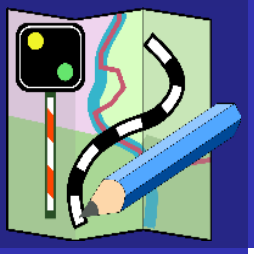


Railways

Michael Reichert (Nakaner)

Tagging
Tracks
Stations
Stations
Signals
Train Protection

Mapping by Foot or Bicycle

Mapping by Train

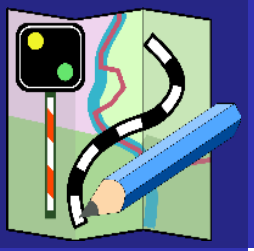
Numbers

Community

Railway Mapping at OpenStreetMap

Michael Reichert (Nakaner)

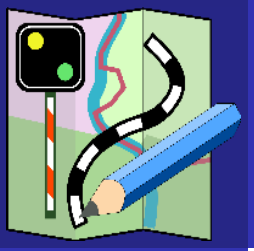
Brussels
24 September 2016



Outline

Tagging
Tracks
Stations
Stations
Signals
Train Protection
Mapping by Foot or Bicycle
Mapping by Train
Numbers
Community

1. Tagging
   - Tracks
   - Stations
   - Stations
   - Signals
   - Train Protection
2. Mapping by Foot or Bicycle
3. Mapping by Train
4. Numbers
5. Community



Tagging
Tracks

Railways

Michael Reichert (Nakaner)

Tagging
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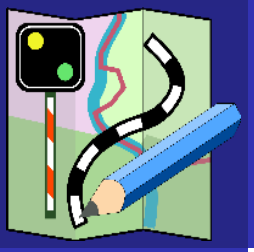
Community

- `railway=rail/tram/*`
- other types: `light_rail`, `subway`, `monorail`, `funicular`
- Please always add `gauge=<value in mm>`!
- `rack=yes/abt/locher/*`
- `electrified=contact_line/rail/...`, `voltage=<value in Volt>`, `frequency=<value in Hz>/0`
- `railway:preferred_direction=forward/backward/both`



Tagging
Tracks

Railways

Michael Reichert (Nakaner)

Tagging
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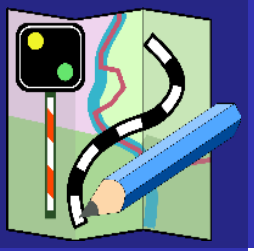
The lifecycle:

- `railway=disused` + `disused=rail/tram/*`
- or `railway=disused` + `disused:railway=rail/tram/*`
- `abandoned`: tracks missing, ballast already there
- `construction`: under construction



Tagging
Tracks

Railways

Michael Reichert (Nakaner)

Tagging
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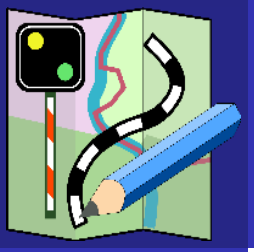
Always disputed

`railway=dismantled`

`railway=proposed`



Tagging
Tracks

Railways

Michael Reichert (Nakaner)

Tagging
- Tracks
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Mapping by Foot or Bicycle

Mapping by Train

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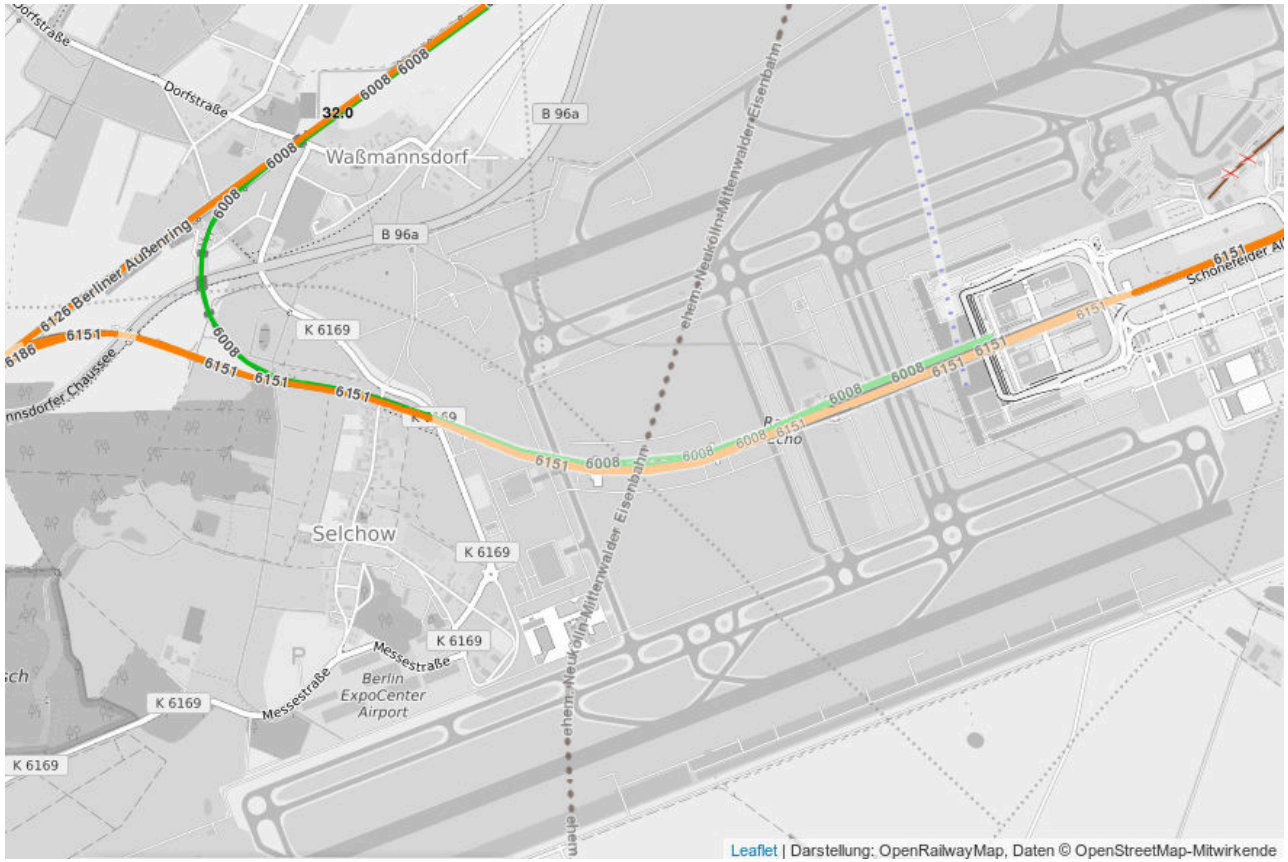
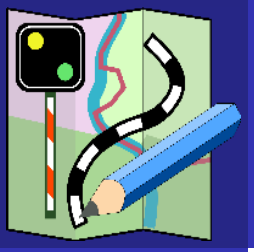
`railway=razed`





Tagging
Tracks

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Michael Reichert (Nakaner)

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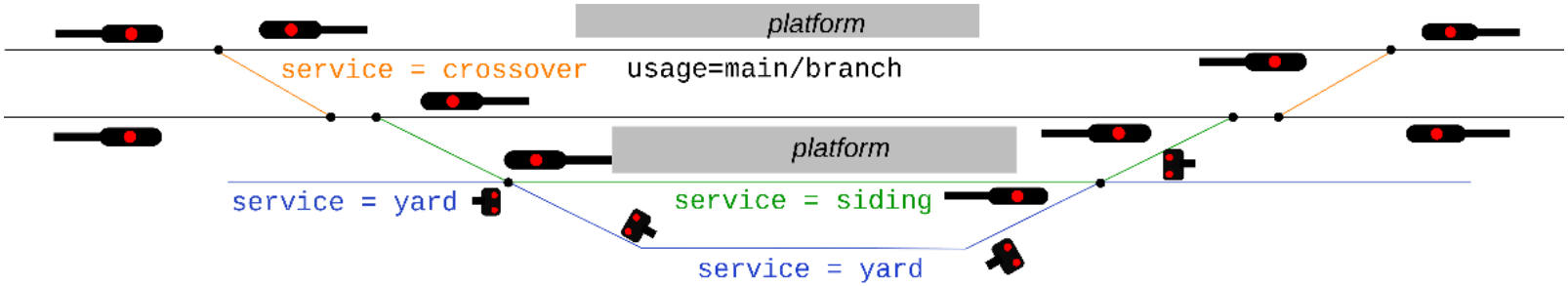
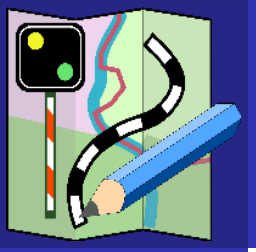


- `usage=main/branch/industrial/military/test` – usage of the railway line
- `service=siding/spur/crossover/yard` – minor tracks in station



Tagging
Stations

Railways

Michael Reichert (Nakaner)

Tagging
- Tracks
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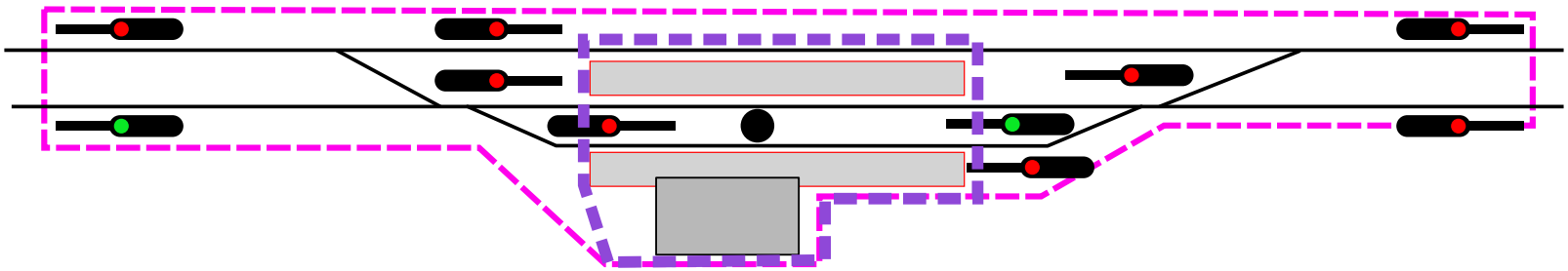
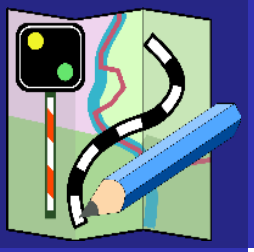
Mapping by Foot or Bicycle

Mapping by Train

Numbers

Community





Tagging
Stations

Railways

Michael Reichert (Nakaner)

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Mapping by Foot or Bicycle

Mapping by Train

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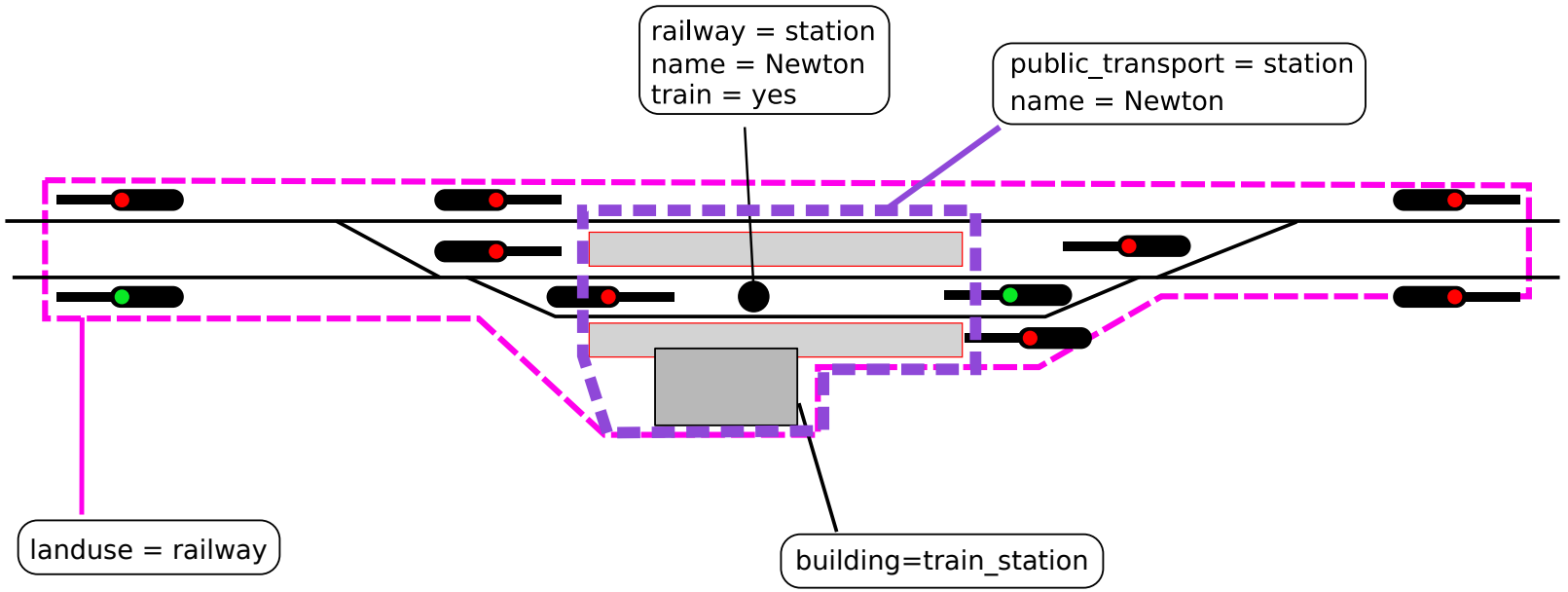
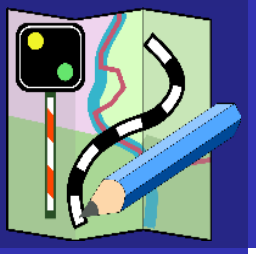
Community





Tagging
Stations

Railways

Michael Reichert (Nakaner)

Tagging
Tracks
Stations
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Signals
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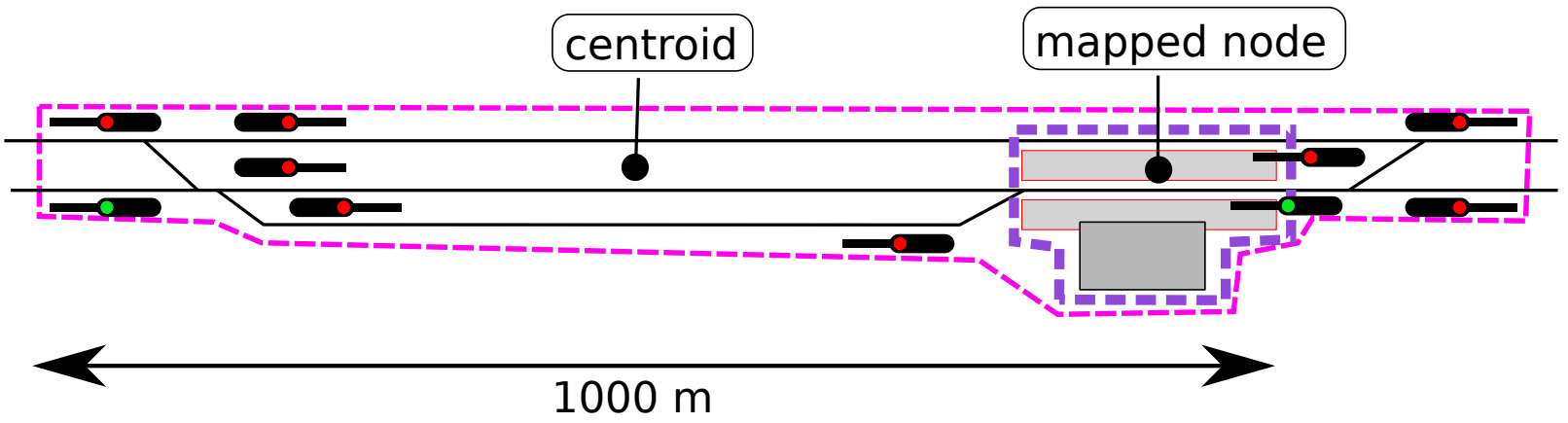
Mapping by Foot or Bicycle

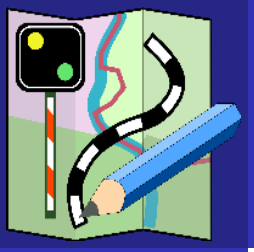
Mapping by Train

Numbers

Community

Stations can be assymetric. This happens quite often.





Tagging
Signals

Railways

Michael Reichert (Nakaner)

Tagging
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Mapping by Foot or Bicycle

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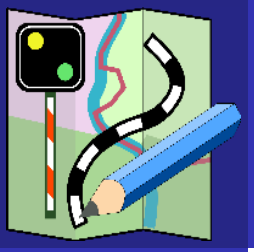
Numbers

Community

Basic signal tags:

- `railway=signal`
- `railway:signal:direction=forward/backward/both`
- `railway:signal:position=left/right/bridge/in_track/catenary`
- `ref=*`



Tagging
Signals

Railways

Michael Reichert (Nakaner)

Tagging
Tracks
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Stations
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Mapping by Foot or Bicycle

Mapping by Train

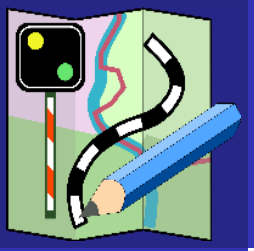
Numbers

Community

34 signal types

main	minor	electricity
distant	shunting	speed_limit
combined	crossing	...

- `railway:signal:<type> = <country>-<operator/ruleset>:<name>`
- Example: `railway:signal:main = DE-ESO:hp`



Tagging
Signals

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main	minor	electricity
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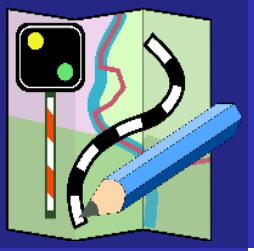
- `railway:signal:<type>` = `<country>-<operator/ruleset>:<name>`
- Example: `railway:signal:main` = `DE-ESO:hp`
- `railway:signal:<type>:form` = `light/semaphore/sign`
- Example: `railway:signal:main:form` = `light`



Tagging
Signals

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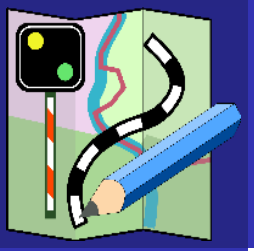
- Example: railway:signal:main:form = light
- railway:signal:<type>:states = [list]
- Example: railway:signal:main:states = DE-ESO:hp0;DE-ESO:hp1
- railway:signal:<type>:height = normal/dwarf



Tagging
Signals

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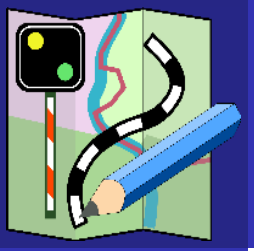

Taggings
Signals

Railways

Michael Reichert (Nakaner)

Tagging
Tracks
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Stations
Signals
Train Protection

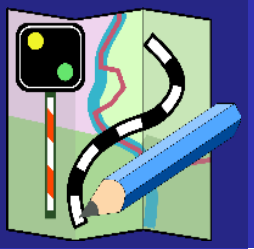
Mapping by Foot or Bicycle

Mapping by Train

Numbers

Community

Country	Tagging	OpenRailwayMap
Germany DB	full	few signals left
German trams	partially	similar to tagging
Austria	full	important signals
Finnland	full	some signals
Switzerland	draft	no
UK	early draft	no



Tagging
Train Protection

Railways

Michael Reichert (Nakaner)

Tagging
- Tracks
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Mapping by Foot or Bicycle

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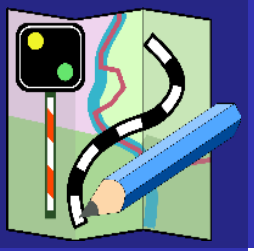

Tagging
Train Protection

Railways

Michael Reichert (Nakaner)

Tagging
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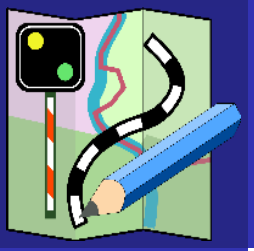
Community

- country-specific topic
- `railway:pzb=yes/no` for German PZB system
- `railway:lzb=yes/no` for German LZB
- `railway:etcs=yes/1/2/3` for European Train Control System
- `railway:*=yes/no/*`



Tagging
Train Protection

Railways

Michael Reichert (Nakaner)

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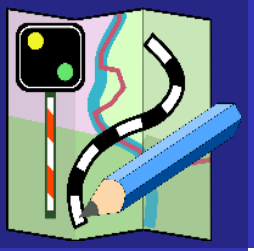
- `railway:*=yes/no/*`
- unlimited number of keys
- impossible to tag "no train protection"
- tagging system needs rework



Tagging
Train Protection

Railways

Michael Reichert (Nakaner)

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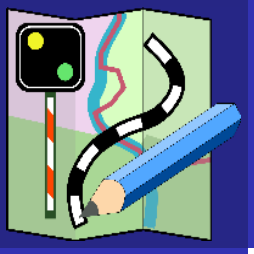

Mapping
Overview

Railways

Michael Reichert (Nakaner)

Tagging
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Stations
Stations
Signals
Train Protection

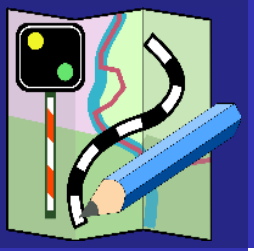
Mapping by Foot or Bicycle

Mapping by Train

Numbers

Community

- by foot or bicycle
- by train
  - taking notes
  - GPS waypoints with notes
  - geotagged photos
  - videos (with and without geotagging)
- Bing, Mapbox Aerial and other imagery sources
- photos published on forums by railway fans (ask them beforehand!)
- open data (data.deutschebahn.com) if license is compatible



Mapping by Foot or Bicycle

Railways

Michael Reichert (Nakaner)

Tagging

- Tracks
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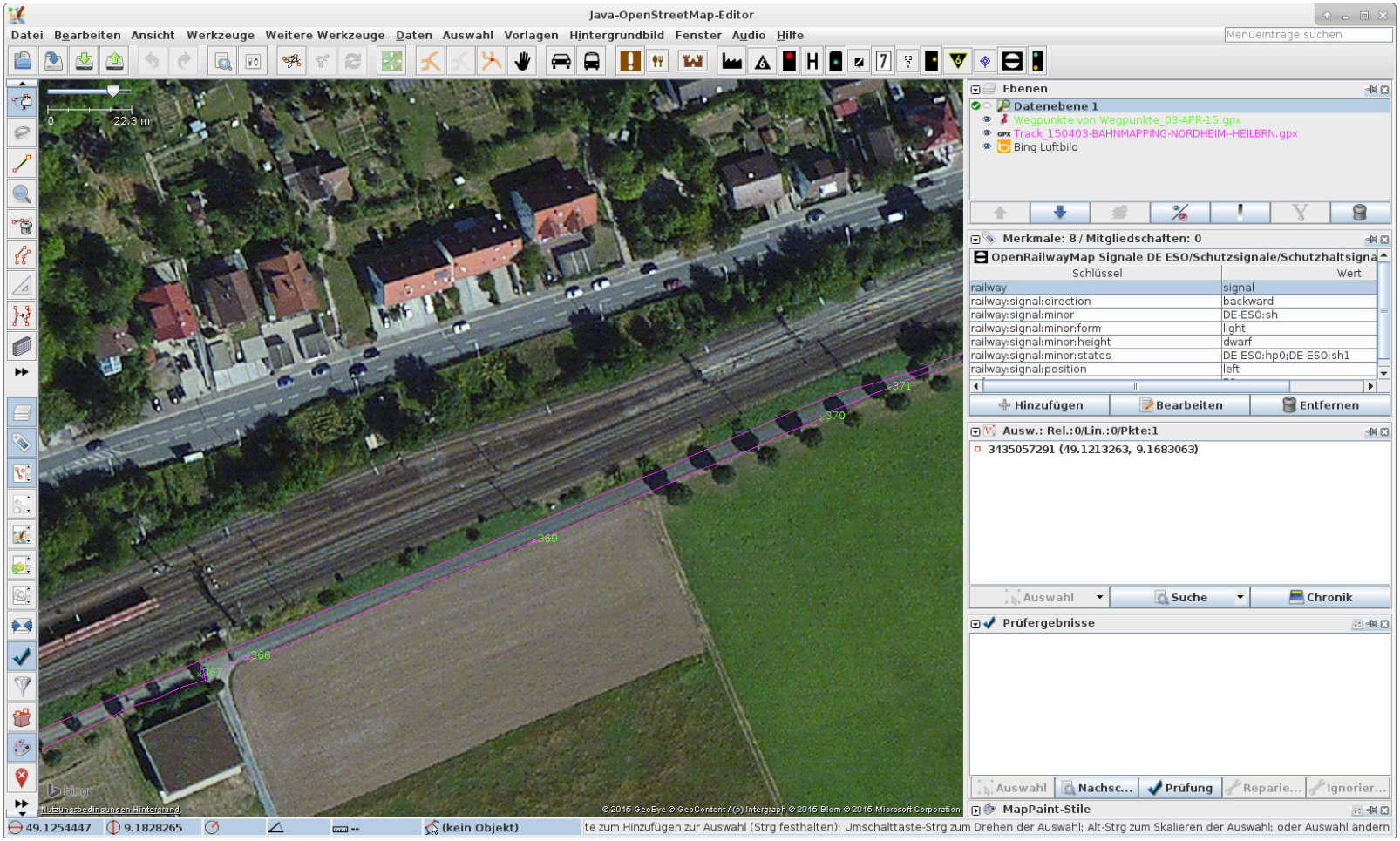
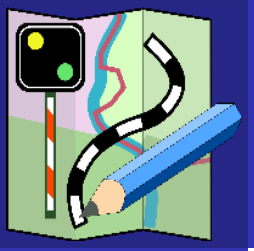
Mapping by Foot or Bicycle

Mapping by Train

Numbers

Community





Mapping by Foot or Bicycle

Railways

Michael Reichert (Nakaner)

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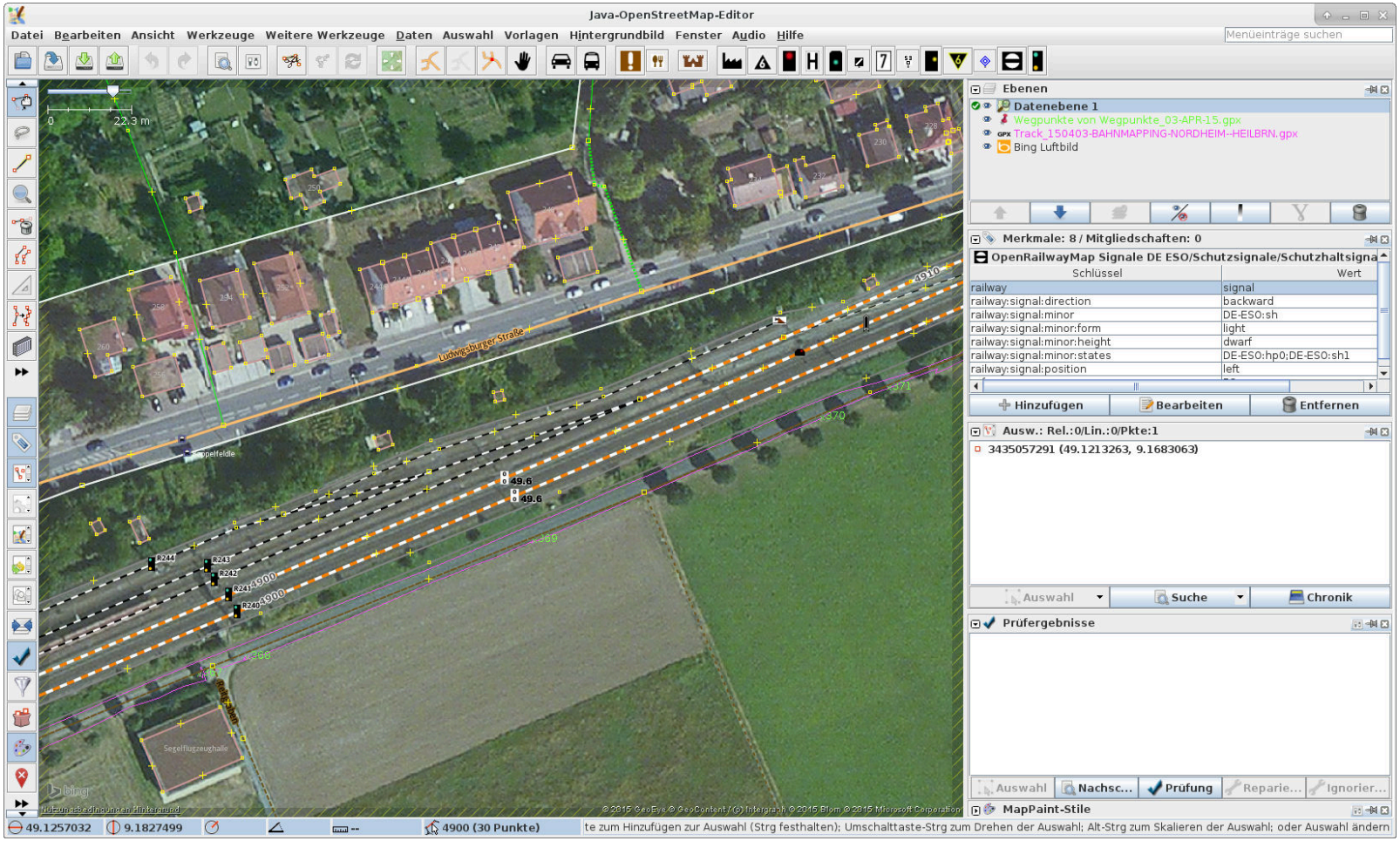

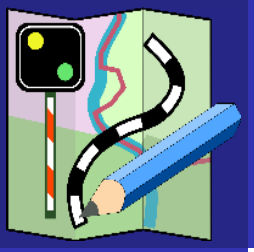

Mapping by Foot or Bicycle

Railways

Michael Reichert (Nakaner)

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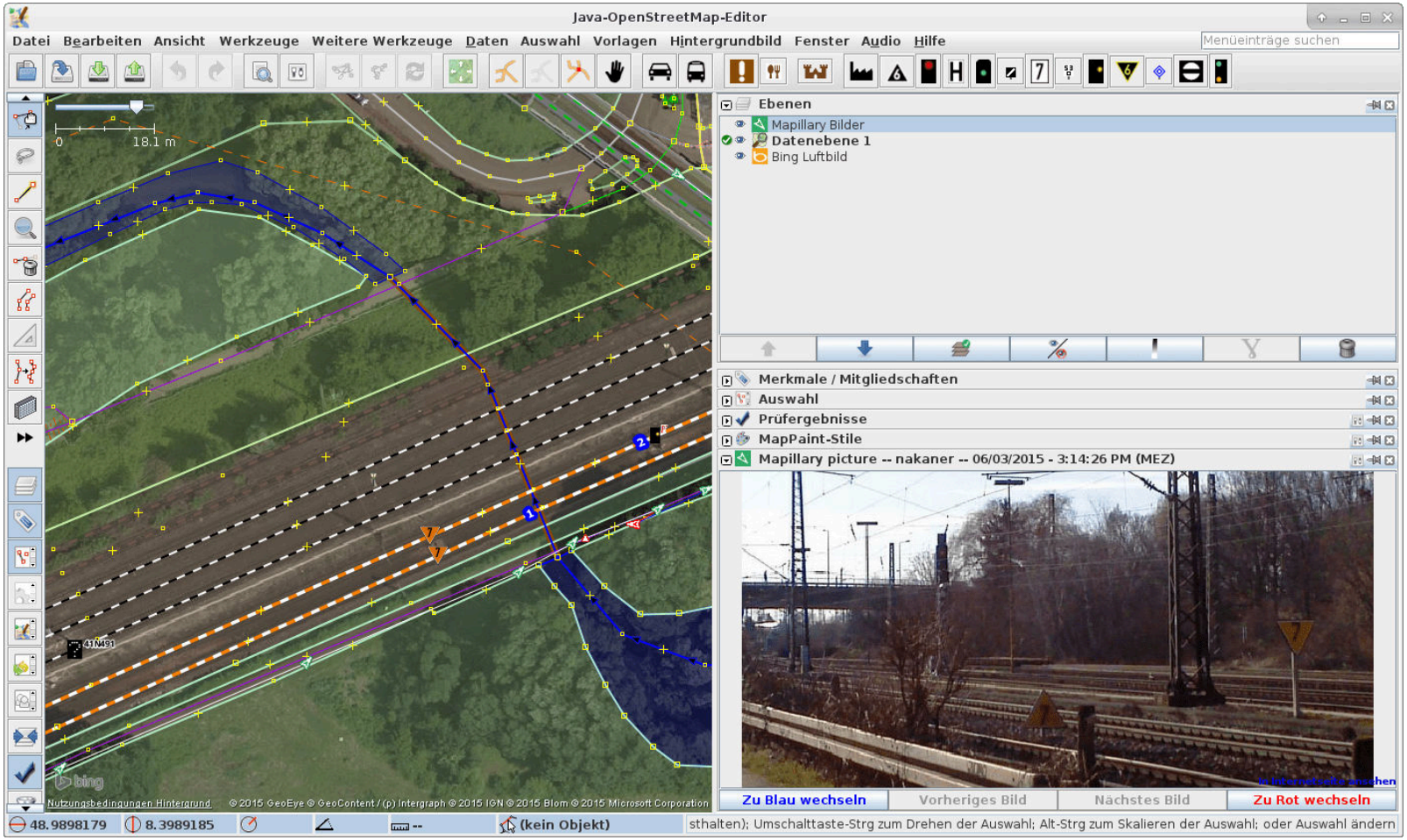
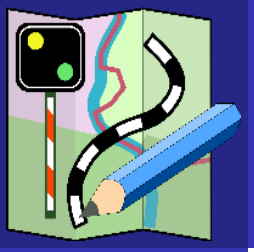




Mapping by Train
Waypoints and Notes

Railways

Michael Reichert (Nakaner)

Tagging
Tracks
Stations
Stations
Signals
Train Protection

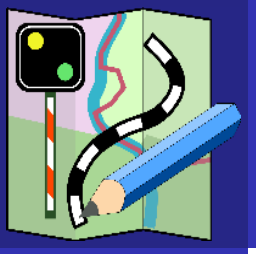
Mapping by Foot or Bicycle

Mapping by Train

Numbers

Community

- GPS signal is weak
- prefer a GPS+GLONASS receiver
- find the best location inside the train



Mapping by Train

GPS Signal Strength

Railways

Michael Reichert (Nakaner)

Tagging
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Mapping by Foot or Bicycle

Mapping by Train

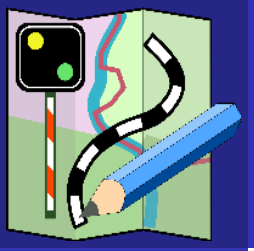
Numbers

Community

http://wiki.osm.org/wiki/WikiProject_Germany/Railways#GPS-Empfang_im_Zug

Bezeichnung	Baureihe(n)	Einsatz	Empfänger	Position	Empfang (0-5)	Anmerkung	Eintragender/Datum
	611	RB, RE, IRE	Samsung Galaxy S5	Faltenbalg am Wagenübergang	4	Garmin Dakota 20 etwas schlechter wegen fehlendem GLONASS	--Nakaner (talk) 19:32, 18 April 2016 (UTC)
			Samsung Galaxy S5	Einstiegstüren hinter dem Führerstand	2		--Nakaner (talk) 19:32, 18 April 2016 (UTC)
			Samsung Galaxy S5	andere Stellen im Zug	0		--Nakaner (talk) 19:32, 18 April 2016 (UTC)
"RegioSwinger"	612	RE, IRE	-	-	0	kein Empfang außer am Fenster des Zugführers	--Nils 13:51, 12 July 2007 (BST)
			Samsung Galaxy S5, Garmin Dakota 20	an vielen Stellen im Zug	3-5	allgemein gut geeignetes Mappingfahrzeug, Erfahrung aus mehreren Fahrten	--Nakaner (talk) 19:39, 18 April 2016 (UTC)
	628	RB, RE	Garmin eTrex **H**Cx, Garmin Dakota 20	direkt am Fenster der Einstiegstür neben Zugspitze/ende	2	empfindlicher Empfänger erforderlich (bei Garmin eTrex Vista/Legend auf das H im Namen achten!), GPS-Fix vor Einstieg sehr empfohlen	--gypakk, --Nakaner (talk) 10:07, 28 July 2014 (UTC)

name class usage receiver location strength comment sign



Mapping by Train

Photo Mapping

Railways

Michael Reichert (Nakaner)

Tagging

Tracks

Stations

Stations

Signals

Train Protection

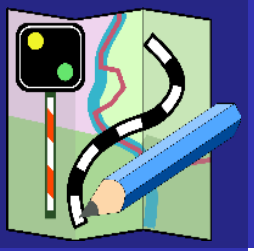
Mapping by Foot or Bicycle

Mapping by Train

Numbers

Community

photo mapping . . . through the drivers cab



Mapping by Train
Photo Mapping

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Michael Reichert (Nakaner)

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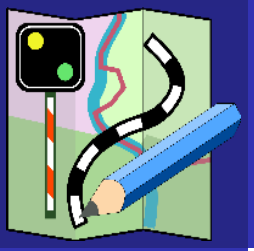
photo mapping . . . through the rear drivers cab



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Michael Reichert (Nakaner)

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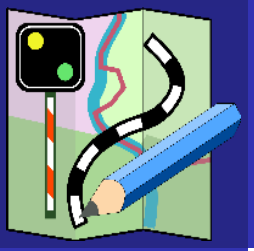
photo mapping . . . at the left window



Mapping by Train

Video Mapping

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Michael Reichert (Nakaner)

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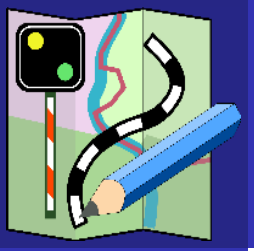
video mapping . . . at the left windows



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Video Mapping

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Michael Reichert (Nakaner)

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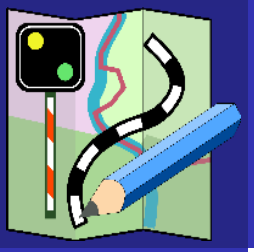

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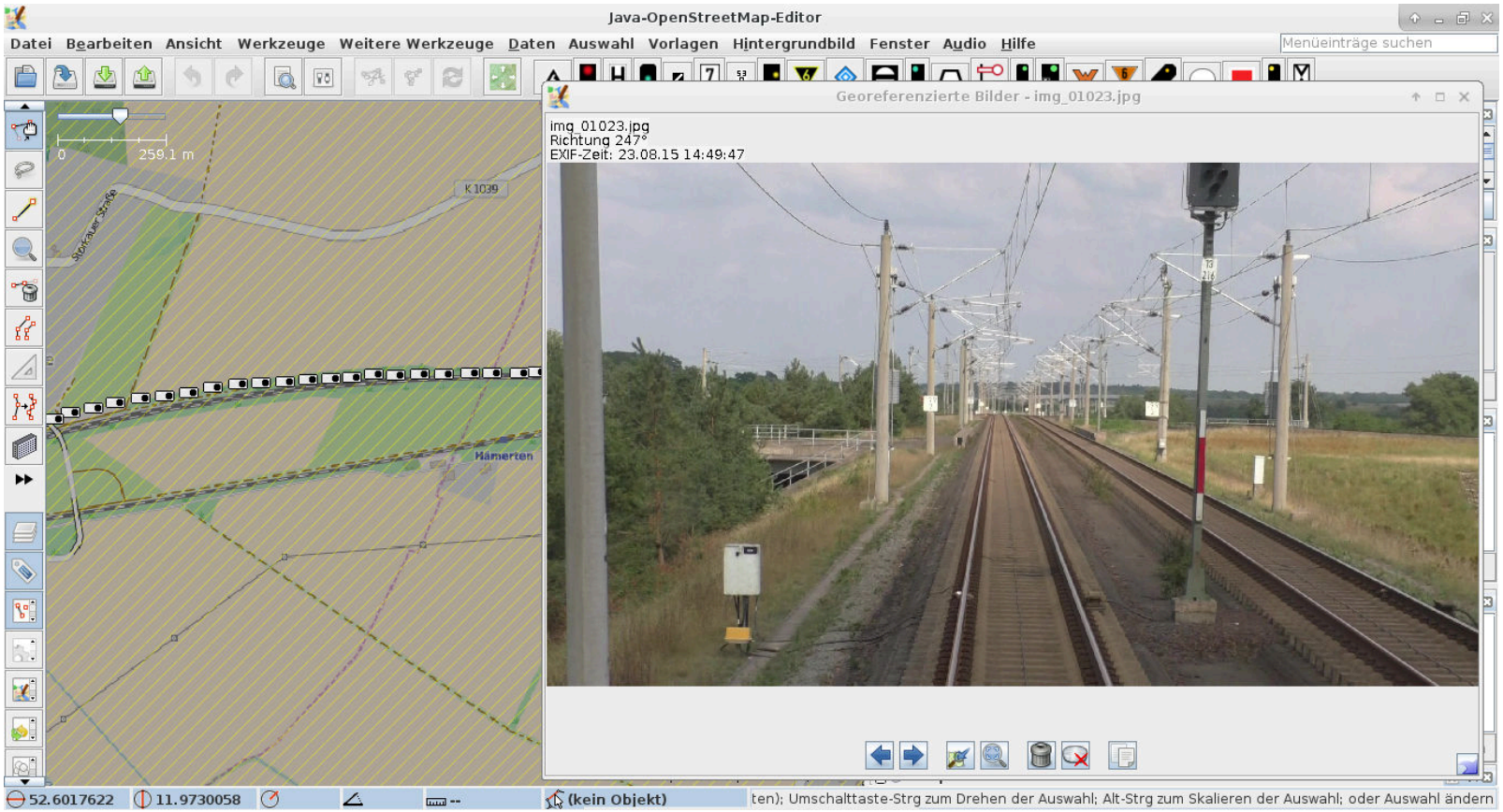
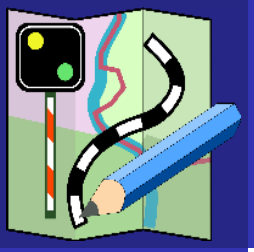


InterCity train, 200 kph, 2 frames/second

extracted frames using ffmpeg, geotagging with

`github.com/Nakaner/mapillary_tools/tree/float-seconds`



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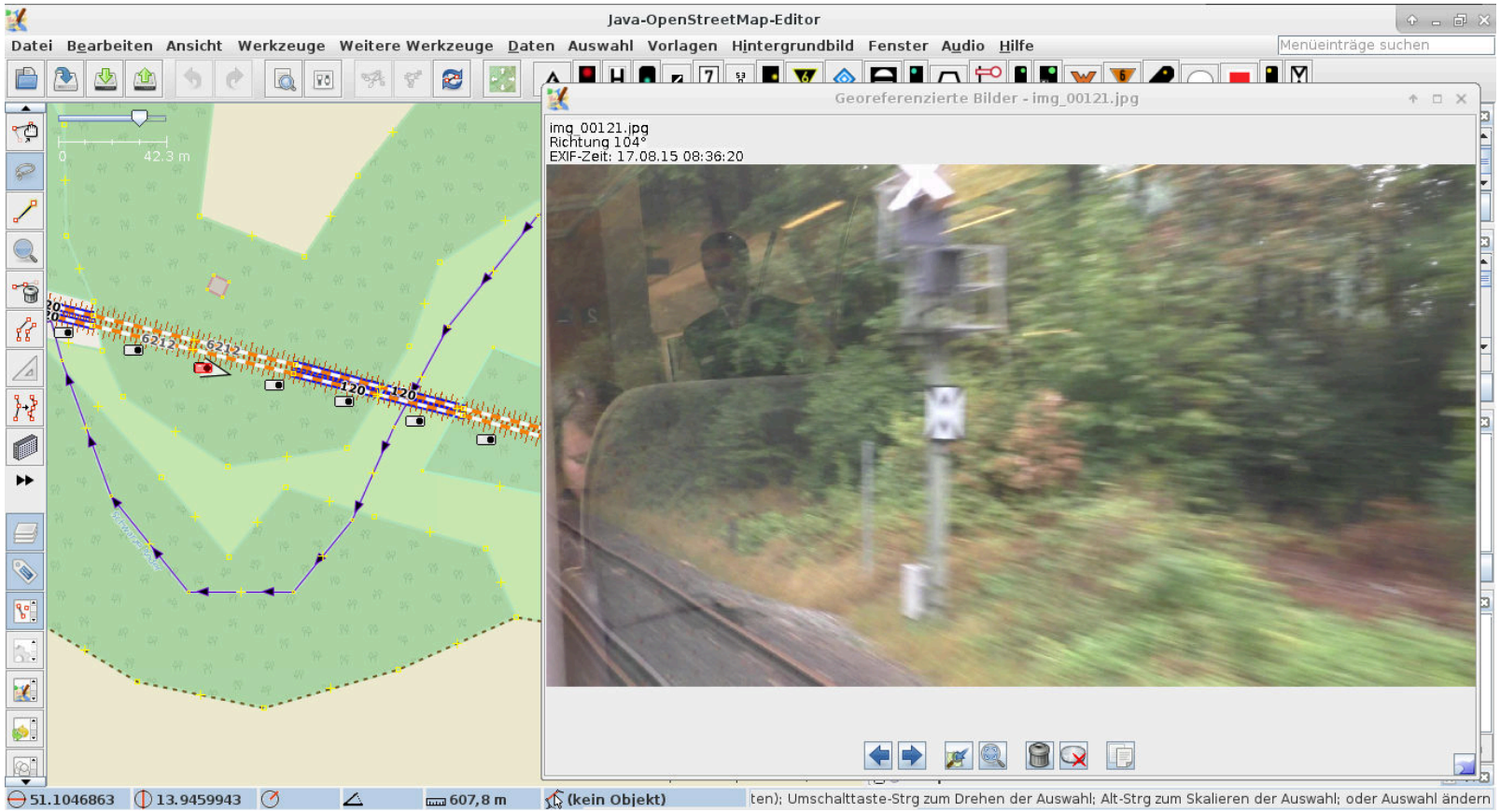
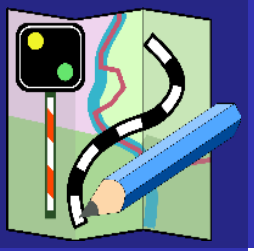


local train, 120 kph, 4 frames/second

extracted frames using ffmpeg, geotagging with

`github.com/Nakaner/mapillary_tools/tree/float-seconds`



Mapping by Train
Lessons Learned

Railways

Michael Reichert (Nakaner)

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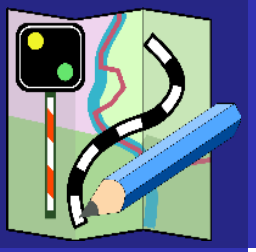
Community

- cameras with optical zoom are better
- Don't zoom in to much.
- Use right/left side windows only as a replacement.
- Avoid filming against the sun!
- dirty windows
- GPS logging!
- extract 4 frames per second – always
- Wear an OSM T-shirt and people will ask you less often.



Mapping

Railways

Michael Reichert (Nakaner)

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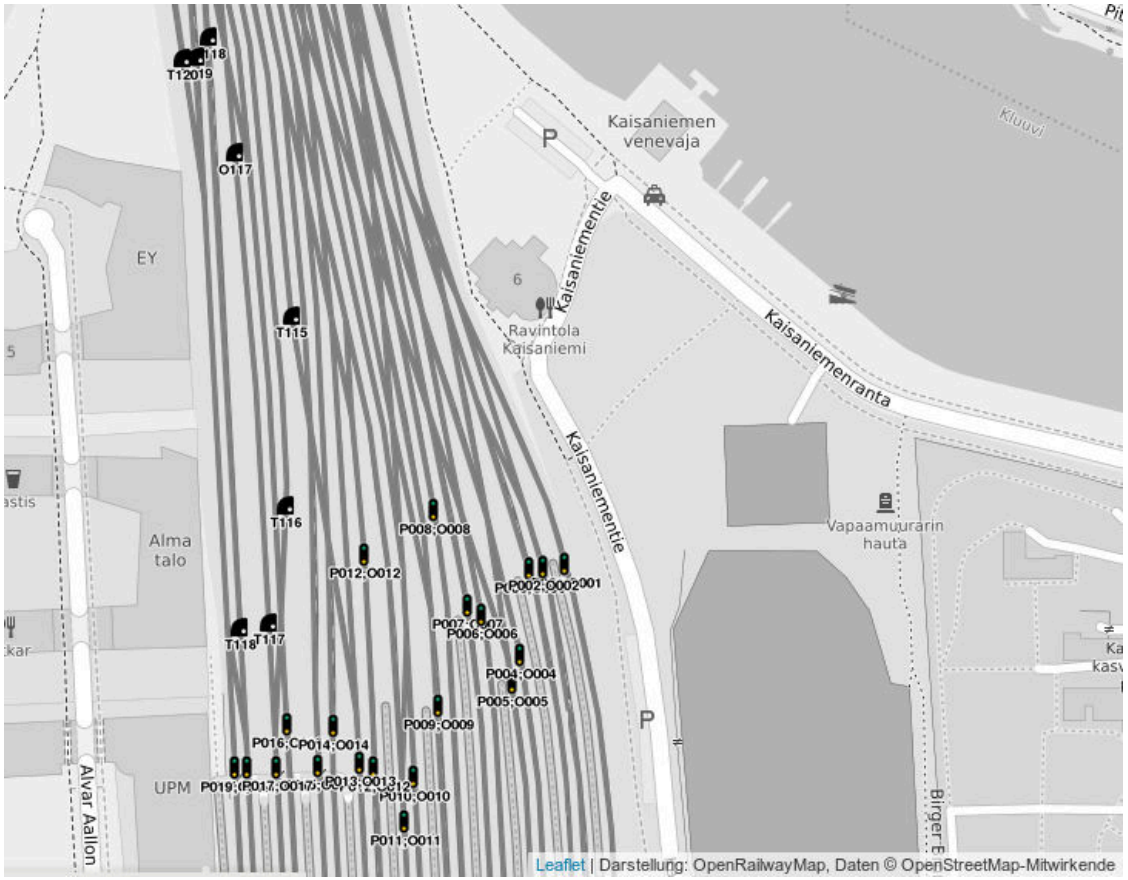

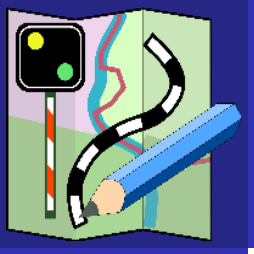

Some Numbers

Railways

Michael Reichert (Nakaner)

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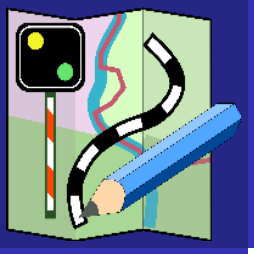
Community

- world-wide:
  - 78,779 nodes with `railway=signal`
  - 76,693 nodes with `railway:signal:direction=*`
  - 39,102 nodes with `railway=milestone`
- Germany yesterday (November 2015 in brackets):
  - 48,163 signals total
  - 10,987 main signals properly tagged (7,917)
  - 9,766 distant signals properly tagged (4,758)
  - 3,828 combined signals properly tagged (2,605)



Some Numbers

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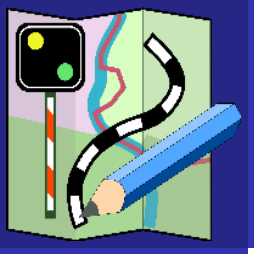
  - 27,365 milestones properly tagged
  - 81,591 km railway track in total (81,235)
  - 29,730 km track with speed limit information (26,415)
  - 49,467 `railway=switch` (35,398)
  - 12,913 of them have `ref=*` (10,240)



Some Numbers

Railways

Michael Reichert (Nakaner)

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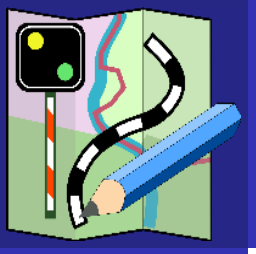

Community

Railways

Michael Reichert (Nakaner)

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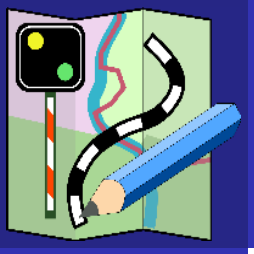
Community

- dominated by Germans in terms of contributors, data and rendering
- Wiki documentation: `OpenRailwayMap/Tagging`
- Mapping tricks at OSM wiki: `DE:OpenRailwayMap/Tutorial` (only German)
- Mailing list: `http://lists.openrailwaymap.org/`
- IRC irc.oftc.net, #openrailwaymap



Credits

Railways

Michael Reichert (Nakaner)

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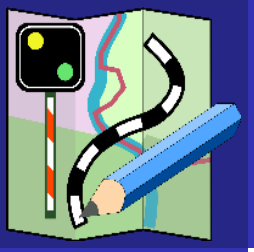
- slide 5: image by Niklas Bildhauer, Flickr, CC-BY-SA 2.0
- slide 7: image by Sebastian Terfloth, CC-BY-SA 2.5
- slide 10: image by Christian Liebscher, CC-BY-SA 4.0
- slide 17: image by Mapillary, CC-BY-SA
- slide 30: image by Ferres, CC-BY-SA
- slide 24: map rendering CC-BY-SA 2.0
- all maps are made of OSM data



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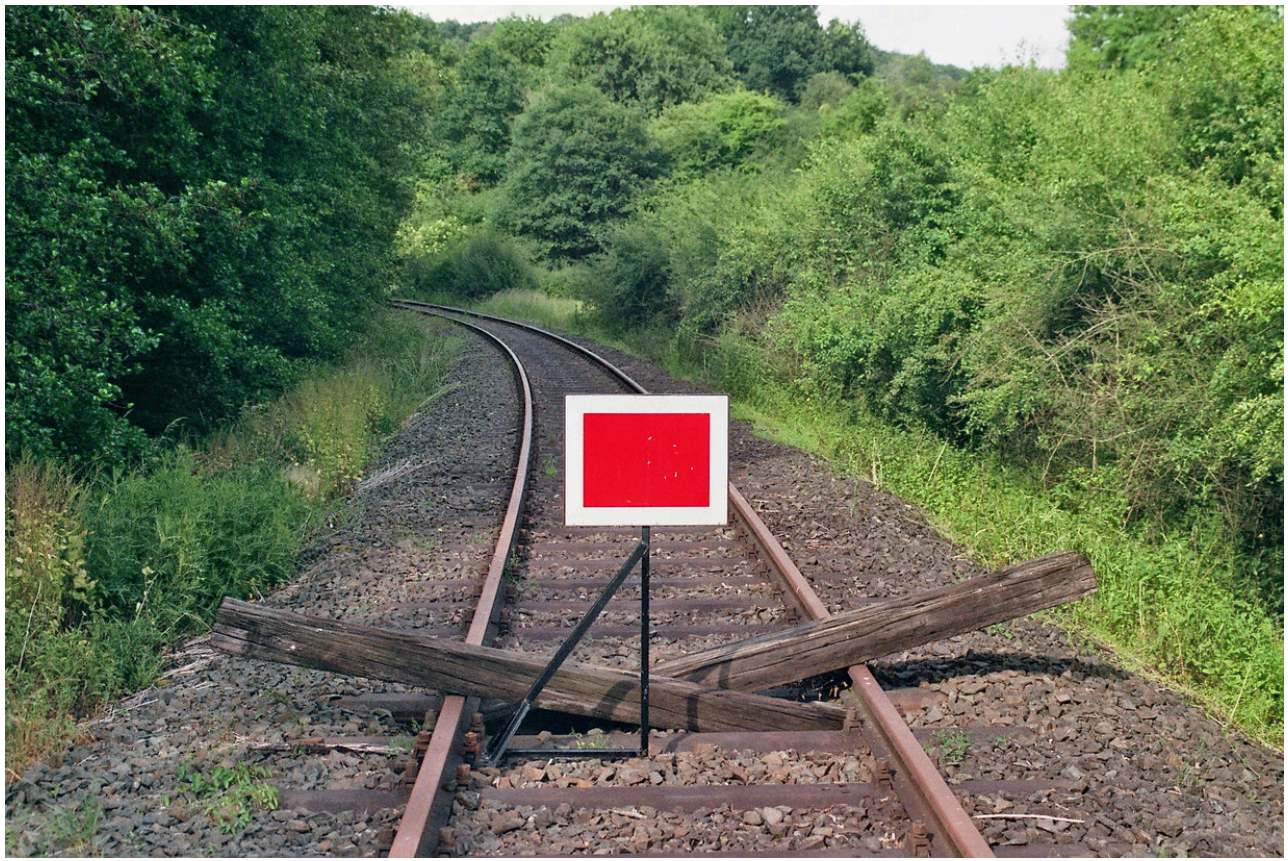
Community