

# **EU RESEARCH AND INNOVATION DAY**

**4<sup>th</sup> October 2016**

## **EV, AD and Paradigm Change in Auto Industry**

**Stephen MARVIN**

**Renault Group**

# 01

## EV MARKET IS GROWING FASTER

# Why EV? **ECO solution**

**Environment regulation**



**Oil price**

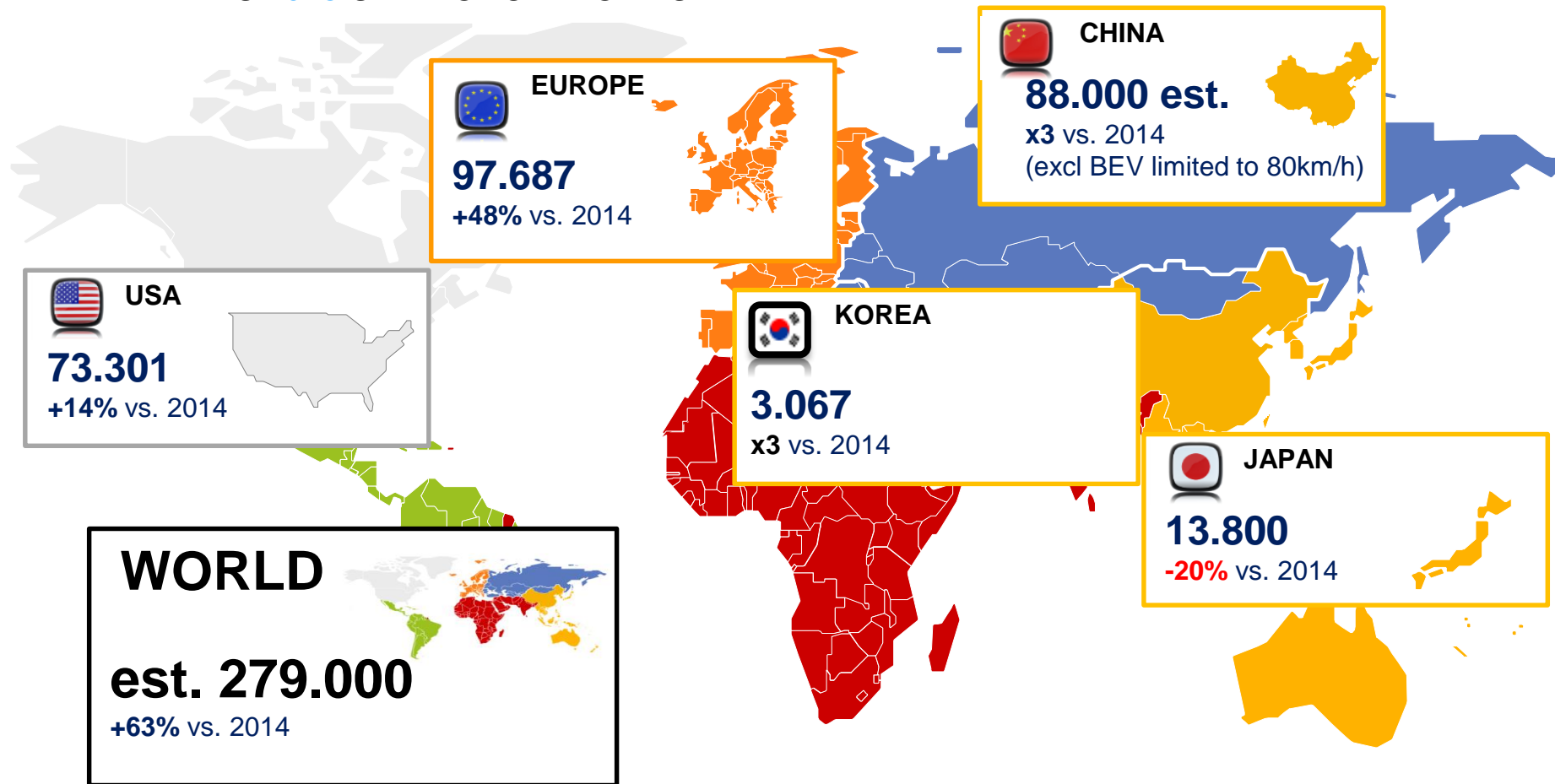


**Find out  
Innovative  
solution with EV  
(Zero Emission)**



# Global EV market is still growing 10 times faster than car market

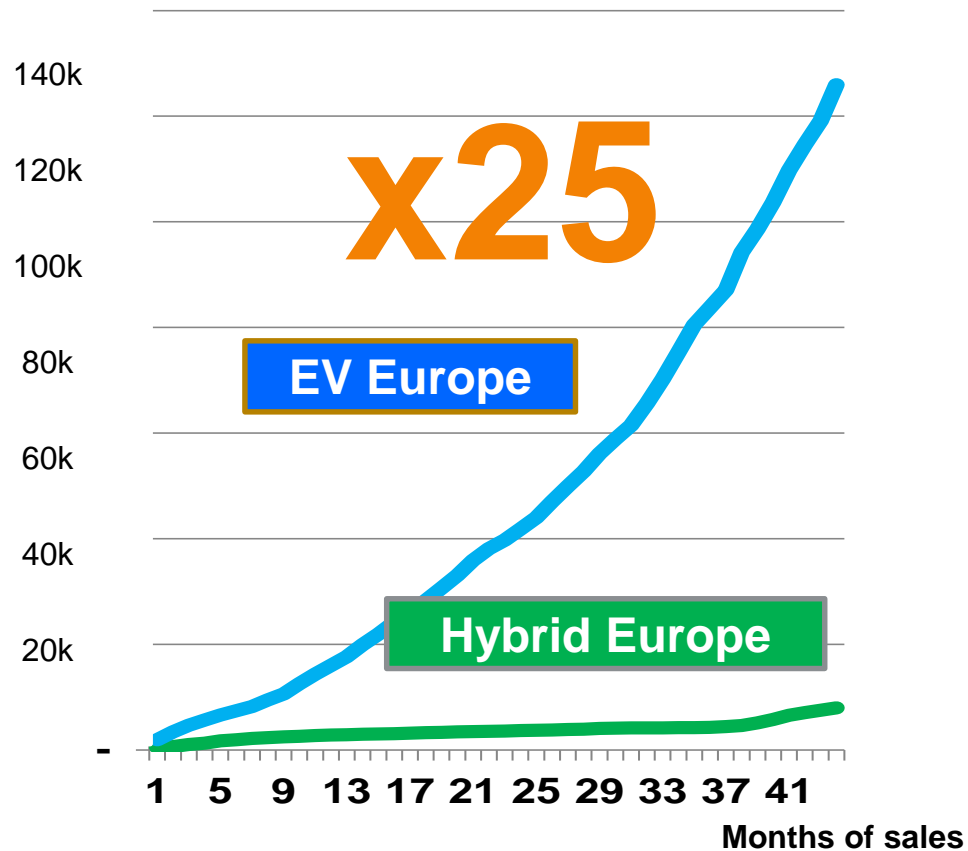
## BEV MARKETS 2015 STILL GROWING FAST



500k EVs on the roads = 6 billion e-km = 600 million kg CO<sup>2</sup> saved

# Europe: EV's initial growth has strongly outpaced Hybrids

First months of sales, cumulative, total EV



**X4**  
In USA

# RENAULT AND NISSAN LEAD THE WAY



**RENAULT LEADER in EUROPE**



**NISSAN LEADER in USA AND JAPAN**



**EV WORLD LEADER WITH 50 % MARKET-SHARE**

*Already 250 000 EVs on the roads*

*More than 3 billion e-km*

# Renault's EV range Today

**Disruptive  
TWIZY**

**Stylish and urban  
ZOE**

**Spacious  
SM3/FLUENCE**

**Practical  
KANGOO**



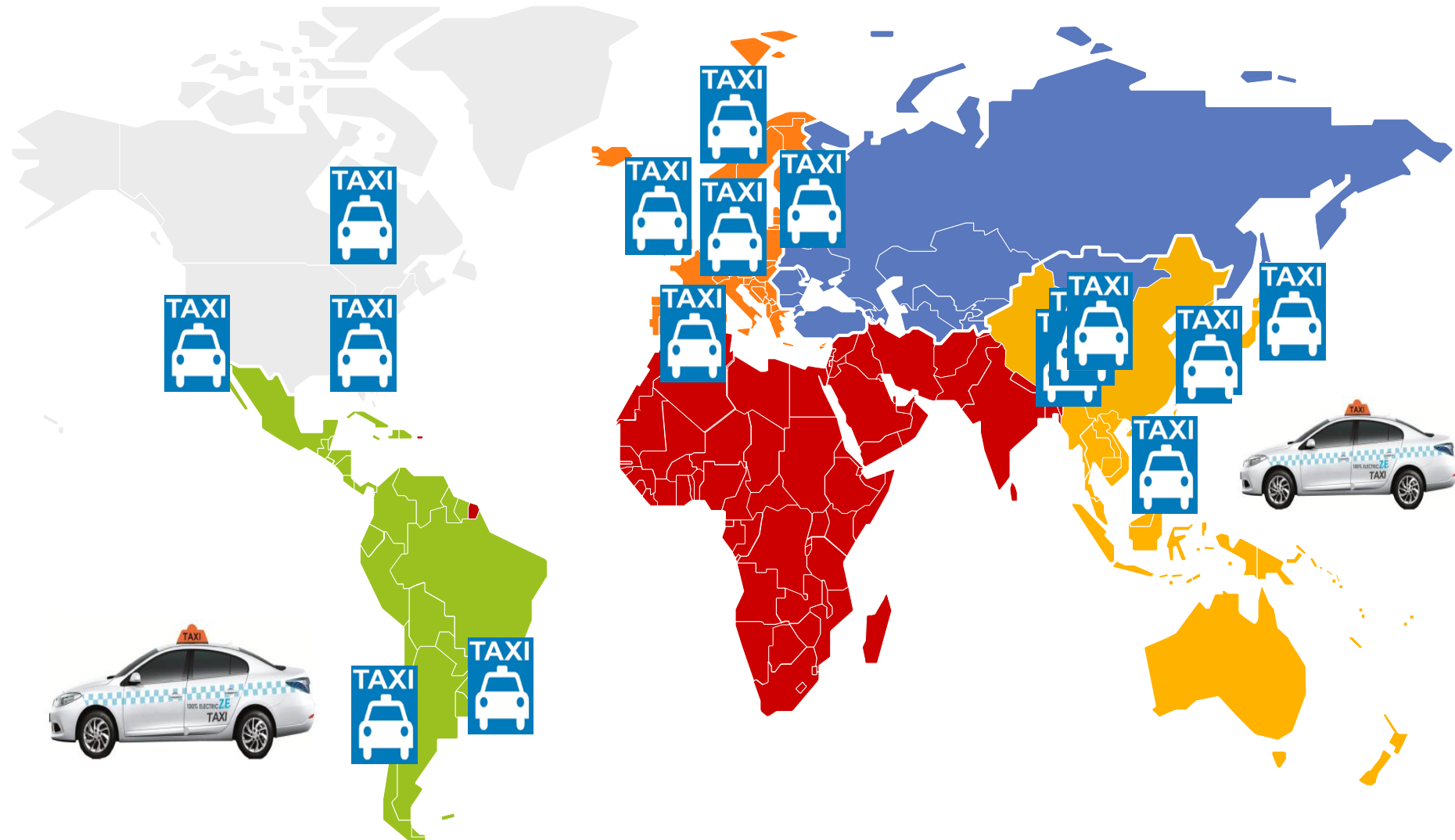
# 02

## PARADIGM CHANGE IN EV

### EV TAXI



# EV TAXI EXPERIMENTATIONS START ALLOVER THE WORLD



# Overseas EV TAXI deployment plan



By 2017,  
EV TAXI 170K.units

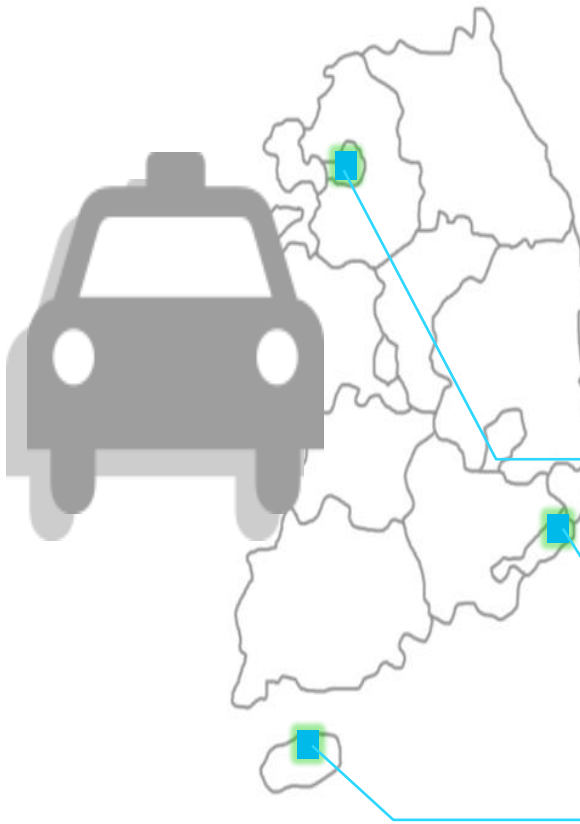


After 2018, EV TAXI  
will be allowed



By 2020,  
1/3 Yellow cab for EV TAXI

# EV TAXI Expansion in Korea.



Target market : Seoul , Busan, JEJU

1<sup>st</sup> Target customer: Autonomy 150~200km(1shift)  
2<sup>nd</sup> stage : over 300km(2shift)

Exclusive EV taxi Infra installation

	Private taxi	Corp.taxi (units)	
Seoul	49,453	21,465	= 70,913
Busan	13,966	11,083	= 25,049
Jeju	3,922	1,511	= 5,433



SM3 ZE TAXI Operation(Seoul)

10units('14) → 40units('15)



# Why EV Taxi ?

## 1. Provide Maximum EV experience with limited EV subsidy

Assume EV 500 units.

Private user



500 people

4,800 times

EV TAXI



2.4M People

Population

Seoul	10M
Busan	3.5M
Jeju	0.6M

	Private	EV TAXI user
Daily EV TAXI user	500 people	$500 \times 20 \text{ people/day} = 10,000/\text{Day}$
Yearly EV TAXI user	500 people	$10,000/\text{day} \times 240 \text{ days} = 2.4\text{M}.\text{people}$

## 2. Air quality improvement with CO2 reduction

Assume EV 500 units  
: Yearly CO2 reduction

Private EV  
900 tons



135,000 Trees

4 Times

EVTAXI  
3,360 tons



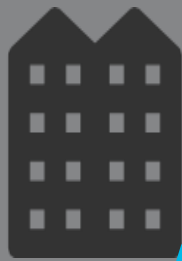
504,000 Trees

	Private	EV TAXI
Yearly mileage	15,000km	48,000km (200km/day)
Yearly CO2 reduction	1.8tons x 500 = 900tons (1,600cc CO2 120g/Km )	6.72ton X 500 = 3,360tons (LPG Taxi CO2 =140g/Km)
Fine tree (30years old)	135,000 Trees (150 trees/ton)	504,000 Trees (150 trees/ton)



## 3. Easy to install EV TAXI Infra

Private



Apt. residence  
= 80%

Difficult to install charger

Bottle neck for  
EV Spread

EV Taxi



Taxi Co.  
Parking lot

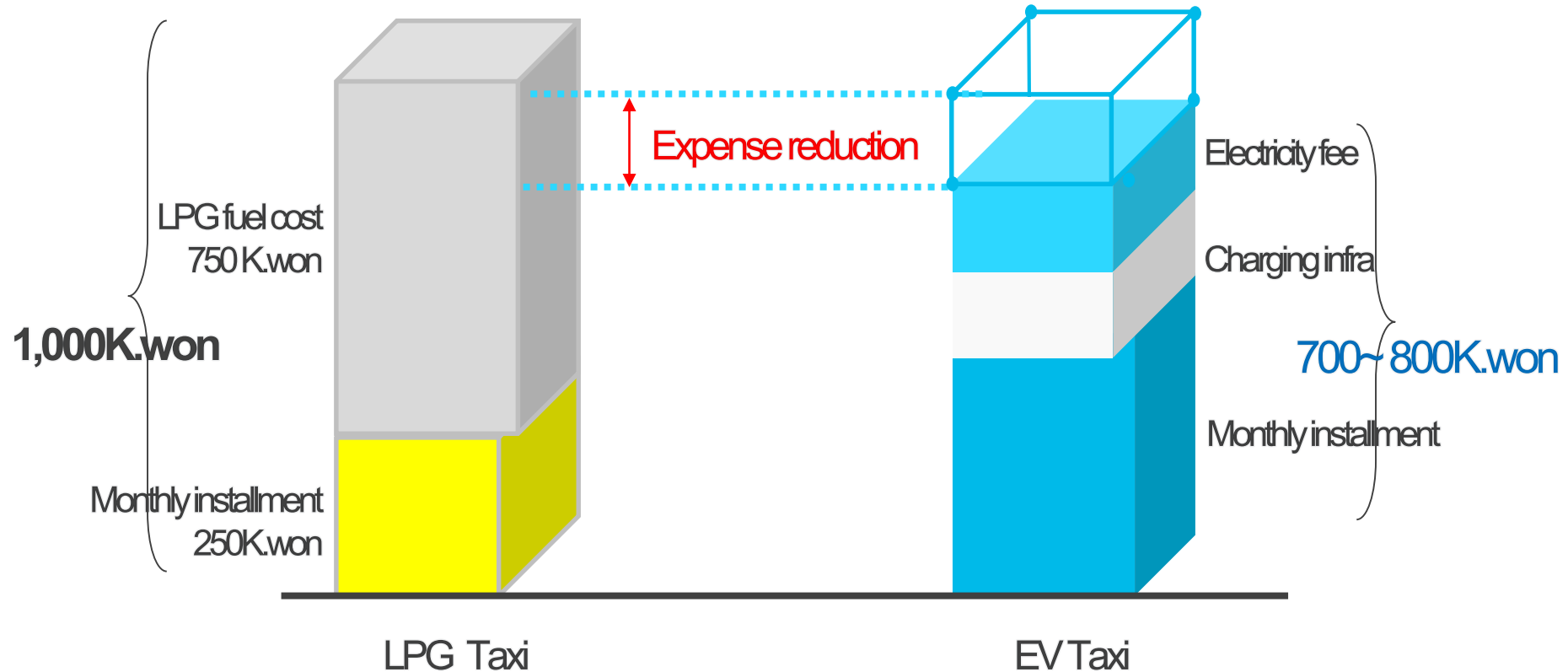
Easy to Install charger

Easy to secure  
parking lot



## Set EV TAXI monthly fee → 70~ 80% of LPG Taxi

※ EV subsidy allows TAXI BIZ to be stabilized in initial stage.



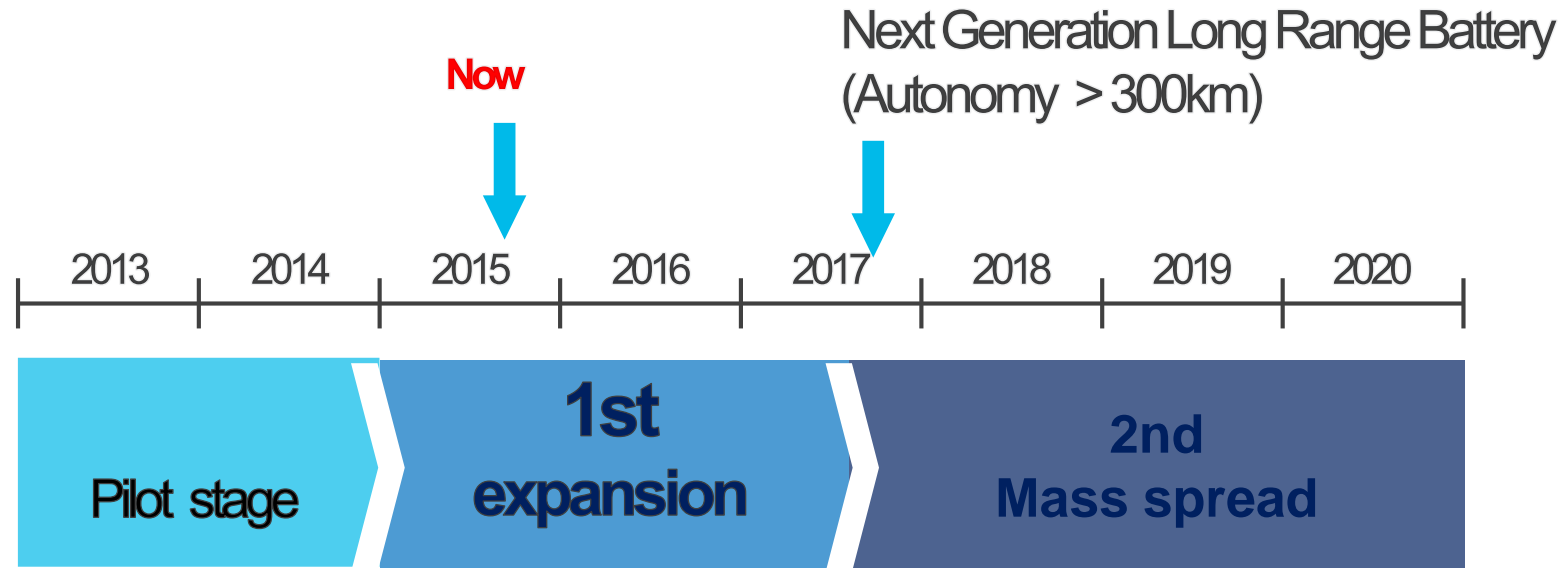


# Next generation Long range battery

« Range Anxiety » will soon be history...



# EV Taxi Road map



## TAXI

Classification	Daily autonomy 150~200km	Daily autonomy Over 200km
Corp. Taxi (86K.units)	1shift Taxi Seoul 30%, Local :70%	2shift taxi : 300 ~ 400km
Private Taxi (164K.units)	150~200km	←

# 03

## **PARADIGM CHANGE IN EV**

## **MICRO-MOBILITY (TWIZY)**



**TWIZY**  
**2** seats,  
all **electric**,  
& bags of **fun** !



... with or without **scissor-doors**



**RENAULT**  
Passion for life

  
**NAULT NISSAN**



# TWIZY Cargo

**1** seat, **1** cargo box,  
all **electric**,  
for **professionals...**



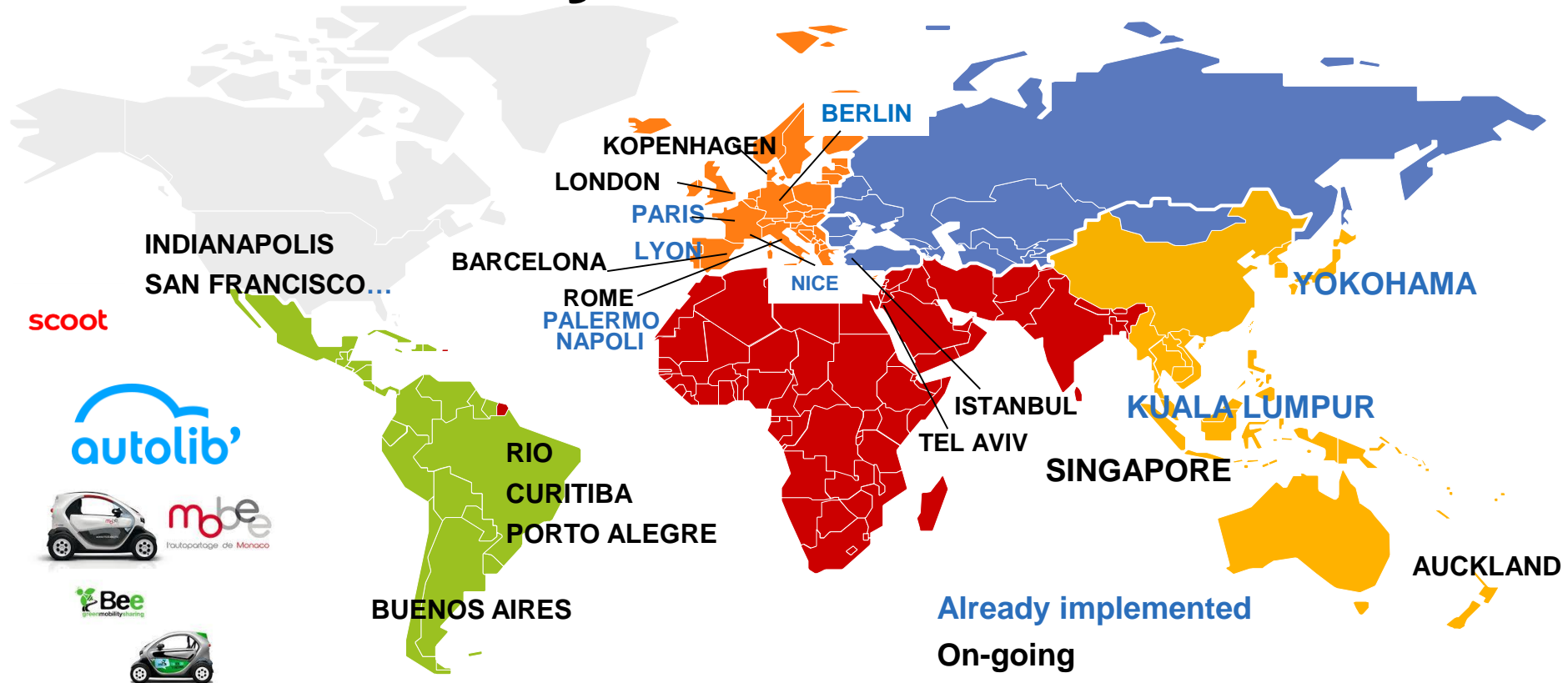
... with or without **scissor-doors**



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# 15,000 Twizy in 40 countries



Quadricycle seen as adapted solution to **LAST MILE** transportation by cities





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## Where is Twizy ?

- Touristic guided tour
- Preserved areas, islands
- Car-rental services
- Car-sharing services
- Car-sharing services (hotels)
- Marketing tool
- Resorts
- Companies, institutions
- Deliveries, logistics
- Emergency services

Click on the colored buttons



Twizy offers car basics

TWIZY

VS.

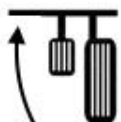
Motorcycles



Airbag and seatbelt for safety

Driving position like a car

4 wheels for best stability



Acceleration and braking with pedals  
coupled braking as a car = automatic  
repartition between front and rear brakes

No clutch pedal as there are no gear changes



Steering wheel : turn it to change direction



2 or 3 wheels  
low adherence conditions



Acceleration with right-hand lever  
Braking : 2 levers, roll-lock system  
6 months adaptation when first use.

Pendular : use angle to change direction  
and turn handlebars only at very low speed



200kg to lift-up.



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## The **safest** quadricycle of the market



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## Twizy safety, passive safety



### Reinforced structure :

- **Side crash box** and **Crossbar** under battery
- **Front bumper beam**



### Equipment :

- Front driver **airbag**
- New driver **seat belt** : 4 points seat belt  
3 points rear seat belt
- Rear seat **compatible with baby seat**



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Twizy: a 100% electric vehicle

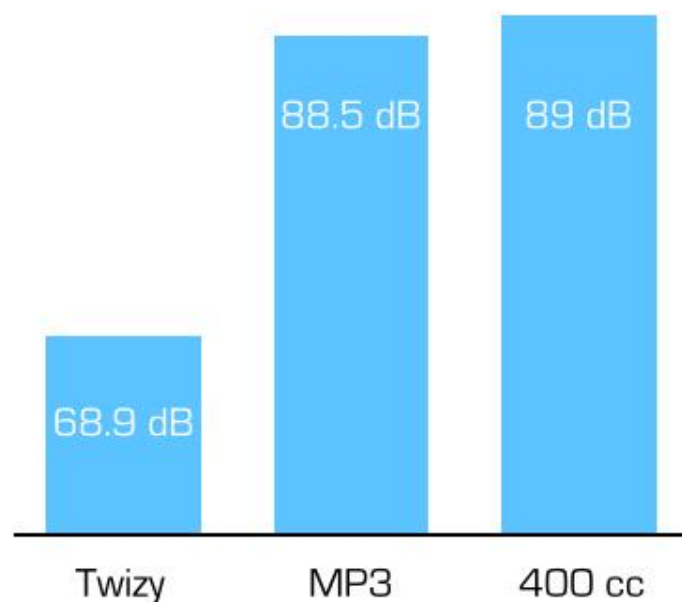


**Low** noise level

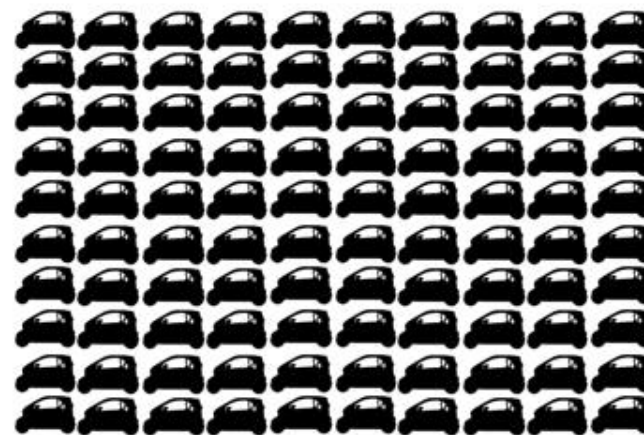


**Zero** emission

For a **better**  
urban area



=



1 Scooter = 100 Twizy

Less **noise**, less **stress**



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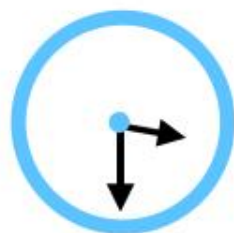
**NAULT NISSAN**



Charging the batteries, couldn't be simpler



- 1) Open the front flap
- 2) Pull out the 3m cable
- 3) Plug into any domestic socket  
(in Europe : 220V/16A)



**3.5 H**  
for a full charge



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## Twizy and its range



**100 km** [normalized urban cycle - ECE-15]

Real use: **50-80 km**

Range depending on :



Driving style



Speed



Topography



Temperature of use



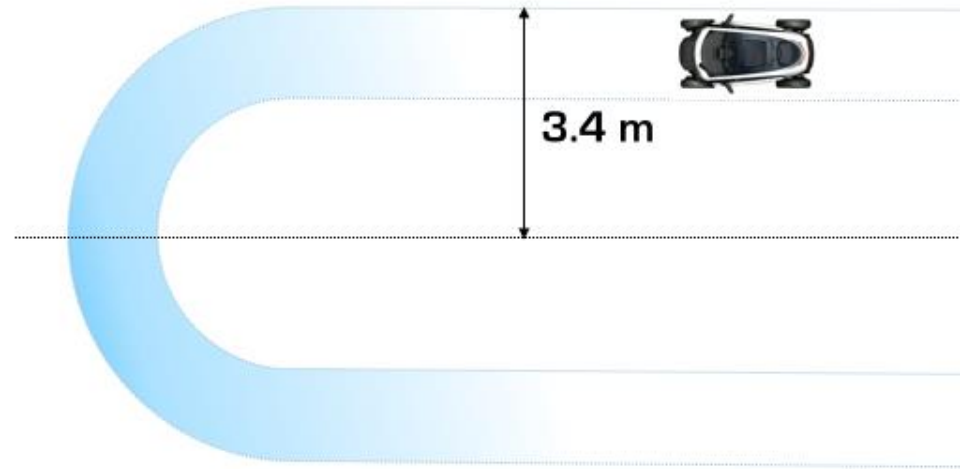
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Passion for life

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3 TWIZY = ONE PARKING SPACE

The must have for **easy parking** ...  
... thanks to its turning cycle,



... and its scissor-doors

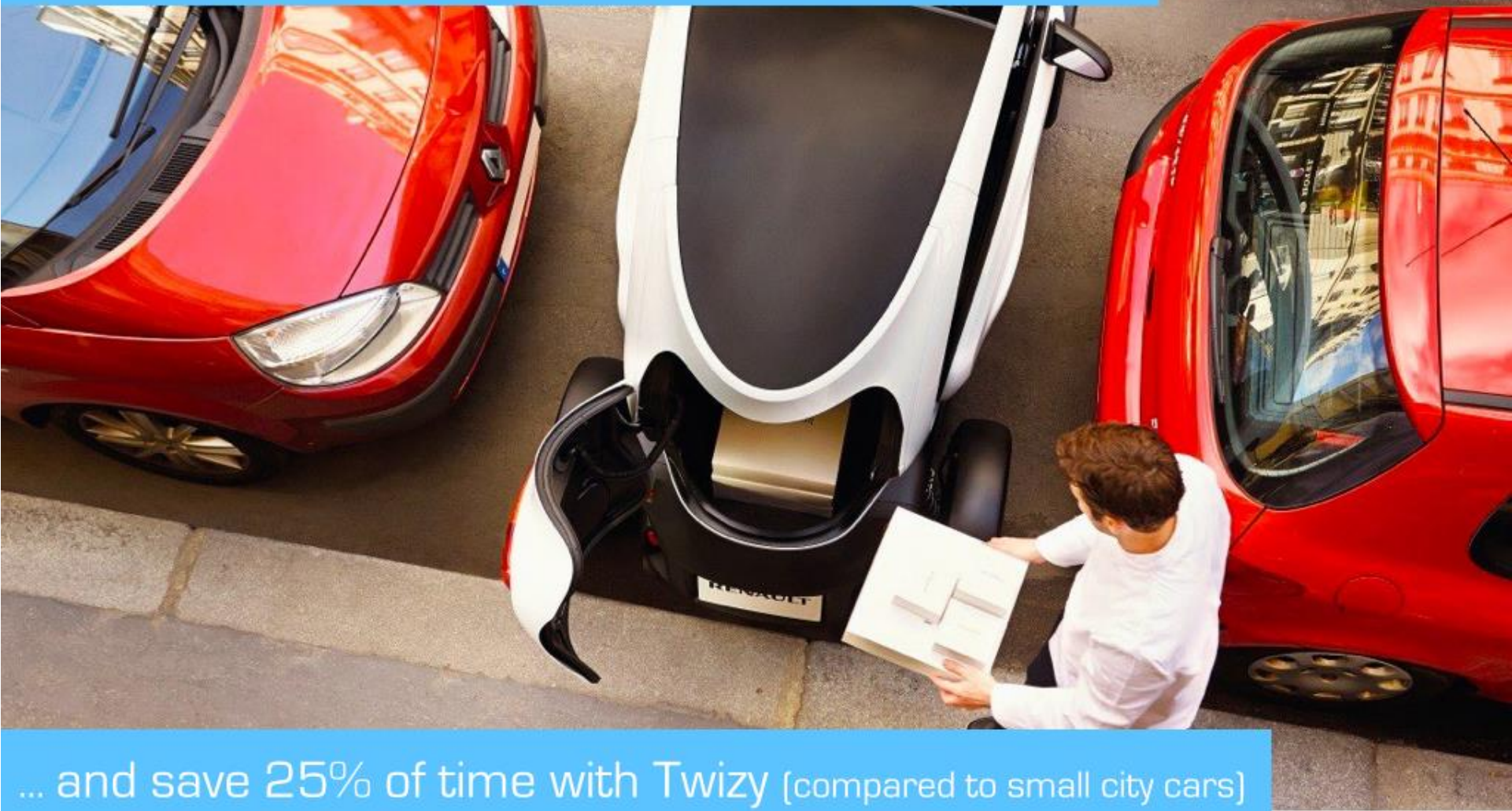


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Twizy can be parked **perpendicular** to the sidewalk ...



... and save 25% of time with Twizy [compared to small city cars]



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**180 L**  
**75 kg**

## **TWIZY** Cargo

**A unique electric  
micro-LCV  
for urban areas**

A lockable 90° door



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# Car rental service



**Wattmobile (France)**  
available in French **train stations**

Fleet of **40** Twizy in 2015  
**11** stations in **9** cities

Fleet of Twizy in  
many French cities



**FranceCars (France)**



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# Car-sharing service



## Choi mobi, Yokohama (Japan)

**11,000** subscribers in 2014

Average distance travelled for a ride : **3** kms

Average time for a ride : **16** min



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# Public, emergency services



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# TWIZY INTRODUCTION INTO KOREA



Korean Government  
announced Micro-mobility  
introduction into Korea as  
national deregulation  
agenda in May 2016

*RECOGNITION OF EU CERTIFICATE FOR KOREAN MARKET*

# TWIZY REGULATION DIRECTION IN KOREA



L category (L1~L7)

TZY45: L6  
TZY80: L7



M category(PC)



Motorcycle

Light/ Small / Middle/ Large



Passenger car (PC)

**Micro  
mobility**

NEV

Normal passenger



Safety Regulations to be prepared until Dec/2016  
by Korean Government



**TWIZY ON THE ROAD IN KOREA  
COMING SOON...**





Autonomous driving : a revolution for  
the eco-system of mobility.



# Agenda

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- Autonomous Driving stakes
- Renault vision
- French Industrial Plan for AD





# AUTONOMOUS DRIVING MORE AND MORE ON STAGE

JUNE 201

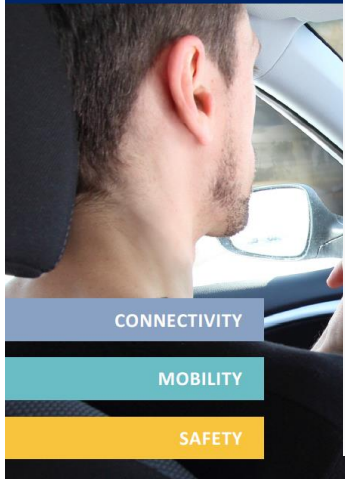
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FEDERATION INTERNATIONALE  
REGION I - EUROPE

POLICY POS



CONNECTIVITY

MOBILITY

SAFETY

2015 TOKYO MOTOR SHOW

## Nissan IDS Concept an autonomous-driving Transformer

Concept showcases Nissan's bold EV, self-driving ambition



Nissan CEO Carlos Ghosn presents the IDS concept at the Tokyo Motor Show.

© Nissan North America, Inc.

Zetsche used this year's Consumer Electronics Show in Las Vegas to debut the

Automotive News World Congress in Detroit in January, Marchionne was asked

Google



semi-autonomous driving  
in the S class is part of  
driver assistance package  
2,678 euros in Germany.

wheel

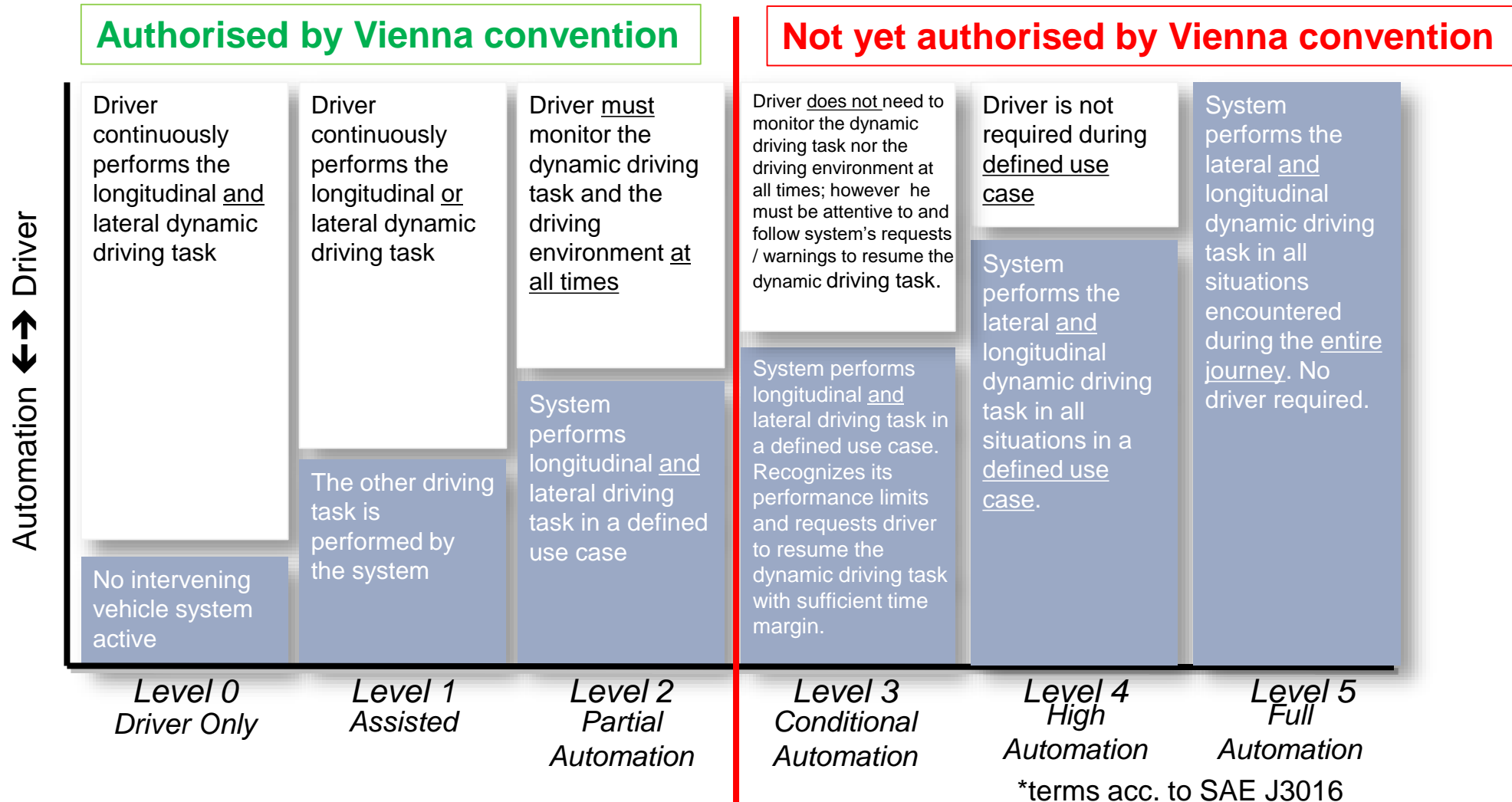
more cautious

# FOUR HIGH STAKES FOR MOBILITY

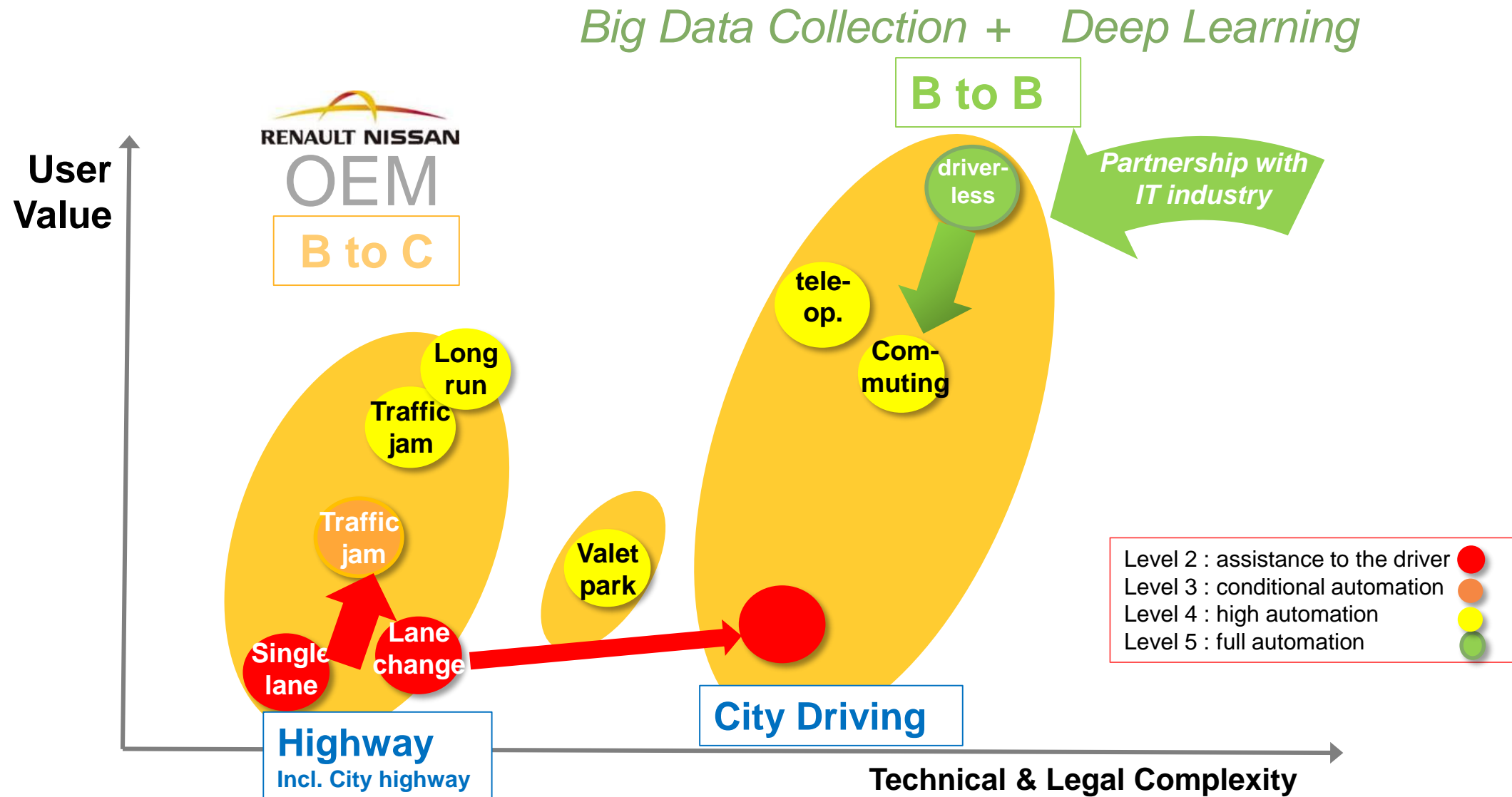
- ❖ 90% accidents due to human errors
- ❖ 78 minutes each day in car, in Ile de France
- ❖ 45% of French population with access to public transport
- ❖ 30% to 60% delivery time for driving in urban city



# TRUE AUTOMATION STARTS FROM LEVEL 3 (SAE)



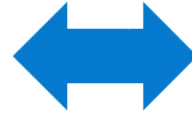
# TWO MAJOR FIELDS FOR AUTOMOTIVE CAR MAKERS





# RENAULT VISION FOR AUTONOMOUS DRIVING

## AUTONOMOUS DRIVE



## MANUAL DRIVE

**SAFETY  
BENEFIT**



**STRESS-FREE  
BENEFIT**



**FREE TIME  
BENEFIT**



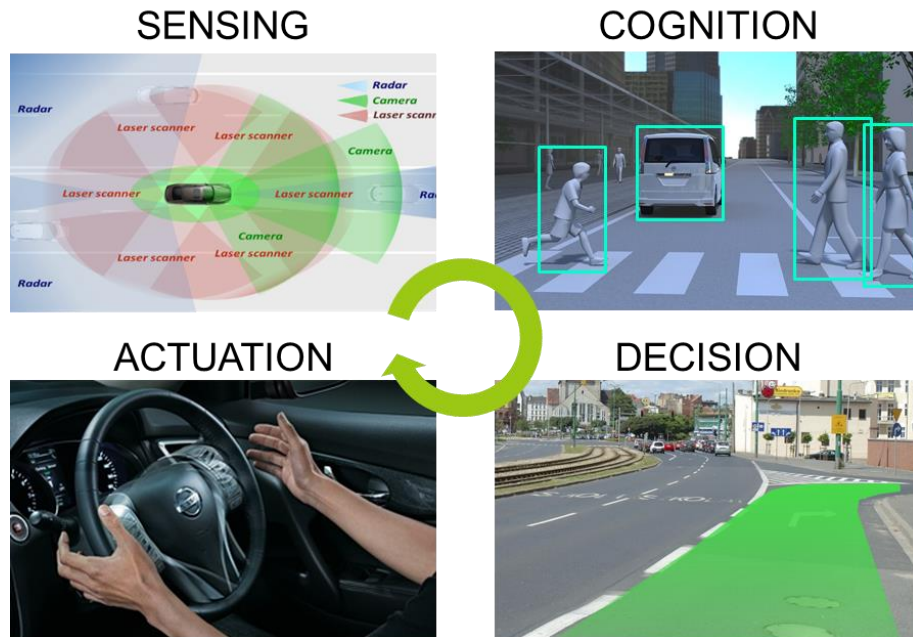
**DRIVING PLEASURE**





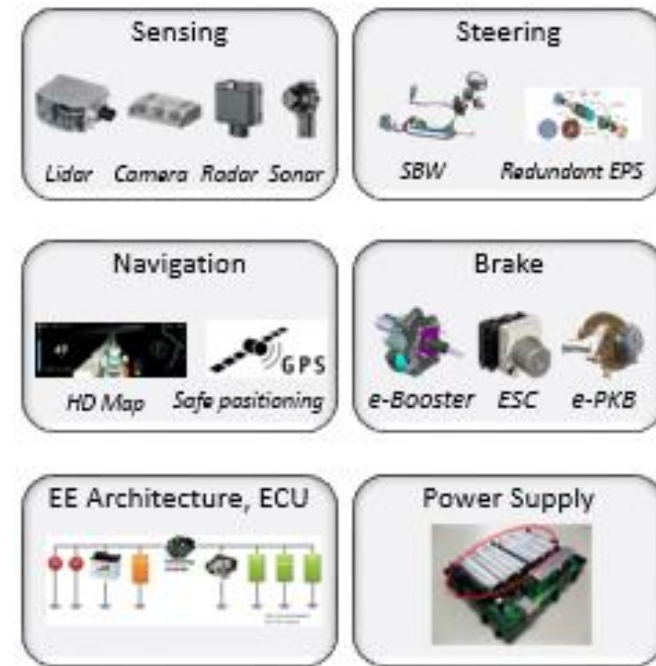
# THE NECESSARY TECHNOLOGY FOR AD

## Core technologies







## Platform enhancement

### Redundancy



# DISRUPTION FOR CUSTOMERS AND FOR OEM

	EYES ON Level < 3 	EYES OFF Level ≥ 4 
DRIVING LIABILITY	<b>CUSTOMER</b> ↓ 	<b>OEM</b> ↓  <b>1/1,000,000,000 HOURS RELIABILITY PROOF</b>
VEHICLE LIABILITY	<b>OEM</b> ↓ <b>HOMOLOGATION</b>	

# RENAULT IS ON TRACK FOR ITS VISION OF AD



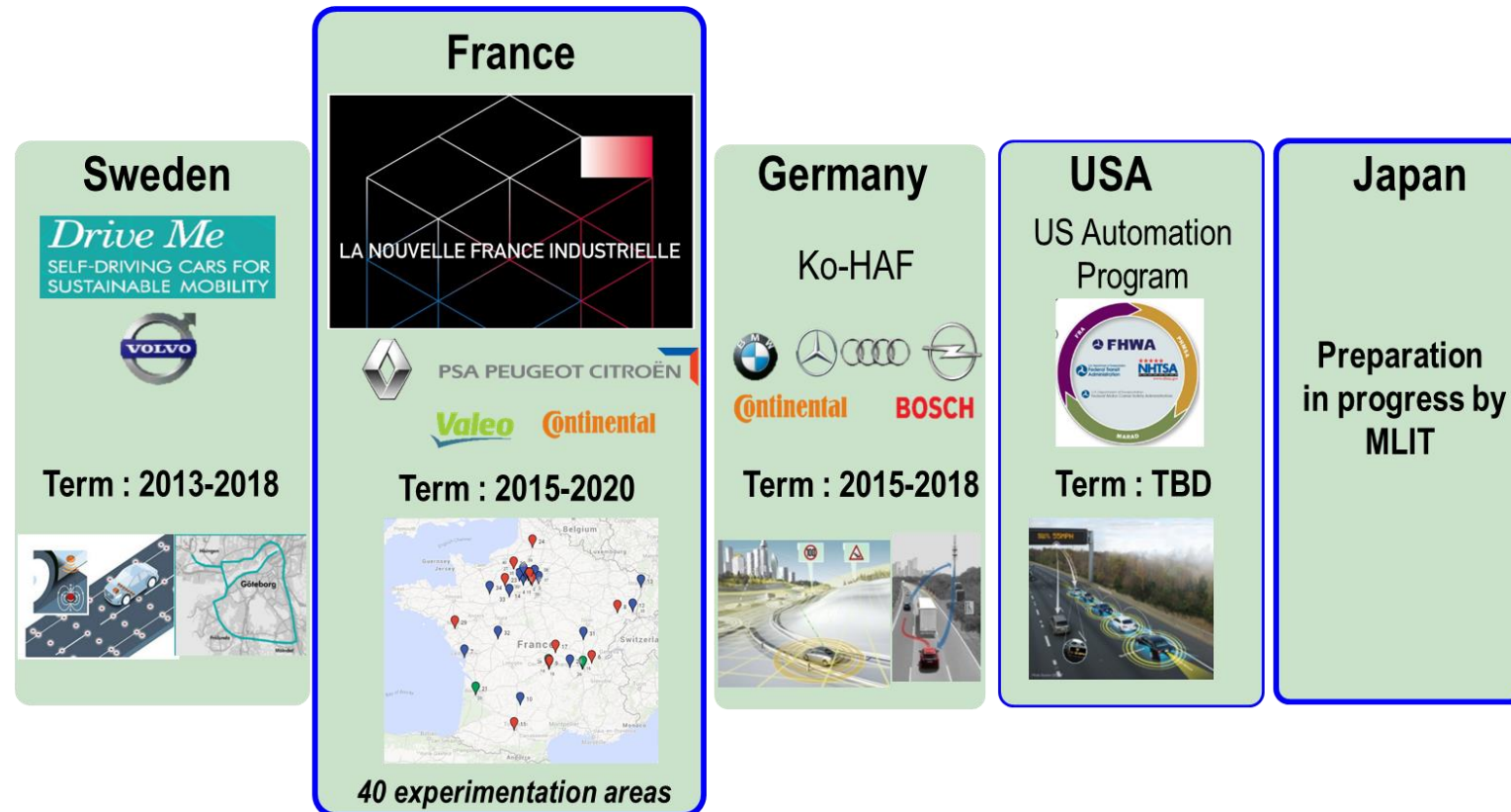
# SUCCESS CONDITIONS : SOCIAL ACCEPTANCE

## Social acceptance

- Regulations
- Product Liability
- Infrastructure
- Insurance
- Consumer awareness
- Driver Education

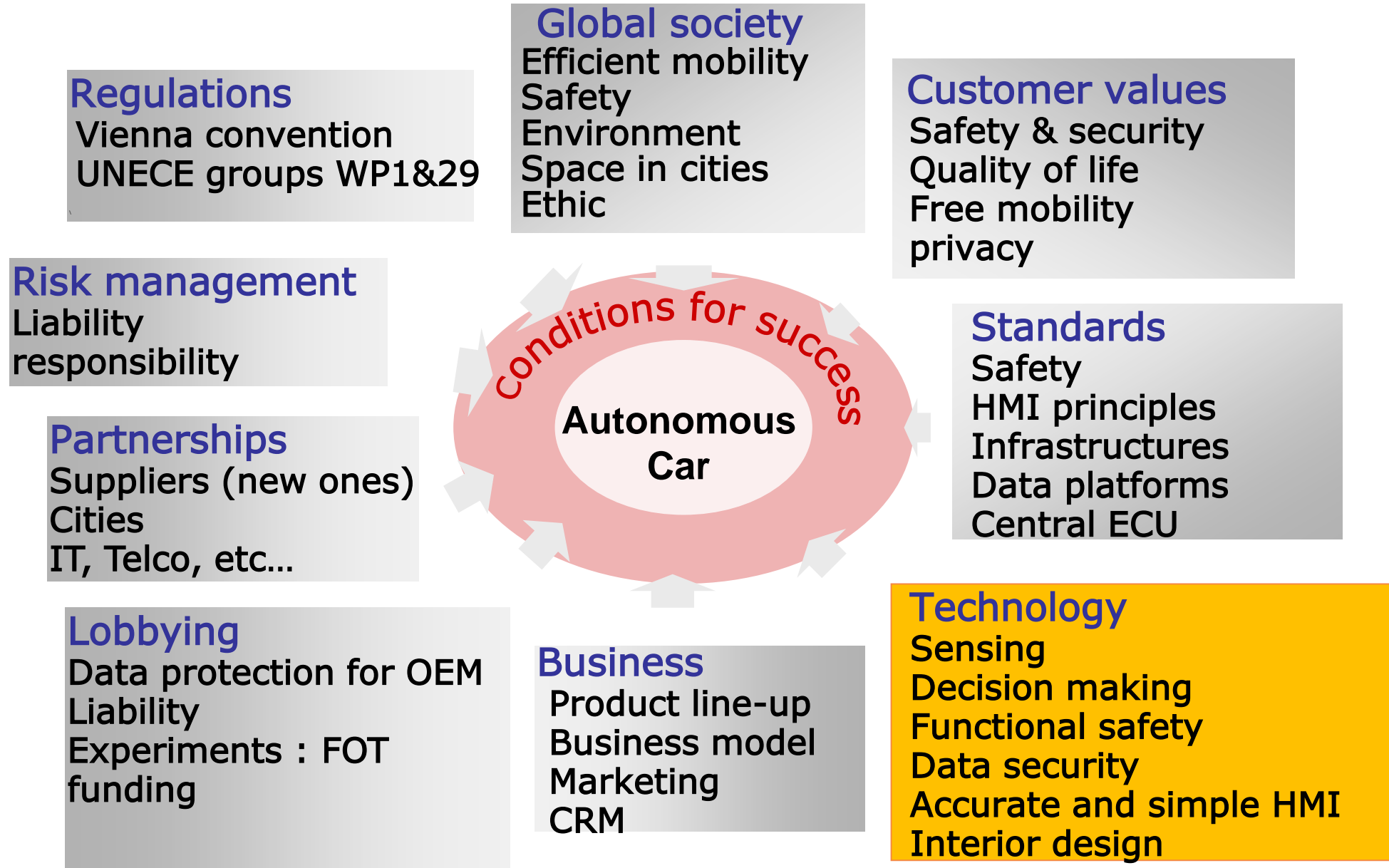
## Experimentation

- Proof by FOT on certified roads



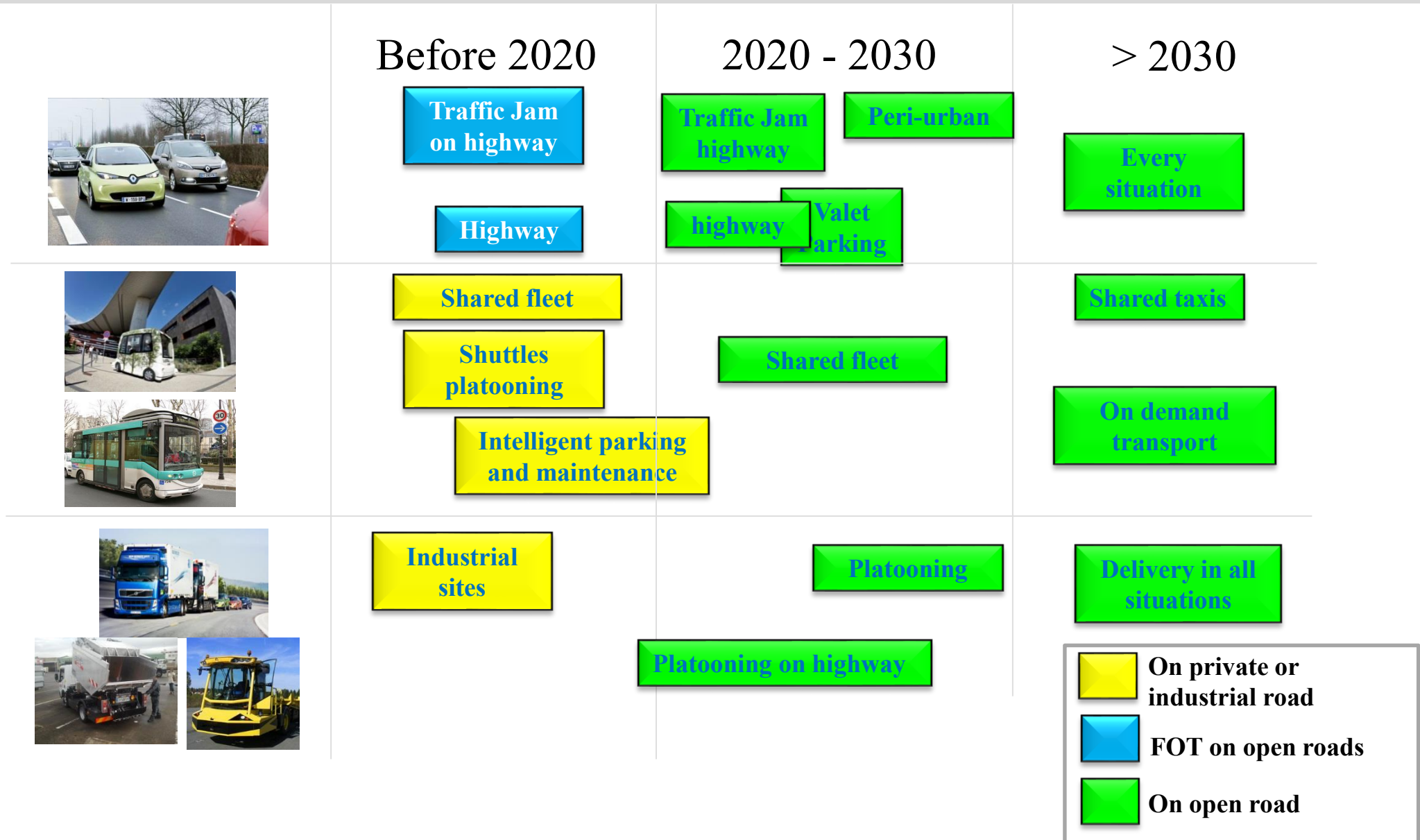


# AUTONOMOUS CARS : BEYOND A TECHNOLOGICAL CHALLENGE

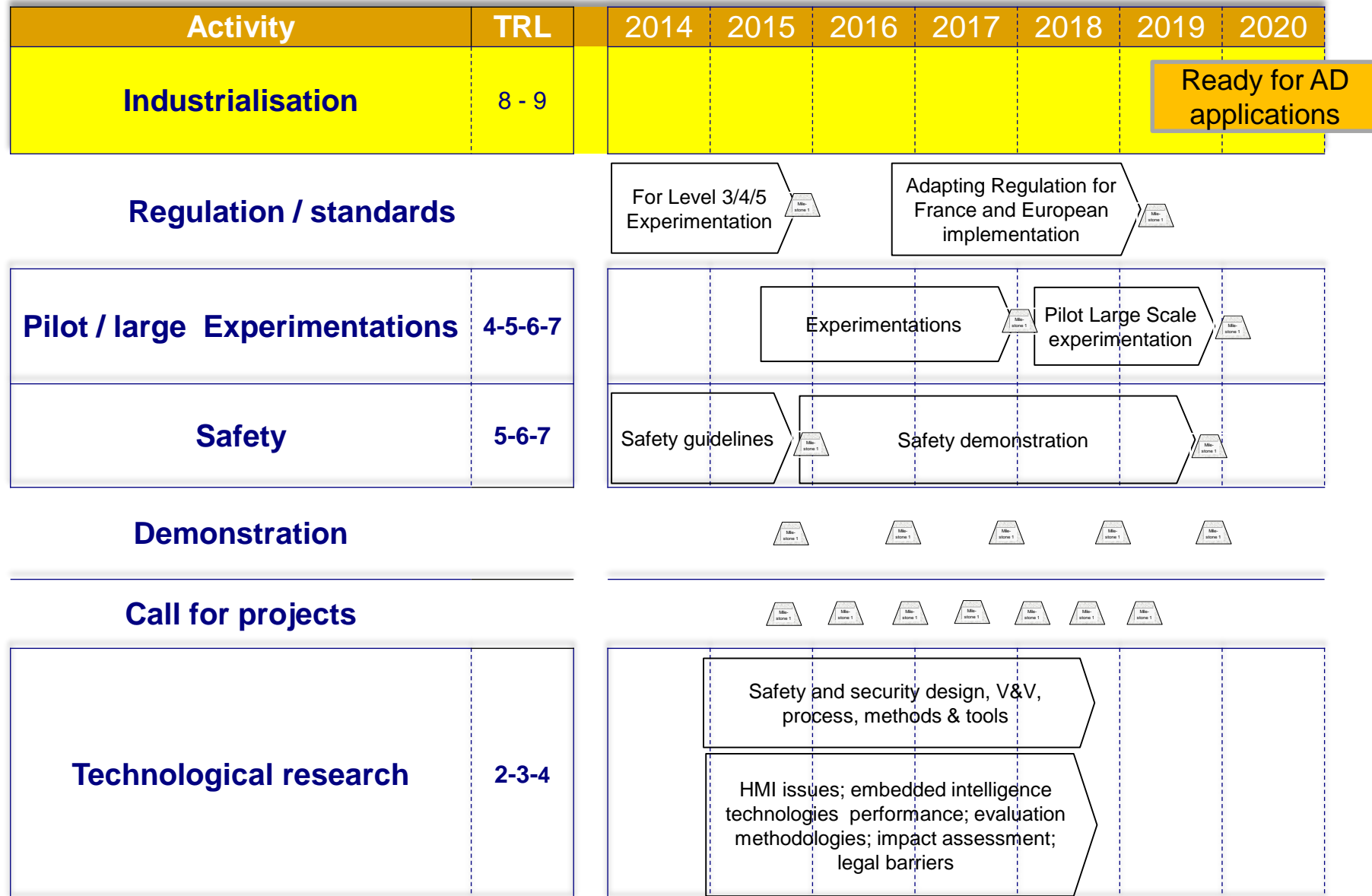




# CLEAR ROADMAPS FOR THE THREE USE CASES

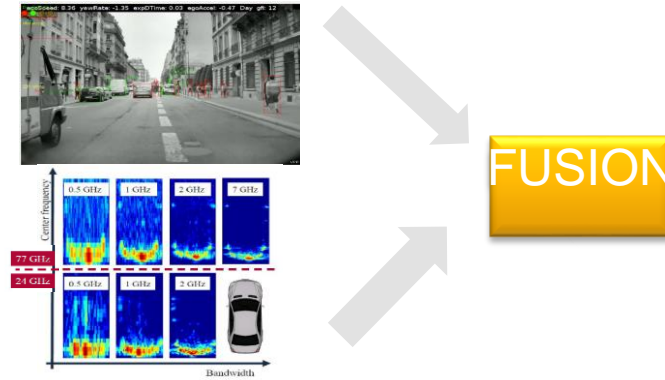


# A STRUCTURED PLAN TO PREPARE OUR INDUSTRY



# THE MAIN NEXT STEPS : TECHNOLOGY (1)

**Robust Data fusion**



**Lane perfect understanding**



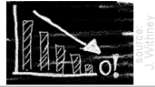




**Precise localization of the car (SLAM+GPS+V2X)**

**Safe architecture for level 4 (redundancy and supervision)**

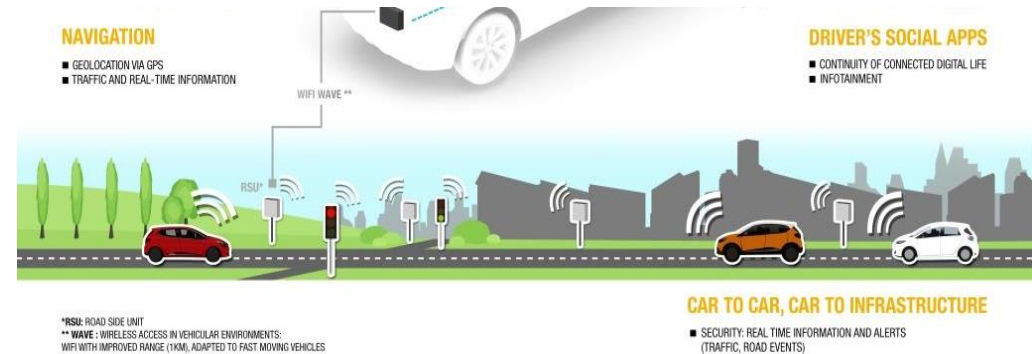
**Validation by simulation (SVA project)**

# THE MAIN NEXT STEPS : SOCIAL IMPACT (2)

## Social benefits evaluation by large scale experimentation

1	<i>Road Safety: Vision Zero</i>	Road safety improvements by reducing human driving errors	
2	<i>Traffic management</i>	<ul style="list-style-type: none"><li>- Optimization of traffic flow management</li><li>- Convenient, time efficient driving via automation</li></ul>	
3	<i>Reducing Emissions</i>	Reduction of fuel consumption & CO2 emission (through optimization of traffic flow management)	
4	<i>Demographic Change</i>	<ul style="list-style-type: none"><li>- Support unconfident drivers</li><li>- Enhance mobility for elderly people</li></ul>	
5	<i>Innovation High technology</i>	<ul style="list-style-type: none"><li>- New economic paradigm – supporting innovation policies of regions, nations</li><li>- Competitiveness / high skill employment</li></ul>	

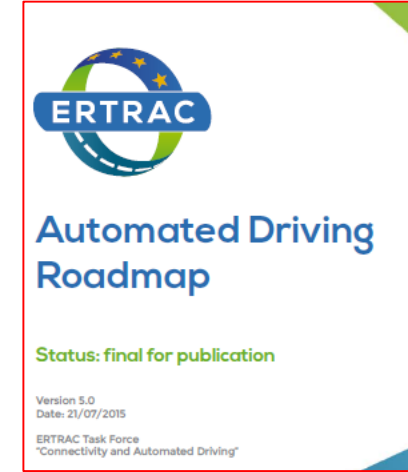
## Infrastructure and V2X



## Liability - Insurance

# THE MAIN NEXT STEPS : INTERNATIONAL (3)

## European coordination via ERTRAC



## Forum Franco-Korean

### Autonomous vehicle



#### First economic event of the France-Korea Year

Inaugurated jointly by Emmanuel Macron and Yoon Sang-Jick, the first edition was held in Seoul in 2014. The forum brought together researchers and companies with success. To further deepen the economic partnership between France and Korea, a second edition of France-Korea Joint Forum on Innovative Industry forum will be held November 26<sup>th</sup>, 2015 in Paris around the same three themes: autonomous vehicle, nano-electronics and digital healthcare.

The forum was mentioned during the speeches of the Presidents during the State Visit of Mr. President François Hollande in the Republic of Korea.

## Working group with China on regulation



# CONCLUSION

- ❖ **Autonomous Driving is a major breakthrough in the usages**
- ❖ **The acceptance by the society is the key issue beyond technology**
- ❖ **Mobility becomes a system of system, and AD will play a key role.**
- ❖ **French industry and science work closely to build a leadership on AD**
- ❖ **Alliance Renault-Nissan intend to lead affordable mass market AD**