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Exploiting traffic data

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Exploiting traffic data

Jan Ramon

INRIA Meet up

Lille, 14/12/2017

Contents

- Introduction
- The ADEME MUST project
- Future perspectives
- Personal data protection

Lots of data

Car

- GPS localization
- Engine operation
- Driving behavior
- Car sensors (seat belts, windows, lights, ...)

Driver

- Demographics
- Social network
- Agenda

Environment

- Road network
- Meteo

ADEME -MUST objectives

1. What value can we get from (mainly) car data?
2. Can we address
 - Congestion
 - Pollution
 - Road security
 - ... ?

Xee

- Recruit drivers
- Collect data

INRIA

- Analyze data
- Interpret results

MUST project

Domain experts

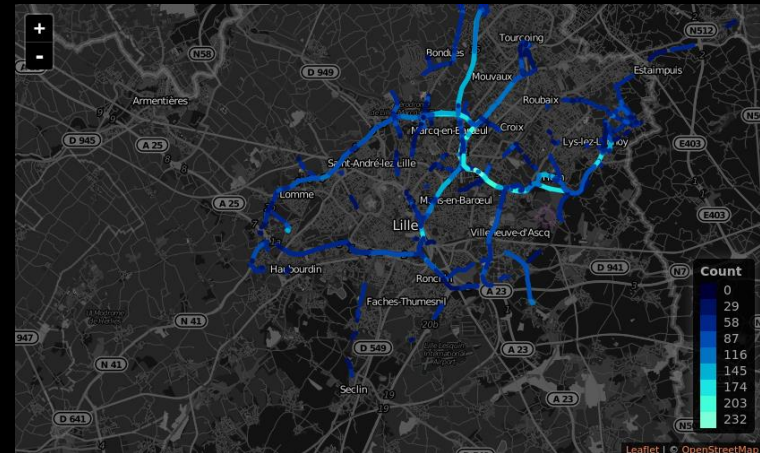
- CEREMA
- i-Trans

Users

- Metropole Lille
- Industry

Progress

- Year 1: preparation
 - algorithm development
 - driver recruitment
- Data stream since October 2017
 - 118 drivers (growing to 500)
 - 116K road segments
 - Only considering Lille area

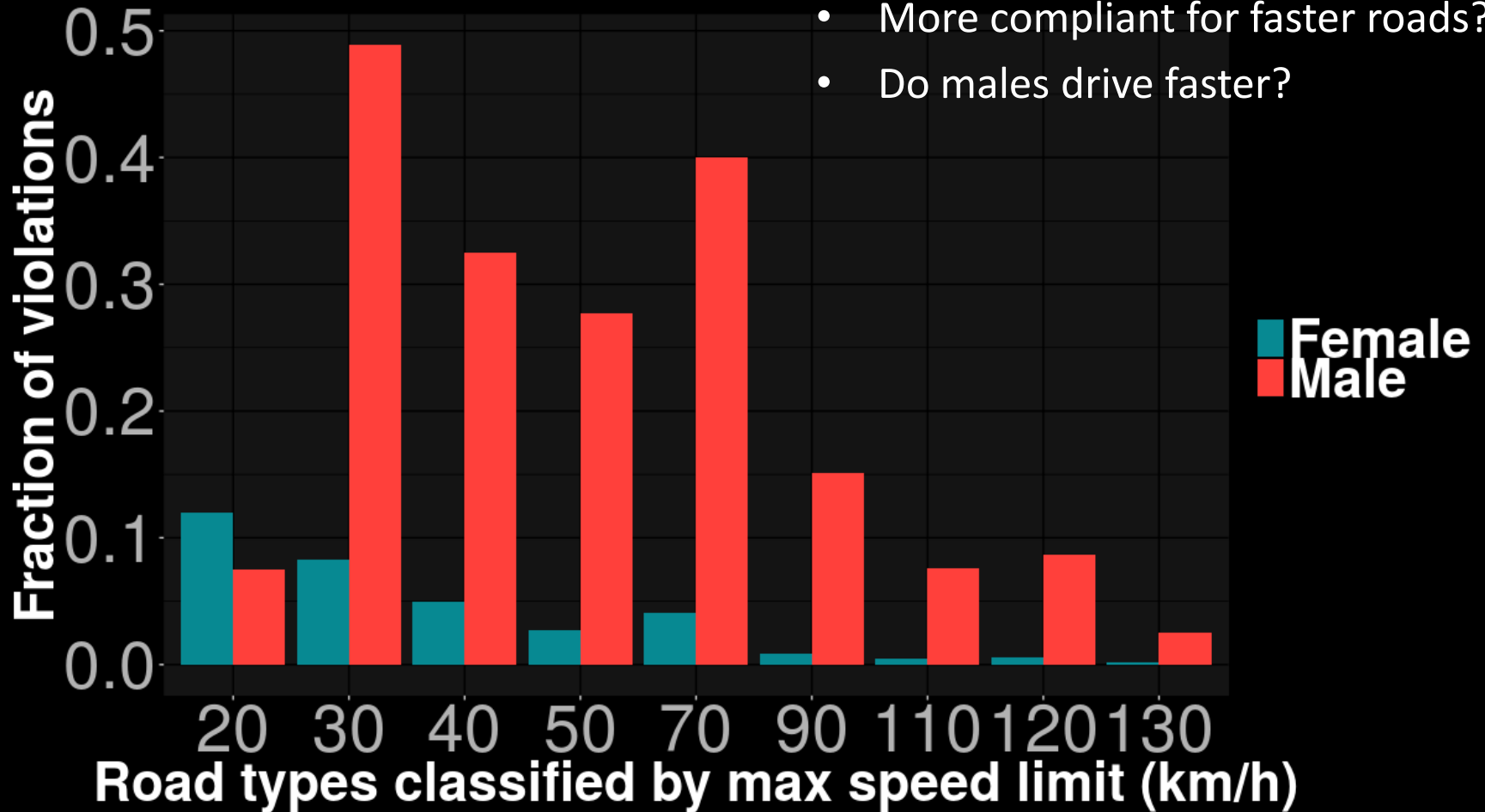


First analysis

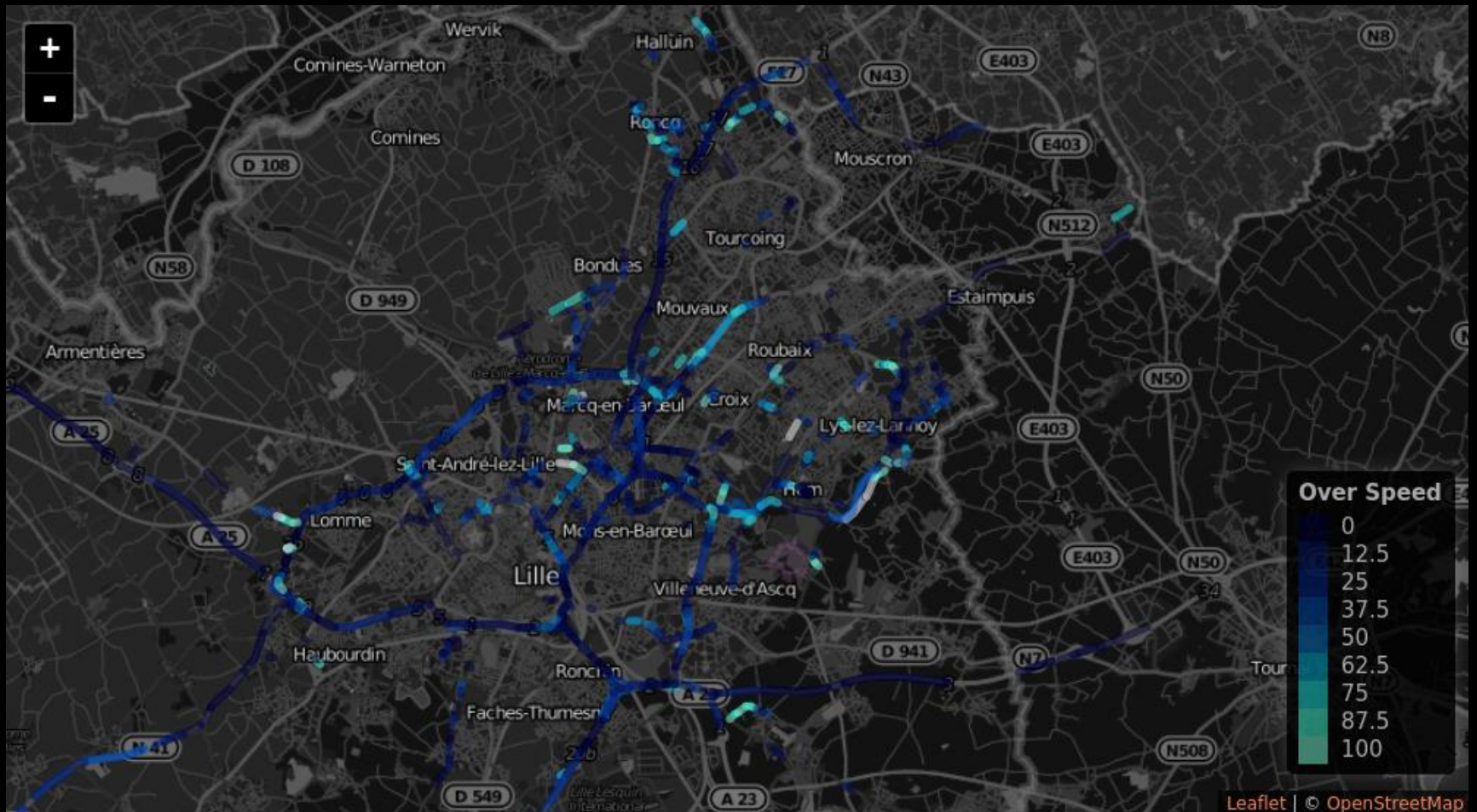
Age	Male	Female
18-25	8	1
25-35	32	4
35-45	26	3
45-55	7	0
55-65	6	2
65+	2	0
Unknown	27	0

Speeding

- Disclaimer: dataset noisy & small!
- More compliant for faster roads?
- Do males drive faster?



Uncleaned speeding on map



Current & next steps

- Driver behavior (acceleration, breaks, ...)
- Choice of trajectory
- Ride sharing
- Factors influencing congestions
- Fuel consumption (in practice)
- Parking (estimate duration, recommend tariffs, time to find free slot, ...)
- Effects of meteo


Future perspectives

- Data volume:
 - New cars will have more sensors (e.g. Camera)
 - Can generate 3Tb/day
- More cars will get “connected”
 - But they still may be far apart

Challenges

- Can't transfer data to a central place
 - 3Tb/day * 33M cars = 100Eb = 10^{20} b/day
- Personal and industrial data
 - GDPR : personal data should be protected
 - Even very innocent-looking data may leak information
 - Safety-critical data should be shared
 - Industries may not want to share some data

A decentralized approach

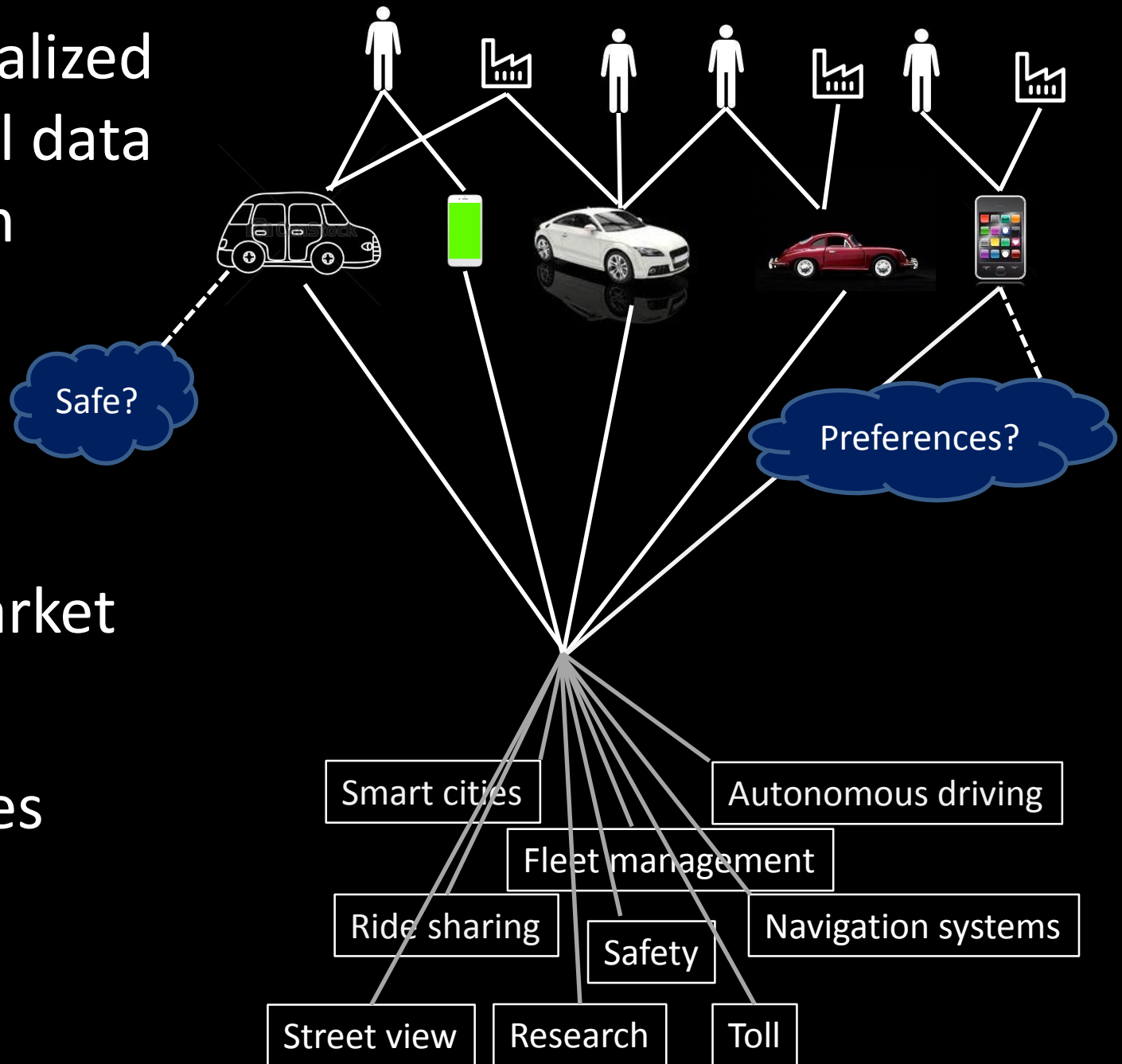
- Don't transfer data if not really needed
- Lower costs
 - Save on central storage
 - Save communication costs (or share only locally)
 - Exploit decentralized computational power
- More potential applications
 - Real-time
 - Perform tasks which are hard in a central HPC model (and even tasks where “move code to car” is not sufficient)
 - E.g. Street view updating
- Lower risks
 - More control on personal/industrial data use by citizen/OEM
 - Data not collected centrally can't leak/reveal information
- ERC  -PoC SOM project

- Decentralized personal data platform

- AI

- Data market

- Use cases



Conclusions

- ADEME-MUST: (wider) exploration of exploitation of mobility data
- Preparing for future challenges
- Lots of possible application, protection of data needed.

Questions?

