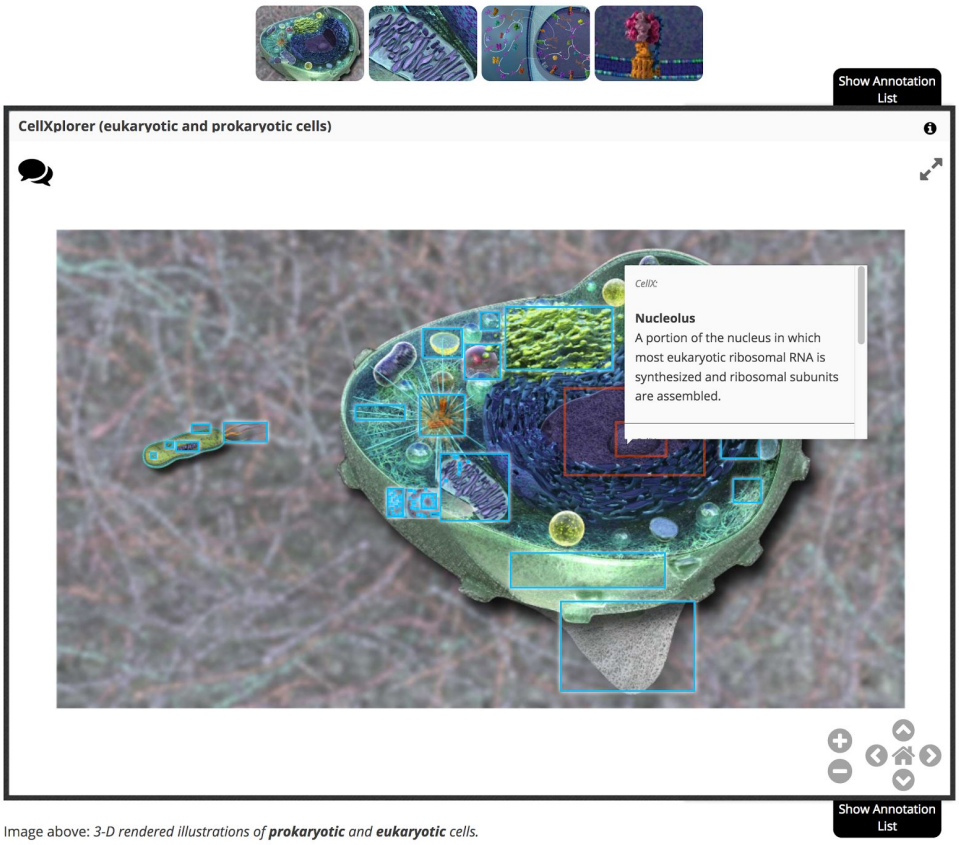
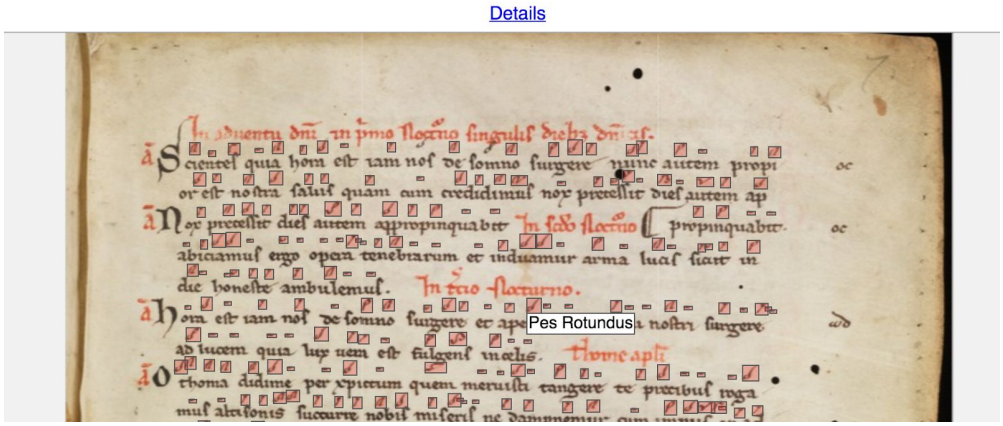


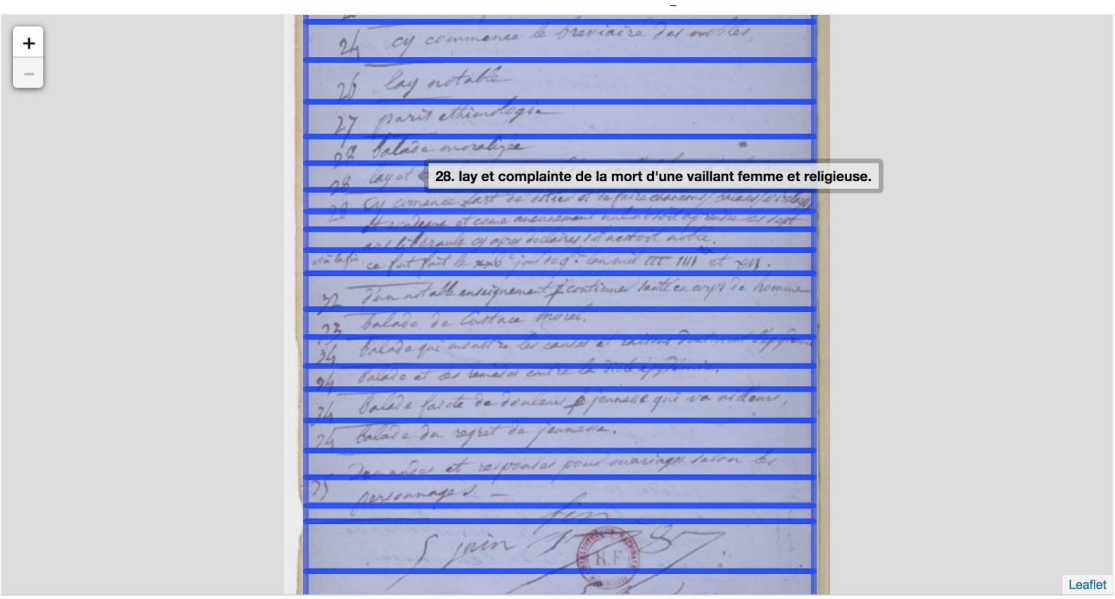
Image above: *3-D rendered illustrations of **prokaryotic** and **eukaryotic** cells.*

IIIF Annotations on Diva.js

St. Gallen, Stiftsbibliothek, Cod. Sang. 390



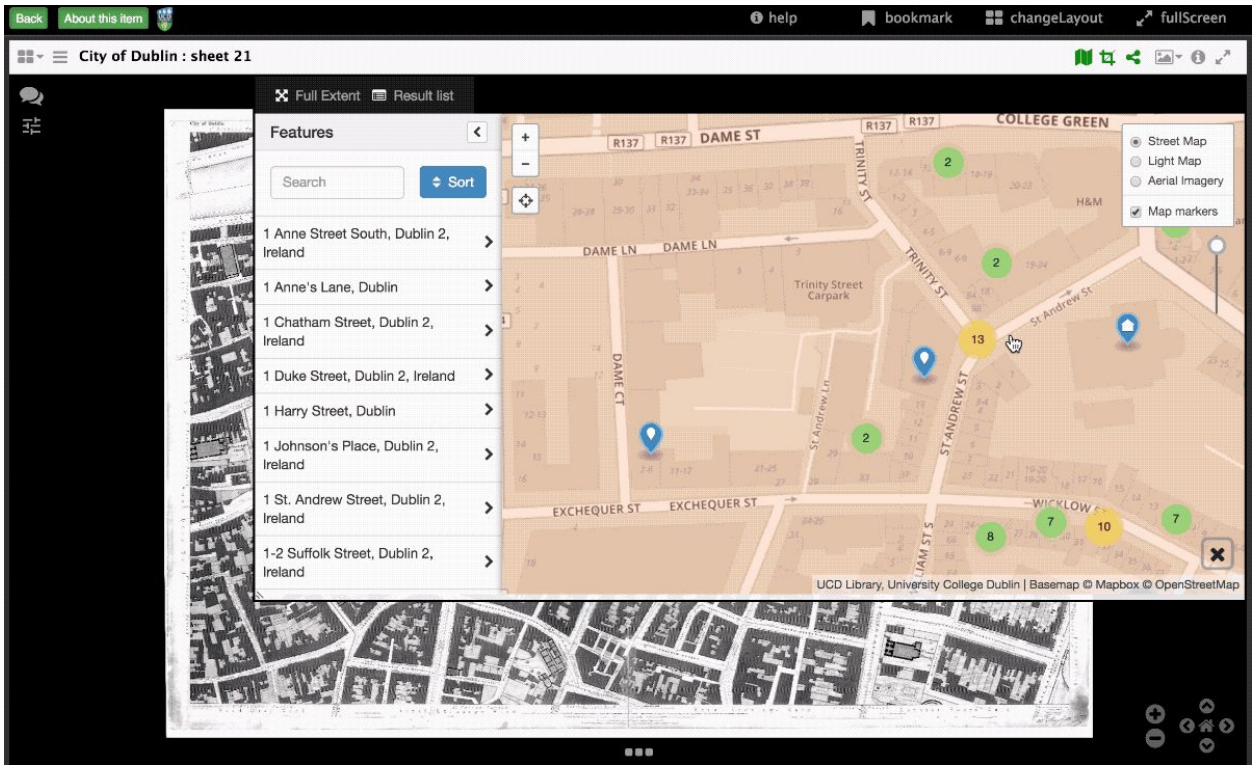
Leaflet annotation example



Displaying Geolocation

A plugin for Mirador allows for the use of a map layer with collection items locations, if geolocation information is available as it is the case for [MacMillan Bloedel Limited fonds] and [UBC Institute of Fisheries Field Records]. See example below.

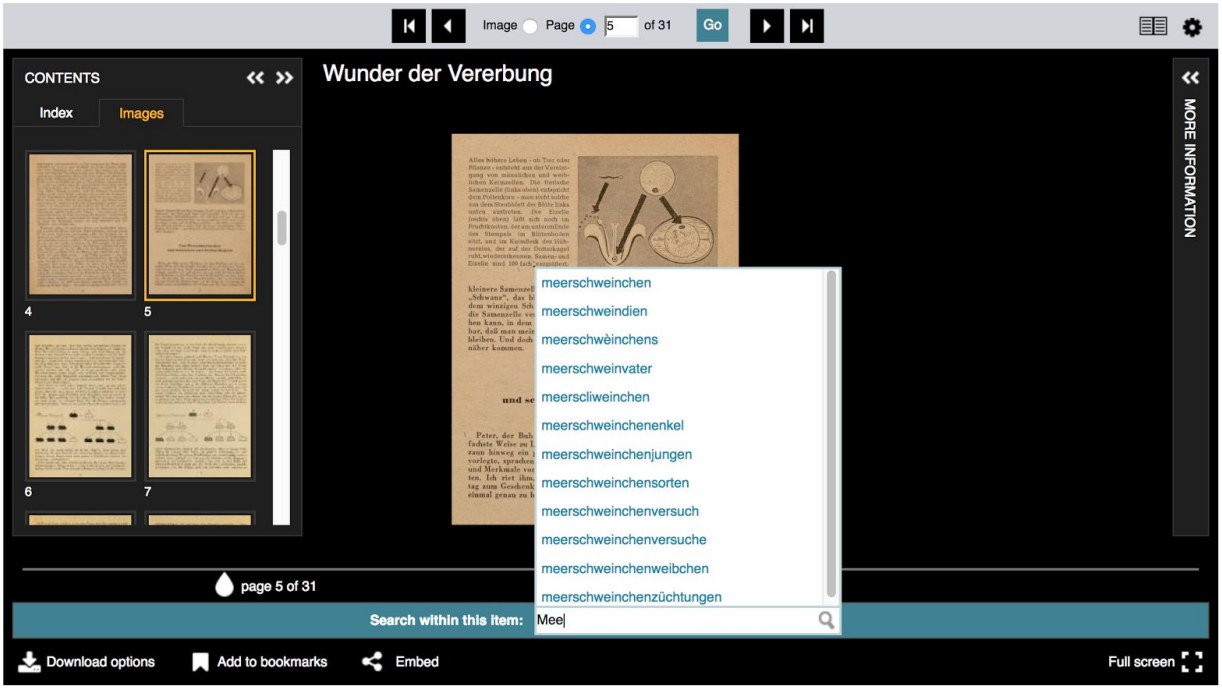
Mirador Georeferencing Plugin
https://github.com/jbhoward-dublin/mirador-plugins-ucd



Autocomplete on searches

Autocomplete on full text search would be desirable for items with a large amount of text, such as books or newspapers from BC Historical Newspapers collection. Universal Viewer allows for the autocompletion of searches, as demonstrated in the example below.

Universal Viewer Autocomplete
https://wellcomelibrary.org/item/b18035723#?c=0&m=0&s=0&cv=6&z=-0.4983%2C-0.115%2C2.9965%2C1.5162



References:

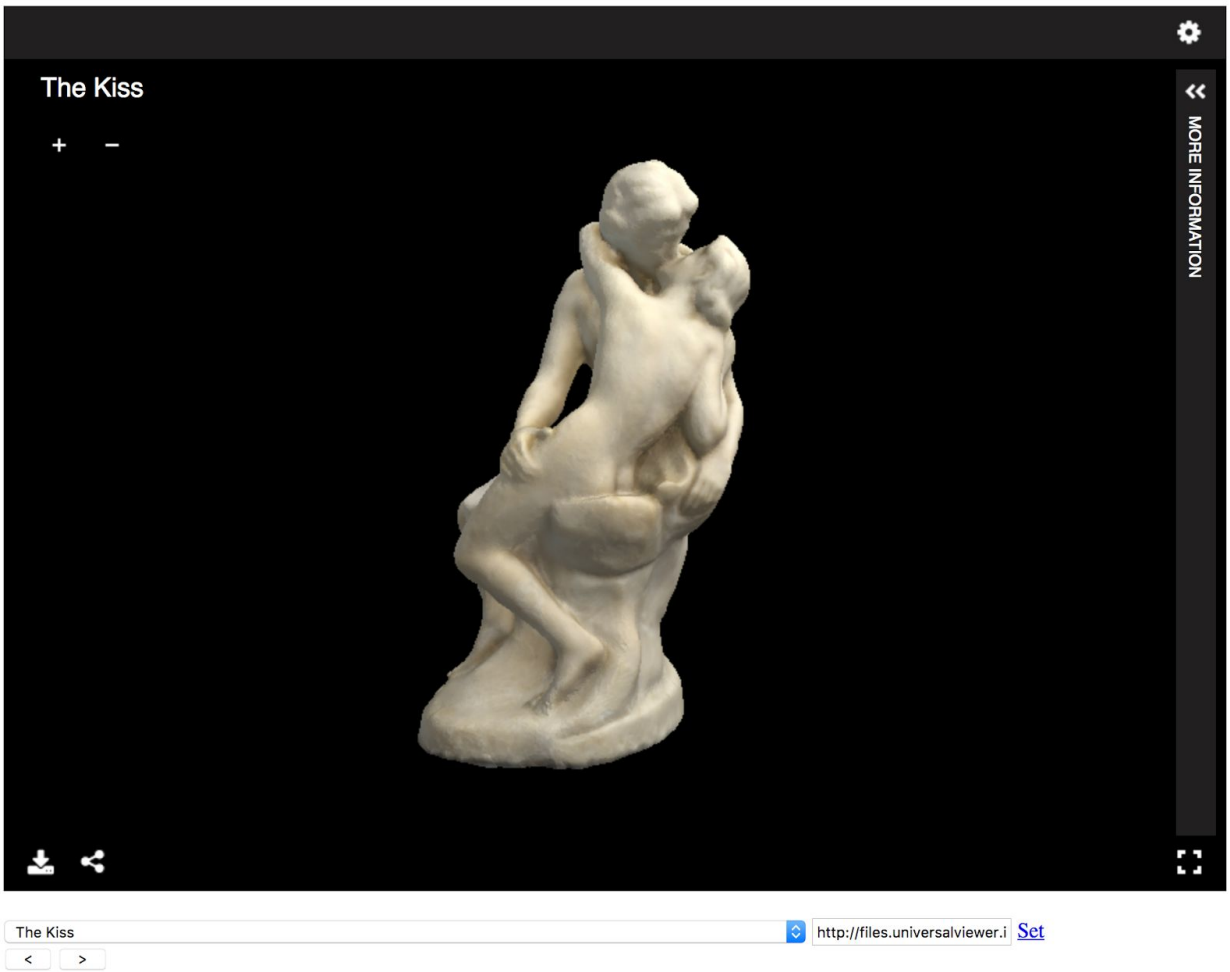
http://ronallo.com/iiif-workshop/search/service-in-manifest.html
https://vimeo.com/126596158 (UV tutorial)

Authentication

Authentication workflow for Electronic Theses and Dissertations in Creative Arts, 2017+ could be managed by IIIF, if we opted to include that collection in Open Collections.

3D Viewing

For future OC collections it might be interesting to have a 3D visualization feature. Universal Viewer has support for displaying 3D objects. You can see some examples including a skull and the Kiss. (Source: http://ronallo.com/iiif-workshop/now/futures.html)



Leaflet example:
http://codh.rois.ac.jp/software/iiif-curation-viewer/demo/?manifest=https://iiif.library.ubc.ca/presentation/cdm.tokugawa.1-0227946/manifest

Appendix A - GVRD Maps HTML code

```
<!DOCTYPE html>

<html>

<head>

<title>Great Vancouver Regional District Maps</title>

<link rel="stylesheet"
href="http://cdn.leafletjs.com/leaflet-0.7.3/leaflet.css" />

<script
src="http://cdn.leafletjs.com/leaflet-0.7.3/leaflet.js"></script>

<script src="jquery-2.1.1.min.js"></script>

<style>

#map {
width: 1400px;
height: 1000px;
}

</style>

</head>

<body>

<div id="map"></div>

<script>
// Adapted from
https://bl.ocks.org/mejackreed/15f4c1c40c36123547f2f401f06248a3

var map = L.map('map');

L.tileLayer('https://{s}.tile.openstreetmap.fr/hot/{z}/{x}/{y}.png',
{
```

```
maxZoom: 19,
attribution: '&copy; <a
href="http://www.openstreetmap.org/copyright">OpenStreetMap</a>,
Tiles courtesy of <a href="http://hot.openstreetmap.org/"
target="_blank">Humanitarian OpenStreetMap Team</a>'
}).addTo(map);

  var imageUrl =
'http://iiif.library.ubc.ca/image/cdm.gvrdmaps.1-0135075.0000/full/fu
ll/0/default.jpg',
      imageBounds = [[49.434, -123.333], [48.974, -121.638]];
  var imageOverlay = L.imageOverlay(imageUrl, imageBounds, {opacity:
0.6}).addTo(map);


var template = '<div style="min-height:
340px;"><h2>{title}</h2><div><a href="{subject}" target=_blank><img
src="{purl}" style="max-width: 300px;"/></a></div>'

function onEach(feature, layer) {
  layer.on('click', function() {
      $.getJSON("gvrd_full.geojson", function(info) {
      var popup = L.popup({
      keepInView: true
      })
      .setContent(L.Util.template(template, {
            title: feature.properties.title,
            purl: feature.properties.purl,
            subject: feature.properties.subject
      })
      );
      layer.bindPopup(popup).openPopup();
      })
  })
}

var links =  $.getJSON("gvrd_full.geojson", function(data) {
      console.log(data);
      var indexMap = L.geoJson(data, {
      onEachFeature: onEach,
      style: function(feature) {
      return {
            weight: 1
```

```
      }
      }
      }
  ).addTo(map);


var baseMaps = {
  "Base Map": map
};

var overlayMaps = {
  "Index Map": imageOverlay
};

L.control.layers(baseMaps, overlayMaps).addTo(map);

      map.fitBounds(indexMap.getBounds());
  });

</script>

</body>

</html>
```

Appendix B - Epigraphic Squeeze IIIF manifest code


```
{
  "label": "Decretum de Minervae Victoriae Sacerdote Temploque (I)",
  "viewingDirection": "left-to-right",
  "viewingHint": "paged",
  "metadata": [
      {
      "label": "AggregatedSourceRepository",
      "value": "CONTENTdm",
      "attrs": {
      "lang": "en",
      "ns": "http://www.europeana.eu/schemas/edm/dataProvider",
      "classmap": "ore:Aggregation",
      "property": "edm:dataProvider"
      },
      "iri": "http://www.europeana.eu/schemas/edm/dataProvider",
      "explain": "A Europeana Data Model Property; The name or
identifier of the organization who contributes data indirectly to an
aggregation service (e.g. Europeana)"
      },
      {
      "label": "AlternateTitle",
      "value": "Decretum De Minervae Victoriae Sacerdote Templeoque",
      "attrs": {
      "lang": "en",
      "ns": "http://purl.org/dc/terms/alternative",
      "classmap": "dpla:SourceResource",
      "property": "dcterms:alternative"
      },
      "iri": "http://purl.org/dc/terms/alternative",
      "explain": "A Dublin Core Terms Property; An alternative name
for the resource.; Note - the distinction between titles and
alternative titles is resource-specific."
      },
      {
      "label": "Category",
      "value": "Decrees and laws dated to the second century",
      "attrs": {
      "lang": "en",
      "ns": "http://purl.org/dc/terms/subject",
```

"classmap": "oc:DataDescription",
"property": "dcterms:subject"
},
"iri": "http://purl.org/dc/terms/subject",
"explain": "A Dublin Core Terms Property; The topic of the resource.; Typically, the subject will be represented using keywords, key phrases, or classification codes. Recommended best practice is to use a controlled vocabulary."
},
{
"label": "Collection",
"value": "Epigraphic Squeezes Collection",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/isPartOf",
"classmap": "dpla:SourceResource",
"property": "dcterms:isPartOf"
},
"iri": "http://purl.org/dc/terms/isPartOf",
"explain": "A Dublin Core Terms Property; A related resource in which the described resource is physically or logically included."
},
{
"label": "DateAvailable",
"value": "2014-11-21",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/issued",
"classmap": "edm:WebResource",
"property": "dcterms:issued"
},
"iri": "http://purl.org/dc/terms/issued",
"explain": "A Dublin Core Terms Property; Date of formal issuance (e.g., publication) of the resource."
},
{
"label": "DateCreated",
"value": "199-100 BCE",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/created",
"classmap": "oc:SourceResource",
"property": "dcterms:created"

},
"iri": "http://purl.org/dc/terms/created",
"explain": "A Dublin Core Terms Property; Date of creation of the resource."
},
{
"label": "DigitalResourceOriginalRecord",
"value": "https://open.library.ubc.ca/collections/squeezes/items/1.0050935/source.json",
"attrs": {
"lang": "en",
"ns": "http://www.europeana.eu/schemas/edm/aggregatedCHO",
"classmap": "ore:Aggregation",
"property": "edm:aggregatedCHO"
},
"iri": "http://www.europeana.eu/schemas/edm/aggregatedCHO",
"explain": "A Europeana Data Model Property; The identifier of the source object, e.g. the Mona Lisa itself. This could be a full linked open date URI or an internal identifier"
},
{
"label": "Extent",
"value": "4 squeezes, 1 fragment",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/extent",
"classmap": "dpla:SourceResource",
"property": "dcterms:extent"
},
"iri": "http://purl.org/dc/terms/extent",
"explain": "A Dublin Core Terms Property; The size or duration of the resource."
},
{
"label": "FileFormat",
"value": "image/jpeg",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/elements/1.1/format",
"classmap": "edm:WebResource",
"property": "dc:format"
},

"iri": "http://purl.org/dc/elements/1.1/format",
"explain": "A Dublin Core Elements Property; The file format, physical medium, or dimensions of the resource.; Examples of dimensions include size and duration. Recommended best practice is to use a controlled vocabulary such as the list of Internet Media Types [MIME]."
},
{
"label": "FullText",
"value": "Array",
"attrs": {
"lang": "en",
"ns": "http://www.w3.org/2009/08/skos-reference/skos.html#note",
"classmap": "oc:AnnotationContainer"
},
"iri": "http://www.w3.org/2009/08/skos-reference/skos.html#note",
"explain": "Simple Knowledge Organisation System; Notes are used to provide information relating to SKOS concepts. There is no restriction on the nature of this information, e.g., it could be plain text, hypertext, or an image; it could be a definition, information about the scope of a concept, editorial information, or any other type of information."
},
{
"label": "Genre",
"value": "Epigraphic Squeeze",
"attrs": {
"lang": "en",
"ns": "http://www.europeana.eu/schemas/edm/hasType",
"classmap": "dpla:SourceResource",
"property": "edm:hasType"
},
"iri": "http://www.europeana.eu/schemas/edm/hasType",
"explain": "A Europeana Data Model Property; This property relates a resource with the concepts it belongs to in a suitable type system such as MIME or any thesaurus that captures categories of objects in a given field. It does NOT capture aboutness"
},
{
"label": "Identifier",
"value": "IG_I3_0035",

"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/identifier",
"classmap": "dpla:SourceResource",
"property": "dcterms:identifier"
},
"iri": "http://purl.org/dc/terms/identifier",
"explain": "A Dublin Core Terms Property; An unambiguous reference to the resource within a given context.; Recommended best practice is to identify the resource by means of a string conforming to a formal identification system."
},
{
"label": "IsShownAt",
"value": "10.14288/1.0050935",
"attrs": {
"lang": "en",
"ns": "http://www.europeana.eu/schemas/edm/isShownAt",
"classmap": "edm:WebResource",
"property": "edm:isShownAt"
},
"iri": "http://www.europeana.eu/schemas/edm/isShownAt",
"explain": "A Europeana Data Model Property; An unambiguous URL reference to the digital object on the provider’s website in its full information context."
},
{
"label": "Language",
"value": "Greek, Ancient (to 1453)",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/language",
"classmap": "dpla:SourceResource",
"property": "dcterms:language"
},
"iri": "http://purl.org/dc/terms/language",
"explain": "A Dublin Core Terms Property; A language of the resource.; Recommended best practice is to use a controlled vocabulary such as RFC 4646 [RFC4646]."
},
{
"label": "Notes",

"value": "Title taken from Inscriptiones Graecae I2 (IG I2).

Alternative title taken from Inscriptiones Graecae I3 (IG I3).",
"attrs": {
"lang": "en",
"ns": "http://www.w3.org/2009/08/skos-reference/skos.html#note",
"classmap": "skos:Concept",
"property": "skos:note"
},
"iri": "http://www.w3.org/2009/08/skos-reference/skos.html#note",
"explain": "Simple Knowledge Organisation System; Notes are used to provide information relating to SKOS concepts. There is no restriction on the nature of this information, e.g., it could be plain text, hypertext, or an image; it could be a definition, information about the scope of a concept, editorial information, or any other type of information."
},
{
"label": "ProjectWebsite",
"value": "http://fromstonetoscreen.wordpress.com/squeeze-collection",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/relation",
"classmap": "dpla:SourceResource",
"property": "dcterms:relation"
},
"iri": "http://purl.org/dc/terms/relation",
"explain": "A Dublin Core Terms Property; A related resource.; Recommended best practice is to identify the related resource by means of a string conforming to a formal identification system."
},
{
"label": "Provider",
"value": "Vancouver : University of British Columbia Library",
"attrs": {
"lang": "en",
"ns": "http://www.europeana.eu/schemas/edm/provider",
"classmap": "ore:Aggregation",
"property": "edm:provider"
},

"iri": "http://www.europeana.eu/schemas/edm/provider",
"explain": "A Europeana Data Model Property; The name or identifier of the organization who delivers data directly to an aggregation service (e.g. Europeana)"
},
{
"label": "Publisher",
"value": "Vancouver: University of British Columbia Library.",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/publisher",
"classmap": "dpla:SourceResource",
"property": "dcterms:publisher"
},
"iri": "http://purl.org/dc/terms/publisher",
"explain": "A Dublin Core Terms Property; An entity responsible for making the resource available.; Examples of a Publisher include a person, an organization, or a service."
},
{
"label": "Reference",
"value": "IG I2 # 24

IG I3 # 35

EM # 8116",
"attrs": {
"lang": "en",
"ns": "https://open.library.ubc.ca/terms#reference",
"classmap": "oc:ArtifactDescription",
"property": "oc:reference"
},
"iri": "https://open.library.ubc.ca/terms#reference",
"explain": "UBC Open Collections Metadata Components; Local Field; Records the reference numbers from various indices.; Records the reference numbers from various indices."
},
{
"label": "Rights",
"value": "Images provided for research and reference use only. Permission to publish, copy or otherwise use these images must be obtained from the Digitization Centre: http://digitize.library.ubc.ca/",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/rights",
"classmap": "edm:WebResource",

"property": "dcterms:rights"
},
"iri": "http://purl.org/dc/terms/rights",
"explain": "A Dublin Core Terms Property; Information about rights held in and over the resource.; Typically, rights information includes a statement about various property rights associated with the resource, including intellectual property rights."
},
{
"label": "SortDate",
"value": "199 BC",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/elements/1.1/date",
"classmap": "dpla:SourceResource"
},
"iri": "http://purl.org/dc/elements/1.1/date",
"explain": "A Dublin Core Elements Property; A point or period of time associated with an event in the lifecycle of the resource.; Date may be used to express temporal information at any level of granularity. Recommended best practice is to use an encoding scheme, such as the W3CDTF profile of ISO 8601 [W3CDTF]."
},
{
"label": "Source",
"value": "University of British Columbia. Department of Classical, Near Eastern and Religious Studies.",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/source",
"classmap": "oc:SourceResource",
"property": "dcterms:source"
},
"iri": "http://purl.org/dc/terms/source",
"explain": "A Dublin Core Terms Property; A related resource from which the described resource is derived.; The described resource may be derived from the related resource in whole or in part. Recommended best practice is to identify the related resource by means of a string conforming to a formal identification system."
},
{
"label": "Title",

"value": "Decretum de Minervae Victoriae Sacerdote Temploque (I)",
"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/title",
"classmap": "dpla:SourceResource",
"property": "dcterms:title"
},
"iri": "http://purl.org/dc/terms/title",
"explain": "A Dublin Core Terms Property; The name given to the resource."
},
{
"label": "Translation",
"value": ".…. ΑΥΚΟΣΕΙΠΕ ....
\n
.... ΚΕΙΗΙΕΡΕΑΝΕΑΓ....
\n
....ΙΕΚΣΑΘΕΝΑΙΟΝΑΠΑ...
\n
....ΣΤΑΙΚΑΙΤΟΙΕΡΟΝΘΥΡΟΣΑ
\n
ΙΚΑΘΟΤΙΑΝΚΑΛΛΙΚΡΑΤΕΣΧΣΥΓΓΡΑΦΣ
\n
ΕΙΑΠΟΜΙΣΘΟΣΑΙΔΕΤΟΣΠΟΛΕΤΑΣΕΠΙΤ
\n
ΕΣΛΕΟΝΤΙΔΟΣΠΡΥΤΑΝΕΙΑΣΦΕΡΕΝΔΕΤ
\n
ΕΝΙΕΡΕΑΝΠΕΝΤΕΚΟΝΤΑΔΡΑΧΜΑΣΚΑΙ
\n
ΤΑΣΚΕΛΕΚΑΙΤΑΔΕΡΜΑΤΑΦΕΡΕΝΤΟΝΔΕ
\n
ΜΟΣΙΟΝΝΕΟΝΔΕΟΙΚΟΔΟΜΕΣΑΙΚΑΘΟΤΙ
\n
ΑΝΚΑΛΛΙΚΡΑΤΕΣΧΣΘΓΓΡΑΦΣΕΙΚΑΙΒΟ
\n
ΜΟΝΛΙΘΙΝΟΝ
\n
ΕΣΤΙΑΙΟΣΕΙΠΕΤΡΕΣΑΝΔΡΑΣΕΛΕΣΘ
\n
ΑΙΕΓΒΟΛΕΣΤΟΘΤΟΣΔΕΜΕΤ [.] ΚΑΛΛΙΚΡΑ
\n
..ΣΧΣΘΓΓΑΦΣΑΝΤΑΣ ΕΠΙΔ..
\n
....ΕΙΚΑΘΟΤΙΑΠΟΜ.....",
"attrs": {
"lang": "en",
"ns": "http://www.europeana.eu/schemas/edm/isDerivativeOf",
"classmap": "edm:ProvidedCHO",
"property": "edm:isDerivativeOf"
},
"iri": "http://www.europeana.eu/schemas/edm/isDerivativeOf",
"explain": "A Europeana Data Model Property; This property captures a narrower notion of derivation than edm:isSimilarTo, in the sense that it relates a resource to another one, obtained by reworking, reducing, expanding, parts or the whole contents of the former, and possibly adding some minor parts. Versions have an even narrower meaning, in that it requires common identity between the related resources. Translations, summaries, abstractions etc. do not qualify as versions, but do qualify as derivatives"
},
{
"label": "Type",
"value": "Still Image",

"attrs": {
"lang": "en",
"ns": "http://purl.org/dc/terms/type",
"classmap": "dpla:SourceResource",
"property": "dcterms:type"
},
"iri": "http://purl.org/dc/terms/type",
"explain": "A Dublin Core Terms Property; The nature or genre of the resource.; Recommended best practice is to use a controlled vocabulary such as the DCMI Type Vocabulary [DCMITYPE]. To describe the file format, physical medium, or dimensions of the resource, use the Format element."
}
],
"thumbnail": "https://iiif.library.ubc.ca/image/cdm.squeezes.1-0050935.0000/full/80,100/0/default.jpg",
"attribution": "Images provided for research and reference use only. Permission to publish, copy or otherwise use these images must be obtained from the Digitization Centre: http://digitize.library.ubc.ca/",
"sequences": [
{
"@id": "https://iiif.library.ubc.ca/presentation/cdm.squeezes.1-0050935/sequence/normal",
"@type": "sc:Sequence",
"label": "Default",
"viewingDirection": "left-to-right",
"viewingHint": "paged",
"canvases": [
{
"@id": "https://iiif.library.ubc.ca/presentation/cdm.squeezes.1-0050935/canvas/p0",
"@type": "sc:Canvas",
"label": "Decretum de Minervae Victoriae Sacerdote Temploque (I)",
"height": 5747,
"width": 6188,
"images": [
{

```
            "@id":
"https://iiif.library.ubc.ca/presentation/cdm.squeezes.1-0050935/anno
tation/p0000",
            "@type": "oa:Annotation",
            "motivation": "sc:painting",
            "resource": {
                  "@id":
"https://iiif.library.ubc.ca/image/cdm.squeezes.1-0050935",
                  "@type": "dctypes:Image",
                  "format": "image/jpeg",
                  "height": 5747,
                  "width": 6188,
                  "service": {
                  "@context":
"http://iiif.io/api/image/2/context.json",
                  "@id":
"https://iiif.library.ubc.ca/image/cdm.squeezes.1-0050935",
                  "@profile": "http://iiif.io/api/image/2/level2.json",
                  "scaleFactors": [
                        1,
                        2,
                        4,
                        8,
                        16,
                        32,
                        64,
                        128,
                        256,
                        512,
                        1024
                  ]
                  }
            },
            "on":
"https://iiif.library.ubc.ca/cdm.squeezes.1-0050935/canvas/p0"
            }
            ],
            "otherContent": [
            {
            "@id": "http://localhost:3000/annotation_list.json",
            "@type": "sc:AnnotationList",
            "label": "Text of this page"
            }
```

```
            ]
        }
        ]
        }
    ],
    "description": "[No description]",
    "@context": "http://iiif.io/api/presentation/2/context.json",
    "@id": "http://localhost:3000/epigraphic_manifest_edited.json",
    "@type": "sc:Manifest"
}
```

Appendix C - Epigraphic Squeeze HTML code

```
<!DOCTYPE html>
<html>
  <head>
     <meta charset="utf-8">
     <meta http-equiv="X-UA-Compatible" content="IE=edge,chrome=1">
     <link rel="stylesheet" type="text/css"
href="build/mirador/css/mirador-combined.css">
     <title>Mirador Viewer</title>
     <style type="text/css">
     #viewer {
     width: 100%;
     height: 100%;
     position: fixed;
     }
     </style>
  </head>
  <body>
     <div id="viewer"></div>

     <script src="build/mirador/mirador.js"></script>
     <script type="text/javascript">

     $(function() {
     // Called without "let" or "var"
     // so we can play with it in the browser
     myMiradorInstance = Mirador({
     "id": "viewer",
     "layout": "1x1",
     "data": [
          { "manifestUri":
"http://localhost:3000/epigraphic_manifest_edited.json", "location":
"UBC Library"},
     ],
     "windowObjects": [],
     "annotationEndpoint": { "name":"Local Storage", "module":
"LocalStorageEndpoint" },
     "sidePanelOptions" : {
          "tocTabAvailable": true,
          "layersTabAvailable": true,
```

```
            "searchTabAvailable": true,
            "annotations" : true
        },
        });
        });
        </script>
    </body>
</html>
```

Appendix D - Epigraphic Squeeze IIIF annotation code


```
{
  "@context": "http://iiif.io/api/presentation/2/context.json",
  "@id": "http://localhost:3000/annotation_list.json",
  "@type": "sc:AnnotationList",

  "resources": [
  {
      "@id": "anno_01",
      "@type": "oa:Annotation",
      "motivation": "sc:painting",
      "resource":{
      "@type": "cnt:ContentAsText",
      "format": "text/plain",
      "chars": "<p>.&hellip;.
&Alpha;&Upsilon;&Kappa;&Omicron;&Sigma;&Epsilon;&Iota;&Pi;&Epsilon;
....</p>\n<p>[.....ἐ&pi;&epsilon;&sigma;&tau;ά&tau;&epsilon;,
&Gamma;&lambda;]&alpha;ῦ&kappa;&omicron;&sigmaf;
&epsilon;ῖ&pi;&epsilon;&bull; [&tau;&epsilon;ῖ ]</p>"
      },
      "on":
"https://iiif.library.ubc.ca/cdm.squeezes.1-0050935/canvas/p0#xywh=34
68,928,1396,246"
      },
      {
      "@id": "anno_02",
      "@type": "oa:Annotation",
      "motivation": "sc:painting",
      "resource":{
            "@type": "cnt:ContentAsText",
            "format": "text/plain",
            "chars": "<p>....
&Kappa;&Epsilon;&Iota;&Eta;&Iota;&Epsilon;&Rho;&Epsilon;&Alpha;&Nu;&E
psilon;&Alpha;&Gamma;....</p>\n<p>[Ἀ&theta;&epsilon;&nu;&alpha;ί&alph
a;&iota; &tau;&epsilon;ῖ &Nu;ί]&kappa;&epsilon;&iota;
ἱέ&rho;&epsilon;&alpha;&nu; ἕ ἄ&gamma; [&kappa;&lambda;]</p>"
      },
```

```
      "on":
"https://iiif.library.ubc.ca/cdm.squeezes.1-0050935/canvas/p0#xywh=29
87,1172,1903,212"
      },
      {
            "@id": "anno_03",
            "@type": "oa:Annotation",
            "motivation": "sc:painting",
            "resource":{
            "@type": "cnt:ContentAsText",
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Ἀ&theta;&epsilon;&nu;&alpha;ί&omicron;&nu;
ἁ&pi;&alpha;[&sigma;&otilde;]</p>"
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iota; &kappa;&alpha;&theta;᾽ ὅ &tau;&iota; ἄ&nu;
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f; &chi;&sigma;&upsilon;&gamma;&gamma;&rho;ά&phi;&sigma;</p>"
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ron;&Lambda;&Epsilon;&Tau;&Alpha;&Sigma;&Epsilon;&Pi;&Iota;&Tau;</p>\
n<p>&epsilon;&iota;&bull;
ἀ&pi;&omicron;&mu;&iota;&sigma;&upsilon;&otilde;&sigma;&alpha;&iota;
&delta;ὲ &tau;ὸ&sigmaf; &pi;&omicron;&lambda;&epsilon;&tau;ά&sigmaf;
ἐ&pi;ὶ &tau;</p>"
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&Lambda;&epsilon;&omicron;&nu;&tau;ί&delta;&omicron;&sigmaf;
&pi;&rho;&upsilon;&tau;&alpha;&nu;&epsilon;ί&alpha;&sigmaf;.
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;&Chi;&Mu;&Alpha;&Sigma;&Kappa;&Alpha;&Iota;</p>\n<p>ἐ&nu;
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τὰ σκέλε καὶ τὰ
δέρματα φέρεν
τõν δε "
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ΔΕΟΙΚΟΔΟΜ&E
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/p>\n μοσίον• νεὸν
δὲ
οἰκοδομεσα
ι καθ᾽ὅ τι "
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hi;ΣΕΙΚΑΙΒΟ \n
ἀν
Καλλικράτε&sigma

f;
χσυγγράφσει
καὶ βο "
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ΙΠΕΤΡΕΣΑΝΔΡ&
Alpha;ΣΕΛΕΣΘ \n ἑ&sigma
;τιαῖος εἶπε•
τρες ἄνδρασ
ἑλέσθ "
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ilon;&Tau; [. ]
&Kappa;&Alpha;&Lambda;&Lambda;&Iota;&Kappa;&Rho;&Alpha;</p>\n<p>&alph
a;&iota; ἐ&gamma; &beta;&omicron;&lambda;&epsilon;&sigmaf;&bull;
&tau;&omicron;ύ&tau;&omicron;&sigma; &delta;ὲ &mu;&epsilon;&tau;[ὰ]
&Kappa;&alpha;&lambda;&lambda;&iota;&kappa;&rho;ά</p>"
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&Epsilon;&Pi;&Iota;&Delta;..</p>\n<p>[&tau;&omicron;]&sigmaf;
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