

Intro to semantic annotations for geographic web maps in HTML

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Research Project on „Democratisation of Expert Knowledge“

Topics

1. Semantic annotations
2. The concept of *web mapping documents*
3. Talking *web map elements*
4. *Leaflet*  Implementation
5. Future Work / Demo / Questions

Semantic annotations

„A house - in the middle of a street - A house!“

Suddenly becomes:

Someone said there is something which, when talking English, could be labelled „CivicStructure“.

(Insert Source here)

(Insert Geo Coordinates here)

(Insert URI here)

(Insert schema.org/Type here)

(Insert lots of attributes here...)

Annotation perspective

- Map makers annotating their maps before they publish, so not e.g. Web Annotation Group (W3C)
- Semantic annotations can help readers to understand complex visualizations
- Semantic networks have a great potential to enhance (inter-lingual) communication (pluralistic description of the world)

Semantic annotations

Let's checkout some schema.org vocabulary.

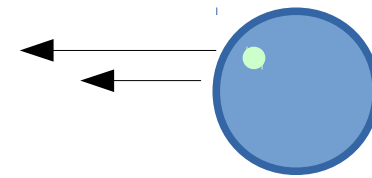
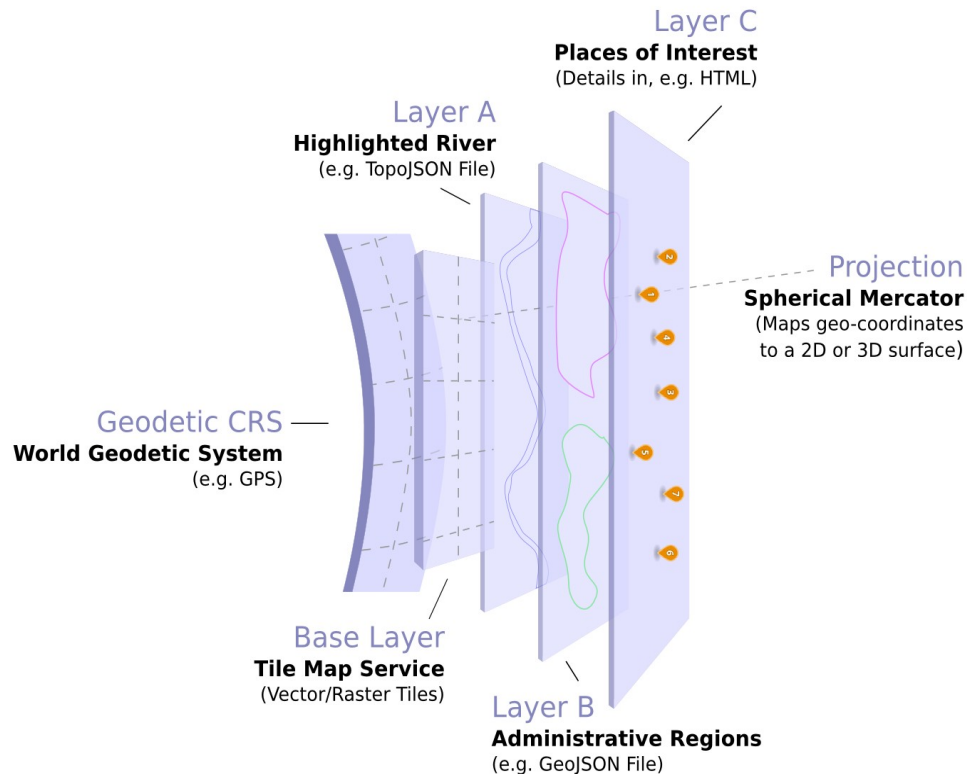
(Now click to see some lines on github)

Organization, CreativeWork, Intangible, Event, Place

People looking at maps

Basic technical structure of an exemplary LeafletJS based webmap

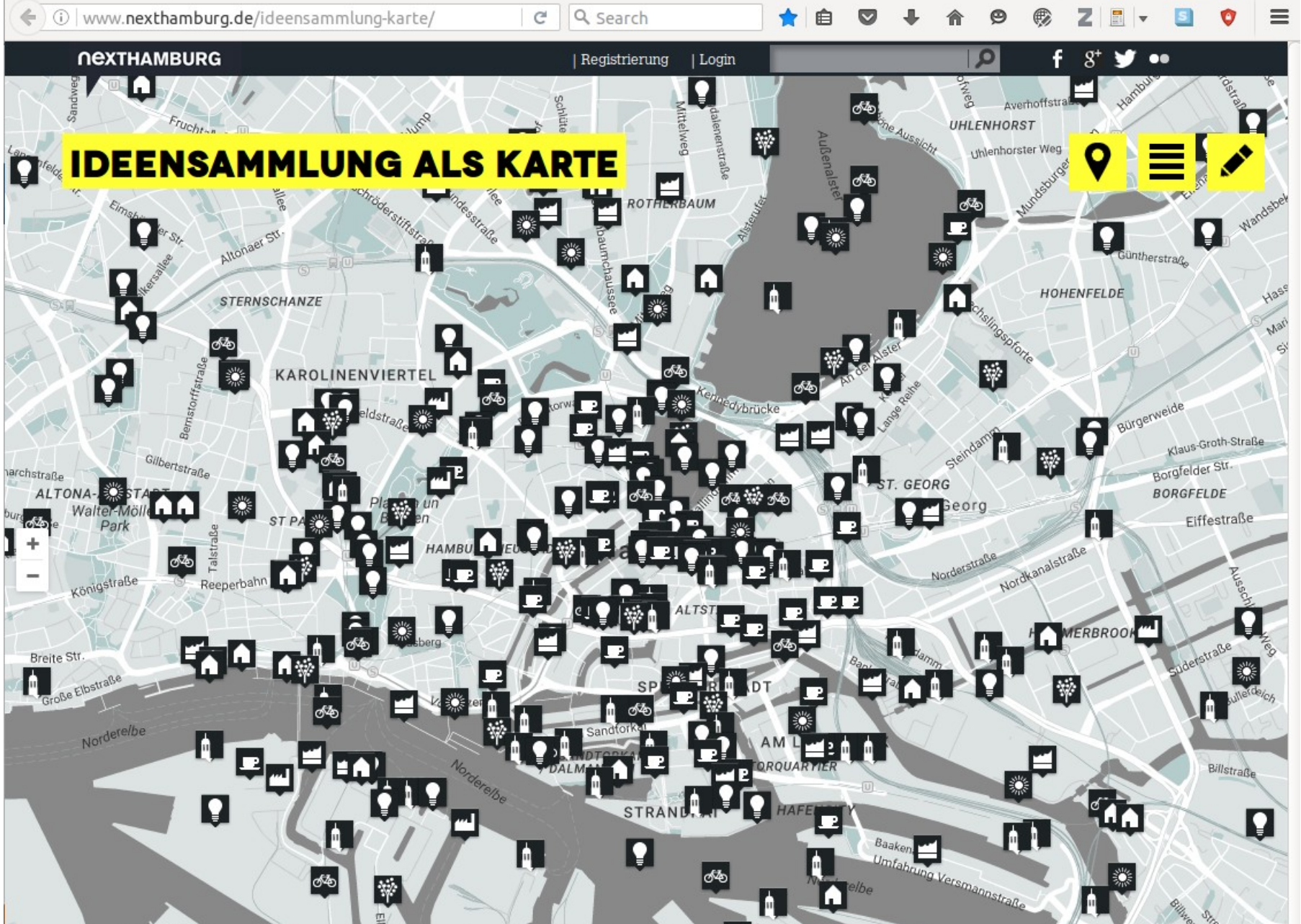
Creative Commons - Attribution 4.0 International (CC BY 4.0), M. Reißig (2016)



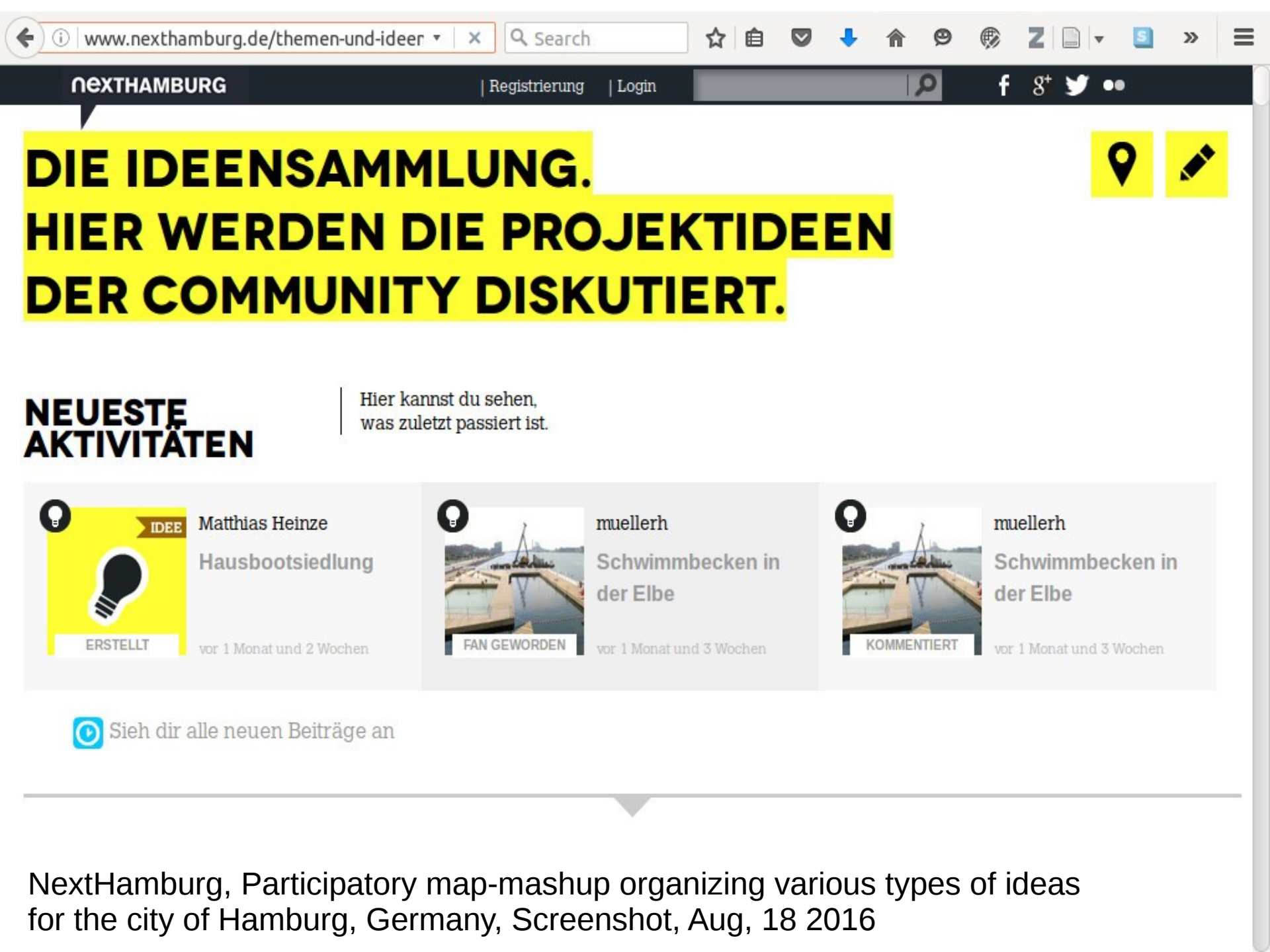
People looking at
geographic web
maps on screens

Web mapping document

- Seen as list of items
- Standard conform & machine readable
- Filterable by e.g. time, contributors, topic
- A simple *version* of a geographic web map to a given time (Snapshot)
- Well defined model allows for the development of a reusable set of controls for metadata based map interactions



NextHamburg, Participatory map organizing various types of ideas for the city of Hamburg, Germany, Screenshot, Aug, 18 2016



NextHamburg, Participatory map-mashup organizing various types of ideas for the city of Hamburg, Germany, Screenshot, Aug, 18 2016

Web mapping document

Representing distinct contents of multiple authors in one HTML document:

rel=author (outdated)
article + address
figure + figcaption

blockquote, q, div, section

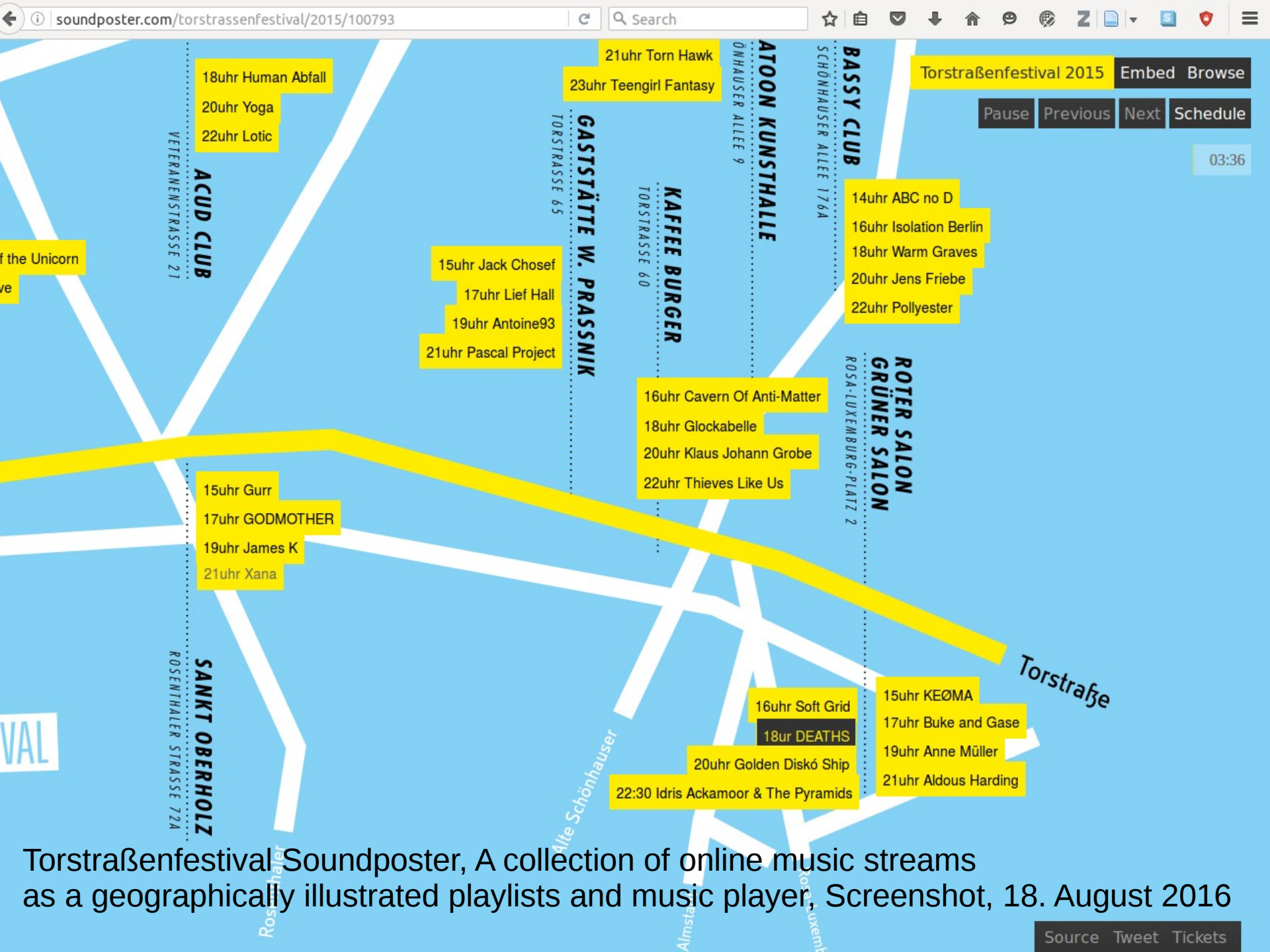
Web mapping document

Representing distinct contents of multiple authors in one HTML document:

rel=author (outdated)
article + address
figure + figcaption

*“content in the **article** element should be independently distributable or reusable” (HTML5)*

blockquote, q, div, section



Torstraßenfestival Soundposter, A collection of online music streams as a geographically illustrated playlists and music player, Screenshot, 18. August 2016

Web map element

- Similar to „POIs“ or „Features“
- Composition of geographic representation & content
- *Statements* about the outer world

To understand parts of maps as WMEs allows us to

- see web mapping documents as lists
- connect WMEs to geospatial indexes of the web
- show selected metadata per WME on-demand
- contribute to finding geodata used via topical search, e.g. web mapping documents by web map elements

Annotation Vocabulary for WMEs

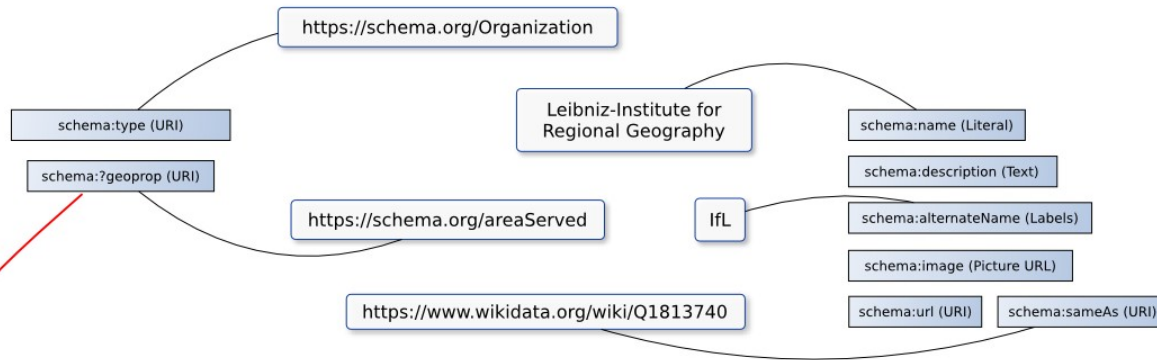
Linking up of:

- Schema.org – „General purpose vocabulary“
- Dublin Core Metadata Element Set + Terms – „Core Metadata to describe any kind of information resource“

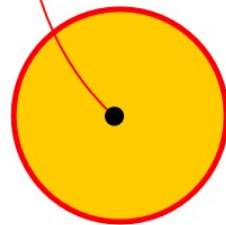
Content Level Annotations

Conceptual Level, e.g. Human Being
(=Classname, Type, Category)

Individual Level, e.g. Malte Reißig
(=Instance, Token, Individual)



Geo Resource Annotations



(Usage right/License) ("Derived from")

dc:rights

dc:source

(Language code, RFC 5646)

dc:language

(Names of entities or persons responsible)

dc:publisher

dc:creator

dc:contributor

(W3C NOTE on Datetime)

dcterms:published

dcterms:created

dcterms:modified

dcterms:identifier

Dublin Core Terms

Dublin Core Metadata Element Set

Schema.org (Thing)

Recommended terms for annotating web map elements

Type (Schema.org Element Name),

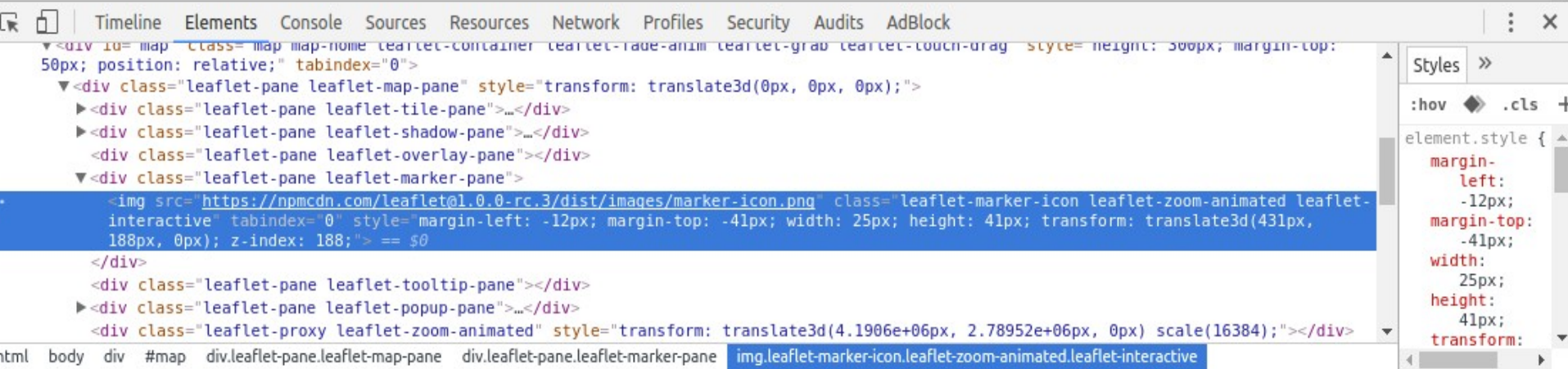
Name (Text), Description (Text), Image (URL), alternateName (Text),

URL (URI), sameAs (URI),

Creator, Contributor, Publisher (Name of Entities/Persons)

Created, Modified, Published (Datetime W3C NOTE)

Source (Derived From), Rights (Text on sage rights/License)

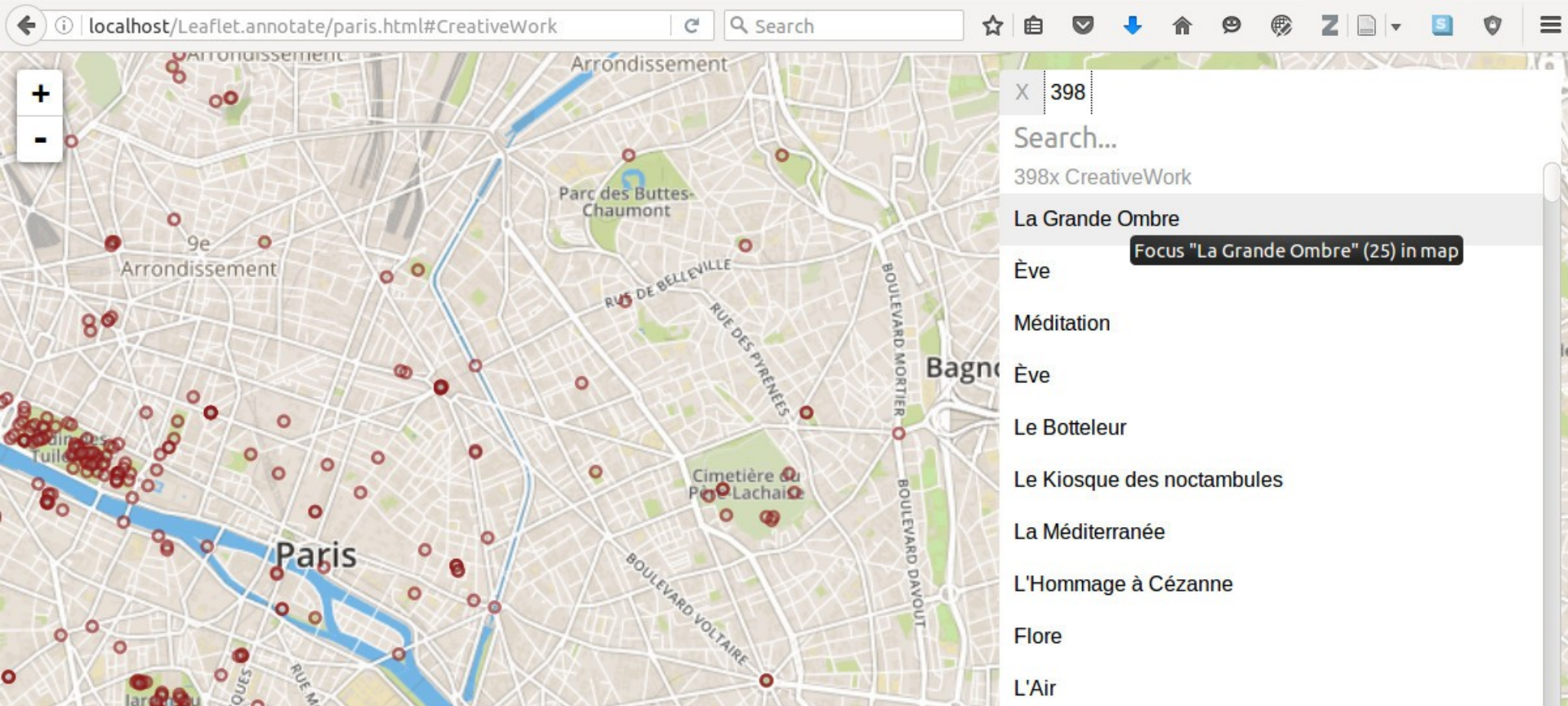


FOSS4G 2016: Leaflet.annotate – Semantic markup for geographic web maps in HTML

05.02.17

A Screenshot of an exemplary LeafletJS based web map
with the browser showing its standard HTML output, Aug, 24 2016





The **annotationViewer** control of the **Leaflet.annotate** plugin used in a map listing all 398 public sculptures mapped onto a baselayer showing Paris. Screenshot, Aug, 23 2016, Data based on a Wikidata SPAQRL Query



The *annotationViewer* control of the *Leaflet.annotate* plugin used in a map displaying metadata on the map element representing the tomb of Oscar Wildes in Paris, Screenshot, Aug, 23 2016, Data: Wikidata SPAQRL Query

← → ↺

https://search.google.com/structured-data/testing-tool

☆

⋮

Apps tmp ifl work sounds design swings phil kitchen software Importiert

Google

Test-Tool für strukturierte Daten

Anmelden

↻

NEUER TEST

⚙

1<head>
2<title>Public Sculptures in Paris on Wikidata</title>
3<meta charset="utf-8">
4<meta name="viewport" content="width=device-width, initial-scale=1.0">
5<meta name="author" content="Malte Reißig, IfL Leipzig">
6<meta name="description" content="Example map for the Leaflet.annotate plugin. Annotated single web map elements with the semantic markup vocabularies Schema.org and Dublin Core. Data on public sculptures in Paris, France queried live from Wikidata.">
7<style>
8body { margin: 0px; padding: 0px; }
9#map { width: 100%; height: 100px; margin-top: 0px; }
10.leaflet-popup-pane article { transform: none !important; }
11.leaflet-control-container .annotation-viewer a.leaflet-control-annotation-viewer,
12.leaflet-bar,
13.leaflet-popup-content-wrapper { border-radius: 0px; }
14

Photograph

All (412) ▾

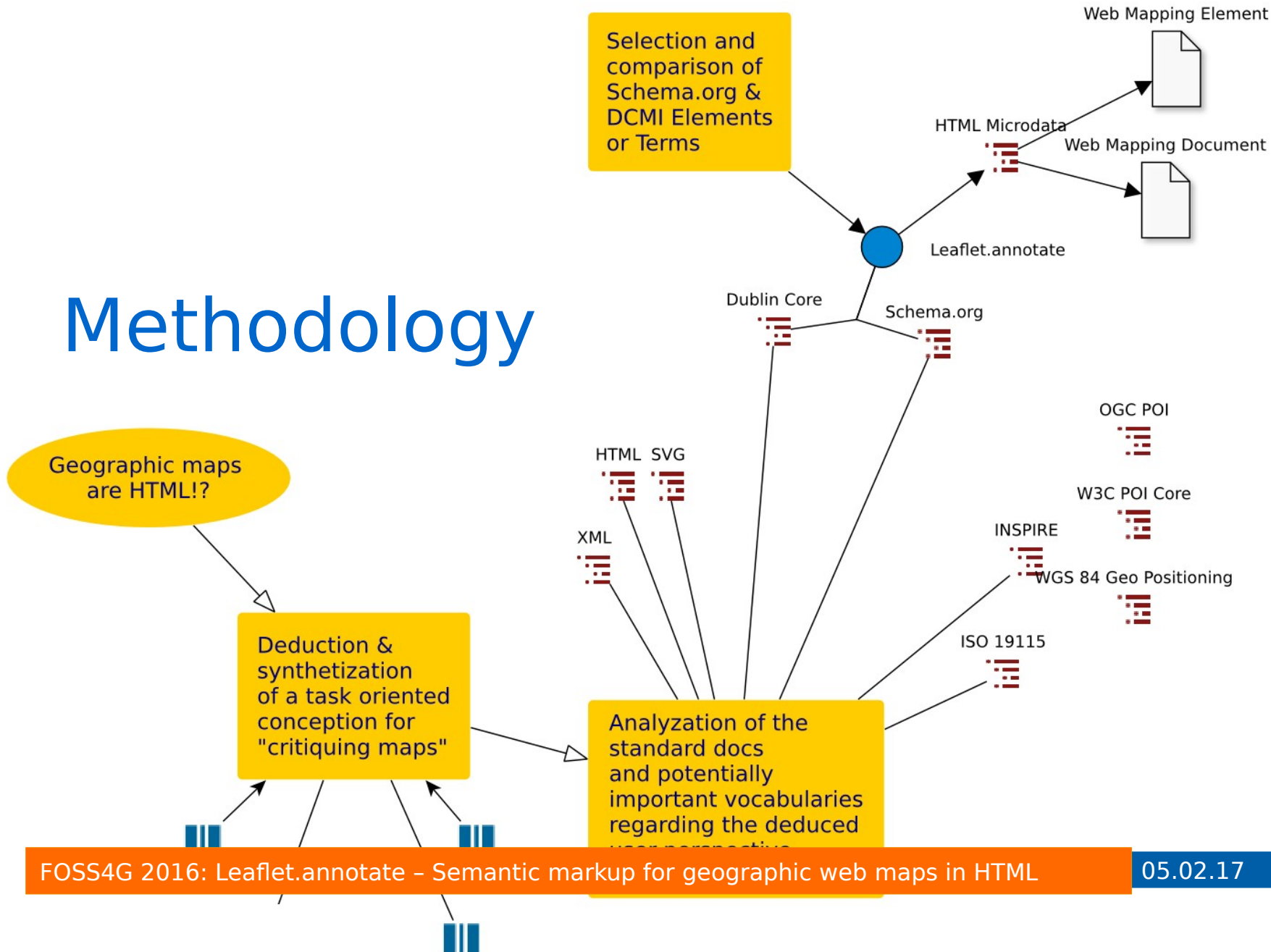
Photograph0 FEHLER0 WARNUNGEN ^

@type	Photograph
name	Picture of Le Botteleur
url	https://commons.wikimedia.org/wiki/Special:FilePath/Le%20Botteleur%20J%20Perrin%20A.jpg
contentLocation	
@type	Place
geo	
@type	GeoCoordinates
latitude	48.862
longitude	2.37904

▶

FOSS4G 2016: Leaflet.annotate – Semantic markup for geographic web maps in HTML05.02.17

Methodology



Implementation & Usage



Source Code & Download:

<http://github.com/ifl-geovis/Leaflet.annotate>

Release Candidate, Testing, Welcoming Feedback

Insights regarding implementation & standards

- *meta* elements are not supposed to occur in the SVG namespace – but that doesn't seem to bother Google's Structured Data Testing Tools
- *metadata* element in SVG 1.1 (Second Edition) is supposed to contain RDF contents - 1.2 allows for RDFa.
- *JSON-LD* is (now) the official recommendation for injecting semantic annotations dynamically into a DOC

Insights regarding implementation & standards

- *JSON-LD* would also work for annotating *canvas* and *webgl* based maps
- Logical map (as constructed in Leaflet) is not necessarily hierarchical (compared to a HTML document)

Using *Leaflet.annotate*

For generating semantic markup for geographic web maps in HTML you need to include the following *script* in your HTML Document.

```
<script src="Leaflet.annotate.Microdata-0.3.0_en_US.min.js"></script>
```

To provide your web map audience an additional control operating on the semantic markup, include also the following *script* in your HTML Document. It is the first *annotationViewer*, a search dialog for web map elements.

```
<script src="Leaflet.annotate.Viewer.js"></script>
```

Annotating pin-point marker

Annotating happens automatically whenever you add a *Marker*, *CircleMarker*, *ImageOverlay* or *Popup* to your *L.map* **and** pass them a valid *itemtype* value as an option to Leaflets Standard API

```
L.marker(coordinates, {  
    title: 'Madison Square Garden' itemtype: 'CivicStructure'  
})
```

Valid *itemtype* values are currently the names of Schema.org terms which allow for at least one Place as one of their *properties*.

Annotating circle marker

Regarding the schema.org type you use you might be required to explicitly specify the desired *geoprop* option

```
L.circleMarker(coordinates, { title: „...“  
    itemtype: 'CreativeWork', geoprop: 'locationCreated',  
})
```

For example when mapping *CreativeWorks* you can express a geographical dimension for the location it was created (*locationCreated*) or for the location it depicts (*contentLocation*) using the respective property names.

Annotated *CircleMarker* output in SVG

```
<g>
  <path stroke-linejoin="round" stroke-linecap="round"
    fill-rule="evenodd" stroke="#0033ff" stroke-opacity="0.5"
    stroke-width="2" fill="#0033ff" fill-opacity="0.2" d="M-806,-
      394A10,10,0,1,1,-806.1,-394 z"
    class="leaflet-clickable">
  </path>
  <metadata itemtype="http://schema.org/CreativeWork" itemscope="" >
    <descr itemprop="name"
      content="The circle marker indicating geographically where
        this meta poem was conceived." />
    <g itemprop="locationCreated"
      itemtype="http://schema.org/Place" itemscope="">
      <g itemprop="geo" itemtype="http://schema.org/GeoCoordinates"
        itemscope="">
        <descr itemprop="latitude" content="40.573112"/>
        <descr itemprop="longitude" content="-73.98074"/>
      </g>
    </g>
  </metadata>
</g>
```

Colors: Standard Leaflet HTML Element, Schema.org Markup

Annotating an *ImageOverlay*

```
L.imageOverlay(imageUrl, imageBounds, {  
  "itemtype": "Map", "geoprop": "contentLocation",  
  "publisher": "The University of Texas",  
  "source": "https://www.lib.utexas.edu/maps/new_jersey.html",  
  "title": "Newark N.J - Automobile Blue Book",  
  "created": "Thu Jan 01 1920 01:00:00 GMT+0100 (CET)"  
}).addTo(map)
```



Annotated *ImageOverlay* HTML output

```
<article itemtype="http://schema.org/CreativeWork" itemscope="">
  <meta itemprop="name" content="Automobile Blue Book"
  <meta name="http://purl.org/dc/elements/1.1/publisher"
    content="The University of Texas">
  <time name="http://purl.org/dc/terms/created"
    content="Thu Jan 01 1920 01:00:00 GMT+0100 (CET)">
  <div itemprop="contentLocation" itemtype="http://schema.org/Place">
    <div itemprop="geo" itemtype="http://schema.org/GeoShape"
      itemscope="">
      <meta itemprop="box" content="40.712216, -74.22655
        40.773941, -74.12544">
    </div>
  </div>
  </article>
```

Colors: Standard Leaflet HTML Element, Schema.org Markup,
Dublin Core Elements & Dublin Core Terms Markup

Annotated *Popup* in HTML

```
<article itemscope="" itemtype="http://schema.org/Article">
  <meta itemprop="name" content="Quiet Coney Island">
  <meta itemprop="description" content="New York Today - Good Morning on this
springlike Wednesday.">
  <meta itemprop="url" content="
http://www.nytimes.com/2016/03/09/nyregion/new-york-today-coney-island-off-season.
html?_r=0
">
  <div itemtype="http://schema.org/Place" itemprop="contentLocation" ...>
    <div itemprop="geo" itemtype="http://schema.org/GeoCoordinates" ...>
      <meta itemprop="latitude" content="40.573112">
      <meta itemprop="longitude" content="-73.98074">
    </div>
  </div>
  <div class="leaflet-popup leaflet-zoom-animated" style="opacity: 1;
transform: translate3d(557px, 50px, 0px); bottom: 27px; left: -83px;">
    <a class="leaflet-popup-close-button" href="#close">×</a>
    <div class="leaflet-popup-content-wrapper">
      <div class="leaflet-popup-content" ..>Coney Island - NYC</div>...</div>
</article>
```

Colors: Standard Leaflet HTML Element, Schema.org Markup

Annotating GeoJSON Layer

When you want to annotate a **GeoJSON** element of your map you also explicitly need to call **.annotate()** on the returned object

```
L.geoJson(geojsonData, {  
  title: „Uganda“ itemType: 'Country',  
  sameAs: 'https://www.wikidata.org/wiki/Q1036'  
}).annotate()
```

Colors: **JavaScript** using the **LeafletJS Standard API**
Options provided by **Leaflet.annotate**

This will markup the **GeoJSON** document as a map overlay representing the area for the *Republic of Uganda*. In Wikidata the URI for the concept/entity representing this country is <https://www.wikidata.org/wiki/Q1036>

Annotating GeoJSON Layer

```
var statesBoundaries = undefined

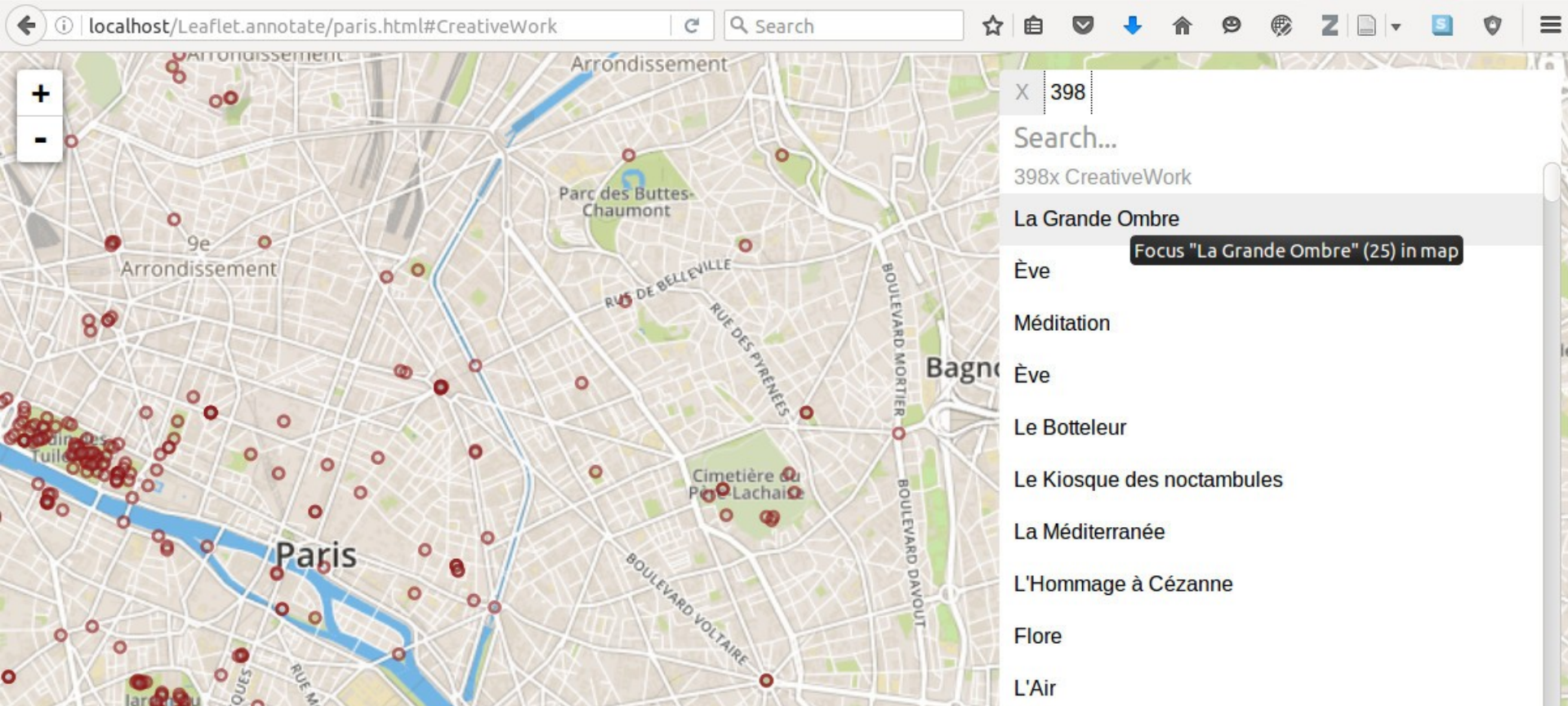
jQuery.getJSON('test-geometries/admin0_poly.json', function(response) {
    statesBoundaries = L.geoJson(response, {
        title: 'Charmingly Inaccurate - United States of America',
        itemtype: 'Country', description: 'A caricature of the lower 48 United States, this linework set is recognizable and friendly, but not concerned with ...." It's that friend you have who's always embellishing his stories. You never mind his lying, though, because the exaggerations make things more fun. Go ahead, enjoy the story your map is telling. (Version 1.1)',
        creator: 'Daniel P. Huffmann', publisher: 'Daniel P. Huffmann',
        published: '10/04/2013', modified: '10/04/2013',
        created: '3/24/2013', rights: 'Public Domain',
        derivedFrom: 'Derived from a 1920 broadside map entitled "The Rights of the People—Women are People: Suffrage Victory Map." Equal Suffrage League of Virginia Papers, Acc. 22002, Library of Virginia.', '}).addTo(map)
    statesBoundaries.annotate()
})
```

Colors: Standard JavaScript, JavaScript using the LeafletJS API,
Options provided by Leaflet.annotate

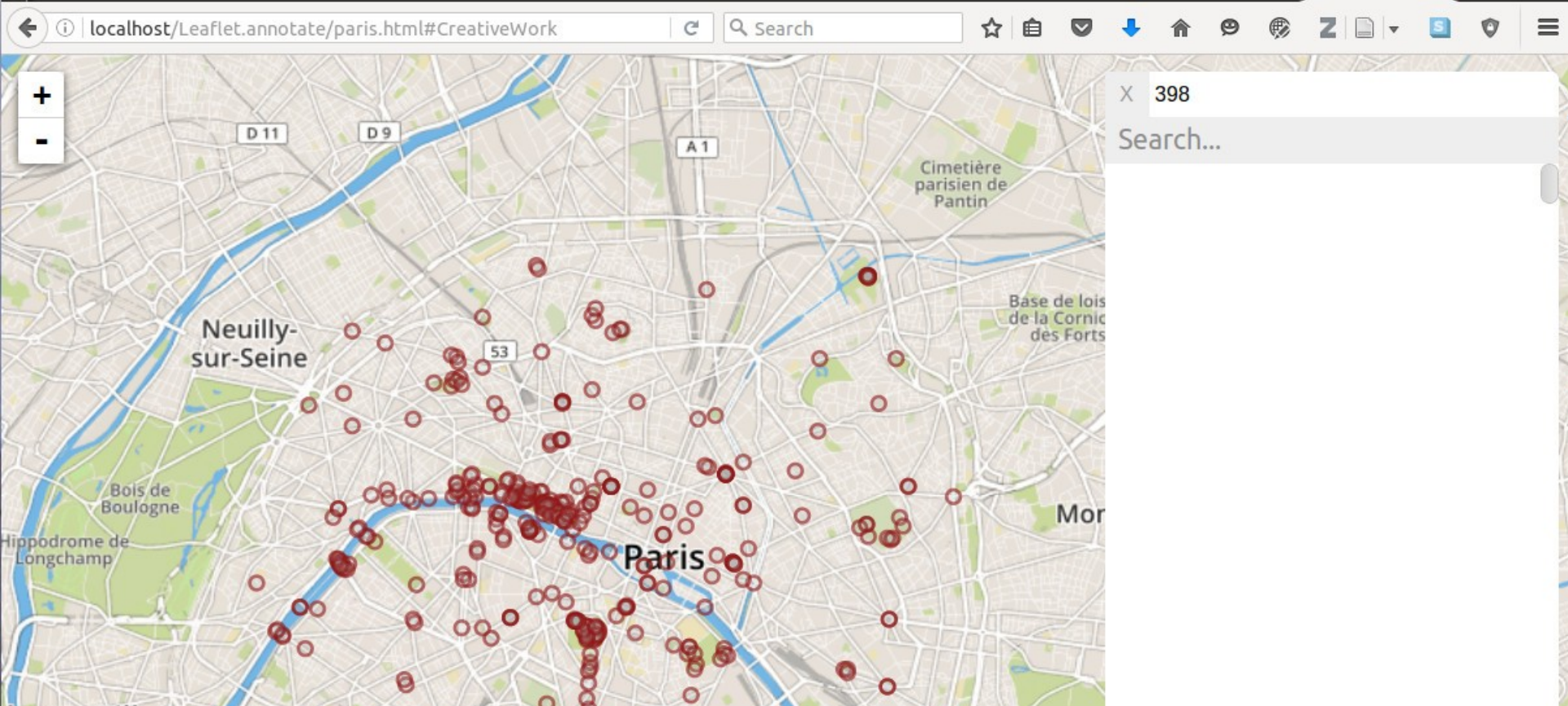
SVG output for the GeoJSON Layer

```
<g>
  <path stroke-linejoin="round" stroke-linecap="round" fill-rule="evenodd" stroke="#0033ff"
stroke-opacity="0.5" stroke-width="5" fill="#0033ff" fill-opacity="0.2" class="leaflet-
clickable" d="M663 327L661 325L669 325L663 327z"></path>
  <metadata itemscope="" itemtype="http://schema.org/Country" data-internal-leaflet-id="38">
    <descr itemprop="name" content="Charmingly Inaccurate - United States of America">
    <descr itemprop="description" content="A caricature of the lower 48 United States,
this linework set is recognizable and friendly, but not concerned with such stuffy notions as
"cartographic accuracy." It's that friend you have who's always embellishing his stories. You
never mind his lying, though, because the exaggerations make things more fun. Go ahead, enjoy
the story your map is telling. (Version 1.1)">
    <descr itemprop="url" content="
https://github.com/mapsam/project-linework/tree/master/linework-sets/charmingly-inaccurate">
    <descr name="http://purl.org/dc/elements/1.1/creator" content="Daniel P. Huffmann">
    <descr name="http://purl.org/dc/elements/1.1/publisher" content="Daniel P. Huffmann">
    <descr name="http://purl.org/dc/elements/1.1/date" content="10/04/2013"><meta
name="http://purl.org/dc/elements/1.1/rights" content="Public Domain"><meta
name="http://purl.org/dc/elements/1.1/source" content="Derived from a 1920 broadside map
entitled "The Rights of the People—Women are People: Suffrage Victory Map." Equal Suffrage
League of Virginia Papers, Acc. 22002, Library of Virginia.">
    <descr name="http://purl.org/dc/terms/created" content="3/24/2013">
    <descr name="http://purl.org/dc/terms/modified" content="10/04/2013">
    <g itemprop="geo" itemtype="http://schema.org/GeoShape"
      itemscope=""><descr itemprop="polygon" content="....."></g>
  </metadata>
</g>
```


Quick demo of *L.annotationViewer* (L.Control)



The **annotationViewer** control of the **Leaflet.annotate** plugin used in a map providing a geographical index to public sculptures located in Paris, Screenshot, Aug, 23 2016, Data based on a Wikidata SPARQL Query



The **annotationViewer** control of the **Leaflet.annotate** plugin providing a **search dialog** over metadata on public sculptures mapped onto Paris, Screenshot, Aug, 23 2016, Data based on a Wikidata SPAQRL Query

Thanks for listening!

Please try out the *Leaflet.annotate* plugin and if you have feedback or want to contribute please use the github repository located at <http://github.com/ilf-geovis/Leaflet.annotate>

Source Code & Download

Source code and API Docs of *Leaflet.annotate* at Github:

<https://github.com/ifl-geovis/Leaflet.annotate>

Download First Release:

<https://github.com/ifl-geovis/Leaflet.annotate..>