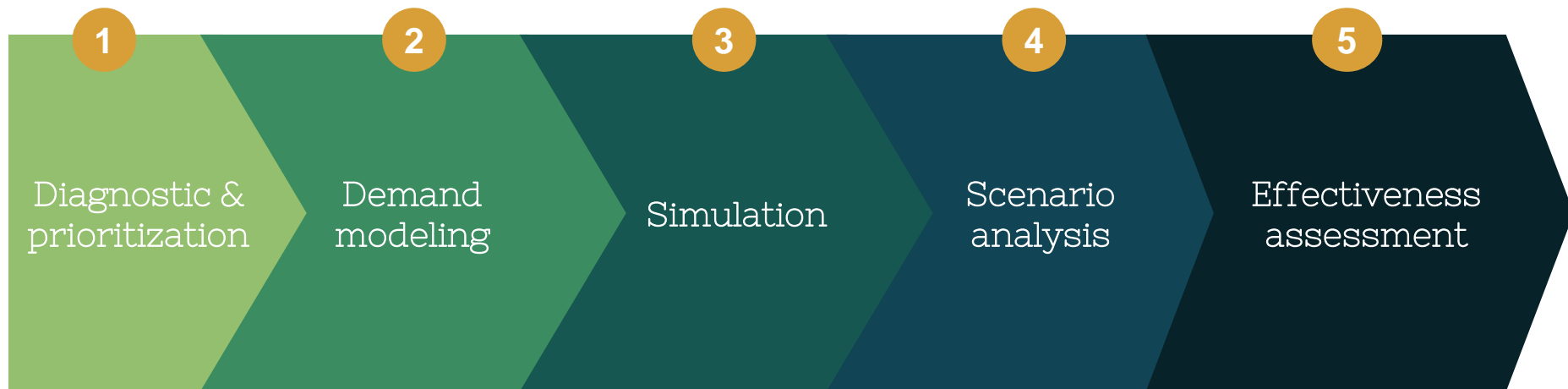


Smart Mobility

Technology applied to urban mobility management

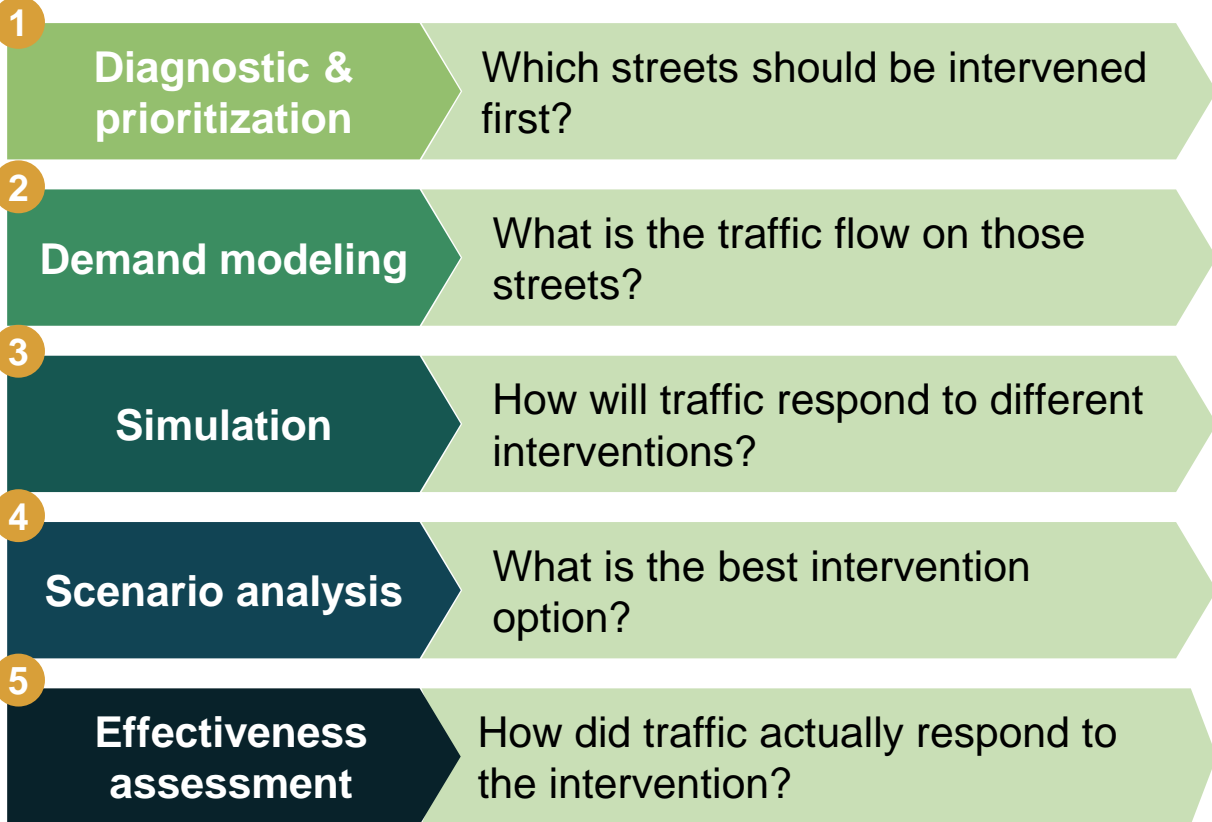


Methodology





Methodology



Data



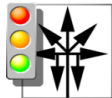
waze



Prefeitura de
Joinville



Tools



SUMO



python



ArcGIS



amazon
web services™



Postgre**SQL**



CONNECTED CITIZENS

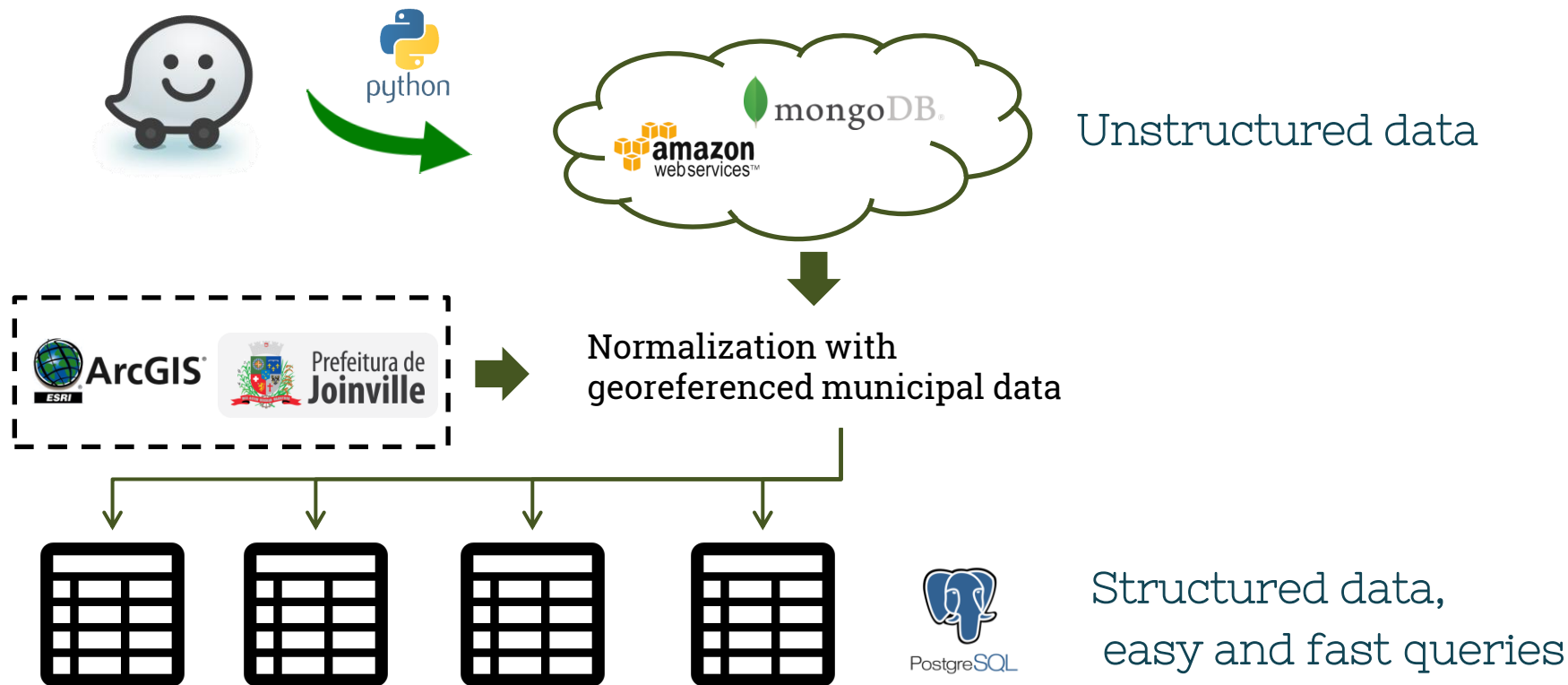
by waze



- Real time data
- Partners across the globe (500+)
- Global forum for discussion of data applications
- Program started on October/2014 (we're all learning together!)

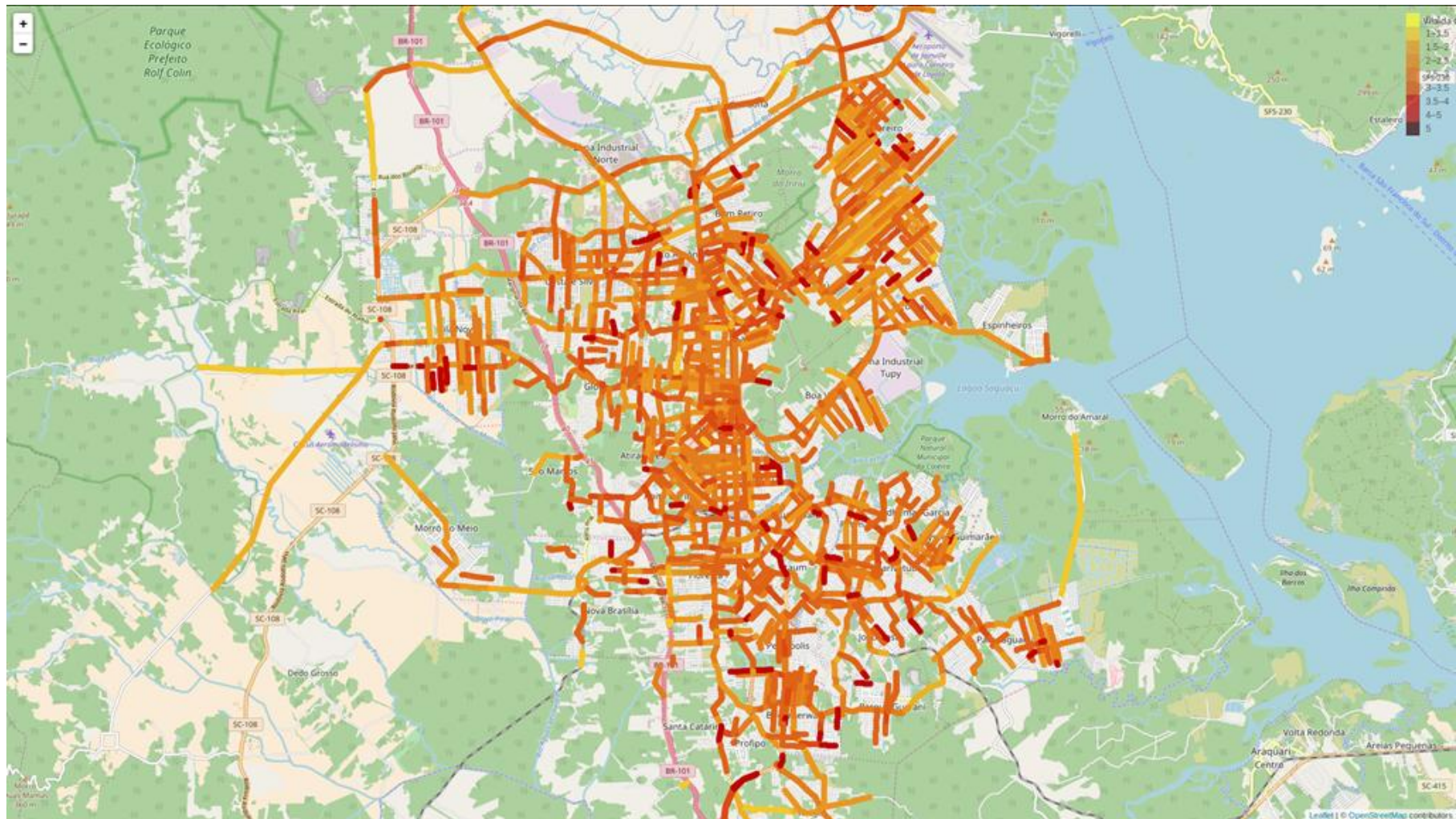


Architecture in Joinville



+510,000

Jam minutes stored since September/2017





+370,000 km

Of jams stored in database



1,616 streets

Covered by the data



Every 2 min

New data is cleaned and stored



How are we using
the data?

1

Diagnostic & prioritization

Which streets should be intervened first?

Diagnostic &
prioritization

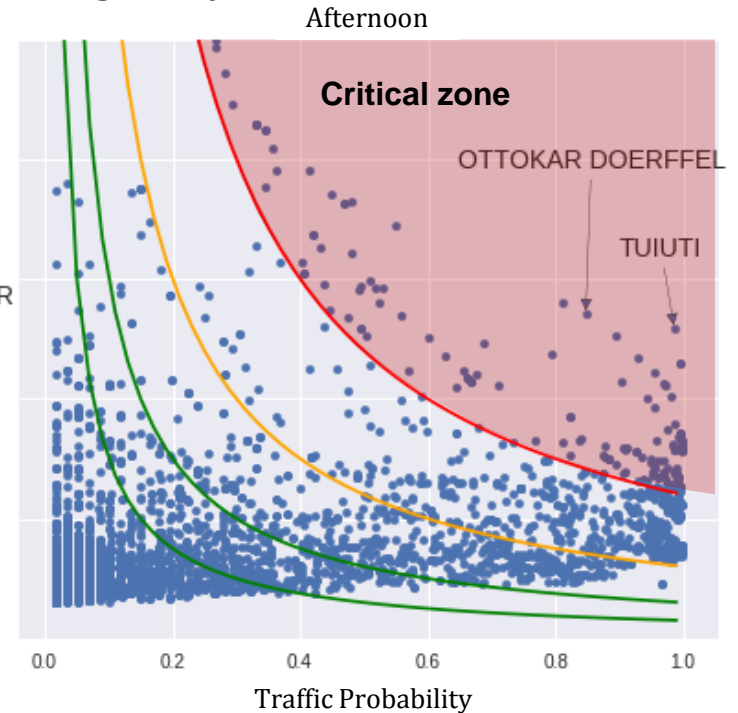
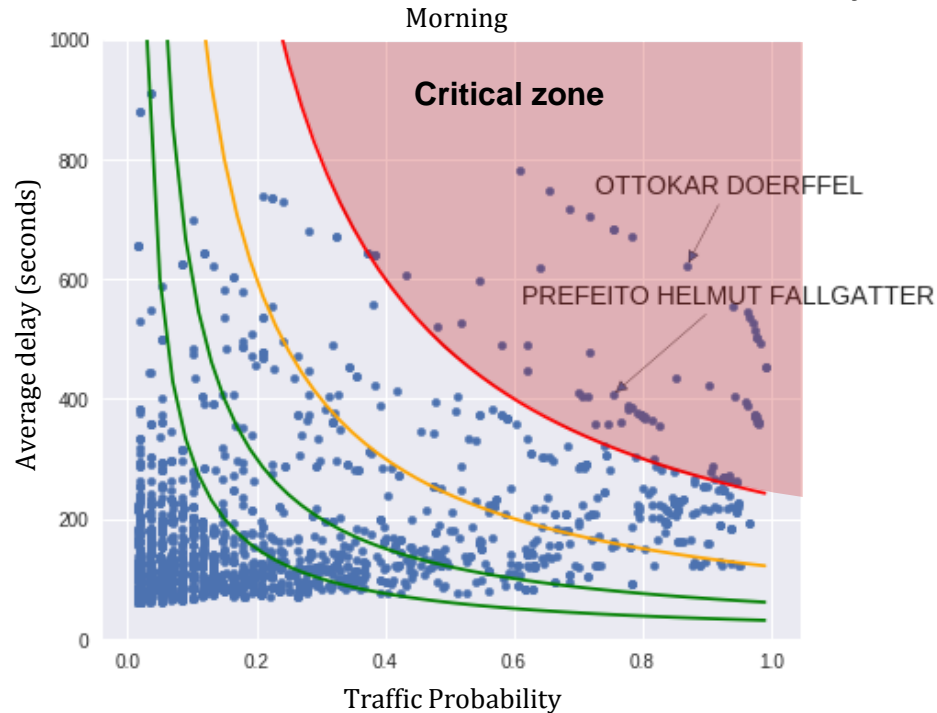
Demand
modeling

Simulation

Scenario
analysis

Effectiveness
assessment

Traffic Probability vs Average Delay



Diagnostic &
prioritization

Demand
modeling

Simulation

Scenario
analysis

Effectiveness
assessment



waze



Prefeitura de
Joinville



Currently
receiving
intervention

Section	Street	Direction N/S	Direction E/W	Period	Traffic Probability	Average Speed (km/h)	Average length (m)	Average delay (s)	Number of accidents	Function
8839	TUIUTI	South	East	pm	100%	5.99	709	459	9	ARTERIAL
4919	FLORIANOPOLIS	South	East	pm	98%	15.90	1,612	251	7	ARTERIAL
4920	FLORIANOPOLIS	South	East	pm	98%	15.81	1,633	256	8	ARTERIAL
2909	GUANABARA	South	West	am	91%	11.16	967	277	8	ARTERIAL
7919	OTTOKAR DOERFFEL	South	West	pm	100%	9.98	1,158	330	5	ARTERIAL
8002	ANITA GARIBALDI	North	East	pm	99%	12.44	1,343	259	6	ARTERIAL
14195	DONA FRANCISCA	North	West	am	97%	9.87	1,129	373	6	ARTERIAL
843	GETULIO VARGAS	South	East	pm	94%	10.36	1,083	266	6	ARTERIAL
3740	MONSENHOR GERCINO	South	East	pm	88%	11.57	1,223	276	5	ARTERIAL

2

Demand modeling

What is the traffic flow on those streets?

Diagnostic & prioritization

Demand modeling

Simulation

Scenario analysis

Effectiveness assessment

Exploratory



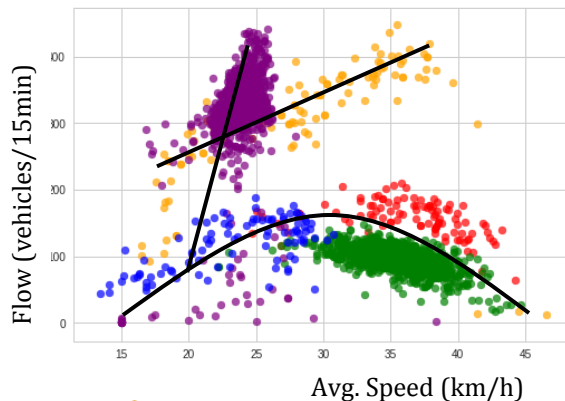
Waze CCP Data

+

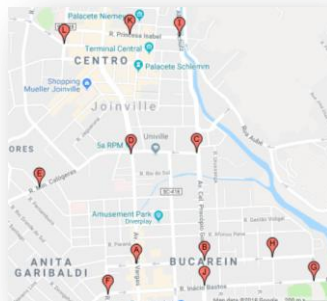


Speed radars' traffic count

Statistical model for traffic flow



Cloud of traffic flow points



Input for traffic simulator



SUMO

+

DFROUTER



Investigation being carried out with involvement of local university



join.vale

3

Simulation

How will traffic respond to different interventions?

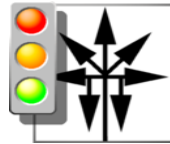
Diagnostic &
prioritization

Demand
modeling

Simulation

Scenario
analysis

Effectiveness
assessment



SUMO
Simulation of
Urban Mobility



Usage of drones for precise counting
and refinement of route definition

4

Scenario analysis

What is the best intervention option?

Diagnostic &
prioritization

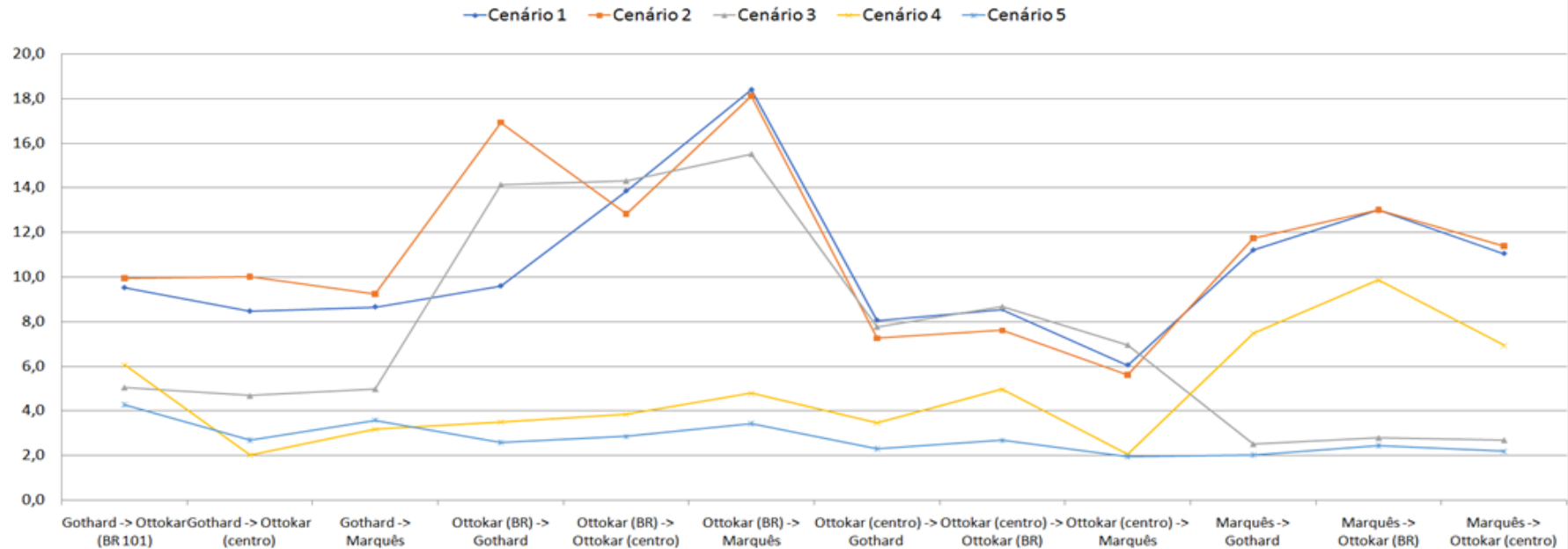
Demand
modeling

Simulation

Scenario
analysis

Effectiveness
assessment

Average travel time (from simulation)



Diagnostic &
prioritization

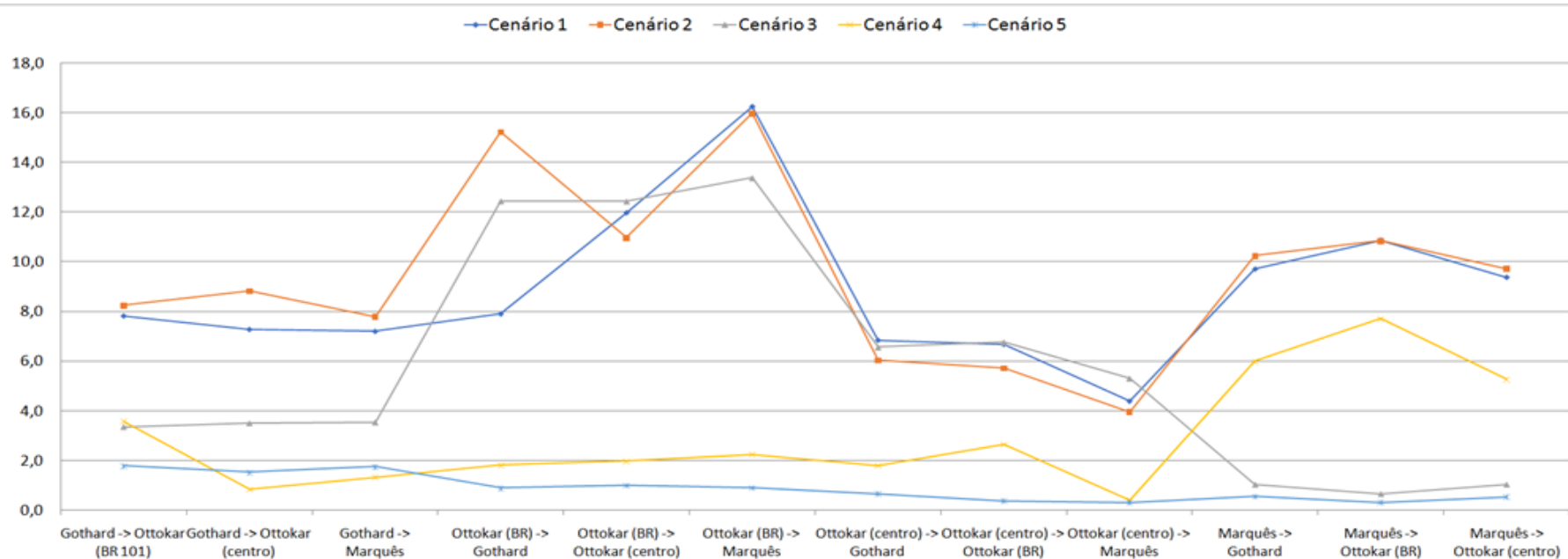
Demand
modeling

Simulation

Scenario
analysis

Effectiveness
assessment

Average wasted time (minutes) (from simulation)



Diagnostic &
prioritization

Demand
modeling

Simulation

Scenario
analysis

Effectiveness
assessment

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Gain
Avg travel time (min)	11.6	11.4	8.4	5.4	2.8	-8.7
Avg wasted time (min)	9.8	9.6	6.6	3.4	0.8	-9.0
Max travel time (min)	38.6	36.8	23.7	21.2	5.8	-32.8

5

Effectiveness assessment

How did traffic actually respond to the intervention?

Diagnostic &
prioritization

Demand
modeling

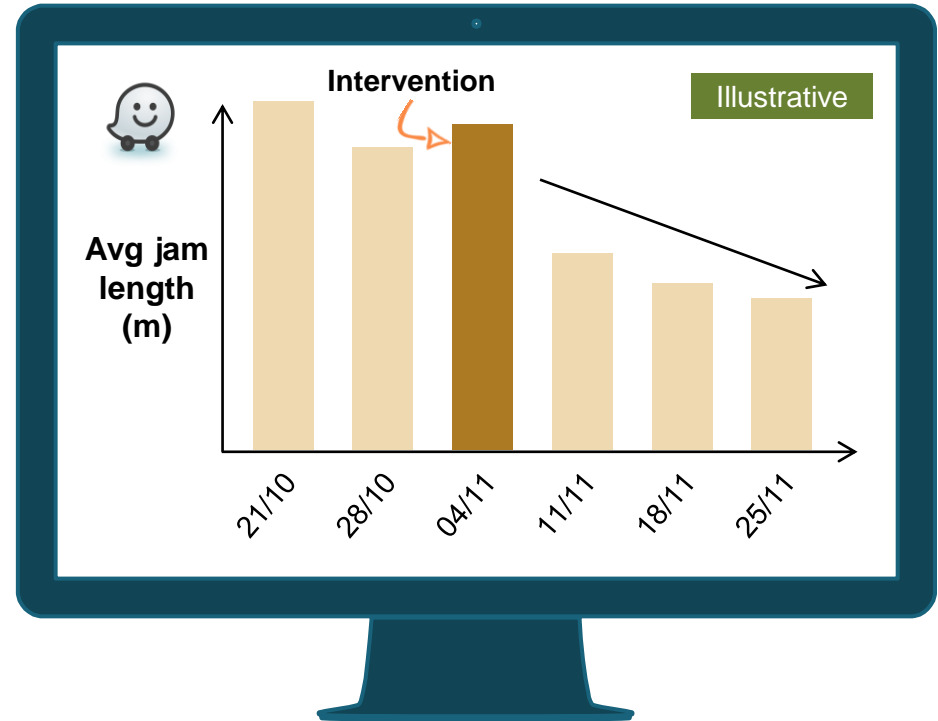
Simulation

Scenario
analysis

Effectiveness
assessment



Street: Ottokar Doerffel
Section: 7919





Challenges





Highly specialized HR

SOFTWARE
ENGINEERING

DATA ANALYSIS
AND
STATISTICS

TRAFFIC
ENGINEERING



Not the core of Municipalities



How to grow, perpetuate and disseminate Smart Mobility ?

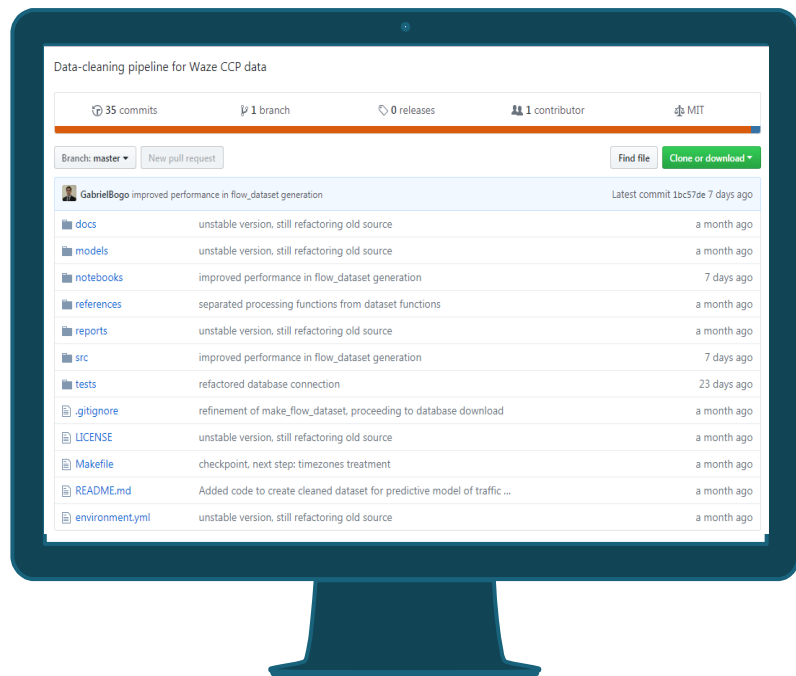




Proposals

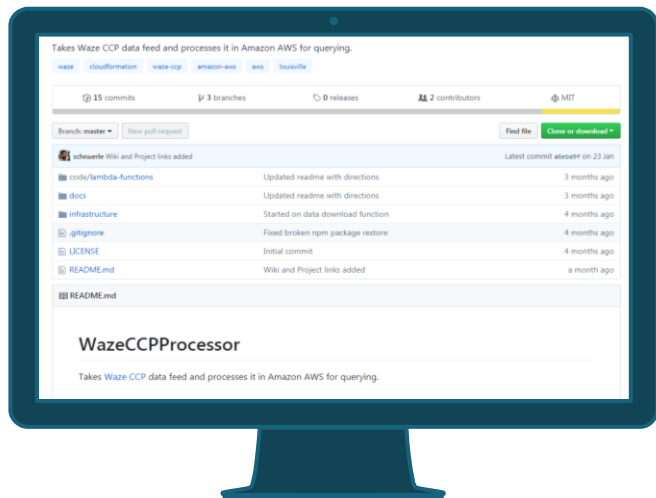
- Open-source e Hackatons
- Collaboration between Municipalities
- Articulation of Triple Helix

Open-source & Hackatons

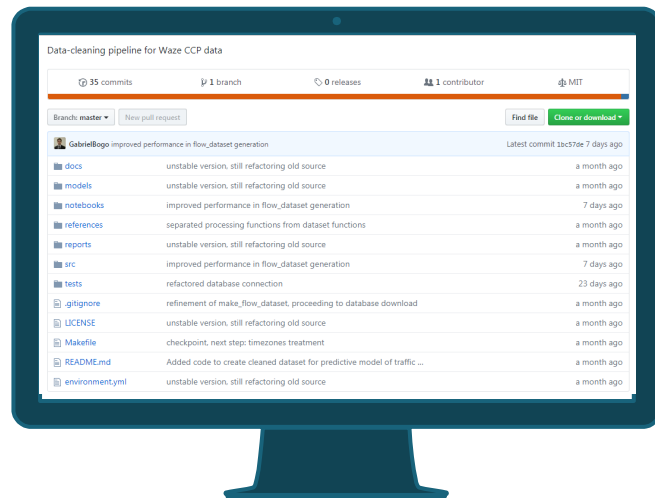


- All code (not data) is shared in GitHub (github.com/GabrielBogo/Joinville-Smart-Mobility)
- All studies are verifiable and replicable
- Studies can be further advanced through Data Science Hackatons

Collaboration



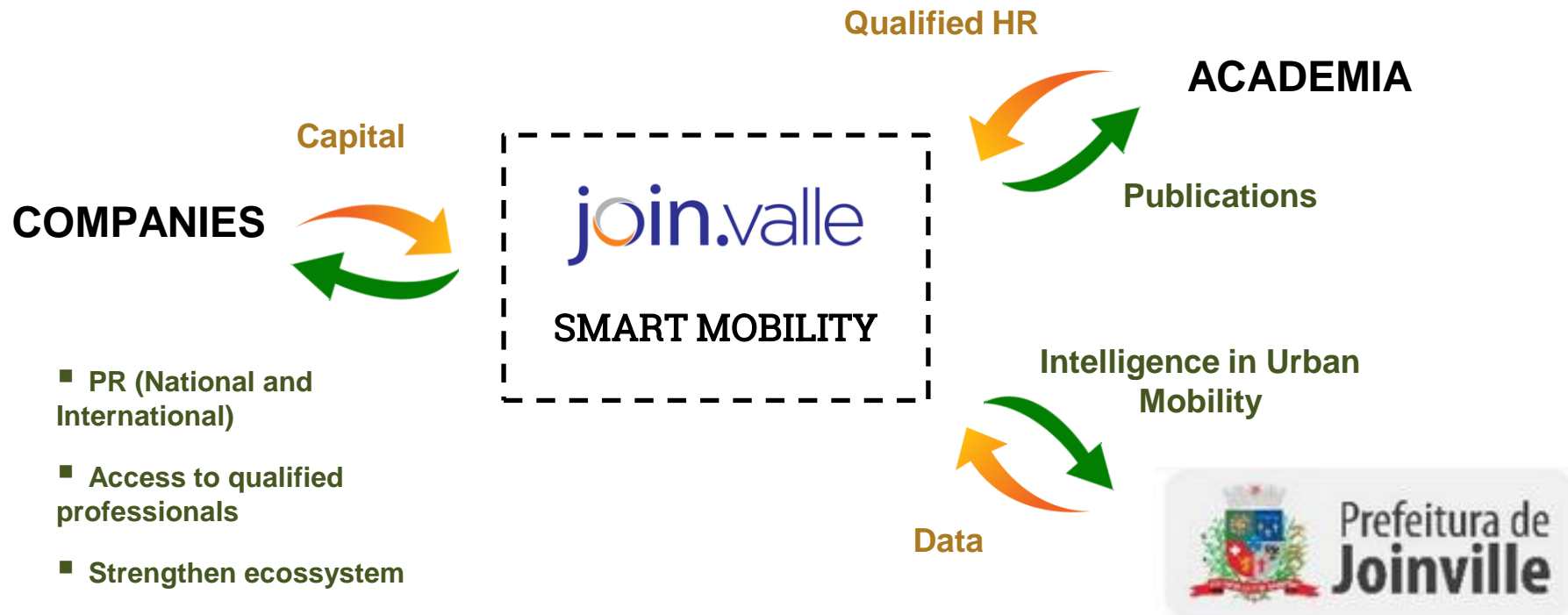
GitHub from Louisville, USA



GitHub from Joinville, Brasil

Collaboration can unify and potentialize work!

Articulation of Triple Helix



Thank you

Division of Urban Planning and
Sustainable Development