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HUMAN CENTERED URBAN DESIGN
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Vivaldi, Trees, and Urban Mobility

Jakob Puchinger

September 28, 2016

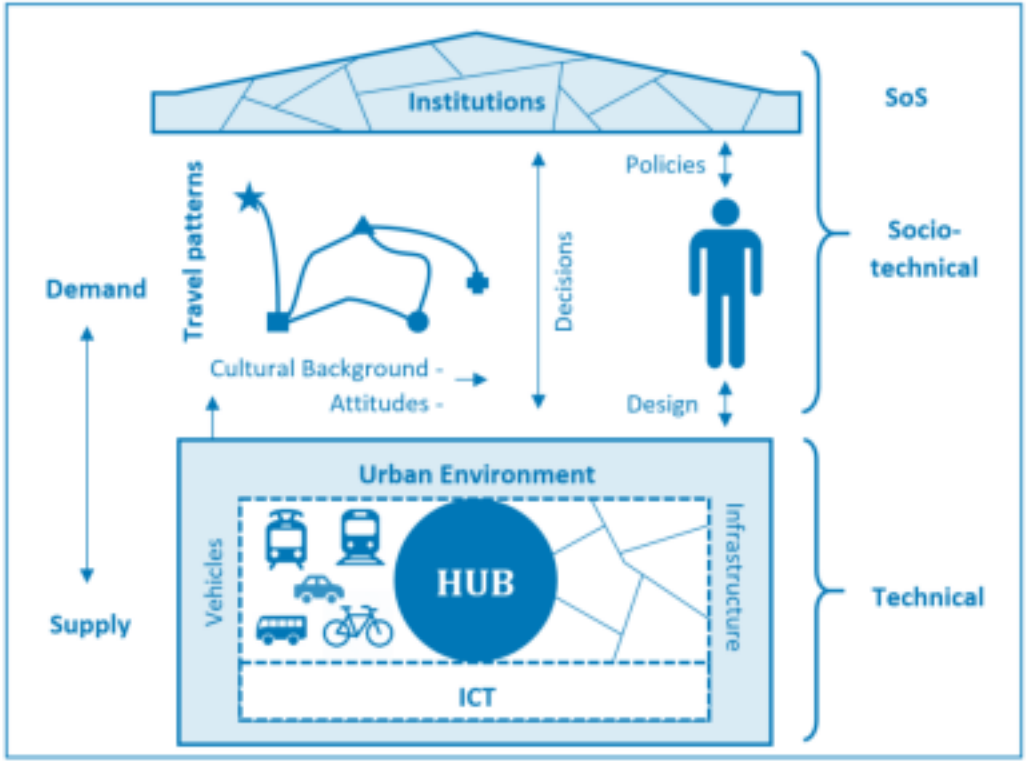
ALSTOM ENGIE RATP GROUPE RENAULT SNCF

INVESTISSEMENTS D'AVENIR

ANR îledeFrance CAPS Essonne LE CONSEIL GÉNÉRAL université PARIS-SACLAY Fondation de Coopération Scientifique Systematic Paris Region Systems & ICT Cluster advancity Ville & Mobilité Durables ASTech Paris Region mov'eo Imagine mobility

A long personal story, but why is it interesting?

Urban Mobility



An Overview of Urban Mobility

From: Ouail Al Maghraoui, Flore Vallet, Jakob Puchinger, Anthropolis Deliverable 1, 2016.

- **Habits**
- **Feelings**
- **Irrationality**
- **Society**
- **Economics**
- **Housing**
- **…**


GIBERT JEUNE
SCIENCES HUMAIN HISTOIRE
COLLEGE - LYCÉE
LE DEPART
Glaces
LAVAZZA

Major Challenges in Habitability, Ecology, and Accessibility


POLLUTION
RALENTIR
N302
70
RAPPEL
Brossette

Cars are by far the most used mode of daily transport (54%)

Urban public transport (19%)

Eurobarometer 422 2014

Convenience (61%) and speed (31%) are much more important than price (12%)

Eurobarometer 422 2014

QUE DE TEMPS PERDU SUR LES AUTOROUTES FRANCILIENNES

Voici quatre exemples de personnes travaillant à Paris, faisant un **trajet quotidien de 25 km aller et 25 km retour**, partant de leur domicile le matin aux heures de pointe, entre 7h00 et 10h00, et quittant leur lieu de travail le soir, entre 16h30 et 19h30.

NICOLAS PERD 3 JOURS ET 18 HEURES EN UN AN, SOIT 2 SEMAINES ET DEMI DE TRAVAIL[2].
Nicolas habite à Cergy, Val d'Oise. Il emprunte l'A15 tous les matins pour aller à son travail à Paris 17e et le soir pour rentrer chez lui. Chaque jour, il perd 26 minutes sur cet axe.

ANAÏS PERD 2 JOURS ET 20 HEURES EN UN AN, SOIT 2 SEMAINES DE TRAVAIL[2].
Anaïs habite à Louvres, Val d'Oise. Elle emprunte l'A1 tous les matins pour aller à son travail à Paris 18e et le soir pour rentrer chez elle. Chaque jour, elle perd 20 minutes sur cet axe.

SANDRA PERD 3 JOURS ET 6 HEURES EN UN AN, SOIT 2 SEMAINES ET 2 JOURS DE TRAVAIL[2].
Sandra habite aux Ulis, Essonne. Elle emprunte la N118 tous les matins pour aller à son travail à Paris 16e et le soir pour rentrer

MATHIEU PERD 4 JOURS ET 6 HEURES EN UN AN, SOIT 3 SEMAINES DE TRAVAIL[2].
Mathieu habite à Evry, Essonne. Il emprunte l'A6 tous les matins pour aller à son travail à Paris 14e et le soir pour rentrer chez lui. Chaque jour, il perd 29 minutes sur cet axe.

27 % of the daily commute in Île-de-France is saturated

For a 25 km journey this represents about 7 km of traffic jams

Vtraffic Study 2015 Île-de-France

Belief that the urban traffic situation

will improve in the future: 24%

will stay the same: 35%

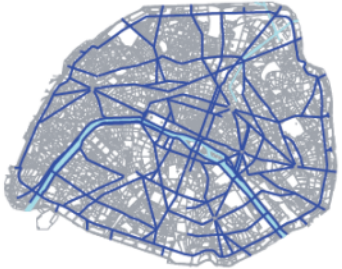
get worse: 37%

Eurobarometer 406 2013

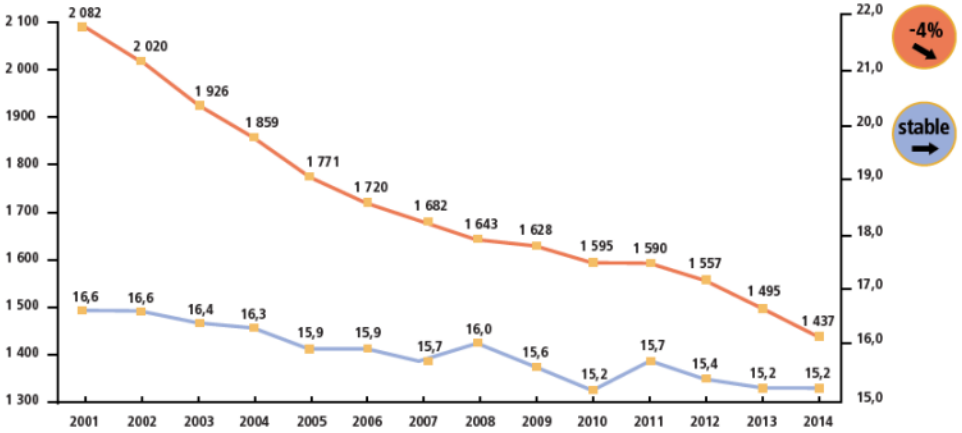
Circulation automobile dans Paris intra-muros
(jours ouvrables)

Source : Mairie de Paris
Direction de la Voirie
et des Déplacements

Réseau instrumenté dans Paris intra-muros
Réseau de 196 km d'axes équipés de capteurs



Évolution annuelle de la circulation dans Paris intra-muros sur le réseau instrumenté



Evolution 2014 / 2013

-4%

stable

City of Paris: Le bilan des déplacements en 2014


RESY!
STOP
KOOKAI

			Evolution 2014 / 2013
Déplacements en transports en commun			
	Métro (RATP) :	**1 526 millions** de voyages *Les données 2013 ont été consolidées	+0,4% *
	RER A et B (RATP) :	**474 millions** de voyages	+1,1%
	Réseau de surface à Paris (RATP) :	**433 millions** de voyages	+6,7%
	dont Tramway T3 :	**91,4 millions** de voyages	+13,1%
	Transilien SNCF : (RER A, B, C, D, E et train)	**745 millions** de voyages *Les données 2013 ont été consolidées	-0,3% *
Déplacements à vélo			
	Fréquentation des aménagements cyclables		+8%
	Nombre de déplacements à Vélib' :	**39 462 944**	+13%
Circulation automobile			
	Paris intra-muros (réseau instrumenté) :	**1 437** véhicules* km/h ramenés au km d'axe instrumenté	-4%
Jours ouvrables, 7h-21h	Boulevard périphérique :	**5 555** véhicules* km/h ramenés au km d'axe	stable
Déplacements en deux-roues motorisés			
	Evolution du nombre de 2 roues motorisés sur les sites enquêtés		+1%

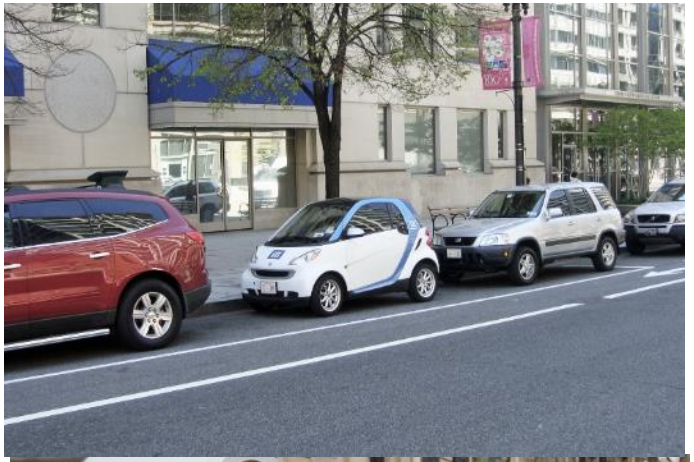
City of Paris: Le bilan des déplacements en 2014

Home-based telework is a fairly restricted phenomenon in France

Without an exogenous shock (…) telework is likely to remain as it is today.

Aguilera, A., Lethiais, V., Rallet, A., & Proulhac, L. (2016). Home-based telework in France: Characteristics, barriers and perspectives. *Transportation Research Part A: Policy and Practice*, *92*, 1-11.

Sharing Economy



Towards a Mobility as a Service

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Nous ne pouvons pas afficher cette image pour l'instant.

Autonomous Vehicles

Google Self-Driving Car

VEDECOM electric and autonomous vehicle

Uber Car

Navya Arma Car

Autonomous vehicle fleets (…) will account for the majority of Lyft rides within 5 years.

By 2025, private car ownership will all-but end in major U.S. cities.

The Third Transportation Revolution
John Zimmer, Lyft Co-Founder, 18/09/2016
https://shift.newco.co/

Enable your car to make money for you when you aren't using it.

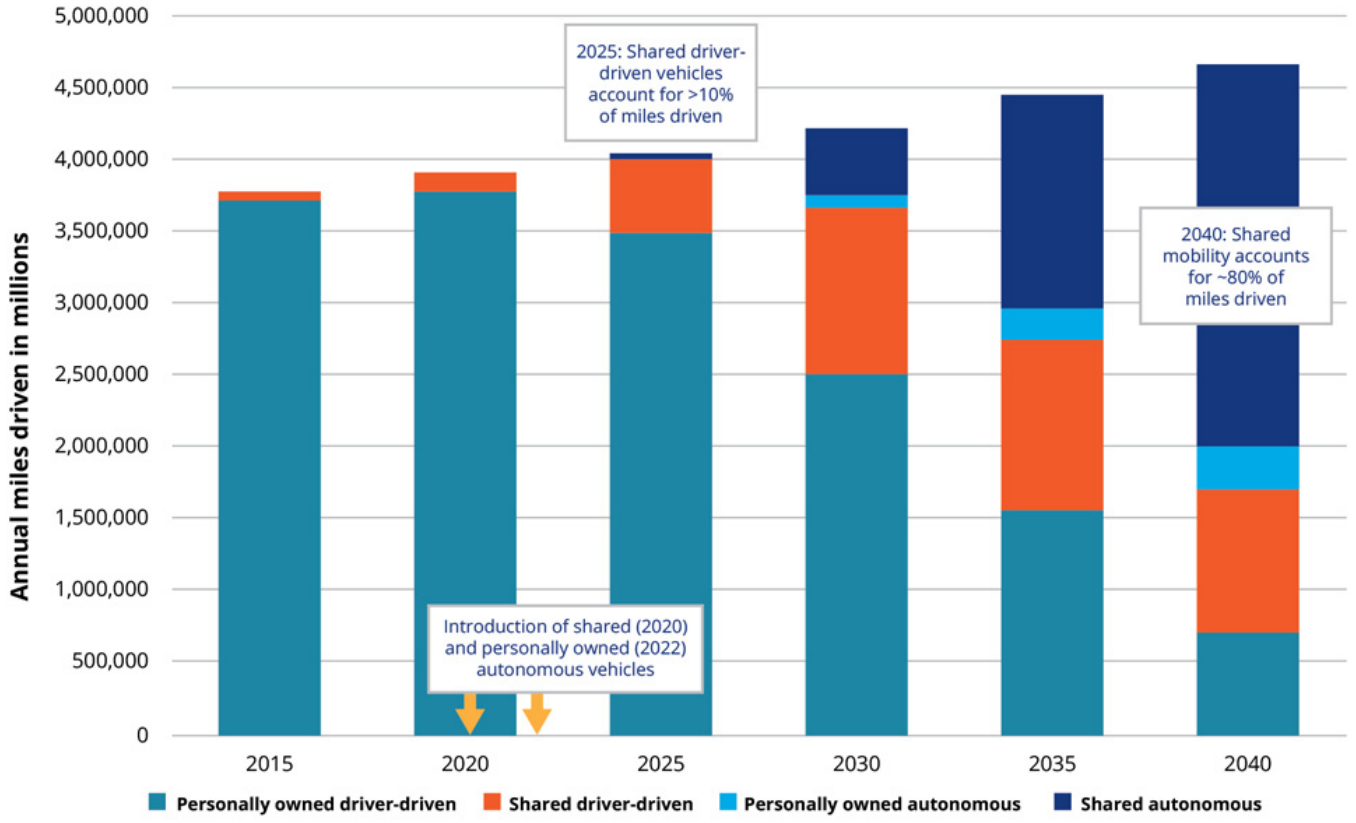
This dramatically lowers the true cost of ownership to the point where almost anyone could own a Tesla.

Master Plan Part Deux,
Elon Musk, Tesla, 20/07/2016,
https://www.tesla.com/blog/master-plan-part-deux

The future of mobility: Whats next?

Deloitte University Press 14/09/2016

Figure 2. Forecast of total miles driven in the United States



Source: Deloitte analysis based on publicly available information. See appendix for data sources.

Graphic: Deloitte University Press | DUPress.com


Allianz
ASNIÈRES
SURES
LA DÉFENSE
NANTERRE
COURBEVOIE
PUTEAUX
S64
70

If we take action, we can build a dream transportation system around self-driving cars. If we don't, we'll create a nightmare

Robin Chase, Author of Peers Inc; co-founder Veniam, vehicle mesh and co-founder former CEO Zipcar
Self-Driving Cars Will Improve our Cities. If They Don't ruin them.
backchannel.com 10/08/2016

The future of mobility: Whats next?

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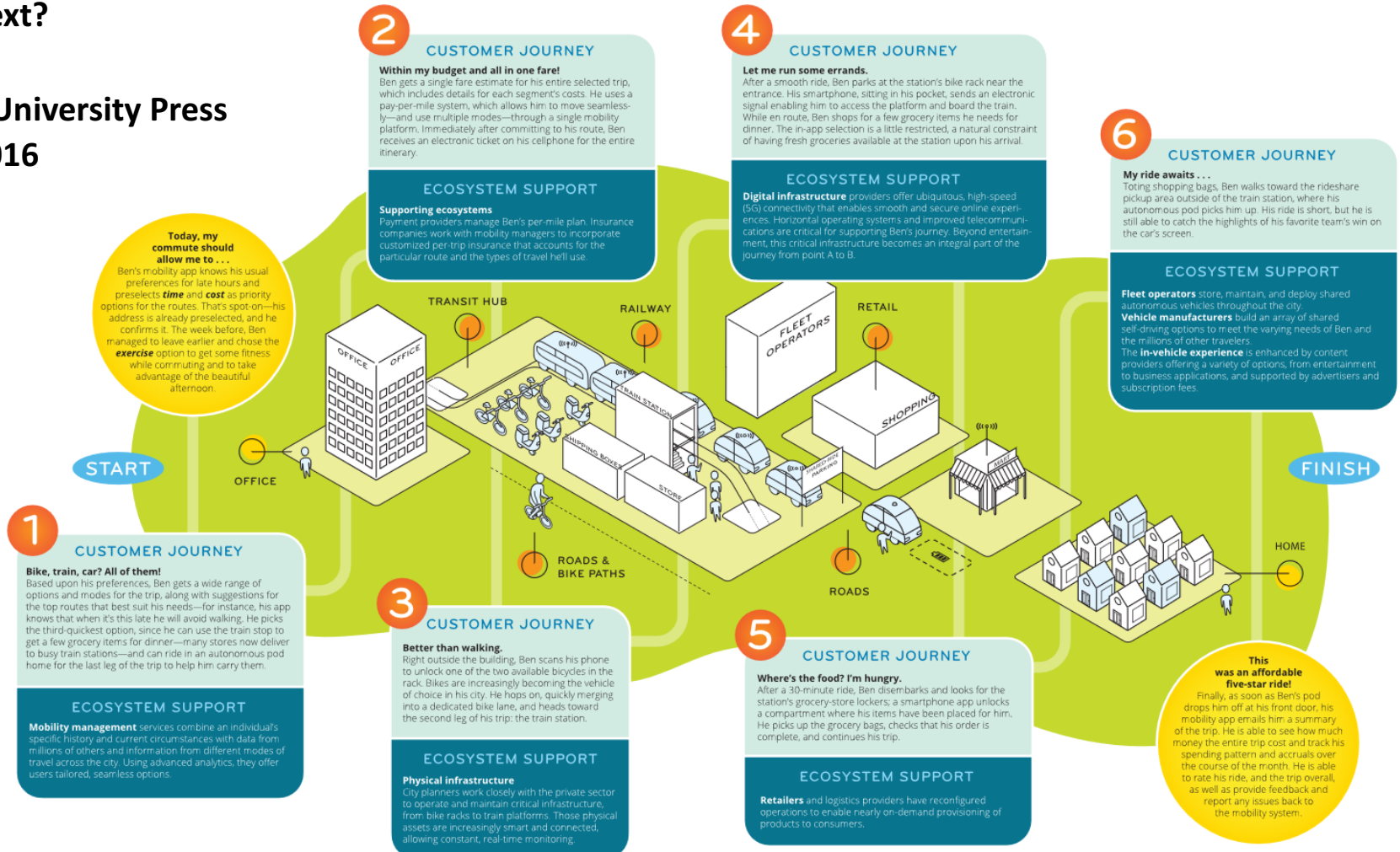

Radical changes are ahead

We need a
human centered approach

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The « Anthropolis » chair investigates human centered eco-innovations in the context of urban mobility systems and their interactions with other urban systems.

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Users and usage scenarios

- Identify needs, behaviors and habits in personal mobility
- Define typical usage scenarios
- Develop observation protocols for given usage scenarios

Disruptive Technologies and Innovation

- Identify future disruptive developments
- Innovation design for user-centered mobility
- Solutions encouraging ecological and sustainable transport

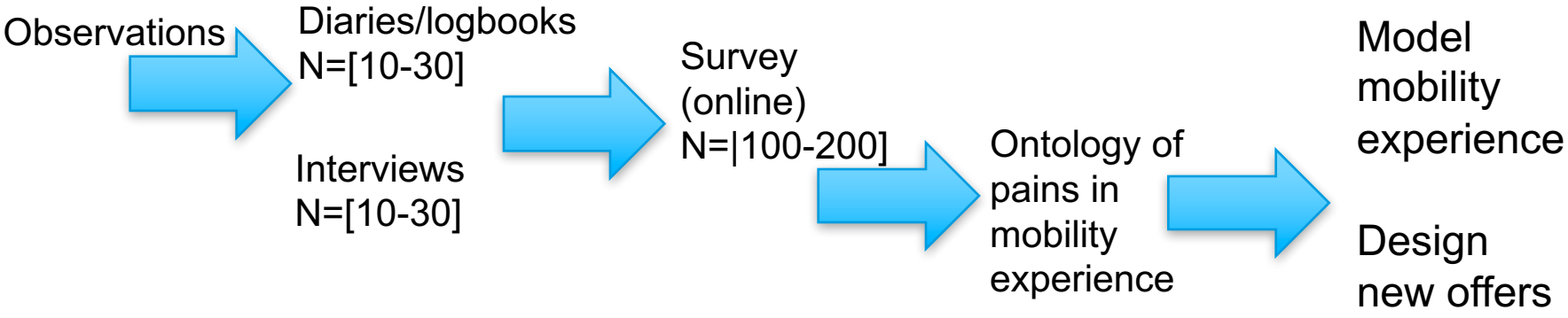
Impact on urban systems

- Adapt existing tools for impact assessment
- Operational design of novel mobility services
- Evaluate the impact of disruptive technologies
- Impact on business models and policy

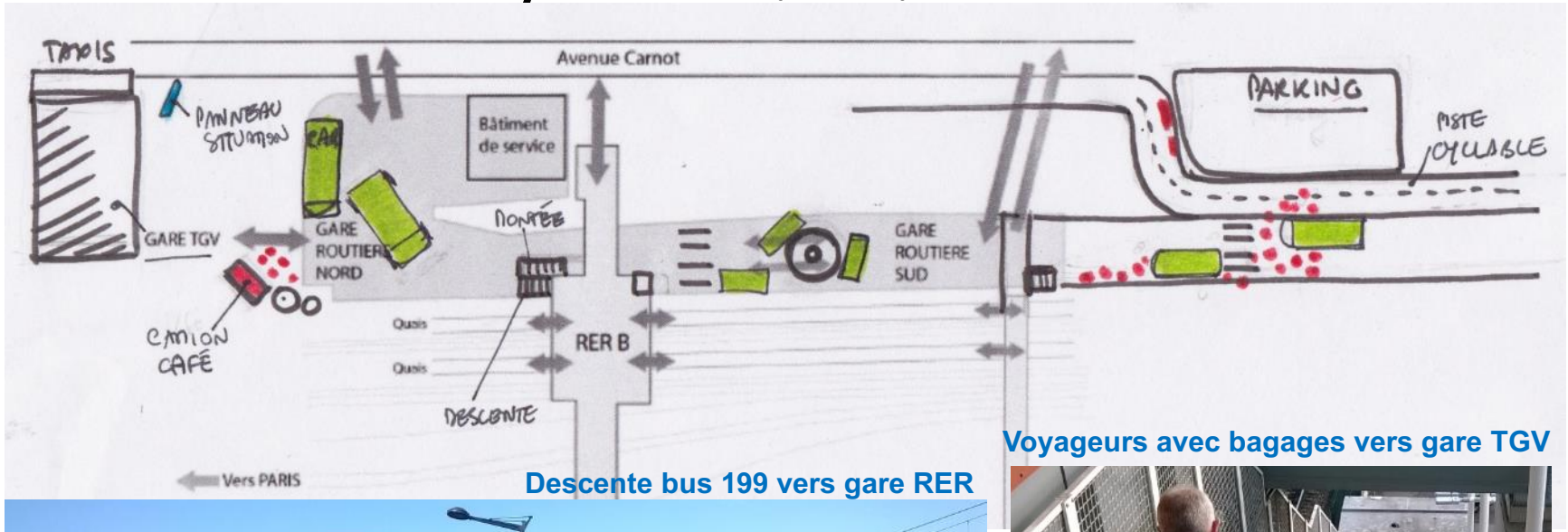
Observation

Empirical Approach

- **Main question:** « What are the pains/satisfactions experienced by travelers in daily urban mobility? »
- **Aim:** integrate qualitative insights on pains ans satisfactions into a model of urban mobility experience; the design of new offers
- **Method:** micro-qualitative (Mariton 2008) and quantitative approach



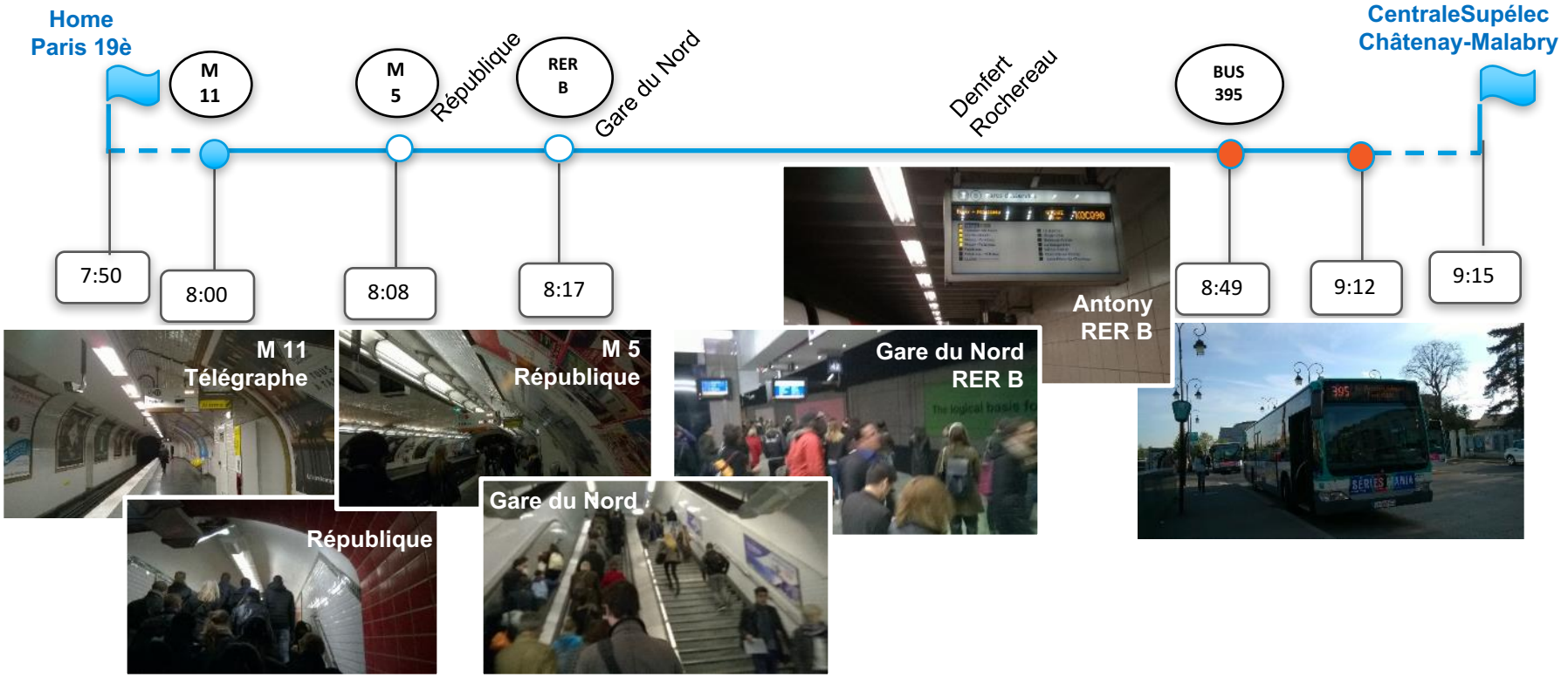
Observation at Massy Palaiseau (3/05/16)



Descente bus 199 vers gare RER

Voyageurs avec bagages vers gare TGV

Trip representations



Impact

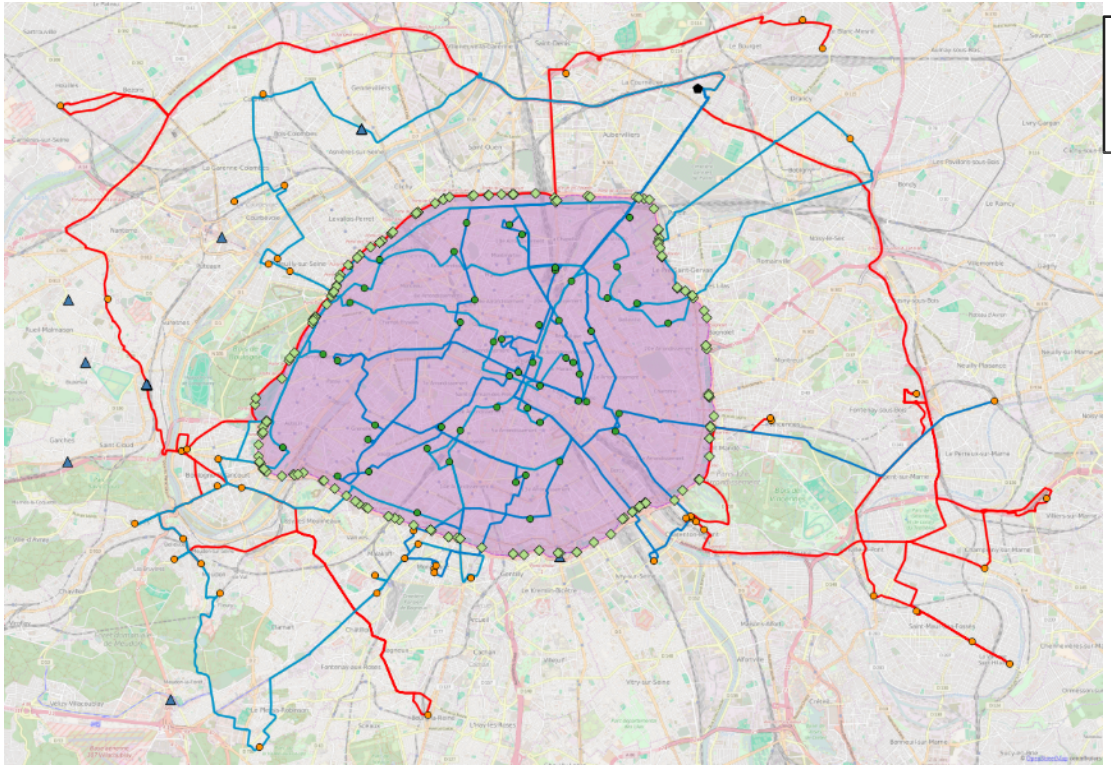
Impacts - City Centers Restrictions

- **Daily fee for entering the controlled area**
  - London, Singapore, Stockholm, ..
- **Old town centers**
  - Durnham, Riga, ..
- **Milan (Area C)**
  - prohibition of old fossil fuelled vehicles
  - others have to pay a fee (€2-5)
  - electric / hybrid vehicles free of charge

G. Hiermann, R. F. Hartl, J. Puchinger and T. Vidal. Hybrid Electric Fleet Routing with City Center Restrictions. Route 2016.

Impacts - City Centers Restrictions

100 customers
- 50 inside
- 50 outside

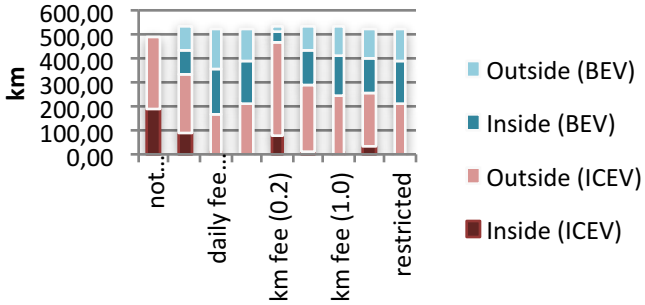


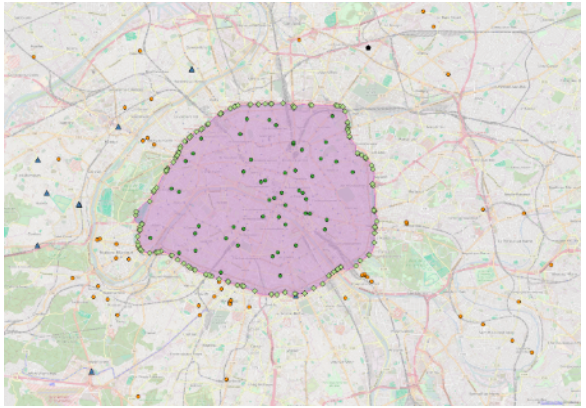
ICEV restricted
- 2 ICEV
- 5 BEV

km inside/outside
ICEV: - /161,53
BEV: 176,80/141,49

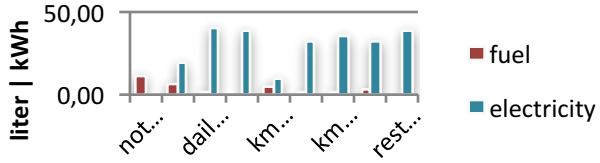
Paris (50/50)

distance travelled

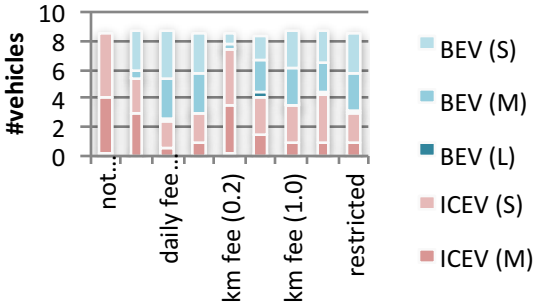




consumption inside the city center



vehicle usage



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Flore Vallet – Researcher

- Expert in Eco-Design and Innovation

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- Users, Usage Scenarios, and Novel Services

Feirouz Ksontini – Research Engineer

- Expert in Transport modelling

Abood Mourad – PhD Student

- Synchronization for shared mobility in an uncertain environment

Jakob Puchinger – Chair Holder

- Expert in Transportation an Operations Research

Thank you!

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