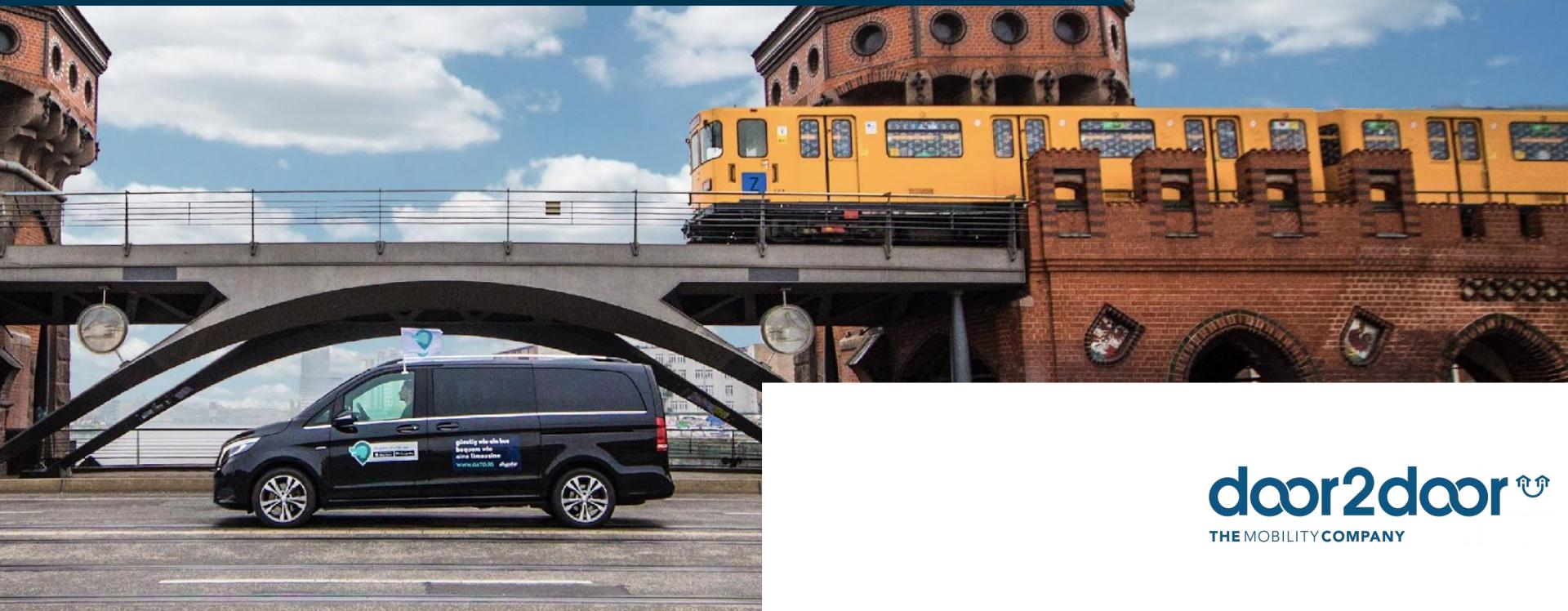


How efficient is your public transport network? A data-driven approach using GeoPandas and GTFS

Pycon.DE 2017



door2door 
THE MOBILITY COMPANY

AGENDA

- What we do
- Tools
 - GeoPandas
 - GTFS
 - Geonotebook
- Maps & Projections
- Demo

door2door PLATFORM





INSIGHTS

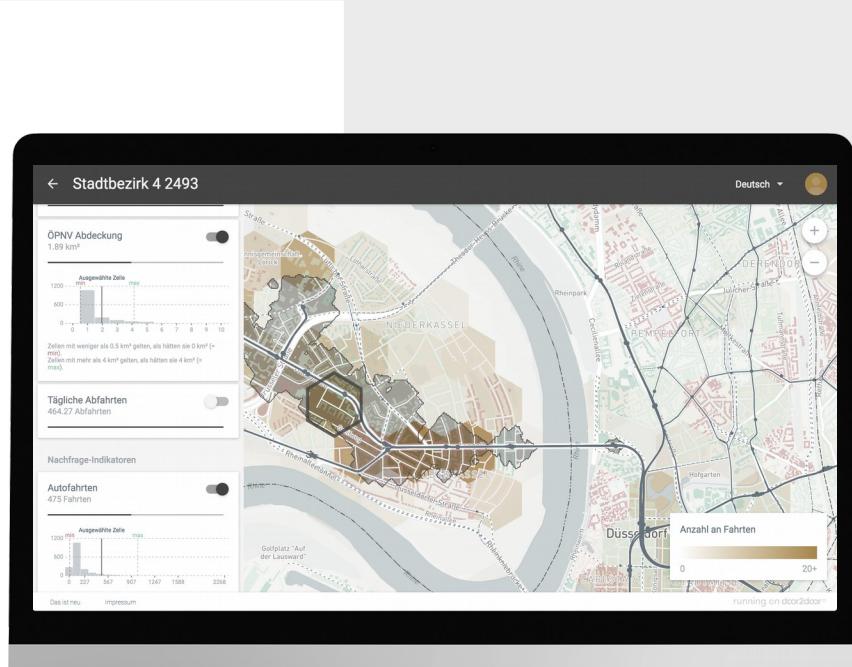


WEB APP



Analyze current supply and demand

Plan Rideshare

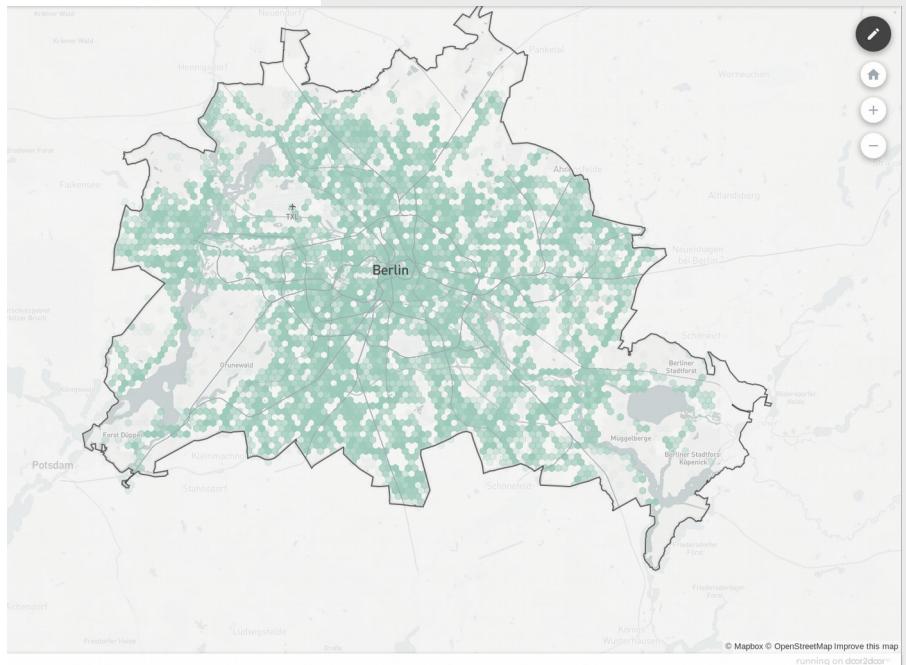


SUPPLY



Population density and demographics

Current public transport infrastructure





TOOLS



GeoPandas

> *GeoPandas extends the datatypes used by pandas to allow spatial operations on geometric types.*

<http://geopandas.org>

	stop_id	stop_name	zone_id	stop_url	location_type	parent_station	geometry
0	de:07334:1714:1:1	Wörth Alte Bahnmeisterei	NaN	NaN	NaN	Parent1714	POINT (8.26622538039577 49.048742345982)
1	de:07334:1714:1:2	Wörth Alte Bahnmeisterei	NaN	NaN	NaN	Parent1714	POINT (8.266737420107789 49.0484420719247)
2	de:07334:1721:1:1	Maximiliansau Eisenbahnstraße	NaN	NaN	NaN	Parent1721	POINT (8.29789997731824 49.0373071007148)
3	de:07334:1721:2:2	Maximiliansau Eisenbahnstraße	NaN	NaN	NaN	Parent1721	POINT (8.29896897250649 49.0371363175998)
4	de:07334:1723:1:1	Maximiliansau West	NaN	NaN	NaN	Parent1723	POINT (8.292024995359281 49.038861789003)

GTFS

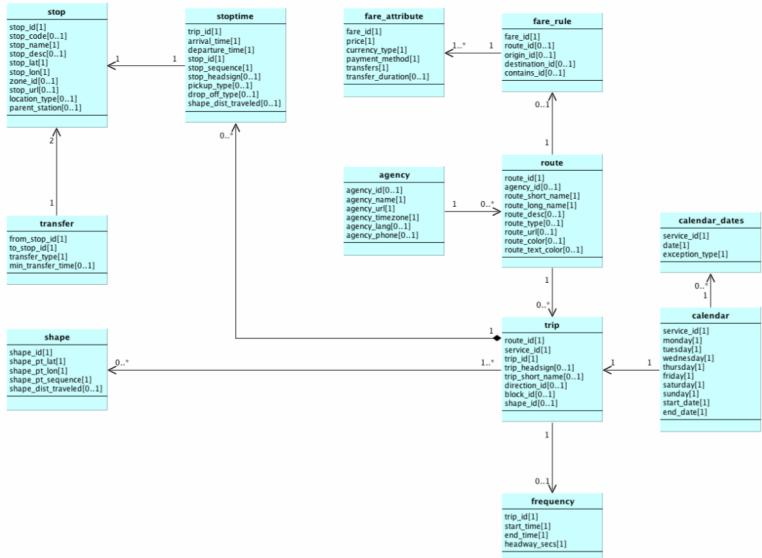
General Transit Feed Specification

> Defines a common format for public transportation schedules and associated geographic information.

<https://developers.google.com/transit/gtfs/>

Zipfile

- Csv files



GeoNotebook

> GeoNotebook is an extension to the Jupyter Notebook that provides interactive visualization and python-based analysis of geospatial data.
<http://geonotebook.readthedocs.io/en/latest/>

jupyter Presentation Last Checkpoint: 17 hours ago (unsaved changes)

In [34]: `M.layers.annotation.clear_annotations()`

In [35]: `here_e = transform_srs(here)`

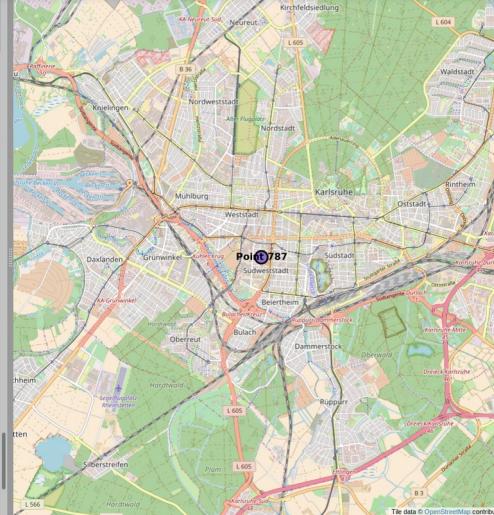
In [29]: `walking_speed = 1.39 # m/s = 5 km/h`
`walking_time = 5 * 1.39 # 5 minutes`
`walkable_stops = here_e.buffer(walking_speed * walking_time)`
`geometry_to_map(walkable_stops, from_proj=calc_proj, name='wlk_dist')`
`walkable_stops = stops[stops.intersects(walking_distance)]`
`stops_to_map(walkable_stops)`

In [30]: `# T000 only for Thursday`

In [31]: `stop_time = gtf['stop_times'].merge(walkable_stops, on='stop_id')`
`trip_stop_time = stop_time[(stop_time['departure_time_int'] <= 1810) &`
`(stop_time['departure_time_int'] >= 1805)]`
`[[('trip_id', 'stop_sequence', 'departure_time')].rename(`
`columns={'stop_sequence': 'current_sequence'})]`

In [32]: `other_stops = gtf['stop_times'].merge(trips, on='trip_id')`
`other_stops = other_stops[(other_stops['stop_sequence'] > other_stops['current_sequence']) &`
`(other_stops['arrival_time_int'] == 1830)]`
`other_stops = stops.merge(`
`other_stops[['stop_id', 'arrival_time_int', 'departure_time_int']],`
`on='stop_id')`
`).sort_values(['arrival_time_int'])`
`).drop_duplicates(subset=['stop_id'])`
`other_stops = other_stops[other_stops['stop_id'].isin(`
`walkable_stops['stop_id'])]`
`)`

`def get_parents(stops):`
 `return gtf[stops].dropna()`
 `.subset(['location_type'])`
 `.merge(`
 `stops.drop_duplicates(subset='parent_station')`
 `.rename(columns={'parent_station': 'stop_id'}),`





MAPS & PROJECTIONS

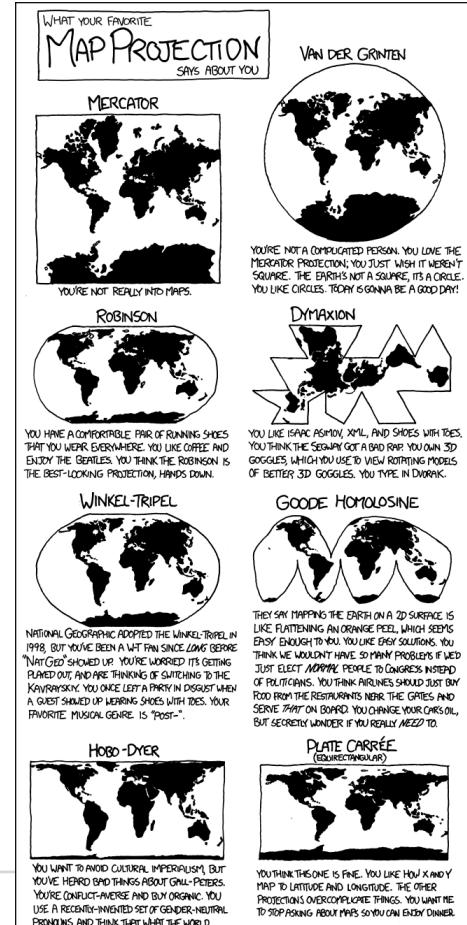


MAPS

Maps are hard!

How do you print an elliptical planet earth on a flat surface?

xkcd.com



PROJECTIONS

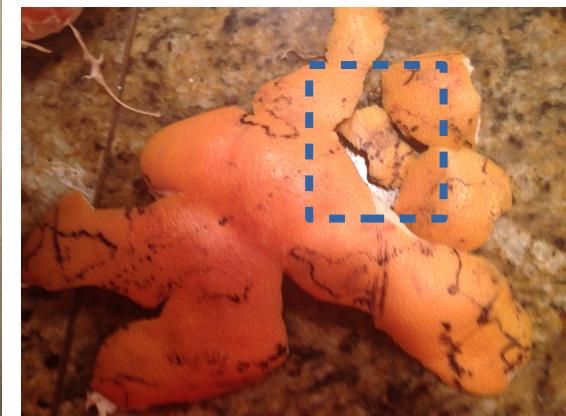
<http://hive5g.blogspot.de/2016/09/earth-as-orange-peeled.html>



Me



WSG84 (Google maps)



ETRS89 (Europe in meters)



DEMO



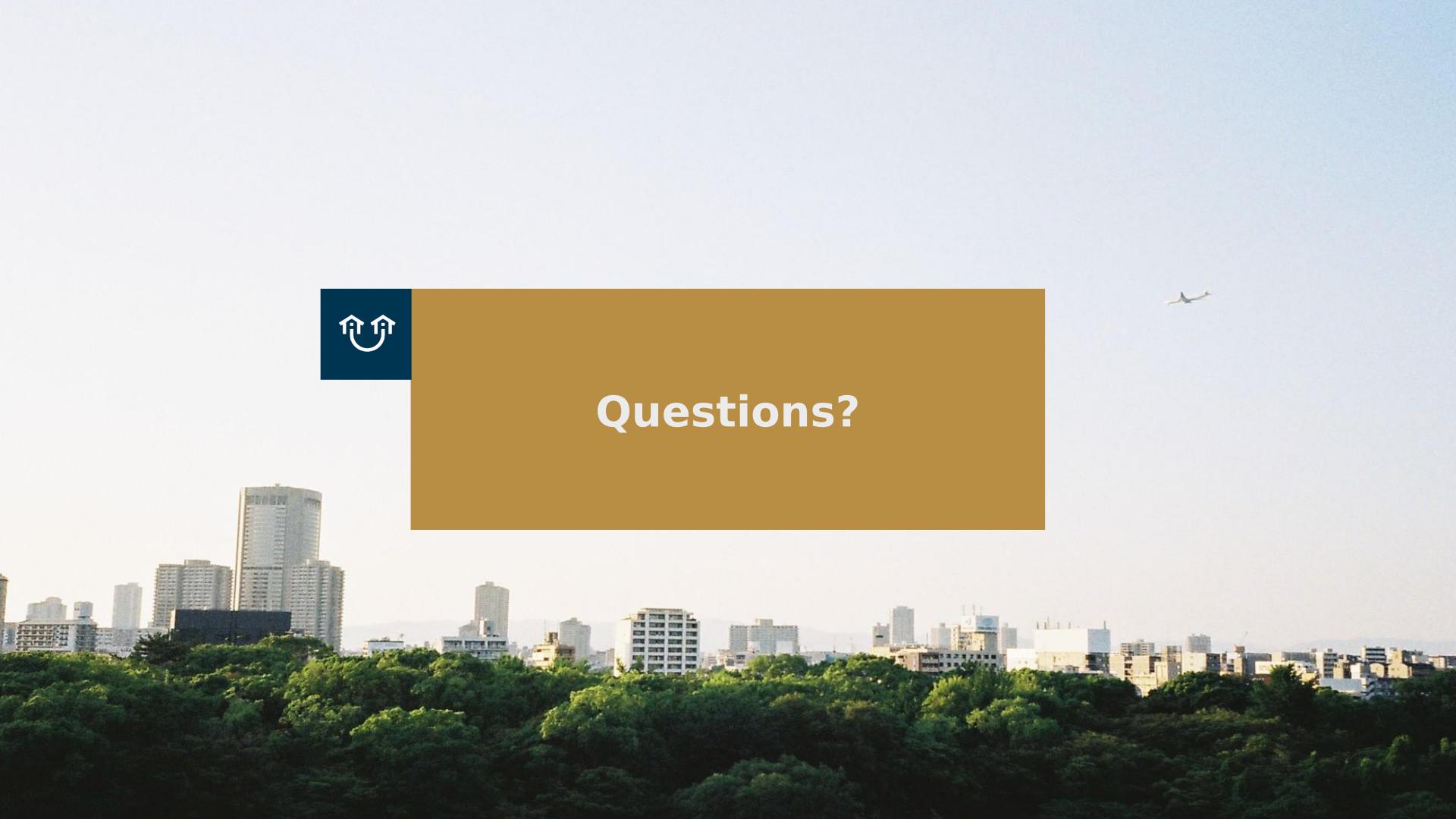
OTP

>OpenTripPlanner (OTP) is an open source multi-modal trip planner, which runs on Linux, Mac, Windows, or potentially any platform with a Java virtual machine.

<http://opentripplanner.readthedocs.io/>



Questions?





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<https://github.com/inytar/pycon2017>

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