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"The revolution of autonomous driving and the boost of autonomous motorsport"

Zurich, CH, 27/9/2022

Driving the Next in motor risk

Swiss Re Institute

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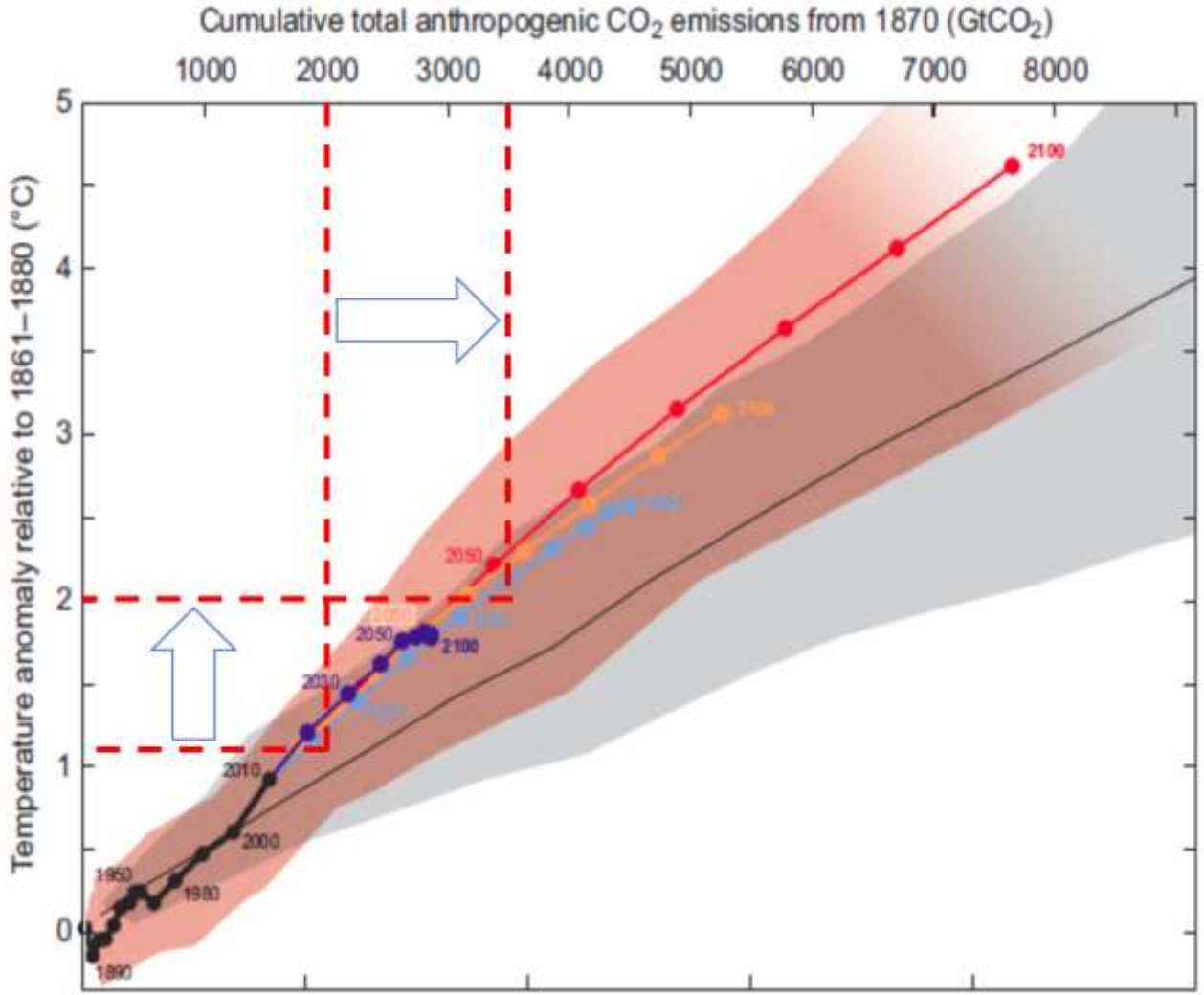
THE problem: anthropogenic modifications of the environment



Residual budget: 1500-2.000 GtCO2

Available fossil fuel: 50.000+ GtCO2!

New mobility model

Heavvy&big

Light&small

Fossil fuels

Electric/H_2

Personal

Shared

Human-driven

Algorithm-driven

+ «connected» (transversal feature)

Autonomous car = cathalizer

Automation of the driver = «**big-bang**»

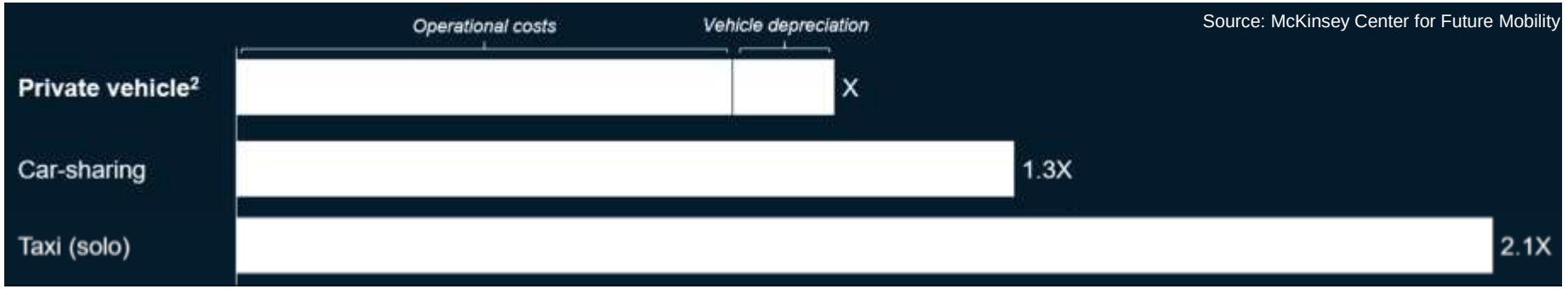
Bifurcations

Today: function&fun

«robo-taxi» = public transport

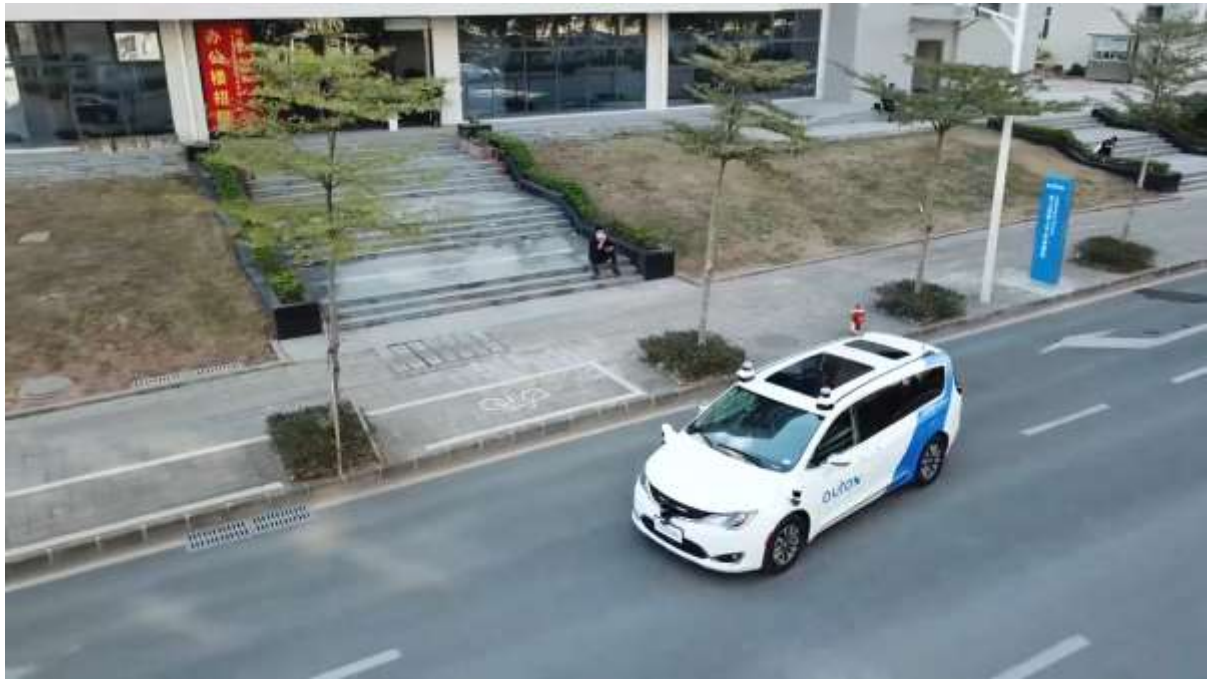
Emotional («red») vehicles

Car-sharing, today



Source: McKinsey Center for Future Mobility

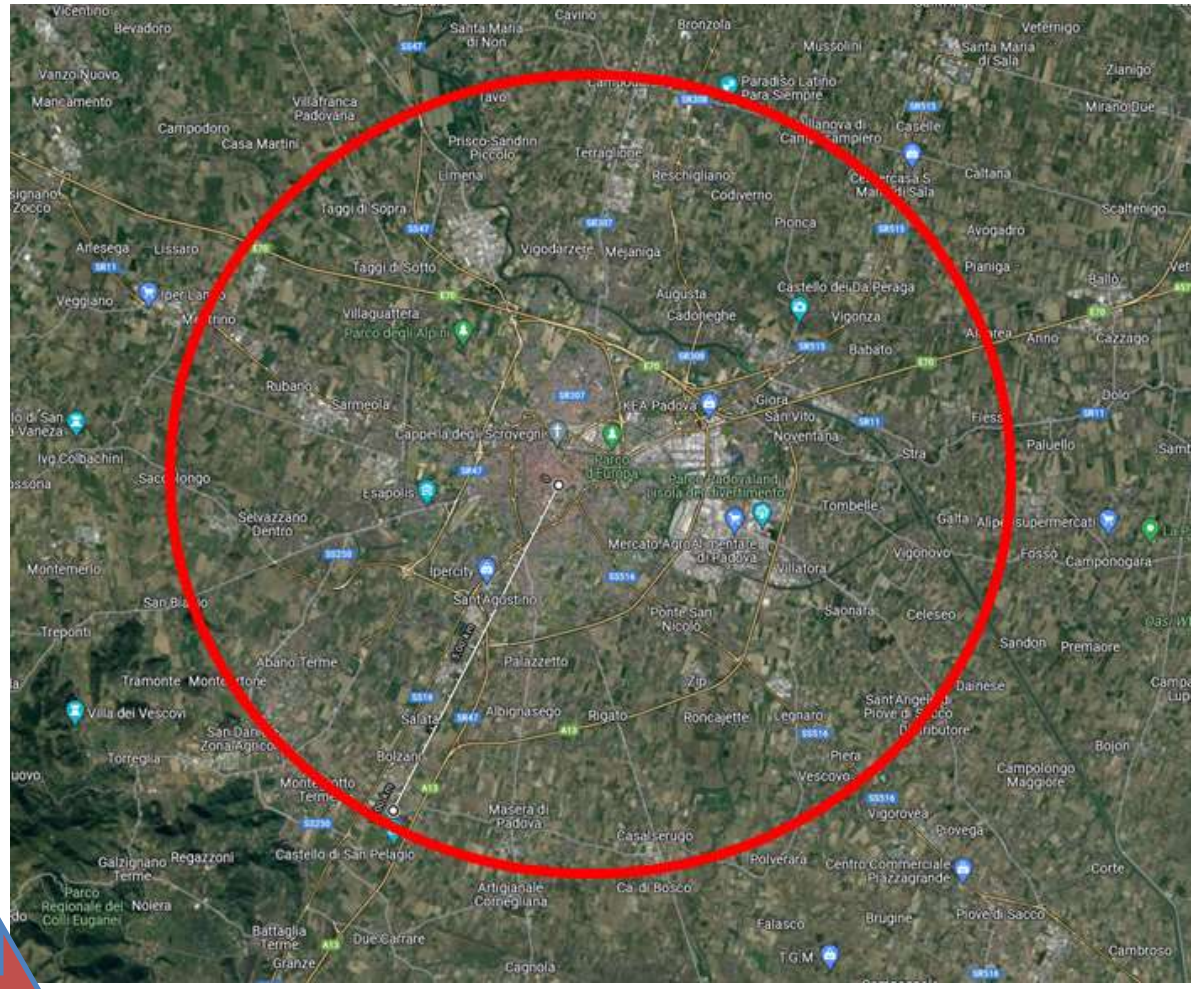
Car-sharing, tomorrow (MAAS)



L5 (robotaxi)

L4- (un-manned, low-speed)

The power of data: a case study (PADUA = 120.000 private cars)



Optimal Vehicles Number	4300
Users per car (efficiency)	8.0
Replaced private cars	34.500 (30%)
Average Mileage	44.000 km/y
Average Wait Time	2min 40s

Main assumption: cars with 90% trips «in-in»

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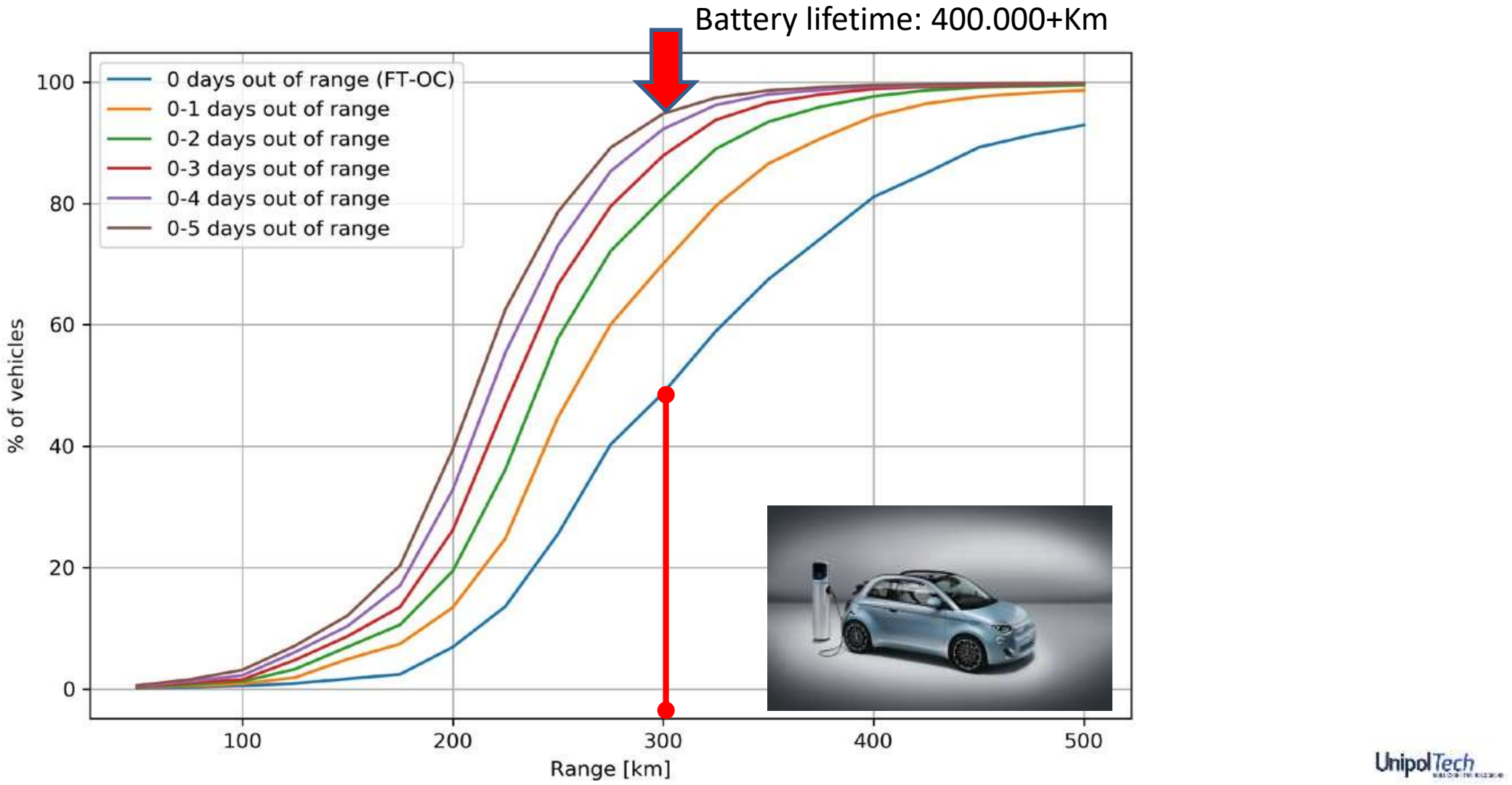
Electric car: mismatch with private ownership



The «right» sequence of events



Electric, private (20-30%) > Autonomous (L4+) > MAAS > Electric, shared (85-90%)

Automation of the driver = «**big-bang**»



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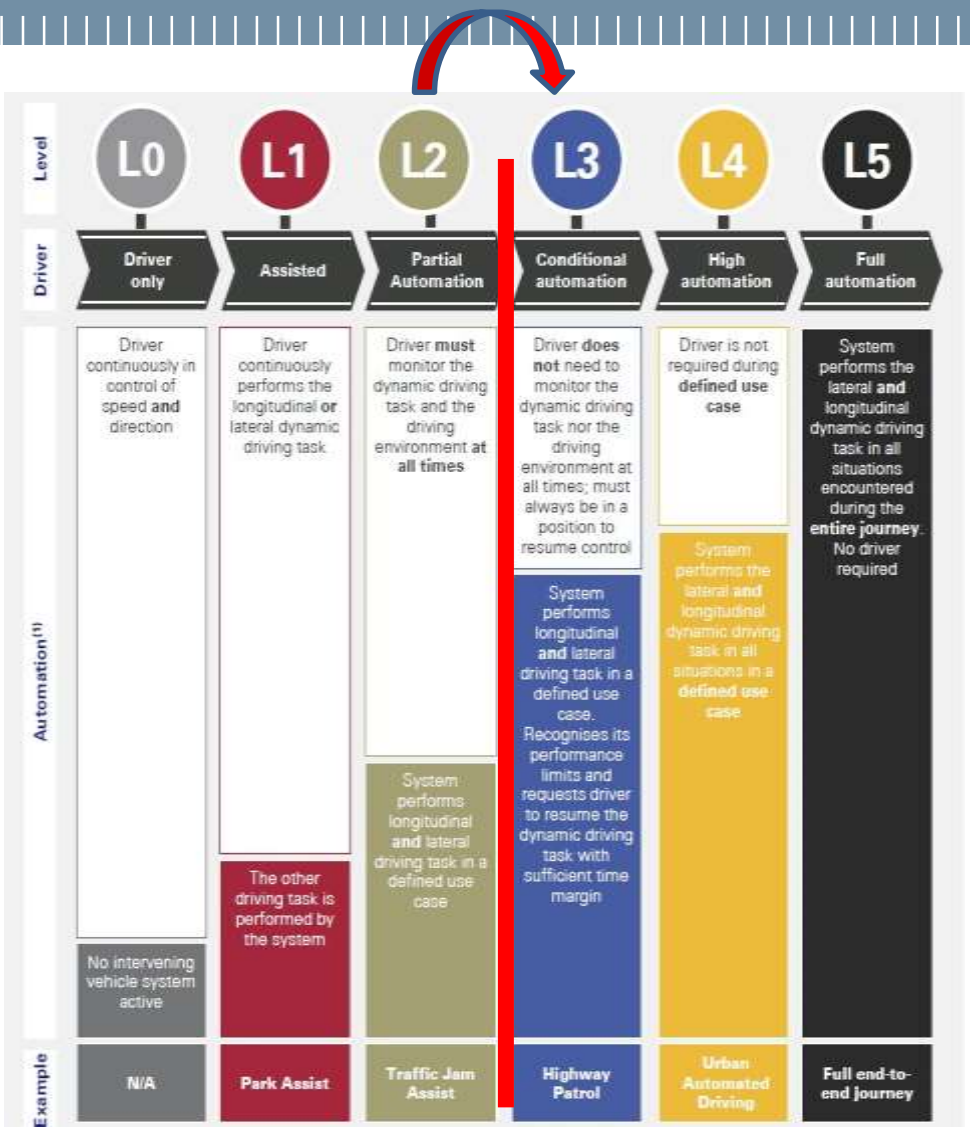
From L2 to L5…

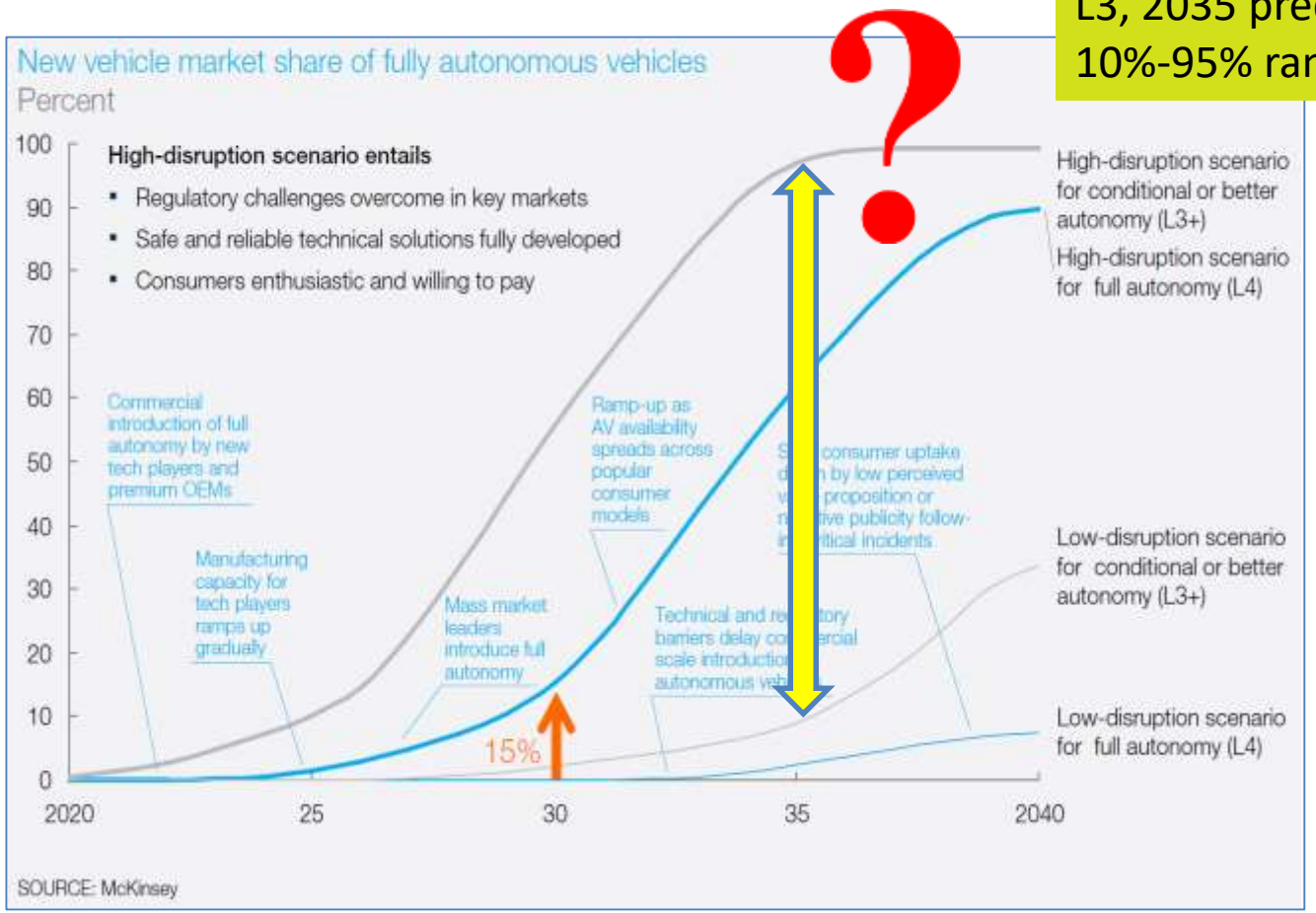


Autonomous car challenge: the most important technology trend

- complete **revolution of the mobility model**
- Major **changes in automotive industry** (tier «0.5», digital players,..)

A technolgy **still to be largely developed (10+years to reach L5)**

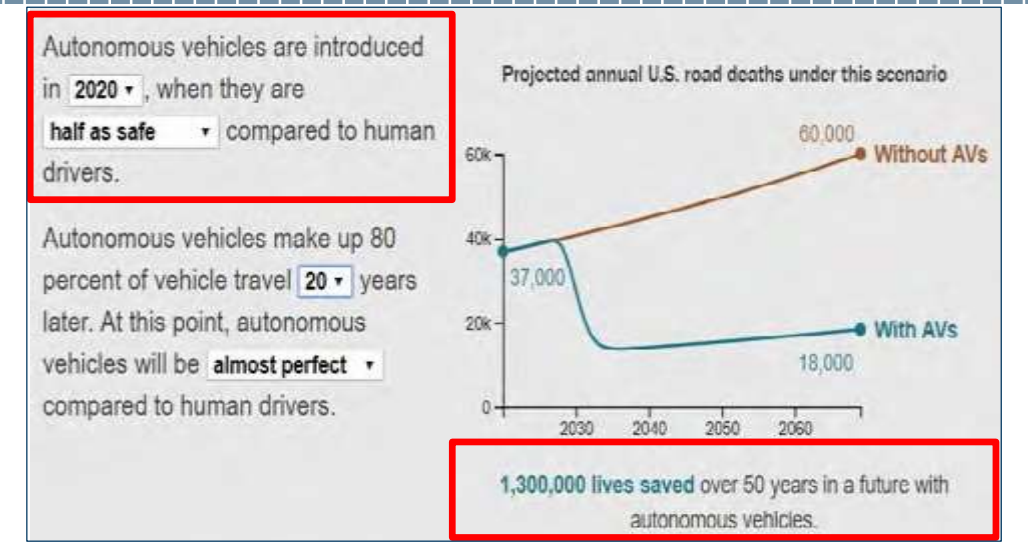
Roadmap to AV: timing?



L3, 2035 prediction:
10%-95% range…

A political dilemma…

-400.000 (est.) people killed in USA



Bifurcations: the virtual way…

ICT technologies are evolving MUCH faster than vehicles and transport systems (**no safety issues; no major infrastructure investments**)

AMAZON-ization of mobility? (people-moving or goods-moving?)

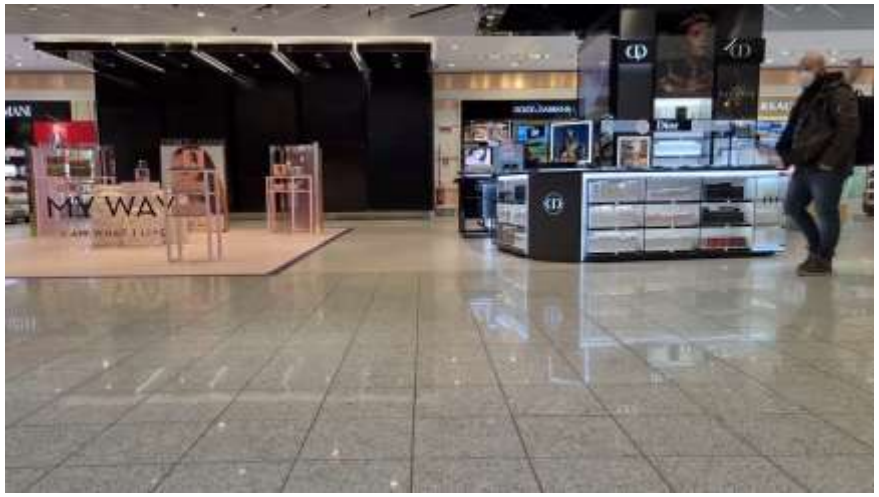
Uber

Uber-ization: mobility as a service

amazon

Amazon-ization: goods-mobility

The YAPE (Your Autonomous Pony Express) spinoff project



yape

spin off
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Scenario#1: A bright and safe future for the cities (robotaxi + soft mobility + smart logistics)

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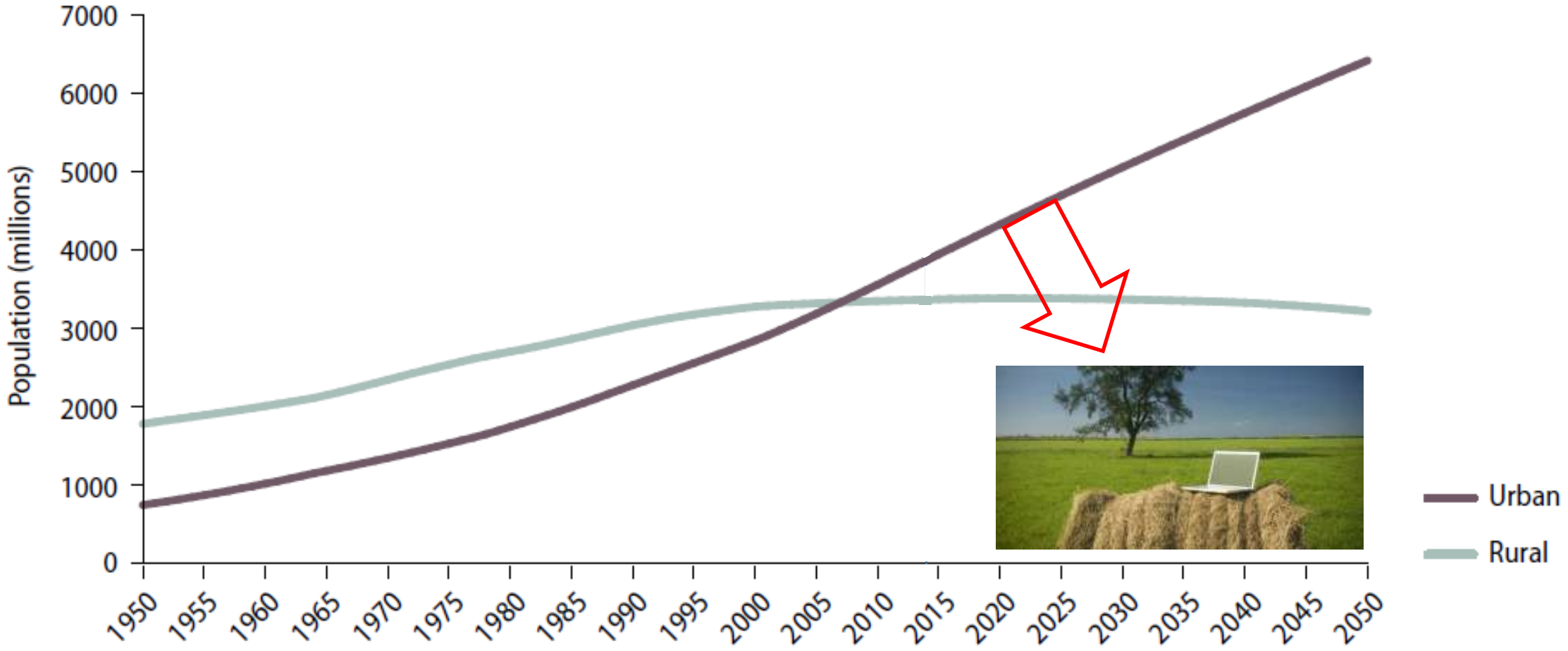
Scenario#2: …a full-digital world…? (threat for physical mobility)

Digital nomads?



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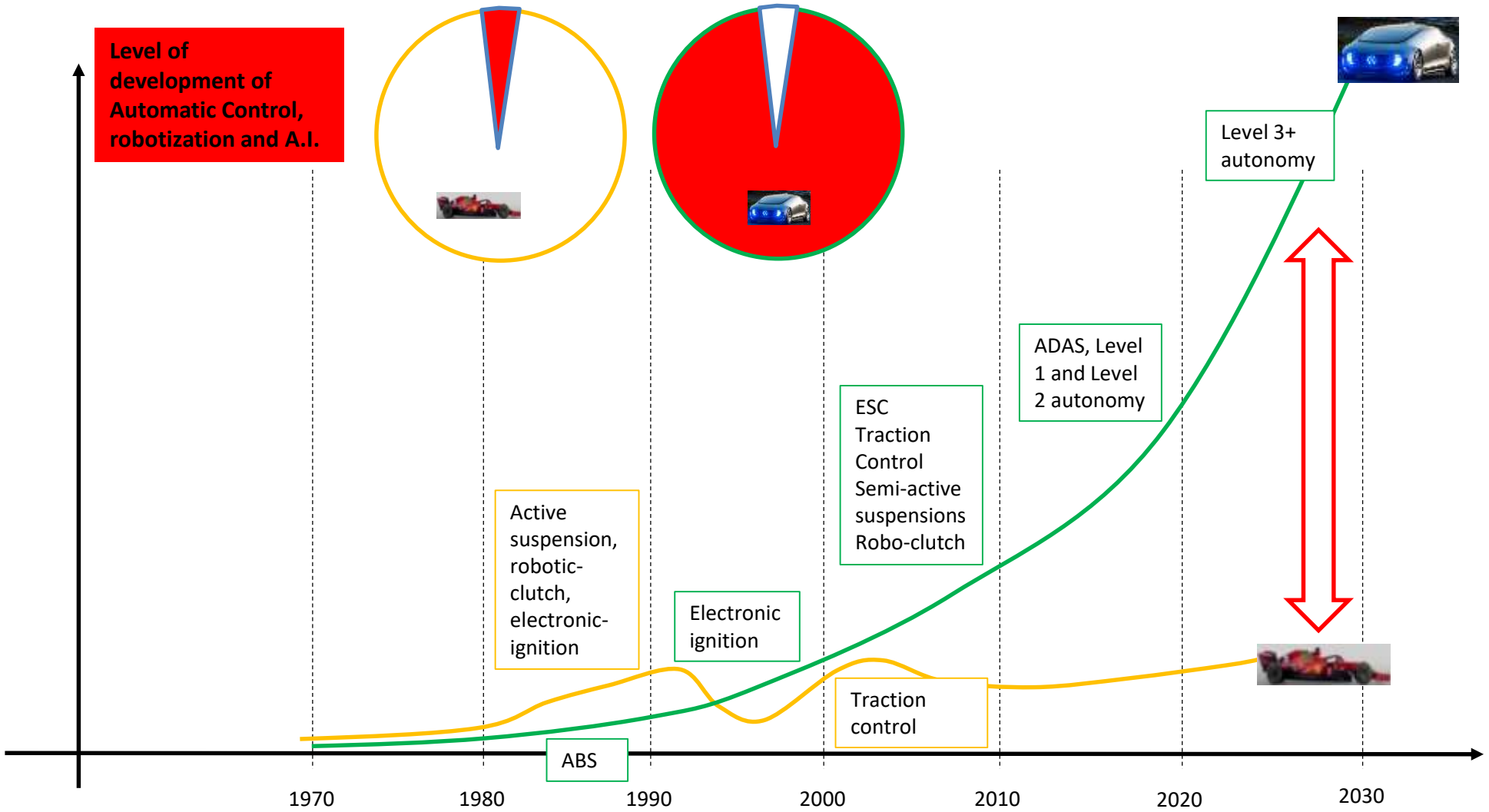
Autonomous driving in motorsport

Artificial Intelligence in motorsport: the Automatic Control gap



Automatic control & A.I. are clearly the next big leap in automotive

The gap with **motorsport cars** is **growing and becoming constantly more significant**

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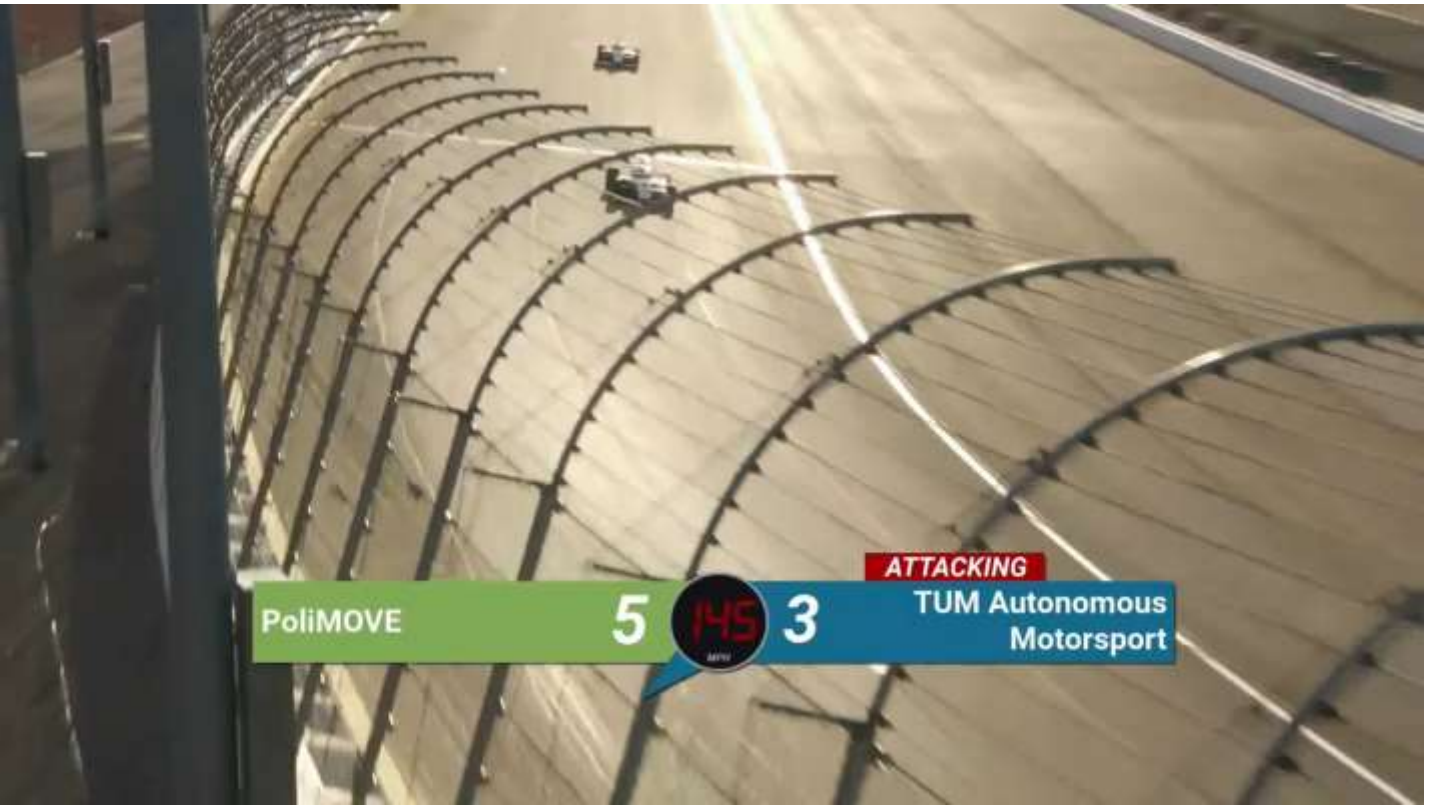
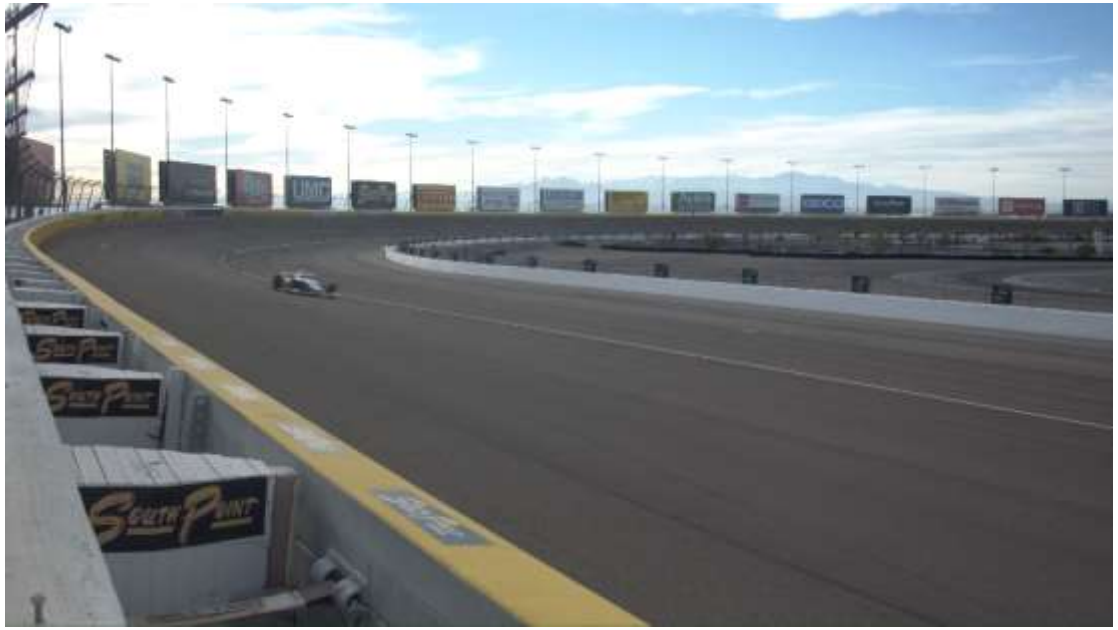
Autonomous Challenge @ CES (Las Vegas) 1/7/22: the birth of Autonomous racing



Winning team:
Polimove,
Politecnico di
Milano



First ever competition:

- **fully autonomous**
- **multi-agent** (head-to-head)
- **high-speed (up to 280kmh)**

AS.CAR.I project : (Indy Autonomous Challenge) world record- (27/4/2022)
Space Florida launch&landing facility, at NASA Kennedy Space Center in Cape Canaveral, FL

New world record holder for a fully-autonomous car: **309.3kph=192.2mph** (two-ways average, average over 1Km); 310.4kph=192.8mph (two-ways average, average over 100m); 311.9kph=193.8mph (top speed). The previous record was held by Roborace since 2019 (282,4kph=175,5mph, two-ways average, average over 100m).

2021-2022: the birth of Autonomous Racing (Roborace, “test” seasons alpha and beta)

Introduction of a **mix of real car and metaverse** cars/obstacles

ROBORACE

Autonomous motorsport future formats?

	Car Driver		CAR	
	Human	A.I.(autonomous)	Real car (on-track)	Simulated Car
Car 1	✕		✕	
Car 2	✕		✕	
Car 1	✕			✕
Car 2	✕			✕
Car 1		✕		✕
Car 2		✕		✕
Car 1		✕	✕	
Car 2		✕	✕	
Car 1	✕		✕	
Car 2		✕		✕
Car 1	✕		✕	
Car 2		✕	✕	

→ Classic Motorsport

→ Classic Gaming

→ «Sim-Race» of A.I. Drivers (first step of Indy Autonomous Challenge)

→ Indy Autonomous Challenge

→ Human vs. A.I. but 1 real car and 1 Holo-car on track

→ Human vs A.I. on real cars **(ultimate goal, higher complexity)**

Autonomous racing: what-for? -> “Emergency Module”

- High speed
- Low grip
- Crowded road
- Unexpected situation

Thanks for your attention!

"We always **overestimate** the change that will occur in the next two years and **underestimate** the change that will occur in the next ten."

Bill Gates