GSoC and OSM

Tobias Knerr
2020-01-27

Spend your summer break writing code for an open source software project!

Matrix.org

An open network for secure, decentralised communication

Mozilla

The internet for people, not for profit.

MuseScore

MuseScore is music notation software used by millions of musicians worldwide

OpenStreetMap

Creating and distributing free geographic data for the world.

OSGeo

The Open Source Geospatial Foundation

PostgreSQL

The World's Most Advanced Open Source Database

Python Software Foundation

Python is a programming language used by software developers and scientists.

R project for statistical computing

R is a free software environment for statistical computing and graphics

ScummVM

ScummVM is a GSoC umbrella for game preservation projects

Swift

Swift is a high-performance application and system programming language.

The Apache Software Foundation

Providing open source software to the public free of charge

The Eclipse Foundation

The Platform for Open Innovation and Collaboration

How to GSoC

1. Pick among 200+ open source projects
2. Spend three months coding (from home)
3. Get experience, good karma, and money

History and numbers

- First GSoC in 2005:
  - 200 student positions were planned
  - received 8740 project applications
- GSoC 2019: 1276 students accepted

73%	Computer Science
17%	Engineering
4.2%	Mathematics

Students by country

1. India (605)
2. United States (104)
3. Germany (53)
4. China (52)
5. Sri Lanka (41)
6. Russia (35)
7. Canada (31)

Stipend

$3000 to $6600 based on university location

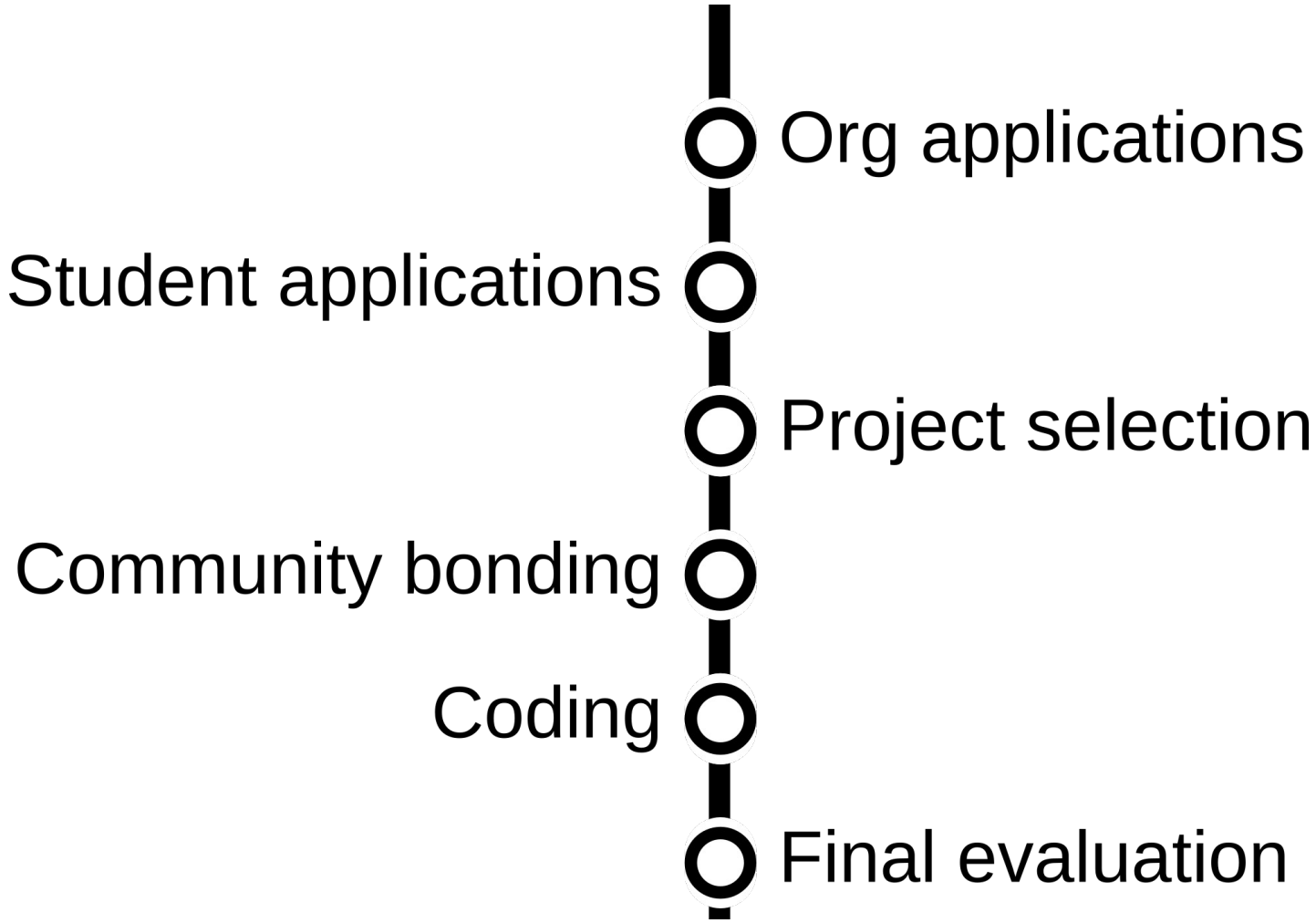
Estonia	3600
Ethiopia	3000
Fiji	3600
Finland	6000
France	5400
Gabon	3000
Gambia, The	3000
Georgia	3000
Germany	5400
Ghana	3000
Greece	4200
Grenada	4200
Guatemala	3000

Eligibility

- At least 18 years old
- Full or part-time student
  - enrolled at the beginning of the program
  - PhD students are eligible, too
- Specific rules about being allowed to work in the country you reside in, not being subject to US embargo, …

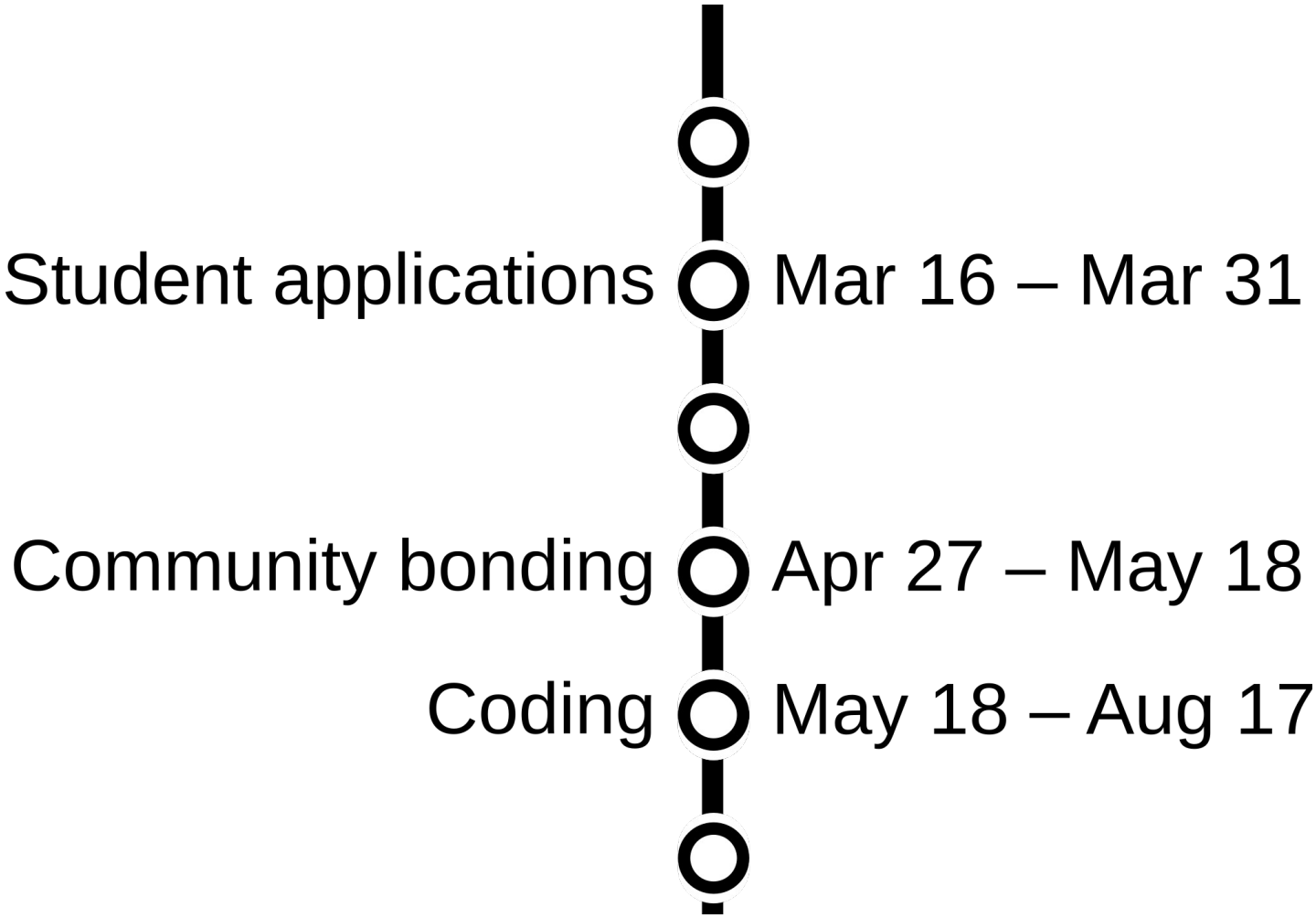
  → verify if this may affect you!

Timeline



https://summerofcode.withgoogle.com/how-it-works/#timeline

Timeline (2020)



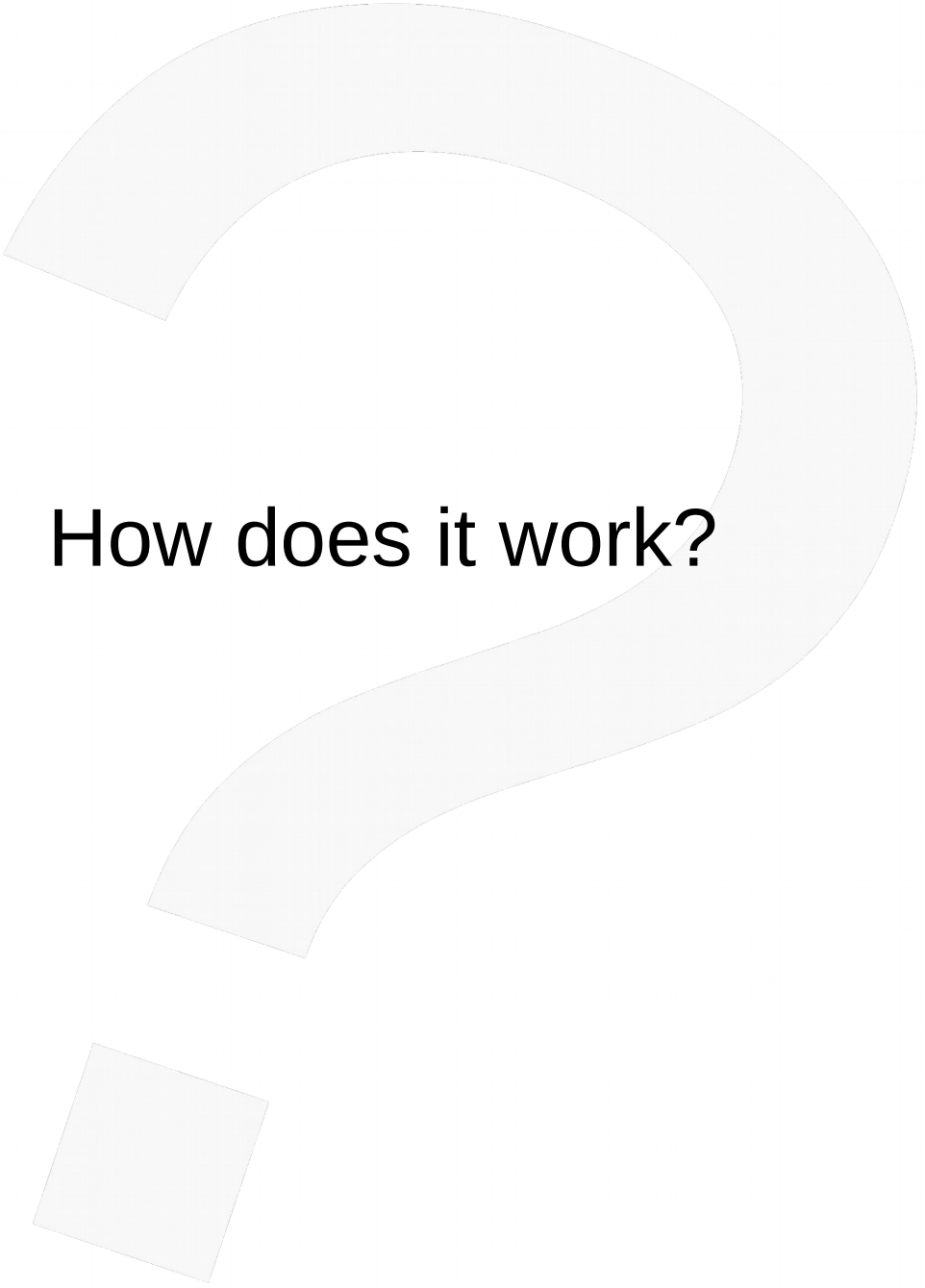
https://summerofcode.withgoogle.com/how-it-works/#timeline

What else is there to learn?

- Finding a fun project idea
- Writing an application that gets you selected for GSoC
- Successfully passing evaluations
- Making use of mentoring

... also, real-world project examples from OpenStreetMap

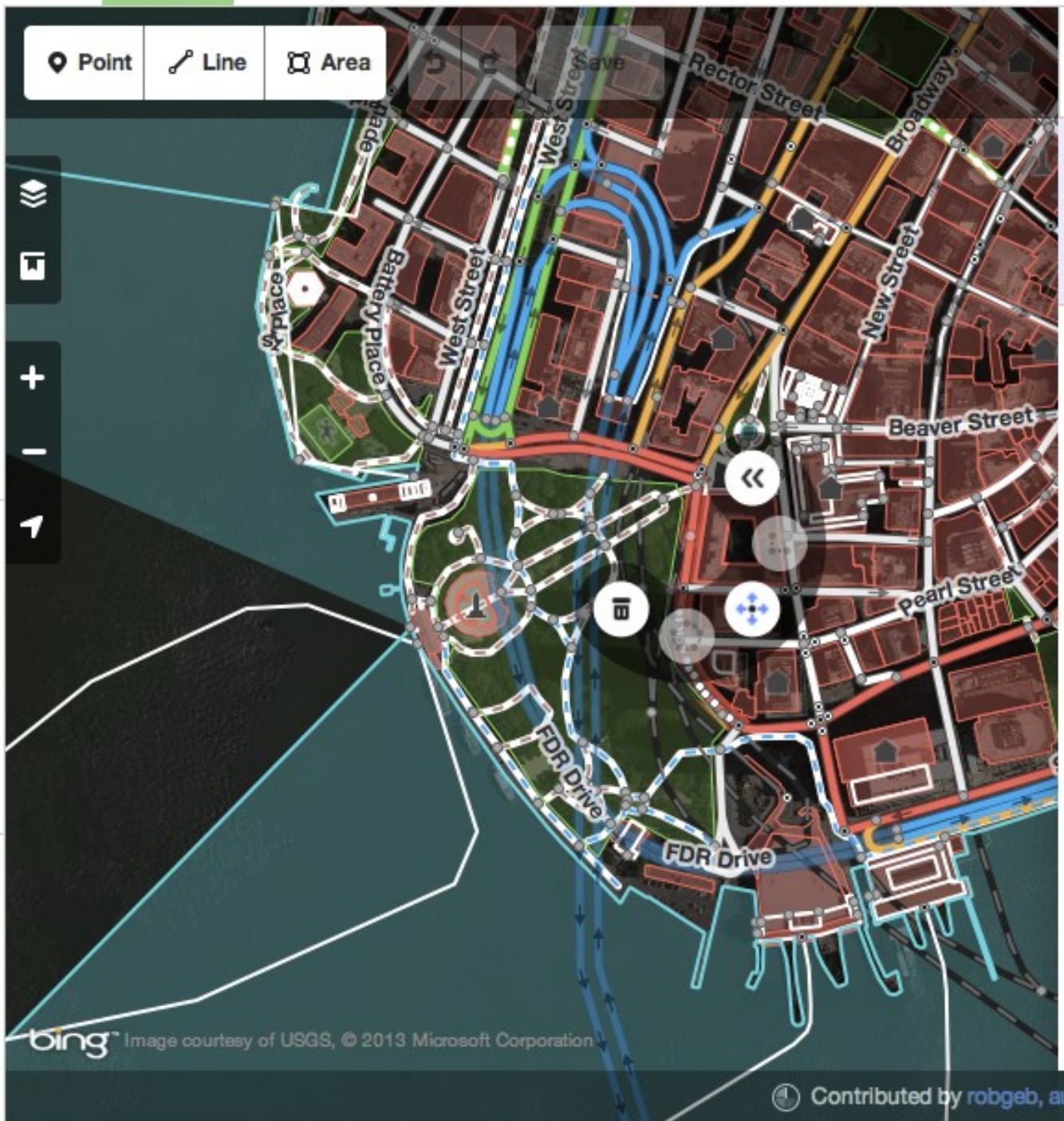
OpenStreetMap is a free, editable map of the whole world that is being built [mostly] by volunteers largely from scratch and released with an open-content license.



How does it work?

Walking Papers

MacBook Pro



Editing Primary Road

Name
State Street

One Way
no

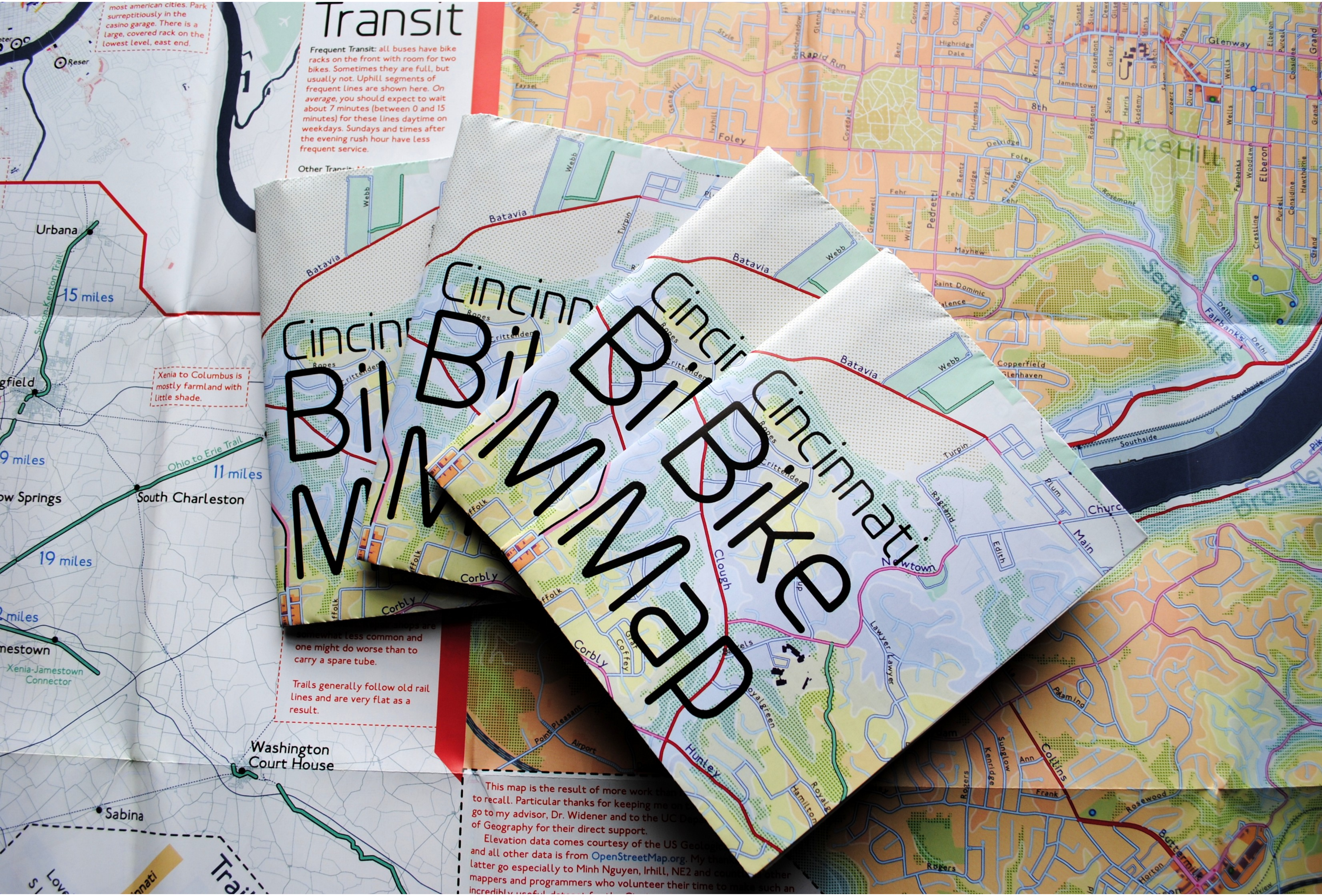
Structure
Bridge
Tunnel
Embankment
Cutting
Remove

Access

STATE OF THE MAP US
2014 - WASHINGTON DC

OSM is everywhere!

AUTONAVIGATOR 333
8, Большой Курмыш ул.
Казеевка
Дача в казеевке
120
0:01
120
17:52
30 м
20
Большой Курмыш ул.
connect


Transit
Frequent Transit: all buses have bike racks on the front with room for two bikes. Sometimes they are full, but usually not. Uphill segments of frequent lines are shown here. On average, you should expect to wait about 7 minutes (between 0 and 15 minutes) for these lines daytime on weekdays. Sundays and times after the evening rush hour have less frequent service.
most american cities. Park surreptitiously in the casino garage. There is a large, covered rack on the lowest level, east end.
Urbana
15 miles
Xenia to Columbus is mostly farmland with little shade.
Ohio to Erie Trail
11 miles
19 miles
South Charleston
Xenia-Jamestown Connector
one might do worse than to carry a spare tube.
Trails generally follow old rail lines and are very flat as a result.
Washington Court House
Sabina
Cincinnati
Bike
Map
Price Hill
Batavia
Webb
Turpin
Clough
Newtown
Corbly
Hunley
Glenway
Elberon
Delhi
Fairbanks
Southside
Collins
Rosewood
This map is the result of more work than … to recall. Particular thanks for keeping me … go to my advisor, Dr. Widener and to the UC … of Geography for their direct support.
Elevation data comes courtesy of the US Geolog… and all other data is from OpenStreetMap.org. My than… latter go especially to Minh Nguyen, Irhill, NE2 and co… mappers and programmers who volunteer their time to make such an

WIKIPEDIA
Die freie Enzyklopädie

Hauptseite
Themenportale
Von A bis Z
Zufälliger Artikel

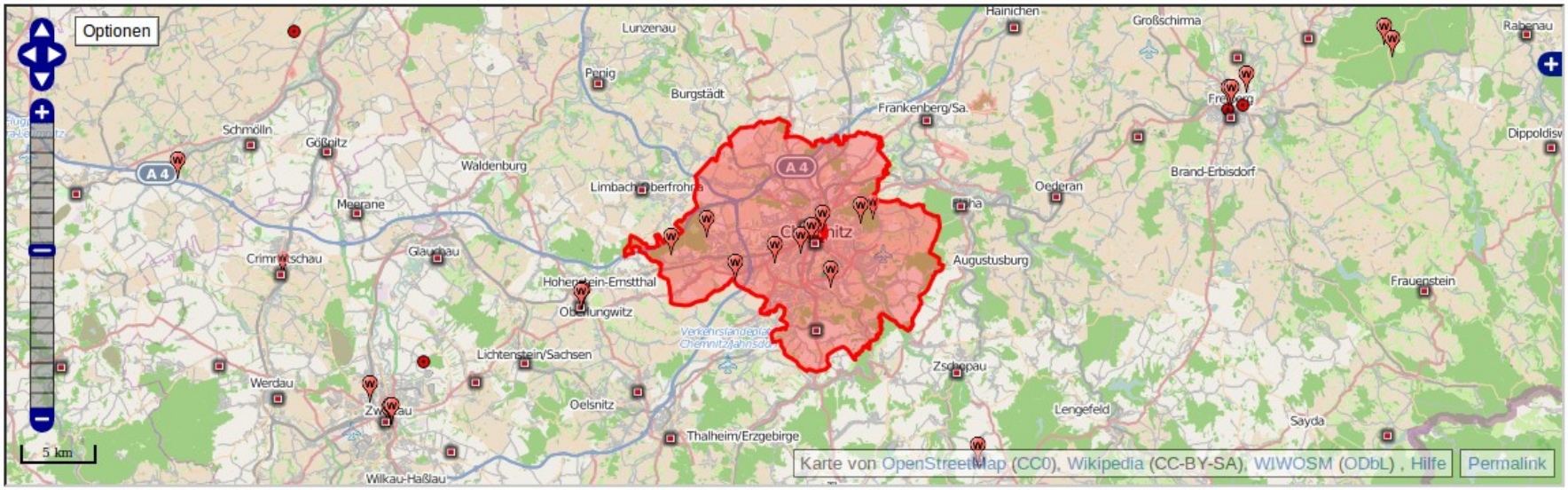
Mitmachen
Artikel verbessern
Neuen Artikel anlegen
Autorenportal
Hilfe
Letzte Änderungen
Kontakt
Spenden

Werkzeuge
Links auf diese Seite
Änderungen an verlinkten Seiten
Spezialseiten
Permanenter Link
Seiten-informationen
Wikidata-Datenobjekt
Artikel zitieren

Drucken/exportieren
Buch erstellen
Als PDF herunterladen
Druckversion

In anderen Projekten
Commons
Wikisource
Wikivoyage

Chemnitz



Der Titel dieses Artikels ist mehrdeutig. Weitere Bedeutungen sind unter Chemnitz (Begriffsklärung) aufgeführt.

Chemnitz [ˈkʰɛmnɪt͡s] (von 1953 bis 1990 nach Karl Marx als **Karl-Marx-Stadt** benannt) ist eine kreisfreie Stadt im Südwesten des Freistaates Sachsen. Sie ist die drittgrößte Stadt sowie eines der sechs Oberzentren von Sachsen. Die Großstadt mit 243.521 Einwohnern (Stand 31. Dezember 2014) liegt am Nordrand des Erzgebirges im Erzgebirgsbecken. Chemnitz ist Hauptsitz der Landesdirektion Sachsen und Teil der Metropolregion Mitteldeutschland.

Die älteste urkundliche Erwähnung datiert aus dem Jahre 1143. Im 19. und frühen 20. Jahrhundert entwickelte sich Chemnitz zu einer wichtigen Industriestadt in Deutschland. Die Einwohnerzahl überschritt in der Zeit der Hochindustrialisierung 1883 die Marke von 100.000 und erreichte zu Beginn der 1930er Jahre mit über 360.000 ihren Höchstwert. Im Zweiten Weltkrieg wurde die Chemnitzer Innenstadt bei Luftangriffen im Februar und März 1945 zu 80 % zerstört.[2] Am 10. Mai 1953 erfolgte durch das Zentralkomitee der SED und die Regierung der DDR die Umbenennung der Stadt in *Karl-Marx-Stadt*.[3]

Wappen	Deutschlandkarte

Basisdaten	
Bundesland:	Sachsen

Nienburg
Hannover Hbf
160 km/h
13:03

HRS
Das Hotelportal
DB
Hauptbahnhof Berlin
DB
Ihr Weg in die Stadt
Fahrkarten
Tickets/Billets/Bigliett

Möckern
Gohlis-Mitte
Gohlis-Süd
Eutritzsch
Schönefeld
Volkmarsdorf
Neustadt-Neuschönefeld
Leipzig

FRONT

BACK

12
9
3

SPORTZENTRUM

- Team
- Hochschulsport
- Kursanmeldung
- Kurse von A-Z
- Kurse nach Bereichen
- Kurse heute
- Sportstätten
- Wettkämpfe
- Sportstudium
- Sporteignungsprüfung
- Aktuelles
- Forschung
- Leistungsdiagnostik
- Leistungssport
- Kontakt

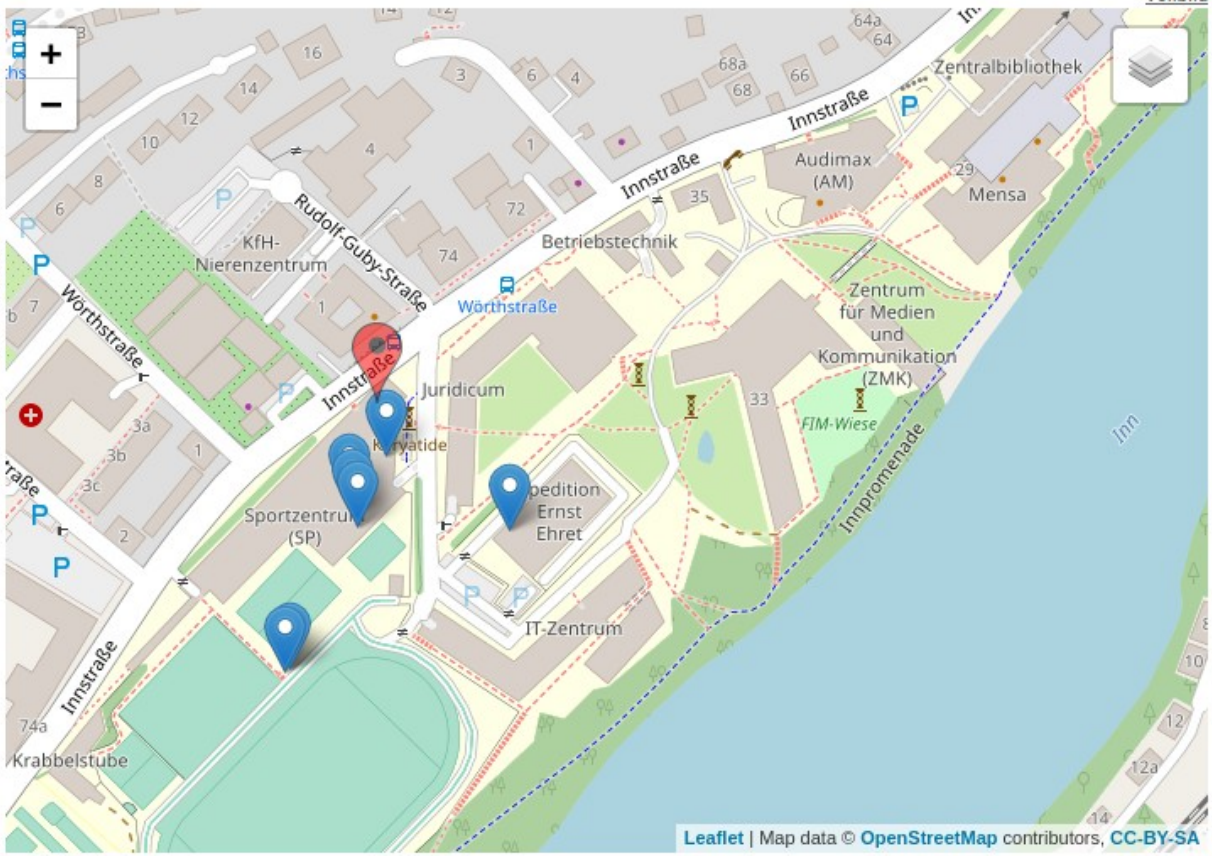
UNI-PORTAL FÜR

- Studierende
- Studieninteressierte
- Wissenschaftler
- Nachwuchsförderung
- Unternehmen
- Alumni, Förderer, Freunde
- Schüler und Lehrer

Dreifachhalle 1

Innstr. 45
94032 Passau

Vollbild



in unmittelbarer Nähe dieses Veranstaltungsortes befinden sich folgende Orte:

Dreifachhalle 1	0 m
Dreifachhalle 2	0 m

Pokémon
GO

amazon

esri

TESLA

facebook

Bing

flickr

FOURSQUARE

Core services

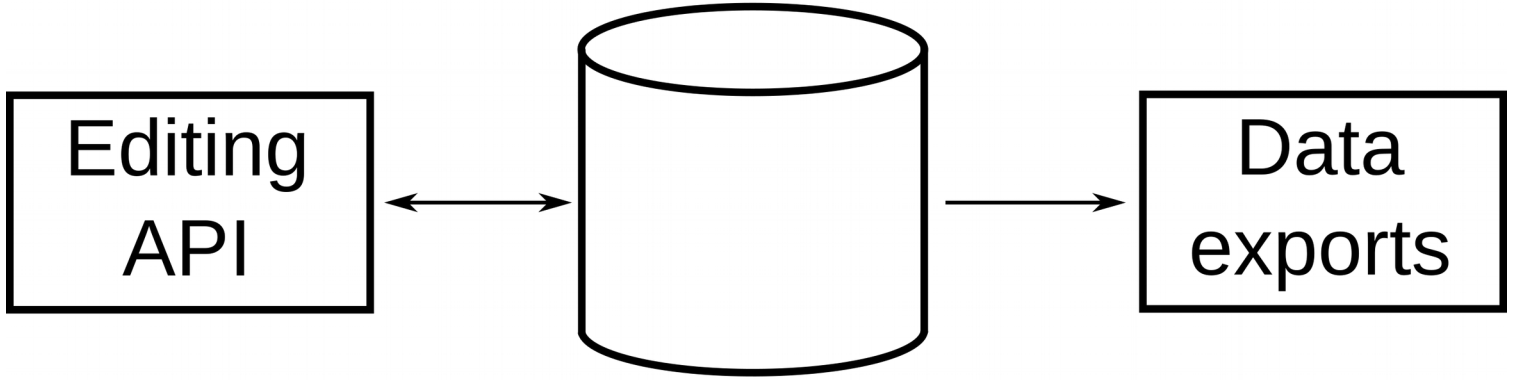
- Hosted by OpenStreetMap Foundation
- Much wider, decentralized ecosystem beyond

Frontend

Wiki Forum Website osm.org Lists etc.

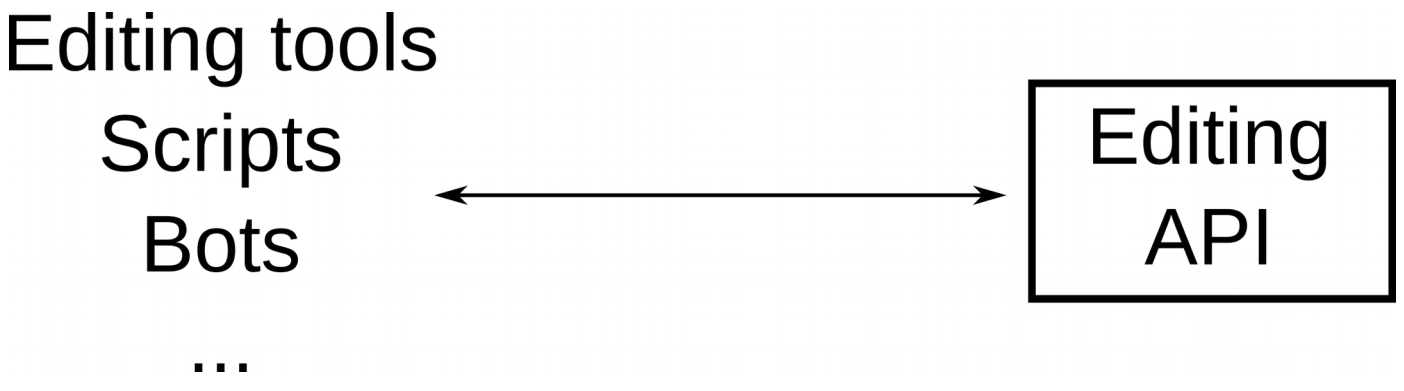
Core services

Map data
+ user accounts,
history, ...

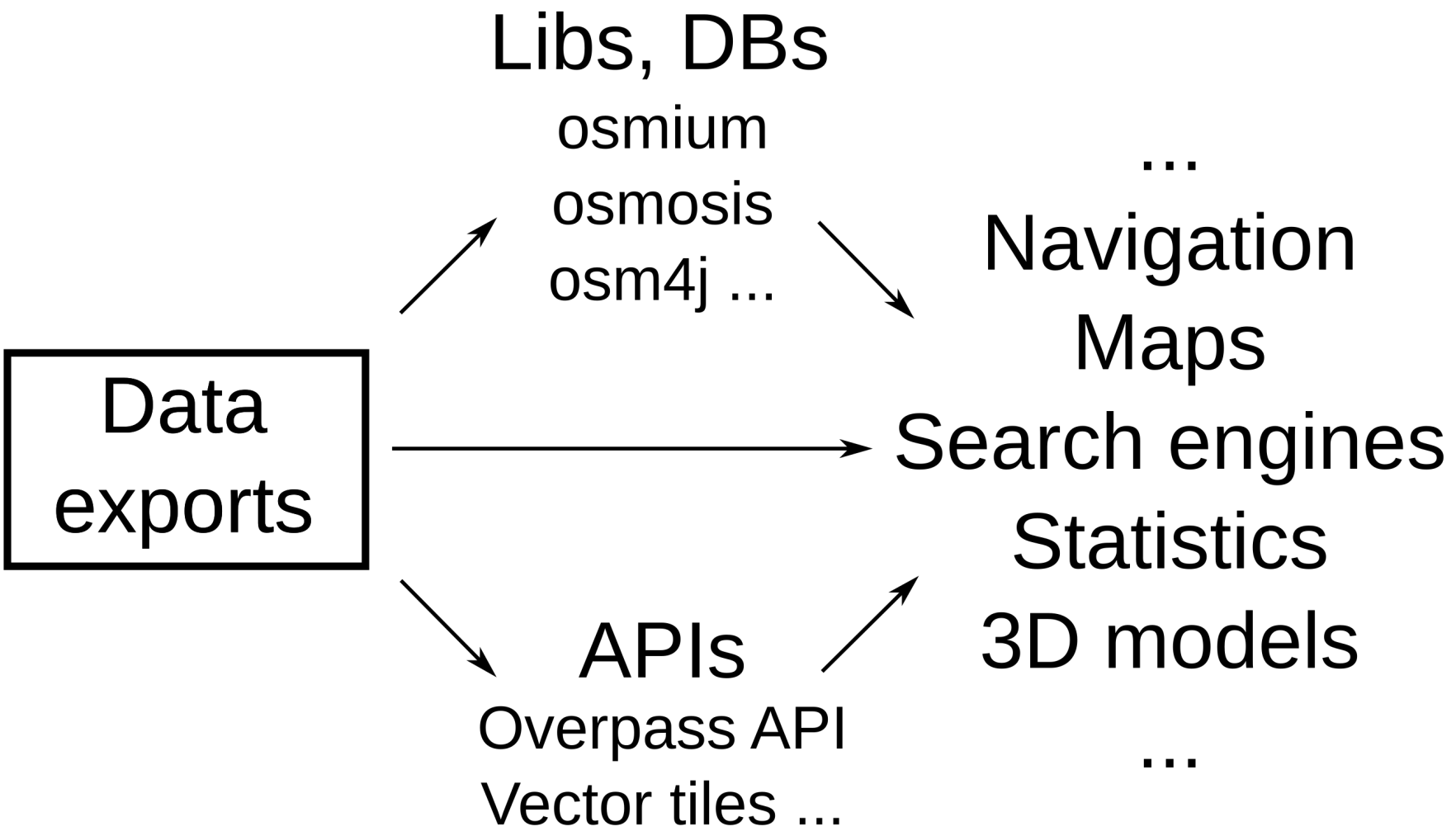


Wiki Forum Website osm.org Lists etc.

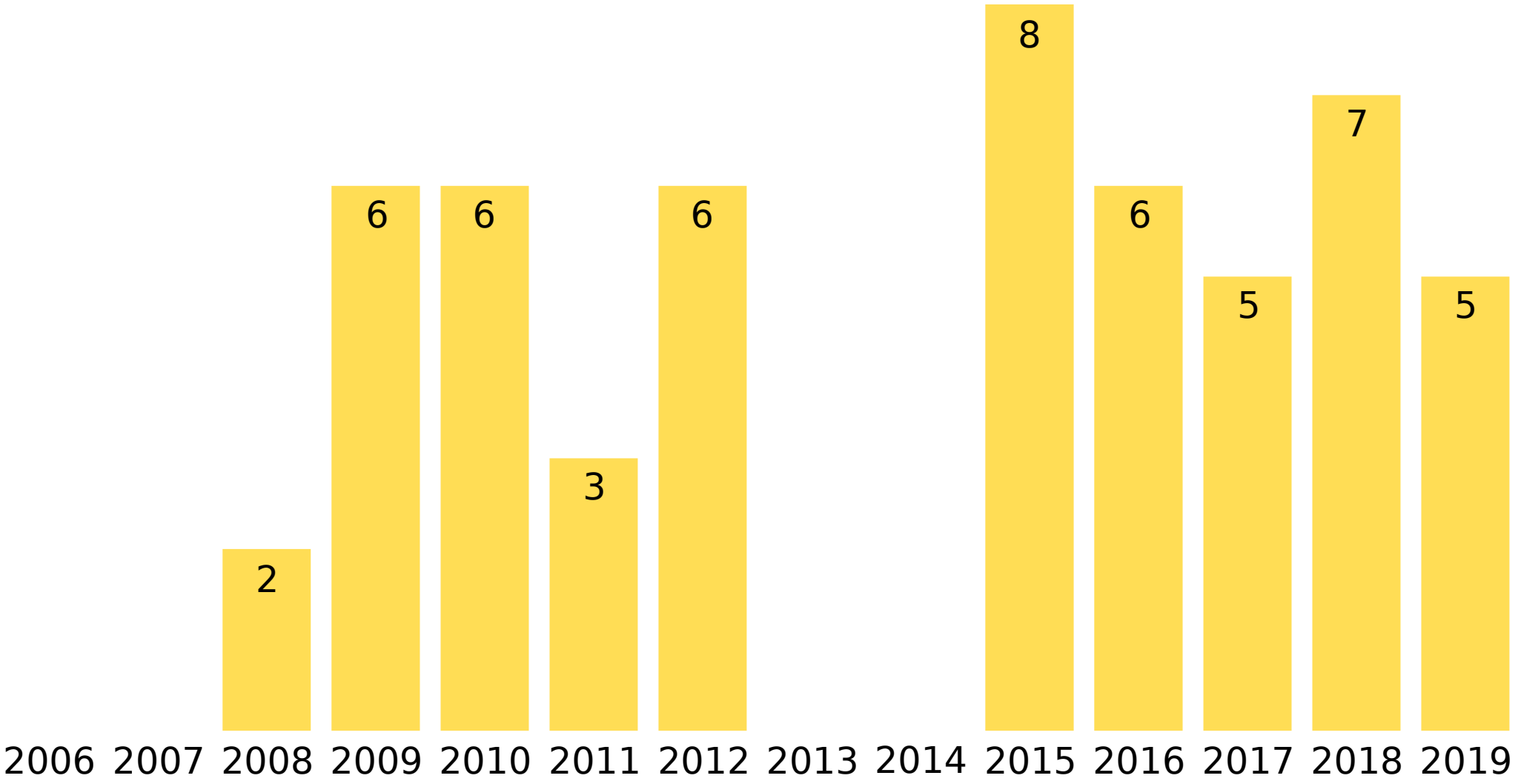
Editing tools



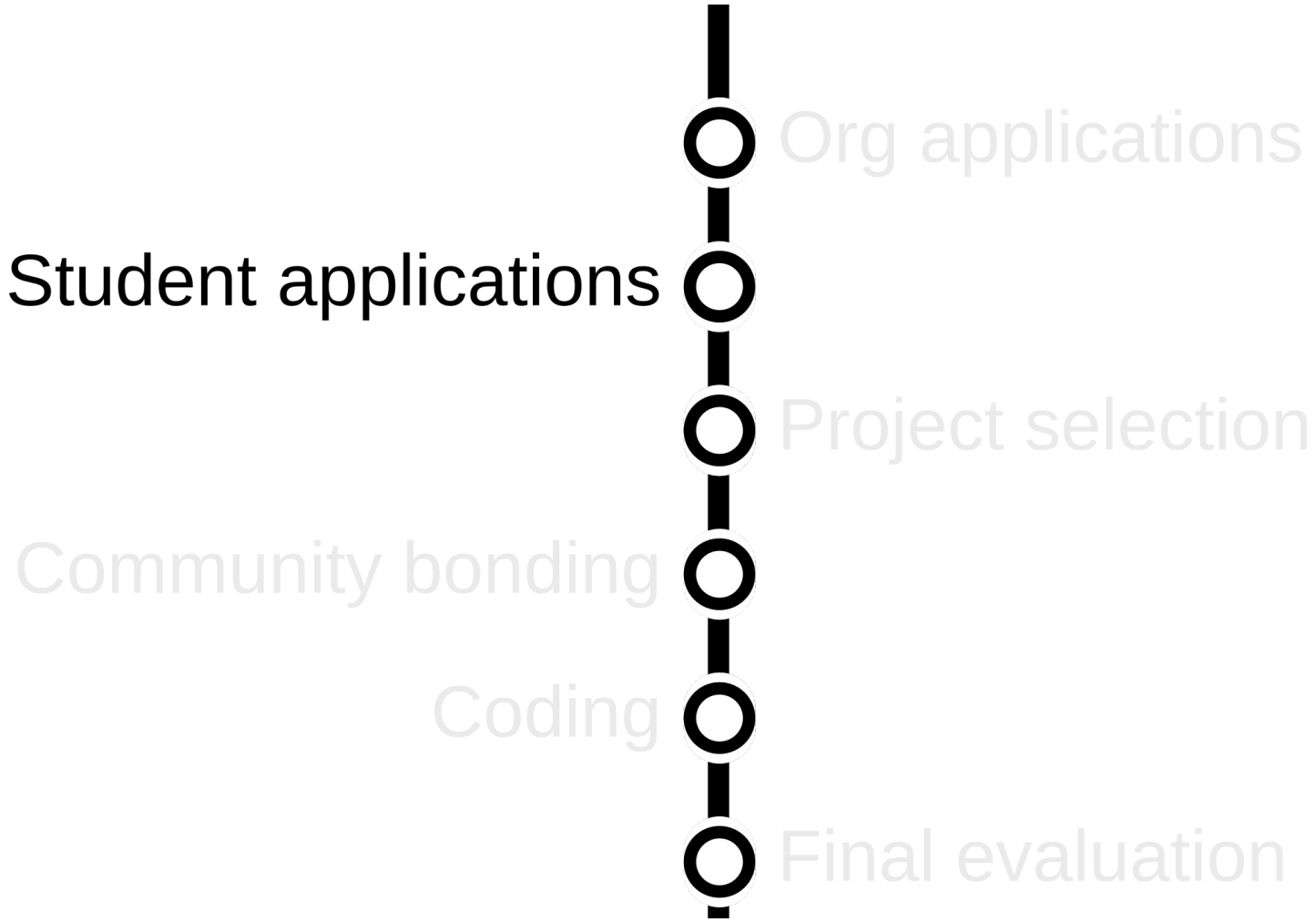
Data consumers



OSM in GSoC: Number of students



Timeline


Org applications
Student applications
Project selection
Community bonding
Coding
Final evaluation

General considerations

- Accepted projects have > 80% success rate

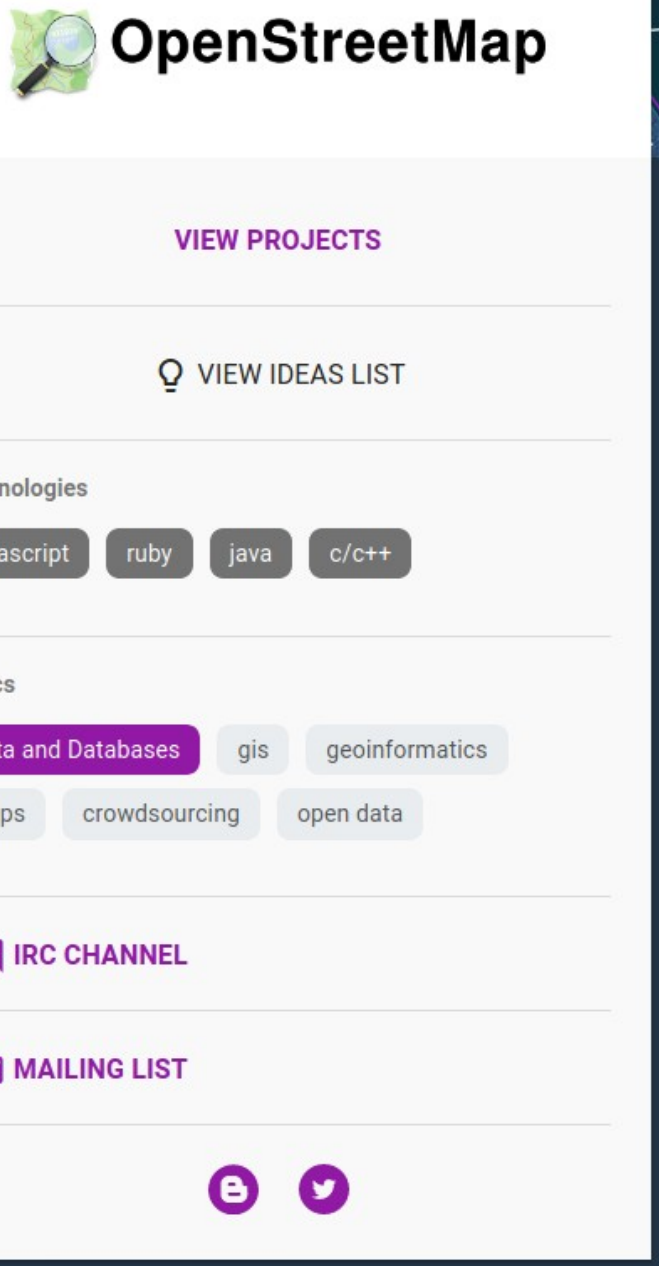
- Up to 3 proposals (but focus your efforts)
- Read the org‘s instructions
- Get started *before* applications open

Finding projects

- Look for interesting orgs and projects
- List of orgs on GSoC page:
  - basic info, technologies
  - links to mailing lists, blogs, chat, etc.
  - project ideas
  - application instructions

OpenStreetMap

https://www.openstreetmap.org/



Creating and distributing free geographic data for the world.

OpenStreetMap is a crowdsourcing project that creates and distributes free geographic data for the world. Our data is collected by volunteers around the globe largely from scratch and released with an open-content license. We allow free access not only to our map images, but all the underlying map data, which powers websites and apps used by billions of people worldwide.

OSM data can be freely used in both open and closed source software, and has attracted many commercial users. Still, the success of OSM wouldn't be possible without open source software and volunteer developers. The database, website and api running on our own servers, the editing tools used by contributors to improve the map, and many of the most popular libraries and end-user applications within the OSM software ecosystem are all open source software, and developed through a community-driven process.

As our Google Summer of Code participation spans this diverse set of software projects, most of which are maintained as independent efforts under the OSM umbrella, students will encounter a diverse range of programming languages, paradigms and use cases. We hope that we have

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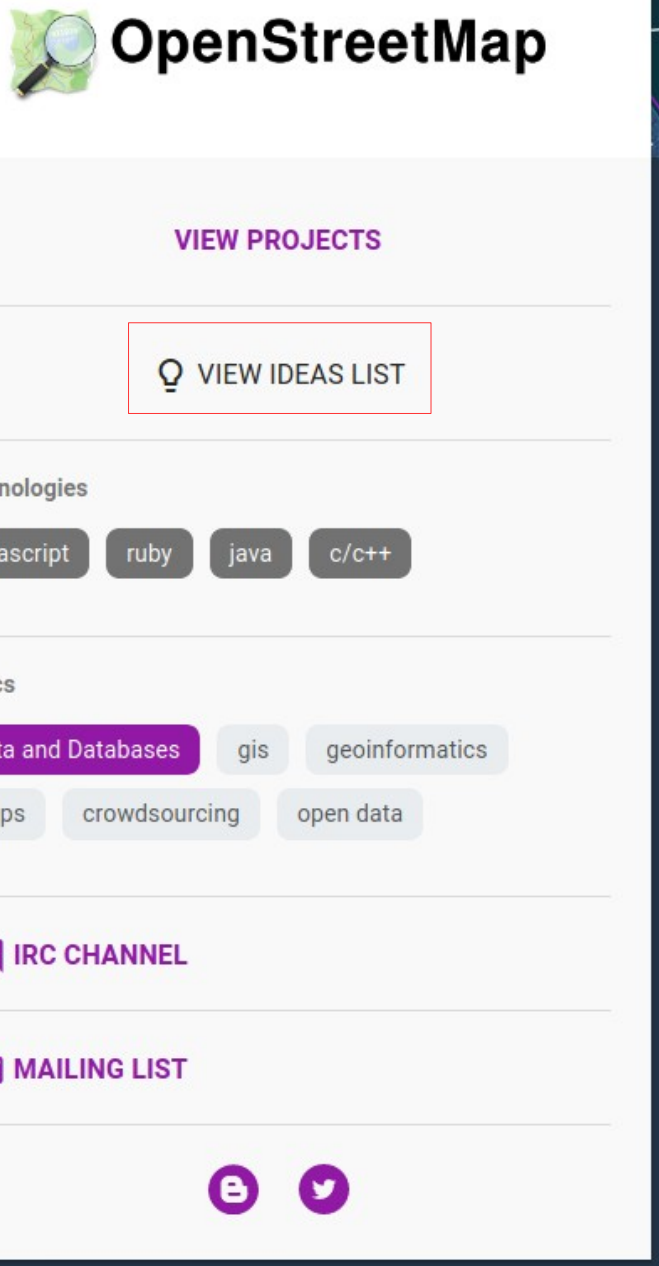

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Search suggestions for osm.org

Suggested By

Lonvia

Summary

Providing suggestions while typing in a query in the search box is a standard feature of online maps. OSM's main search engine Nominatim cannot be used for generating such suggestions because it cannot handle partially written words. Full text search engines like elastic search are much better suited for that job. The goal of this project is to set up a database for search suggestions for osm.org. This database must be derivable from the Nominatim database, regularly updatable, be able to handle arbitrary languages and small enough to run alongside the Nominatim installation on nominatim.openstreetmap.org. A possible starting point is the Photon project which creates an elastic search database from Nominatim and therefore already fulfils part of the requirements.

Skills Required

Java, SQL(Postgresql, Postgis)

Difficulty

Hard

Possible Mentors

lonvia

Notes

Comments

Your own project ideas

- depends on org
- usually possible …

  … as long as it‘s a feature for existing software
- greenfield projects are very rarely an option

- mentor needed!

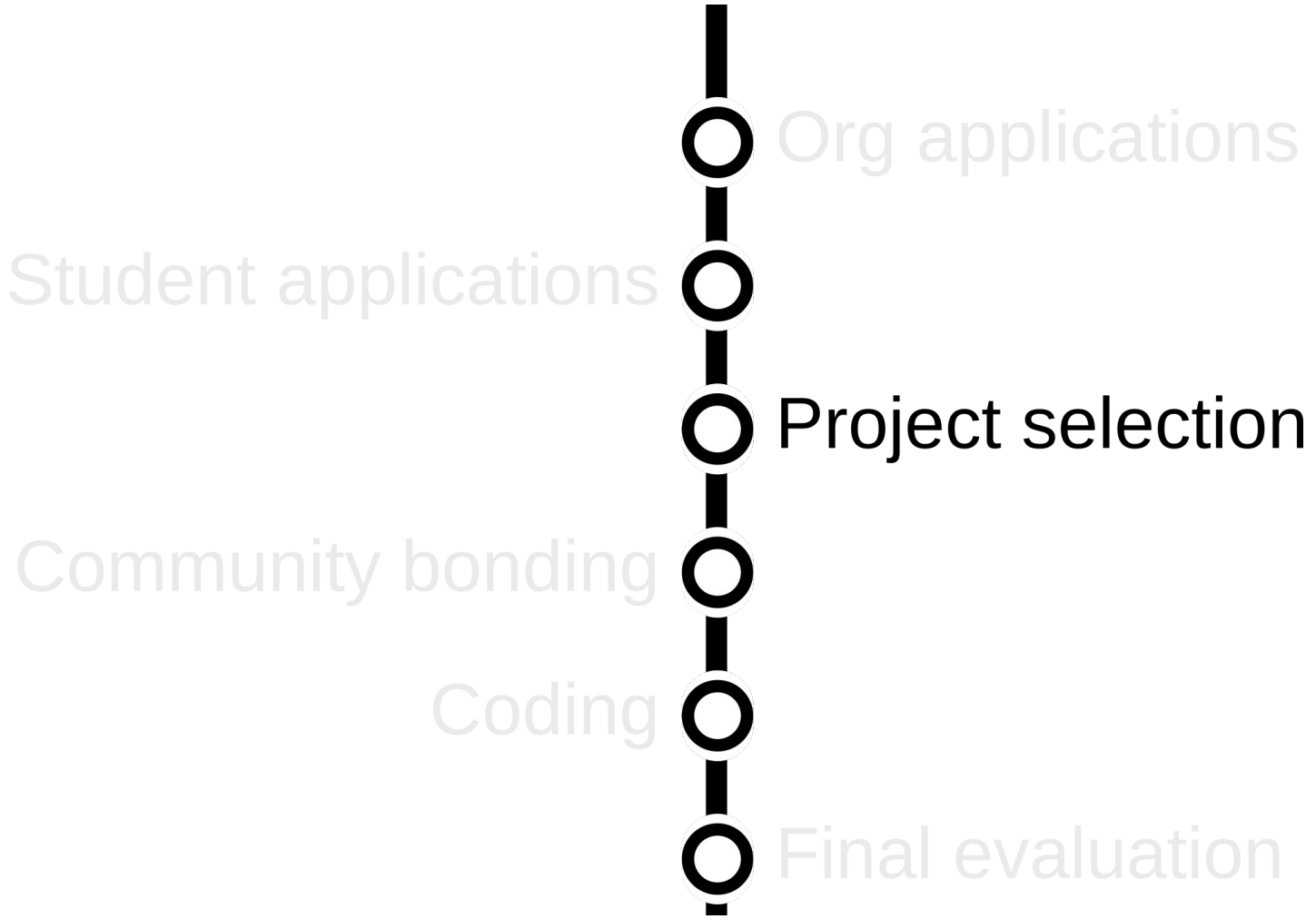
Reaching out

- Contact mentors directly,
  or use lists/forums/chat
- Goals:
  - learn more about the project idea
    (or bring up your own)
  - know enough about the software and
    code base to write a solid proposal
  - leave a good first impression
  - maybe avoid conflicting proposals

Written proposal

- Personal details
- Relevant skills
  - show us previous projects!
- Project proposal (main part)
  - describes what you will implement,
    with some technical detail
  - includes a timeline for certain milestones
  - “contract” for judging whether you pass or fail
- Separately: eligibility check by Google

Timeline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Final evaluation

What are we looking for?

- good programming skills
- knowledge of relevant tools
- existing community connection is a plus
  - fixing some issues
  - OSM-specific: adding map data
- plausible, well-researched proposals

Project selection

- Takes about 1 month
- Admins and mentors review the applications

  … not just mentors for that project idea
- Org requests number of slots (min/max)

  “We‘d like to mentor 6–8 students this year”
- Slot assignment by Google

  “You get 7 slots“ (never more than max)”
- Org fills the slots with student projects

  Deal with students with multiple applications

Internal OSM process

Step 1: Move proposals to ignore list

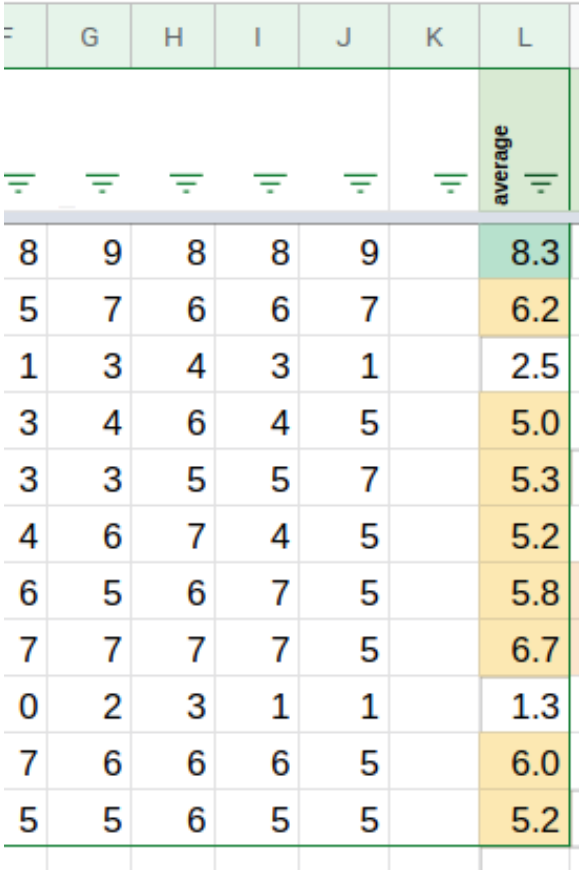
- Extremely short, low effort
- Off topic
- Clearly not eligible
- Significant omissions from our list of questions

Don‘t end up here, please!

Internal OSM process

Step 1: Move proposals to ignore list
Step 2: Independently rate proposals

- We use a 0–9 grading
- Not the final assesment, just a rough ranking
- We also make notes to discuss with others



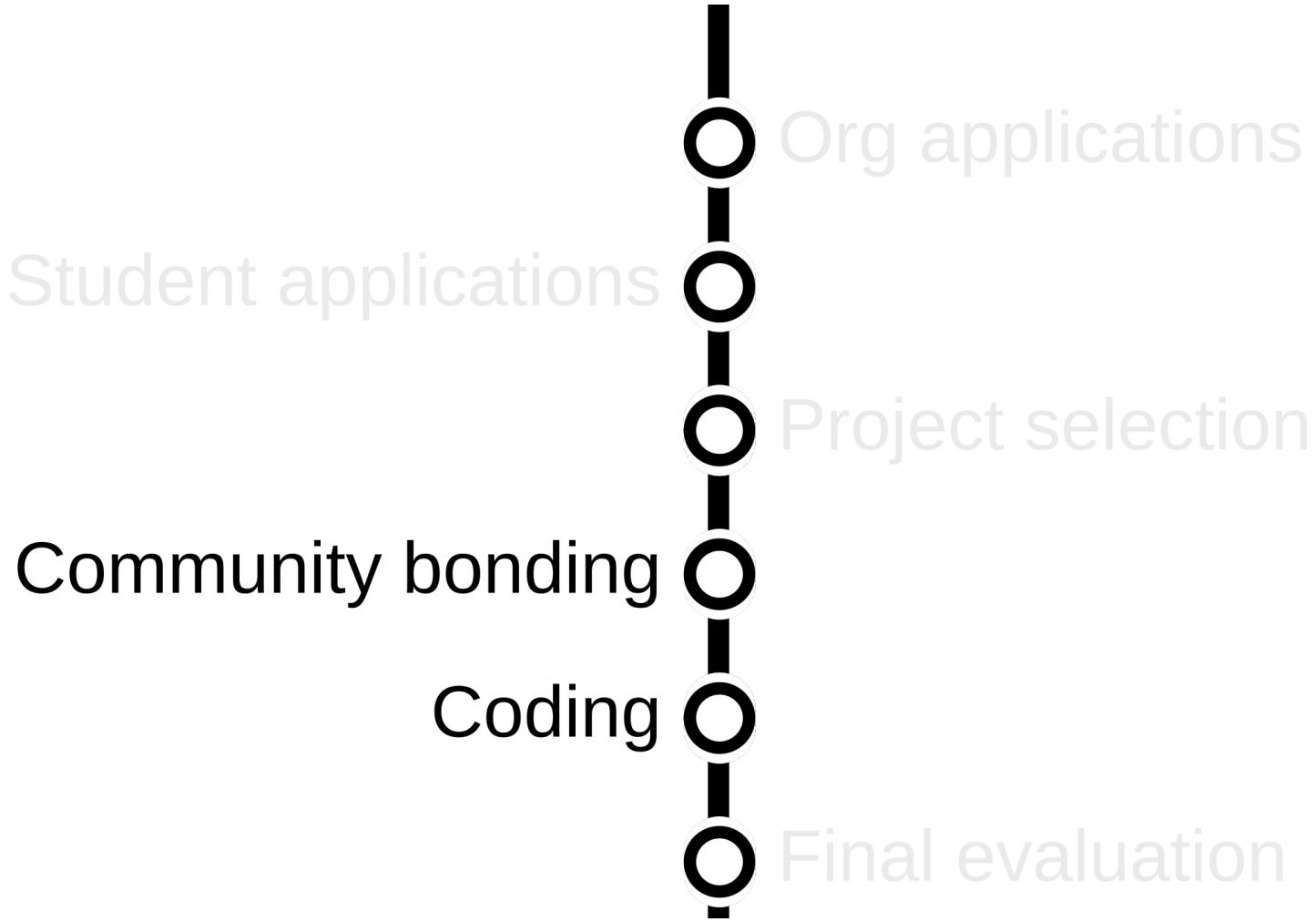
G	H	I	J	K	L
					average
9	8	8	9		8.3
7	6	6	7		6.2
3	4	3	1		2.5
4	6	4	5		5.0
3	5	5	7		5.3
6	7	4	5		5.2
5	6	7	5		5.8
7	7	7	5		6.7
2	3	1	1		1.3
6	6	6	5		6.0
5	6	5	5		5.2

Internal OSM process

Step 1: Move proposals to ignore list
Step 2: Independently rate proposals
Step 3: Meet for conference call

- Output: Ordered list of proposals, “min” / “max” / “no”
- Other selection factors:
  - Mentor vetos, lack of mentors
  - Conflicting projects
  - Mentor workload

Timeline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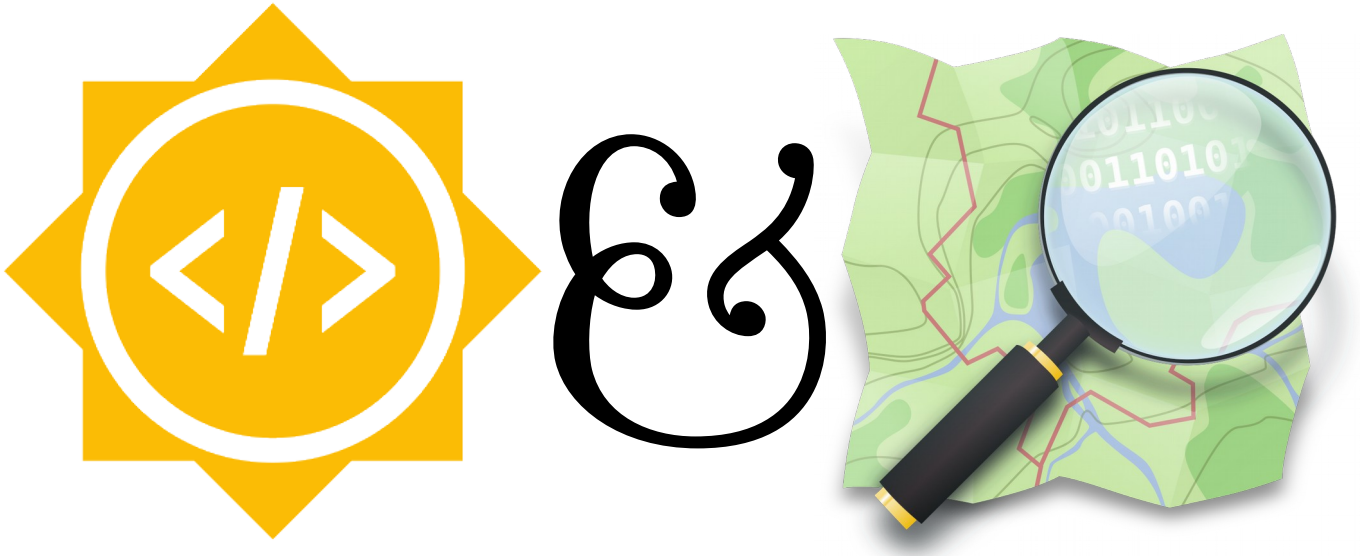
GSoC participation

- Community bonding (2 weeks)
- Coding (3 months)

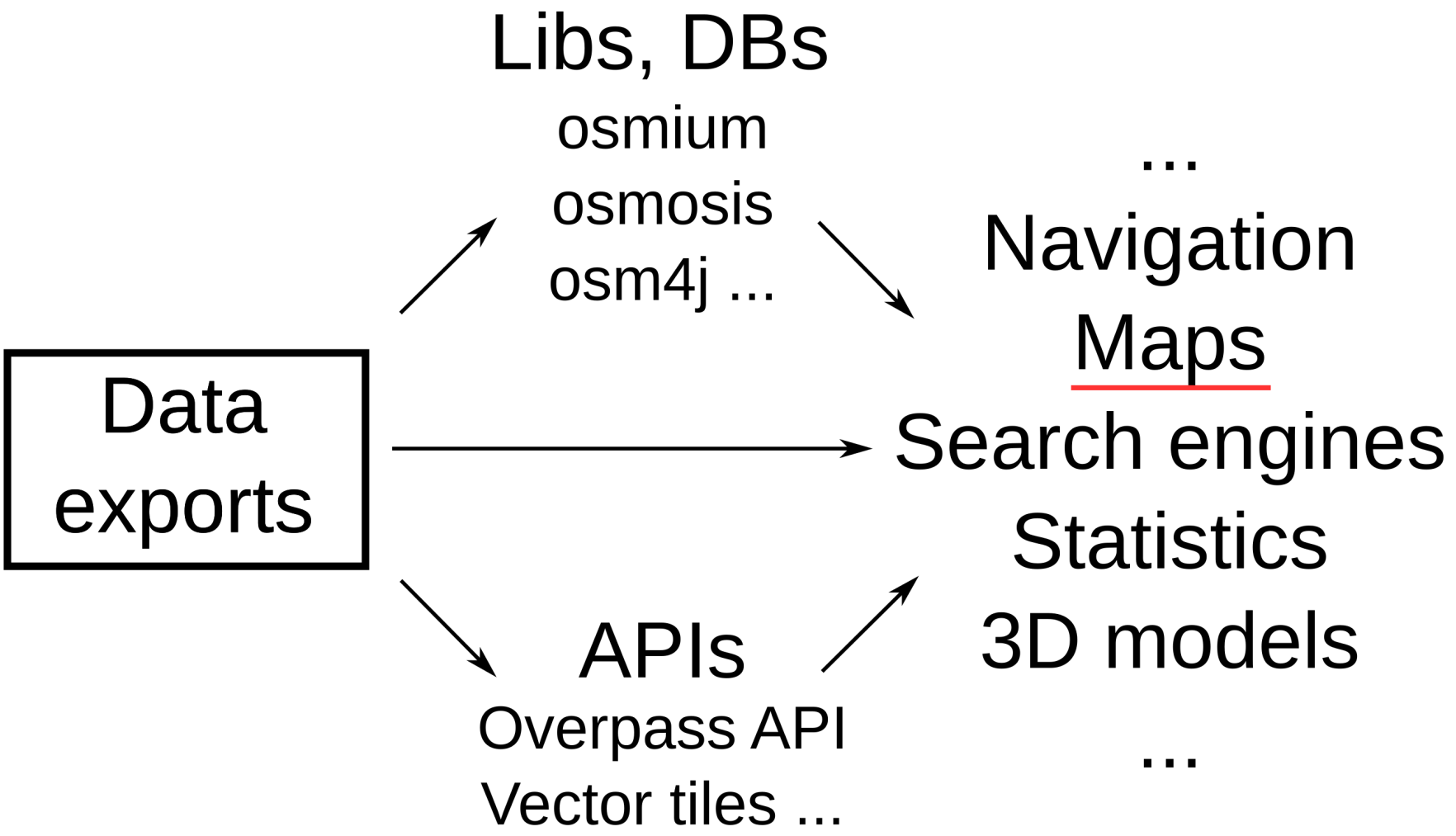
- Communicate!
  - weekly check-ins with mentor
  - keep in touch with the larger community

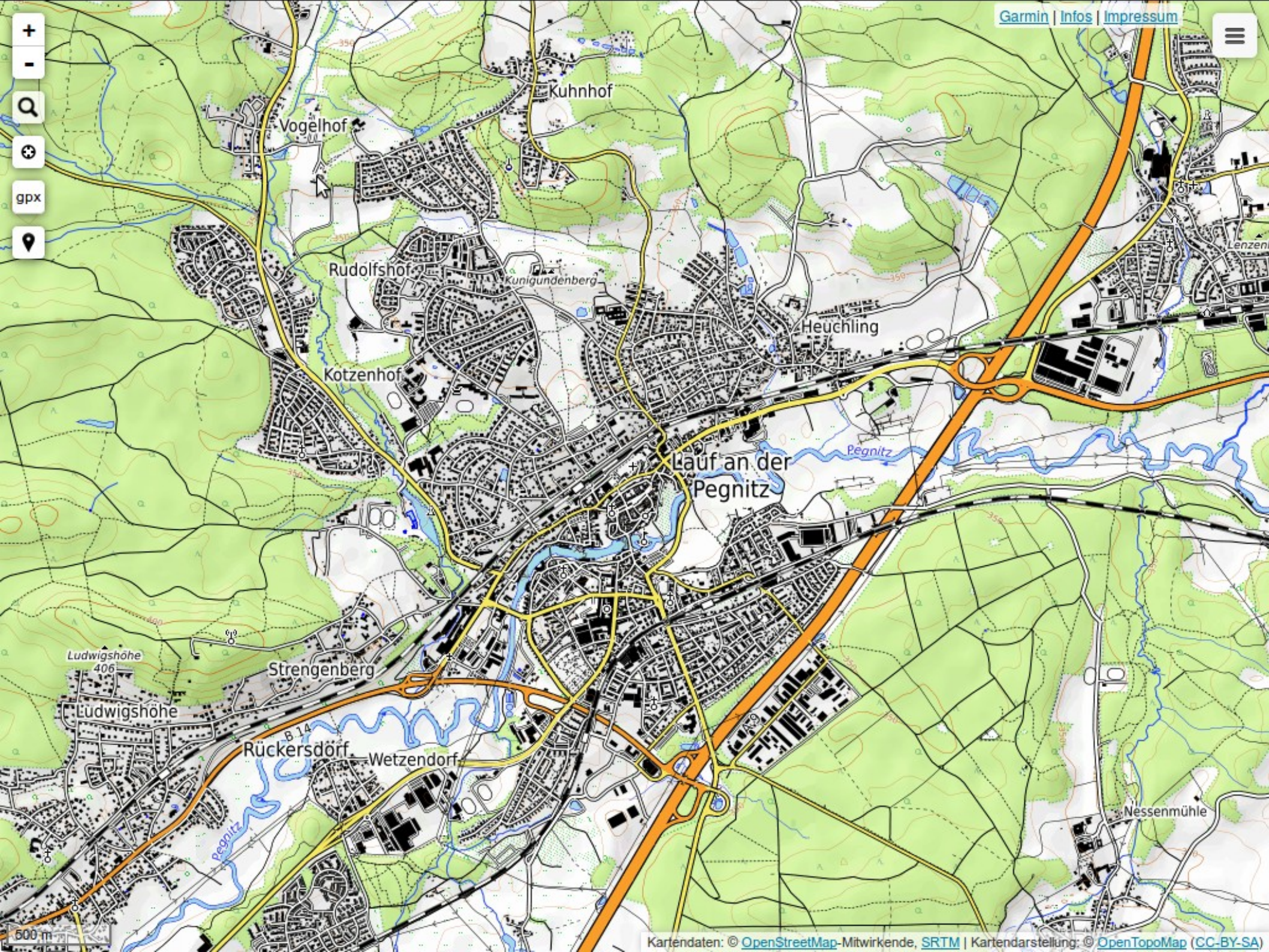
    (at OSM: ~biweekly blog posts or similar)
  - contact admins about problems with mentors

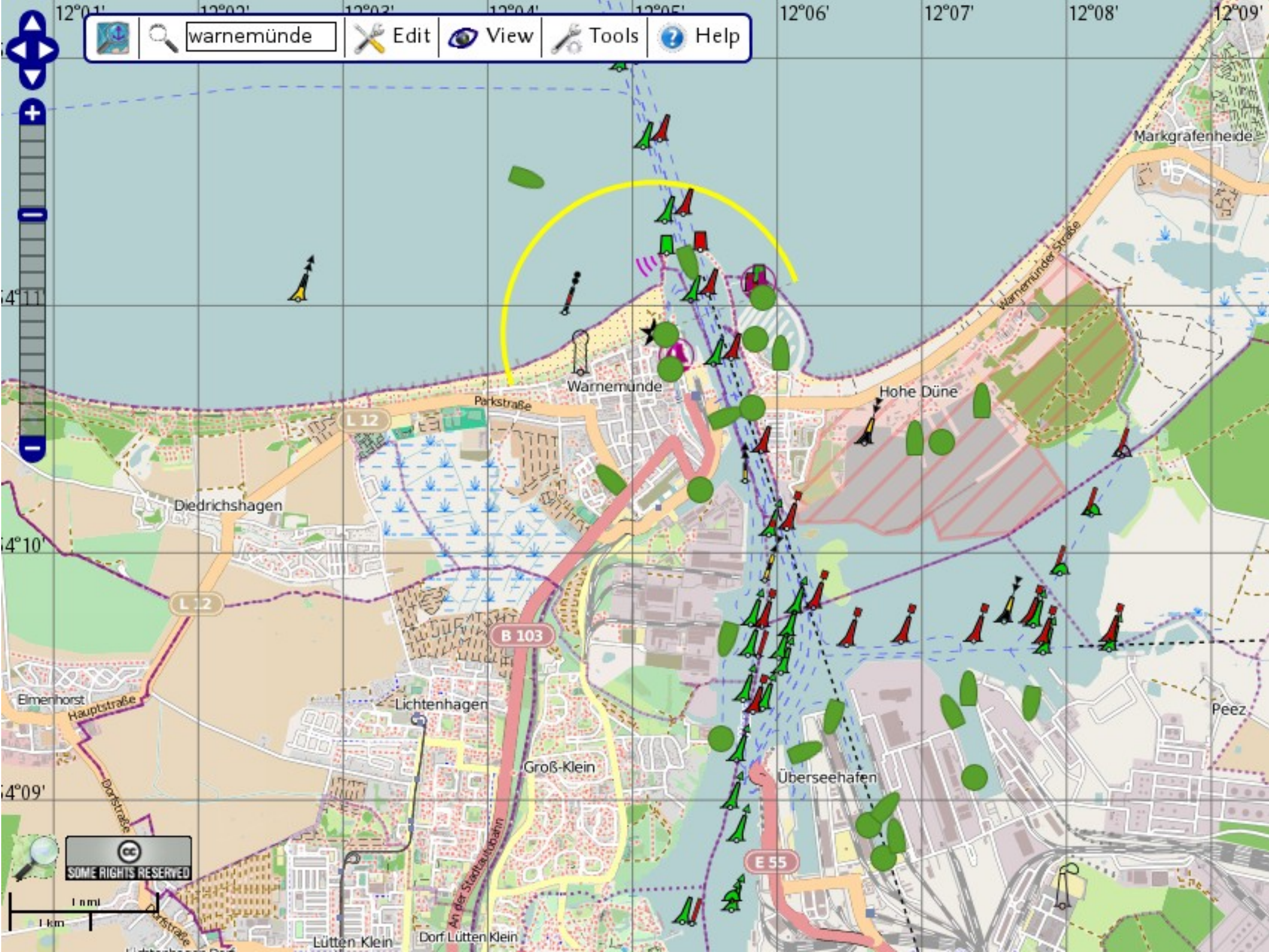


OSM example: Map style

Example: osm-carto




Garmin | Infos | Impressum
+
-
gpx
Kuhnhof
Vogelhof
Rudolfshof
Kunigundenberg
Heuchling
Kotzenhof
Lauf an der Pegnitz
Pegnitz
Ludwigshöhe 406
Strengenberg
Ludwigshöhe
B 14
Rückersdorf
Wetzendorf
Pegnitz
Nessenmühle
500 m
Kartendaten: © OpenStreetMap-Mitwirkende, SRTM | Kartendarstellung: © OpenTopoMap (CC-BY-SA)


warnemünde
Edit
View
Tools
Help
12°06'
12°07'
12°08'
12°09'
Markgrafenheide
Warnemünder Straße
Warnemünde
Parkstraße
Hohe Düne
L 12
Diedrichshagen
B 103
Elmenhorst
Hauptstraße
Lichtenhagen
Groß-Klein
Überseehafen
Peez
E 55
Dorfstraße
An der Stadtbahnbahn
Lütten Klein
Dorf Lütten Klein
SOME RIGHTS RESERVED
1 mi
1 km

Generating raster map tiles

- Input: DB with map data

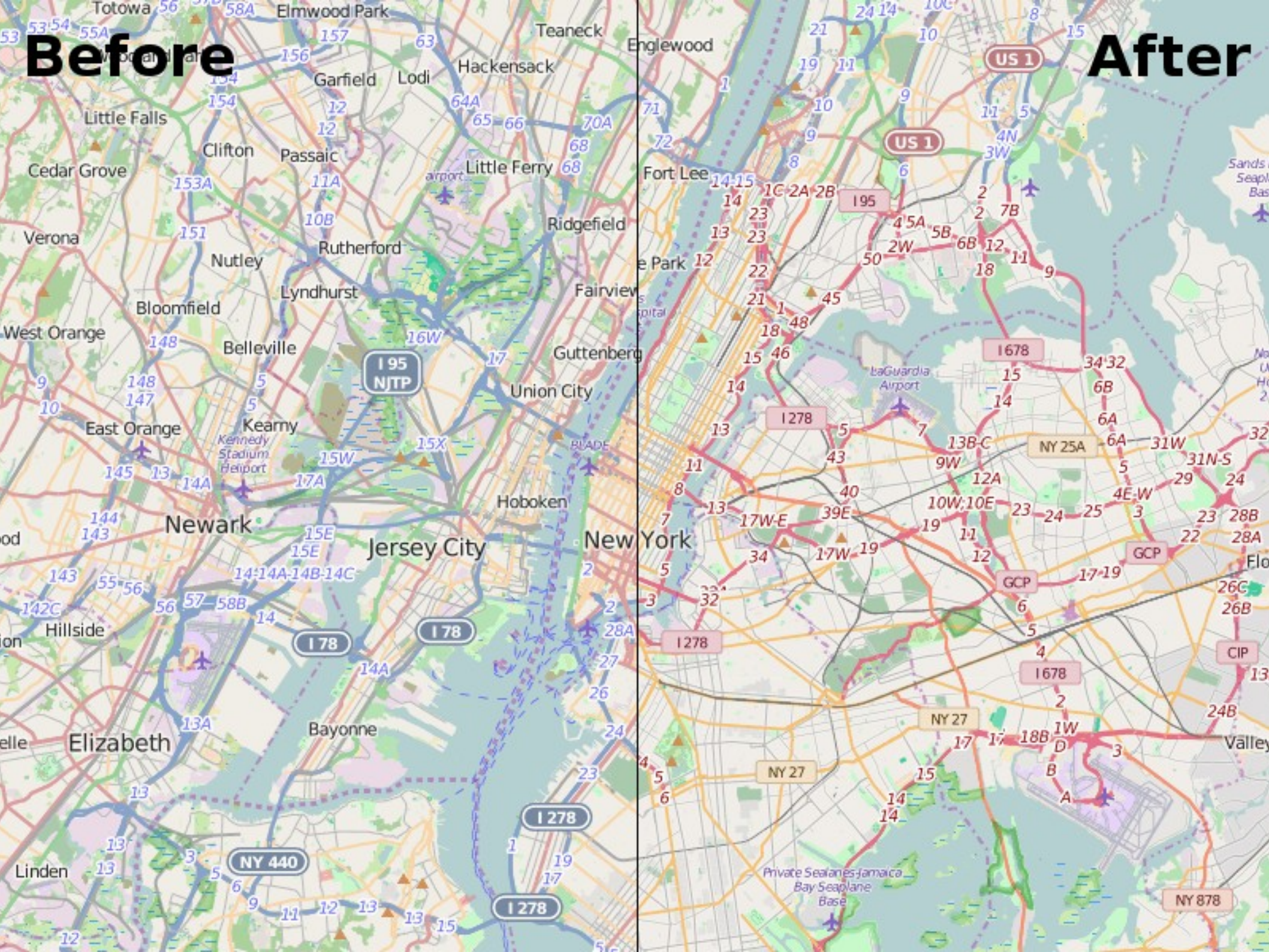
  (optimized for rendering)
- Output: PNG images

  typically 256x256 pixels

- Default style on osm.org: “openstreetmap-carto”
- Software: Mapnik
- Style written as CartoCSS

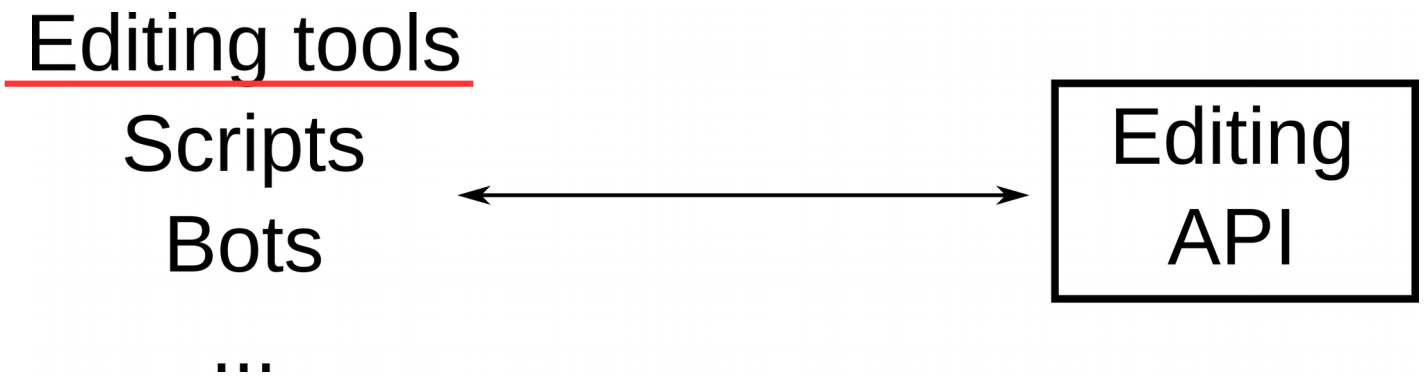
Improvements to openstreetmap-carto

Mateusz Konieczny, 2016


Before
After
Totowa
Elmwood Park
Teaneck
Englewood
Garfield
Lodi
Hackensack
Little Falls
Clifton
Passaic
Cedar Grove
Little Ferry
Fort Lee
Ridgefield
Verona
Nutley
Rutherford
Lyndhurst
Fairview
Bloomfield
West Orange
Belleville
Guttenberg
Union City
East Orange
Kearny
Hoboken
Newark
Jersey City
New York
Hillside
Elizabeth
Bayonne
Linden
Valley
I 95
NJTP
I 78
I 278
NY 440
US 1
I 678
NY 25A
NY 27
GCP
CIP
LaGuardia Airport
Kennedy Stadium Heliport
BLADE
Private Seaplanes-Jamaica Bay Seaplane Base
NY 878

OSM examples: Editing tools

Example: Editing tools



OSM editors

iD – “edit” on osm.org
ease of use, largest no. of users
Web, JavaScript

JOSM
powerful, most data contributed
Desktop, Java (with plugin API)

OSM editors (mobile)

Street Complete
cannot edit everything, “quests”
Android, Kotlin

Vespucci
feature-rich, oldest Android editor
Android, Java

Adding Notes to iD Editor

Thomas Hervey, 2018

Notes on osm.org

Resolved note #689

Description

There's a big roundabout at this junction. The map is showing it as a crossroads

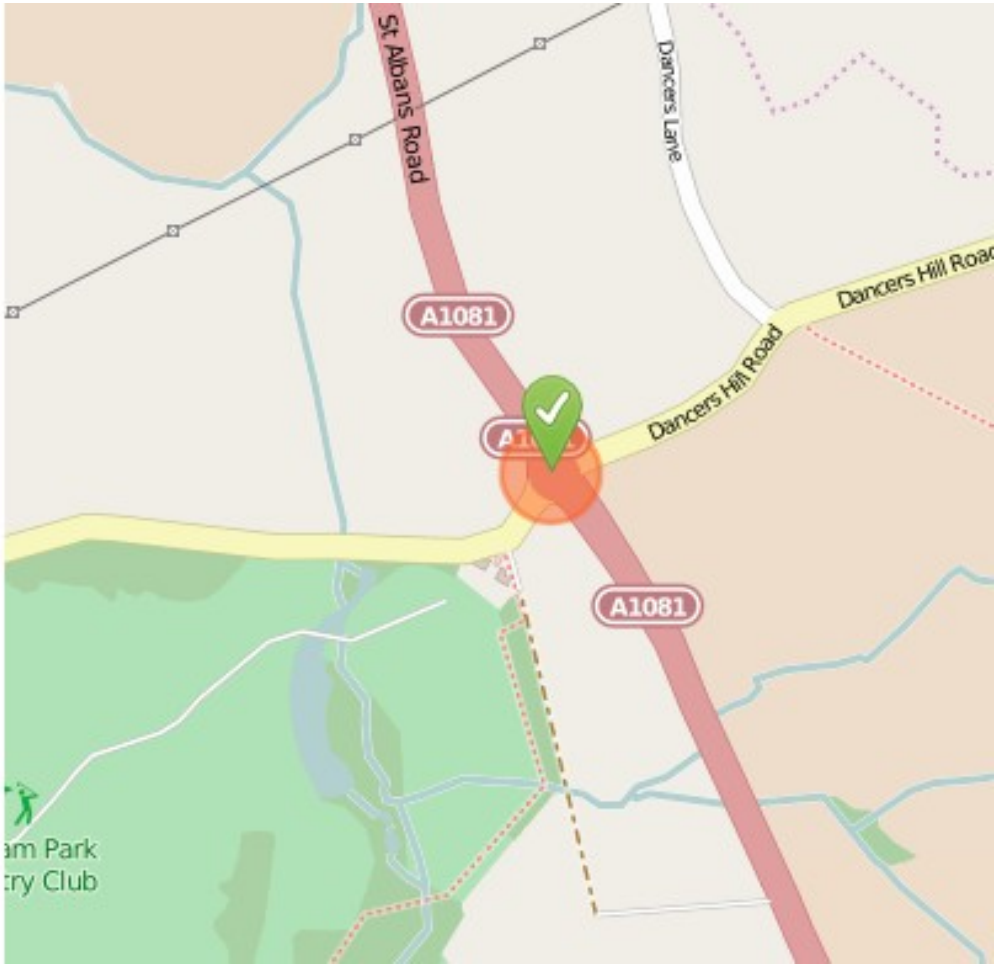
Created by anonymous about 2 years ago
Resolved by Harry Wood about 2 years ago

This note includes comments from anonymous users which should be independently verified.

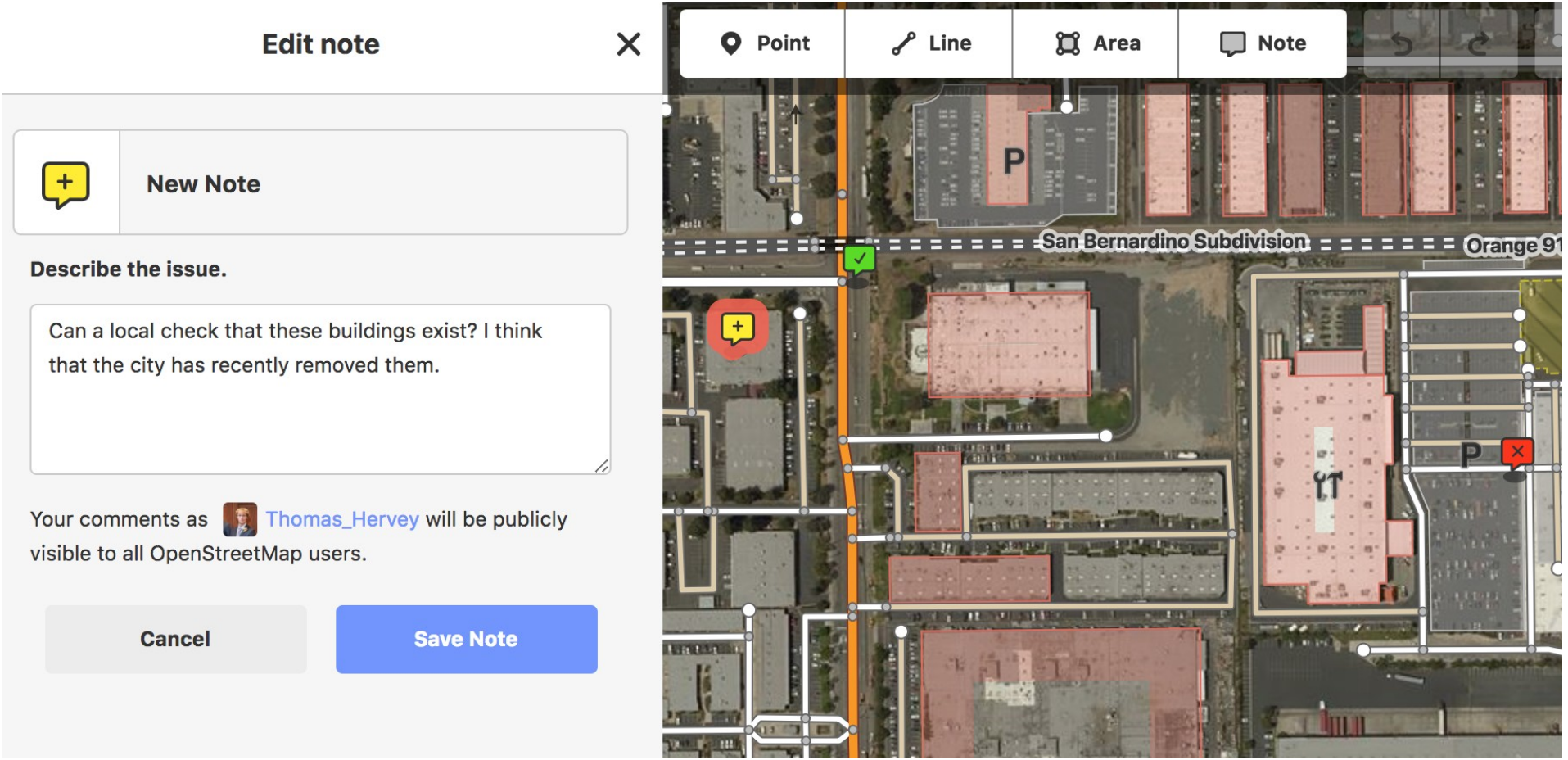
Resolved by Harry Wood about 2 years ago

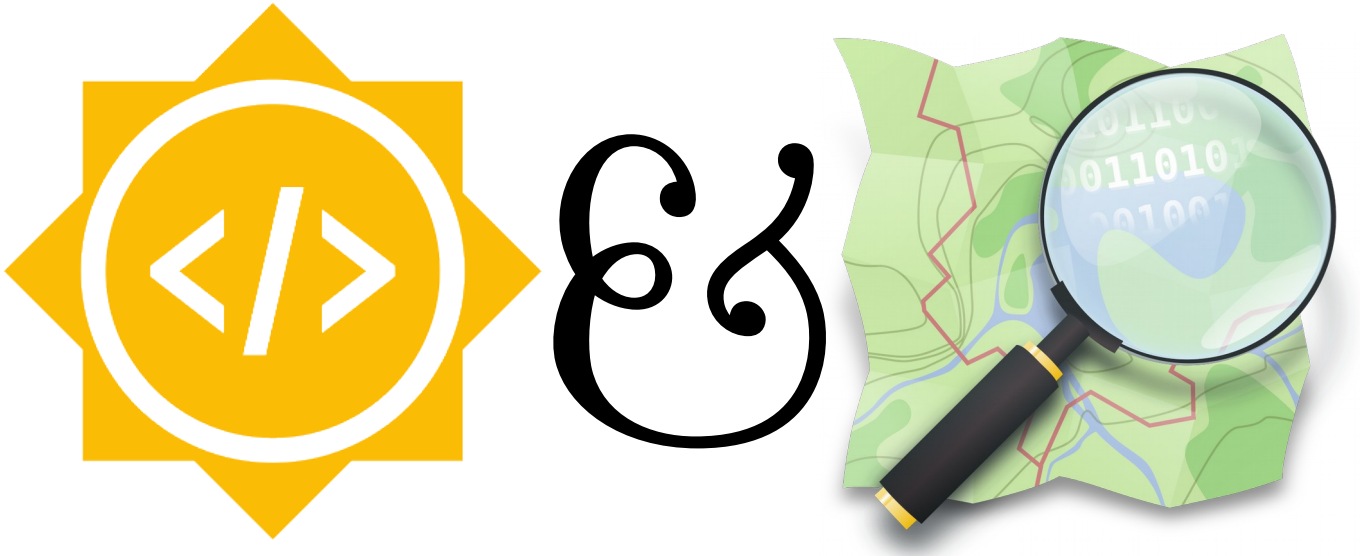
Thanks for reporting this. We had this mapped as a "mini-roundabout" but you're right, it's a big roundabout. I have fixed it.

Reactivate



Notes UI in the iD editor





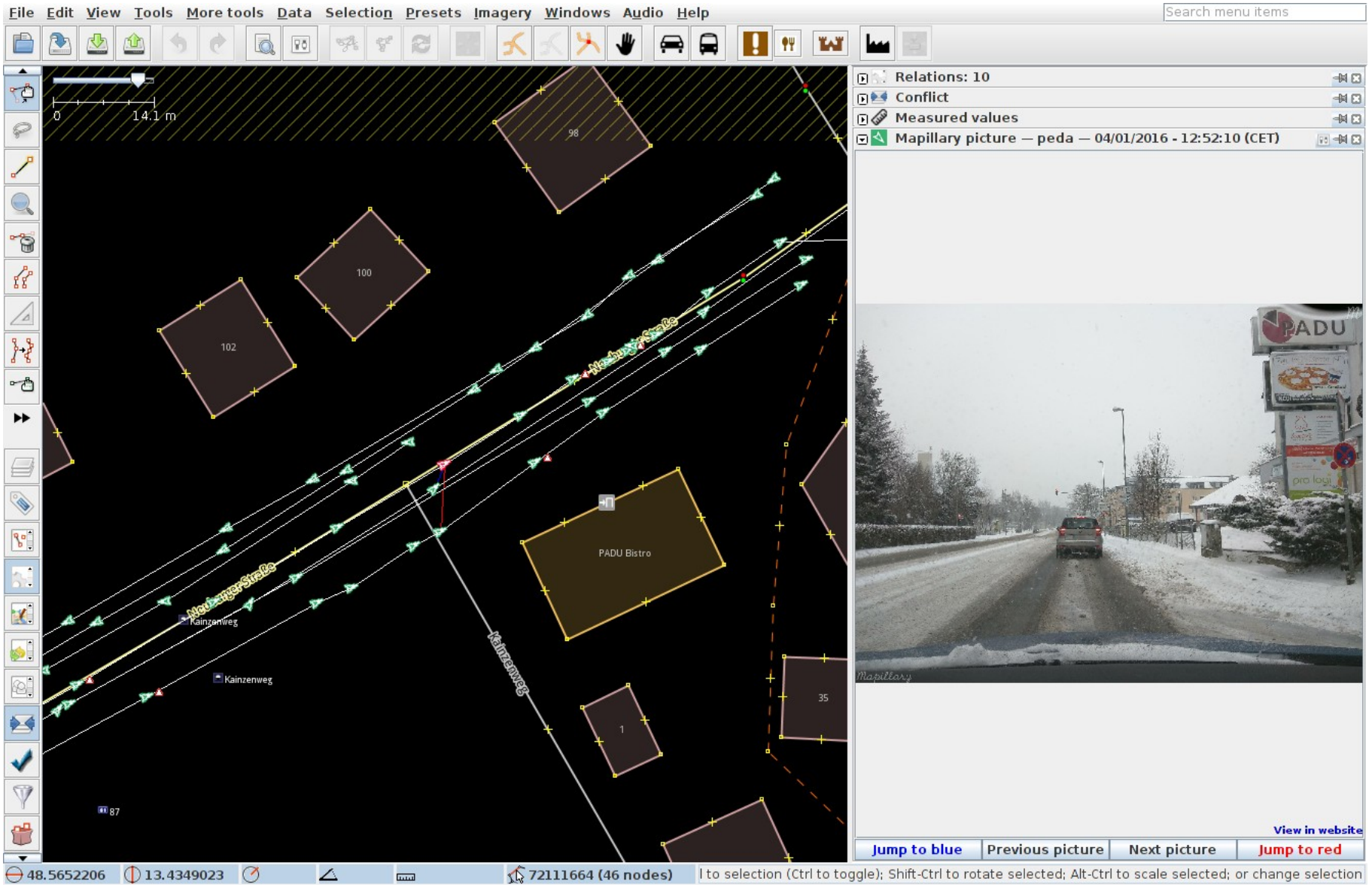
Mapillary plugin for JOSM

Jorge López, 2015

OSM data sources

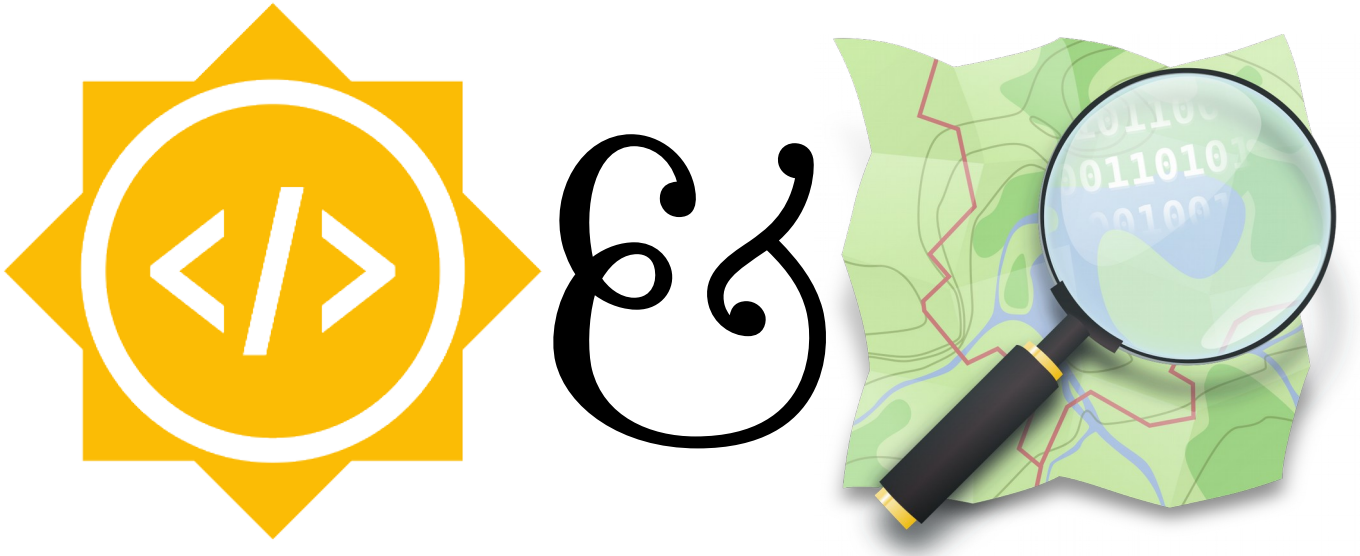
- Individual surveys, local knowledge
  - written notes, audio logs, photographs, …
  - GPS traces
- Corporate sources (e.g. delivery drivers' logs)
- Imports from existing maps
- Aerial imagery
  - manual or AI-assisted tracing
- "Street View"-style photography (e.g. Mapillary)

JOSM: Mapillary plugin



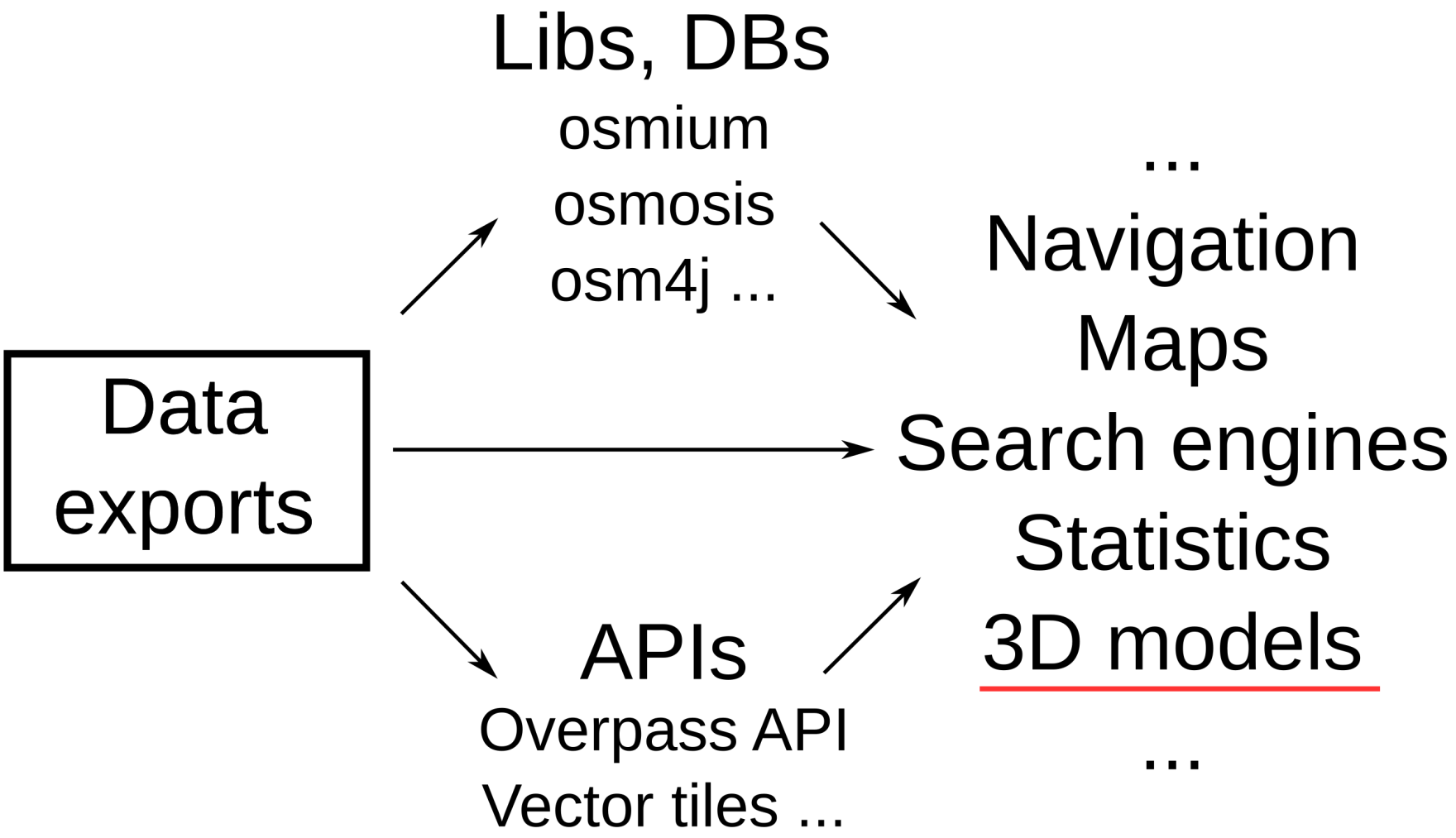
JOSM: OpenGL data view
Michael Zangl, 2015

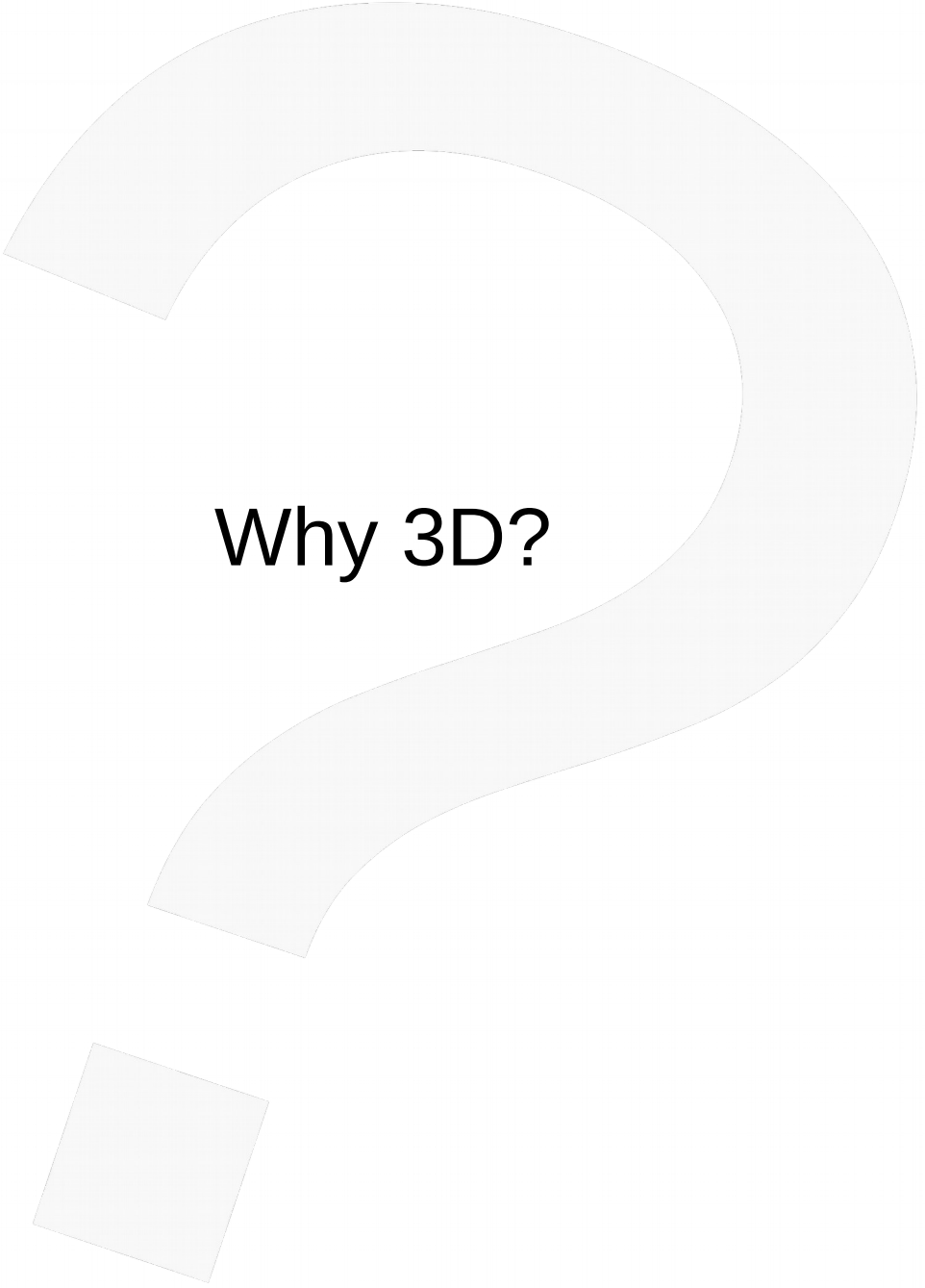
Reorganizing JOSM core
Michael Zangl, 2016



OSM examples: 3D rendering

Example: OSM2World

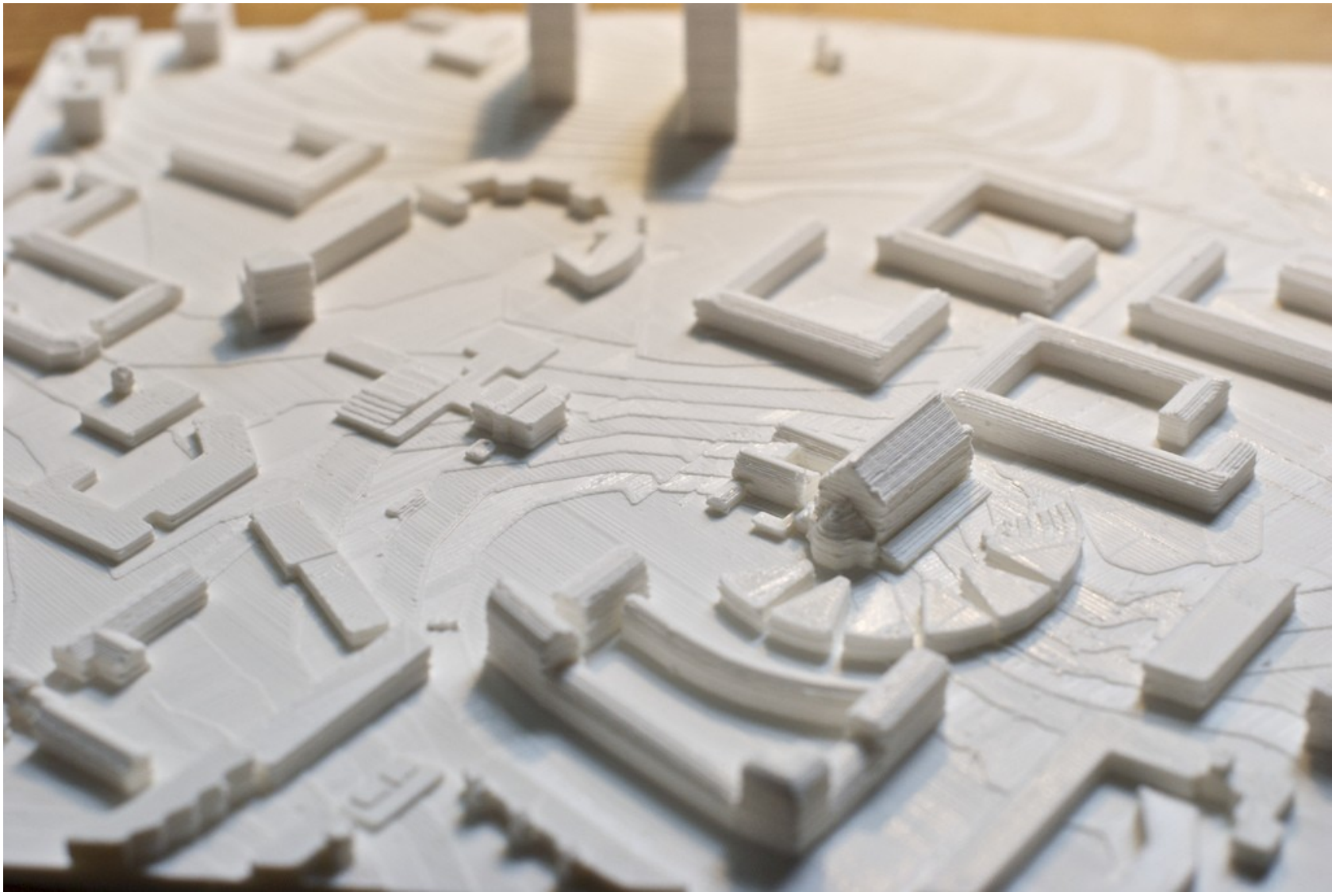




Why 3D?

Videos

3D-Druck



Spieleentwicklung

Increasing amount of detail in OSM

OpenStreetMap: Hamburg vollständig in freier Online-Weltkarte erfasst
Computerbild, 2008

Baum
height = 9 m
diameter = 1 m
diameter_crown = 7 m
denotation = urban
leaf_type = broadleaved
genus = Betula
species = Betula pendula
species:de = Sandbirke

OSM2World

http://osm2world.org

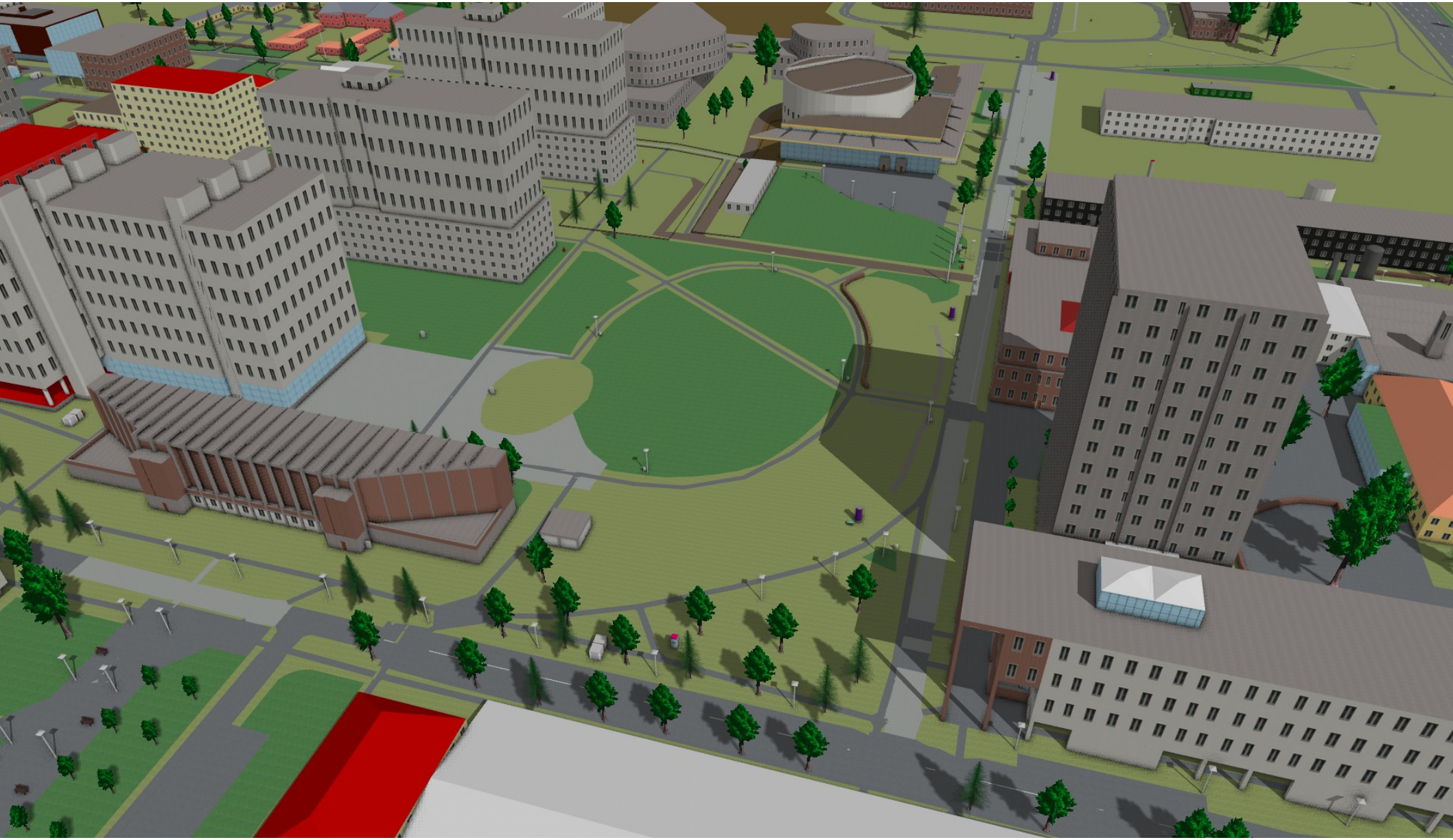
- Creates 3D models from OSM (+ SRTM)
- Exports to ...
  - model files (.obj, .pov)
  - interactive rendering with OpenGL
  - PNG images, including 2D map tiles
  - WebGL (work in progress!)

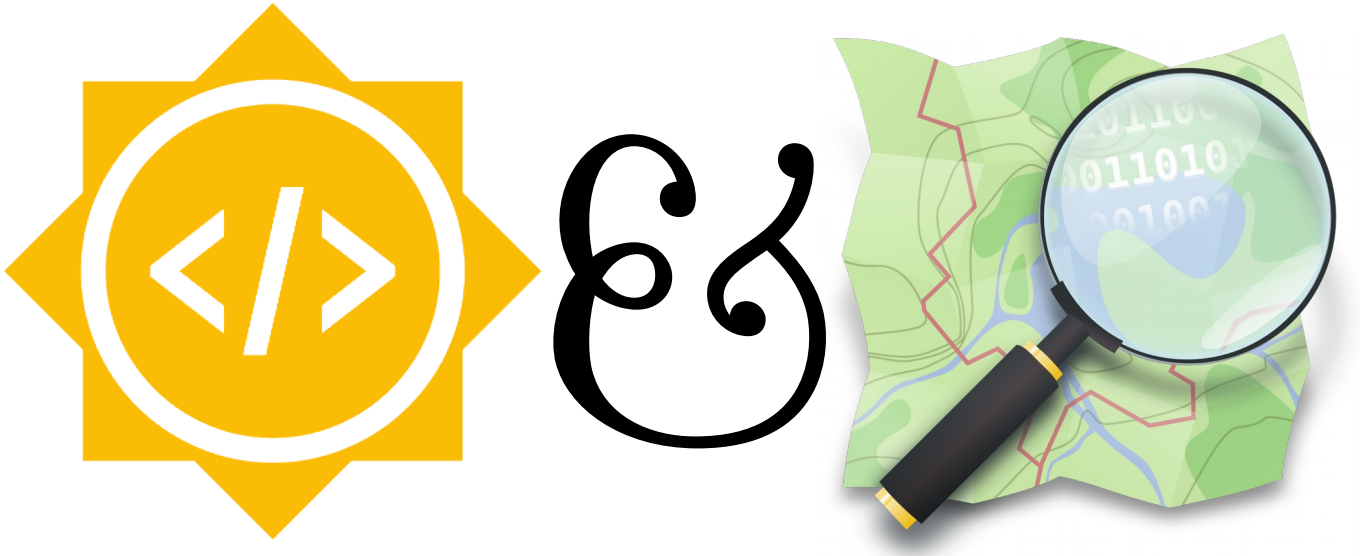
E
N

Improving the OSM2World GUI

Sebastian Vetter, 2015

OSM2World: Shaders



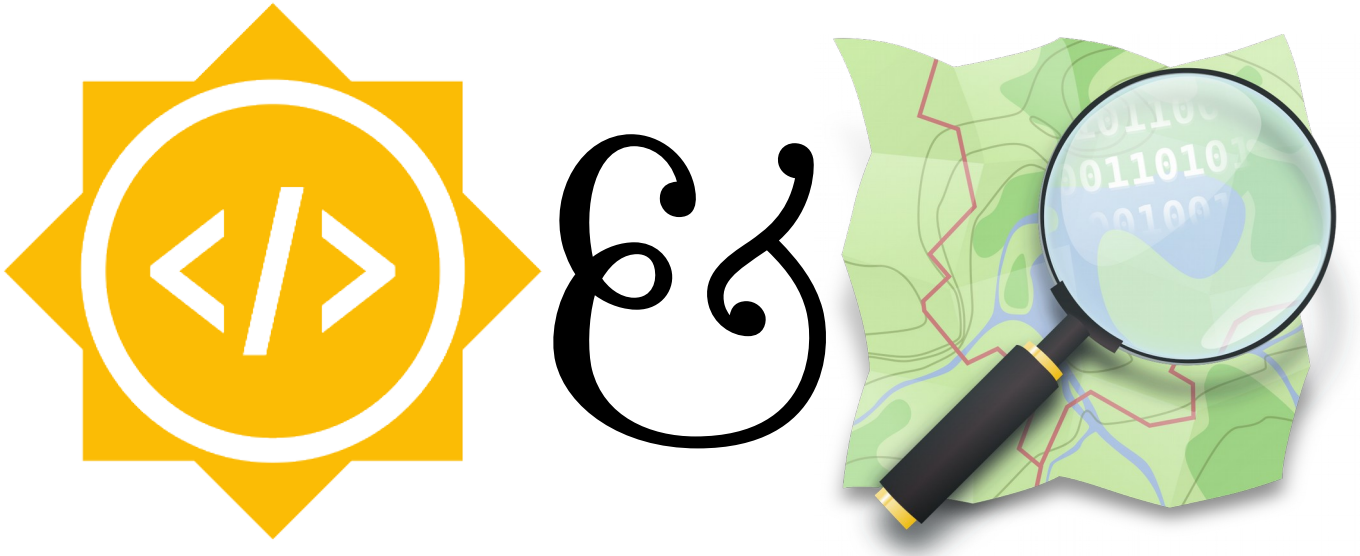


3D Model Repository for OpenStreetMap

Pedro Amaro, 2016

OSM2World: External models

N



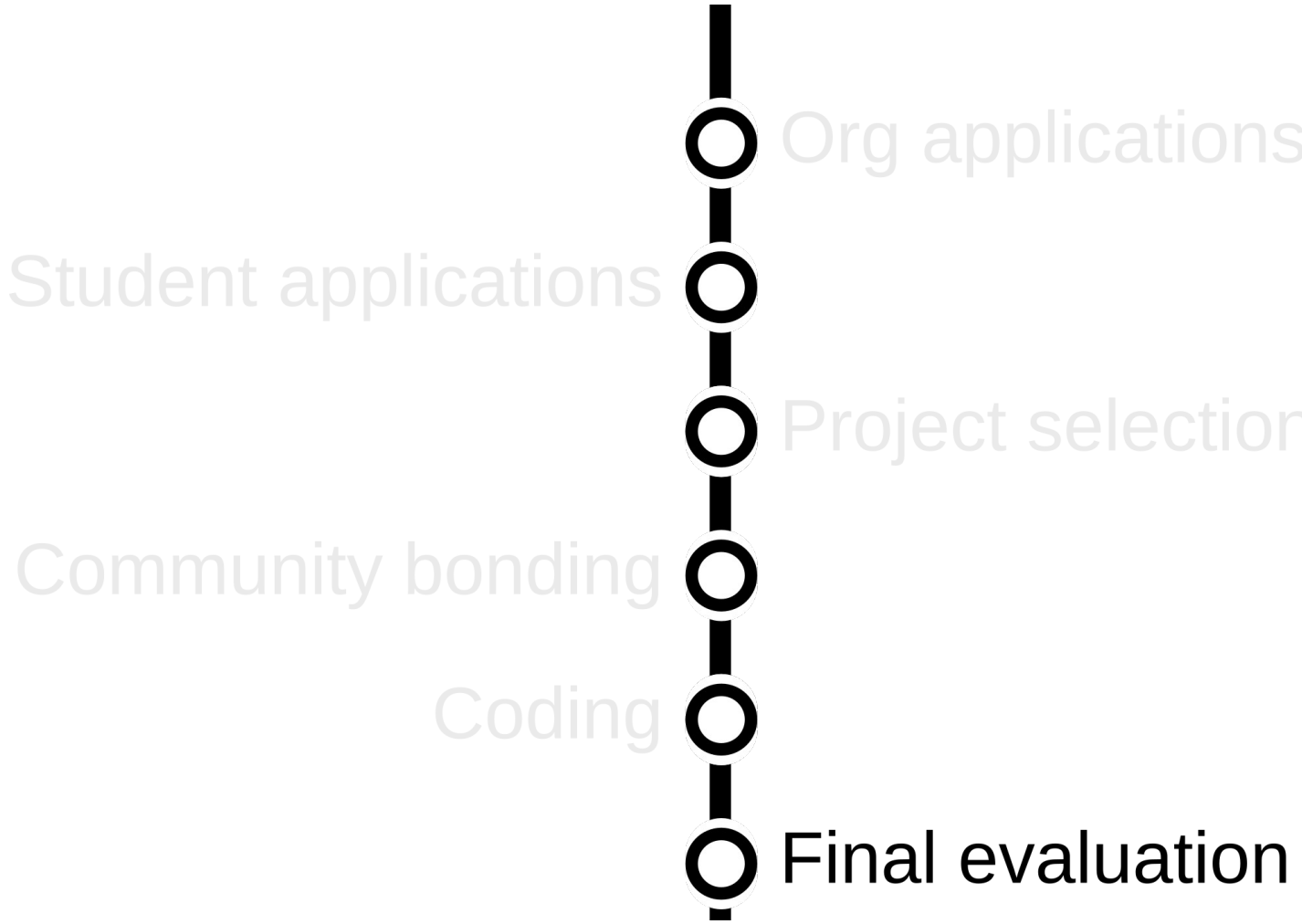
3D Traffic Sign Rendering in OSM2World

Iason Manoloudis, 2016

OSM2World: Traffic signs

- catalogs per country
  user-defined (no coding)
- national defaults
- multiple signs
- new texturing logic
  - textures from SVG
  - textures from text
- infer signs from attributes
  (e.g. maximum speed)

Timeline

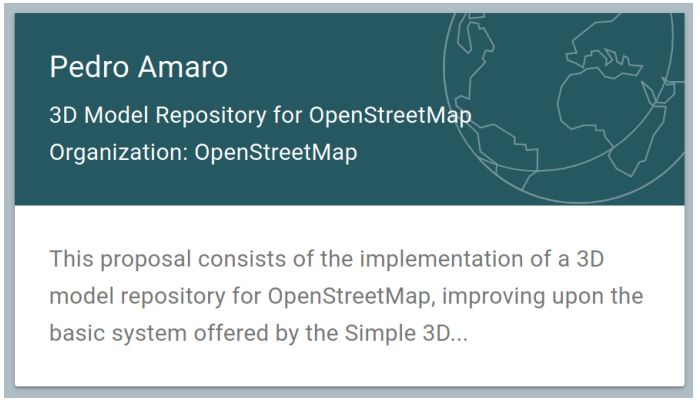

Org applications
Student applications
Project selection
Community bonding
Coding
Final evaluation

Evaluations

- Once a month: Evaluation
  - Mentors decide if students pass or fail
  - Failure ends GSoC participation
  - Students evaluate mentors as well
- Stipends are paid in three parts, one after each successful evaluation:
  - First Evaluation: 30%
  - Second Evaluation: 30%
  - Final Evaluation: 40%

After GSoC

- Code preferably merged during GSoC
  - avoid “almost finished” code
- Your name + project remains public



- Hopefully, you‘ll stay with the project!
- Apply again next year?

Organizations Announced
February 20

Student Application
March 16 - 31

https://openstreetmap.org

https://summerofcode
.withgoogle.com

Thank you for your attention!

Map data © OpenStreetMap,
Open Database License

GSoC logo and website © Google