

MAVEN (Managing Automated Vehicles Enhances Network)

Setting the scene

Recent development in automated driving

Jaap Vreeswijk
MAP traffic management

15 November 2016, Barcelona



MAVEN is funded by the EC Horizon 2020 Research and Innovation Framework Programme, under Grant Agreement No. 690727





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Why? Human error!

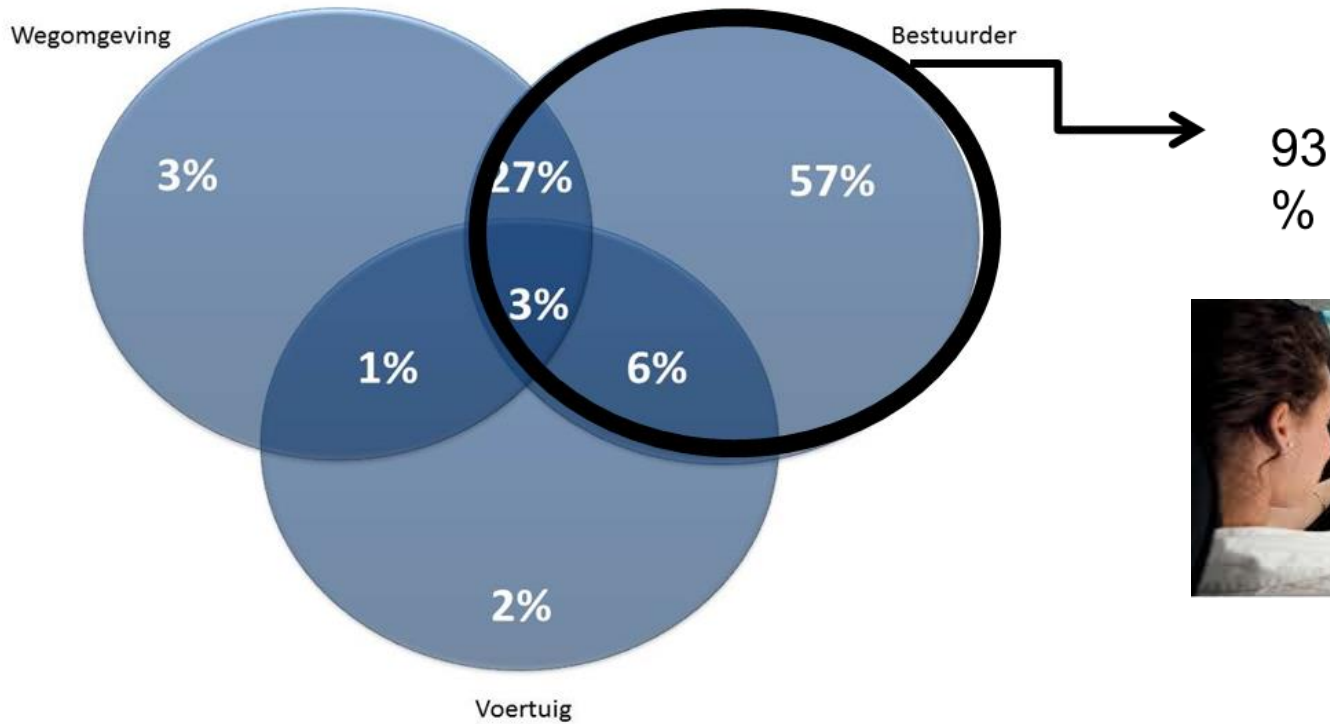


Photo: Shutterstock.com, Gazmaniflu



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In media



Self-driving cars reach a fork in the road, and automakers take ...
Washington Post - 24 aug. 2016

Cars capable of driving themselves may be on the showroom floor sooner than you think, but whether they should come with all the current ...



Why Uber is tuning the streets of a US city into its laboratory
Washington Post - 25 aug. 2016

But for regulators to truly know whether a **self-driving car** is safe, they will need reams of data that come from hundreds of millions of miles of ...

Self-Driving Cars: Half-Assed Automation Is Stupid and Dangerous
Reason (blog) - 26 aug. 2016

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Ford will start selling driverless cars in 2021

Washington Post - 16 aug. 2016

But in just a few years, the car may show up without any driver inside at all. ... [After yet another Tesla crash, do autopilot critics have a point?] ... To complete its push for **self-driving cars**, Ford plans to double the number of ... algorithms to increase the utilization," said Ken **Washington**, Ford's vice president of ...

Ford Announces Plans For Fully Autonomous Self-Driving Car By ...
Mac Rumors - 17 aug. 2016

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Self-driving cars go public; Uber offers rides in Pittsburgh

Washington Post - 18 aug. 2016

The **Washington Post** SAN FRANCISCO — The option to hail a ride in a **self-driving car**, ... which has grown exponentially after starting seven years ago. ... Google has been testing **self-driving cars** on public roads since ...

Uber's First Self-Driving Cars Will Hit the Streets Within Weeks
Vanity Fair - 18 aug. 2016

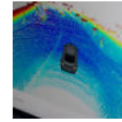
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Driverless cars: The pros and cons

Washington Post - 15 aug. 2016

Driverless car technology can seem both exciting and scary, all at the same time. Should you trust a vehicle that makes its own decisions?



What It Feels Like to Ride in a Self-Driving Uber

New York Times - 4 uur geleden

By THE NEW YORK TIMES on Publish Date September 13, 2016. Photo by Jeff Swensen ... My Uber **self-driving car** will not start driving itself.

Anybody Can Test a Driverless Car in Pennsylvania
The Atlantic - 6 uur geleden

Uber's self driving cars hit the road in Pittsburgh
BGR India - 3 uur geleden

Uber's first self-driving cars start picking up passengers in Pittsburgh
SiliconBeat - 1 minuut geleden

For some safety experts, Uber's self-driving taxi test isn't something ...
Meest geciteerd - Washington Post - 11 sep. 2016

Uber's robot taxis are now picking up fares in Pittsburgh
Diepgaand - Irish Times - 7 uur geleden



The Atlantic



Digital Trends



Irish Times



AFKInsider



Washington ...

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Ford's Driverless Car Plan: Embrace Tech and Go Slow

New York Times - 12 sep. 2016

A **self-driving car** at Ford's campus in Dearborn, Mich. ... And so the automaker plans to introduce **self-driving cars** in a controlled ... Receive occasional updates and special offers for The **New York Times's** products and services. ... the year, and it expects to have three times that number by the end of 2017.

Ford says self-driving cars to be affordable for masses by 2025
Christian Science Monitor - 13 sep. 2016

Ford CEO says Blue Oval will sell self-driving cars by 2025
Autoblog (blog) - 13 sep. 2016

Ford Rolls Out Business Services Unit, Plans Autonomous-Car ...
Wall Street Journal - 3 uur geleden

Ford to sell driverless cars by 2025, says CEO Mark Fields
Diepgaand - Economic Times - 13 sep. 2016



Christian Sci...



Autoblog (blog)



Wall Street J...

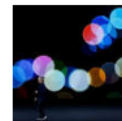


Economic T...



Auto World N...

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Apple Is Said to Be Rethinking Strategy on Self-Driving Cars

New York Times - 9 sep. 2016

SAN FRANCISCO — Apple is rethinking what it plans to do about **self-driving cars**, just as other big tech companies appear ready to plow ...

Apple's Secretive Self-Driving-Car Project Hits a Roadblock
Vanity Fair - 12 sep. 2016

Apple Reportedly Lays Off Dozens From Self-Driving Car Project
Fortune - 11 sep. 2016

Apple may be quitting the race for self-driving cars
Meest geciteerd - Quartz - 10 sep. 2016

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Automated driving

- San Diego '98
- Google
- Tesla
- CityMobil
- Truck Platoon
- Politics



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Automated driving

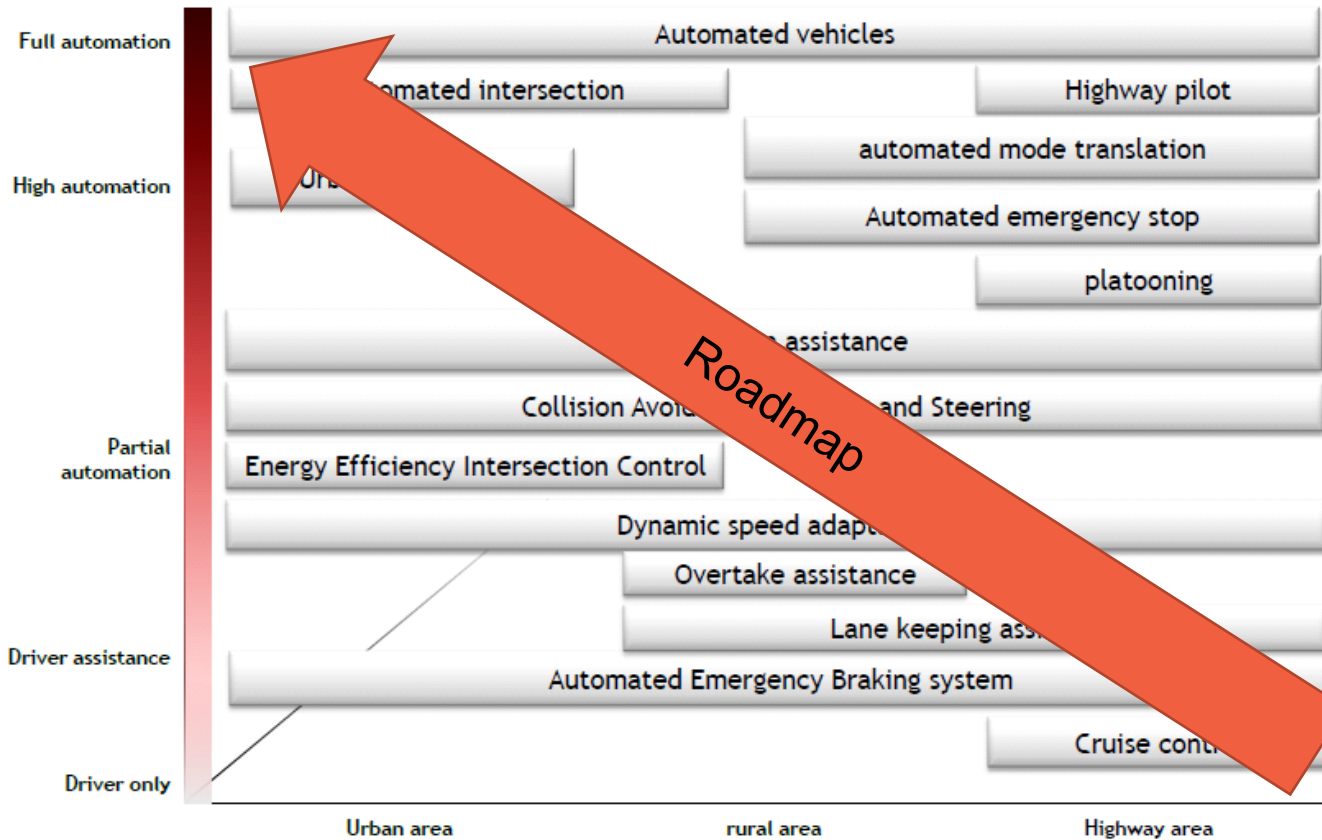
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Automation functions and roadmap



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Levels of automation



	SAE Level	Name	Steering, acceleration, deceleration	Monitoring driving environment	Fallback performance of dynamic driving task	System capability (driving modes)
Human monitors environment	0	No automation the full-time performance by the human driver of all aspects of the dynamic driving task, even when enhanced by warning or intervention systems				
	1	Driver assistance the driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the dynamic driving task.				Some driving modes
	2	Partial automation the driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the dynamic driving task				Some driving modes
Car monitors environment	3	Conditional automation the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task with the expectation that the human driver will respond appropriately to a request to intervene				Some driving modes
	4	High automation the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task, even if a human driver does not respond appropriately to a request to intervene				Some driving modes
	5	Full automation the full-time performance by an automated driving system of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver				All driving modes



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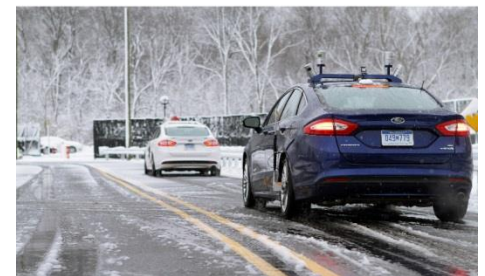


Many subjects of debate

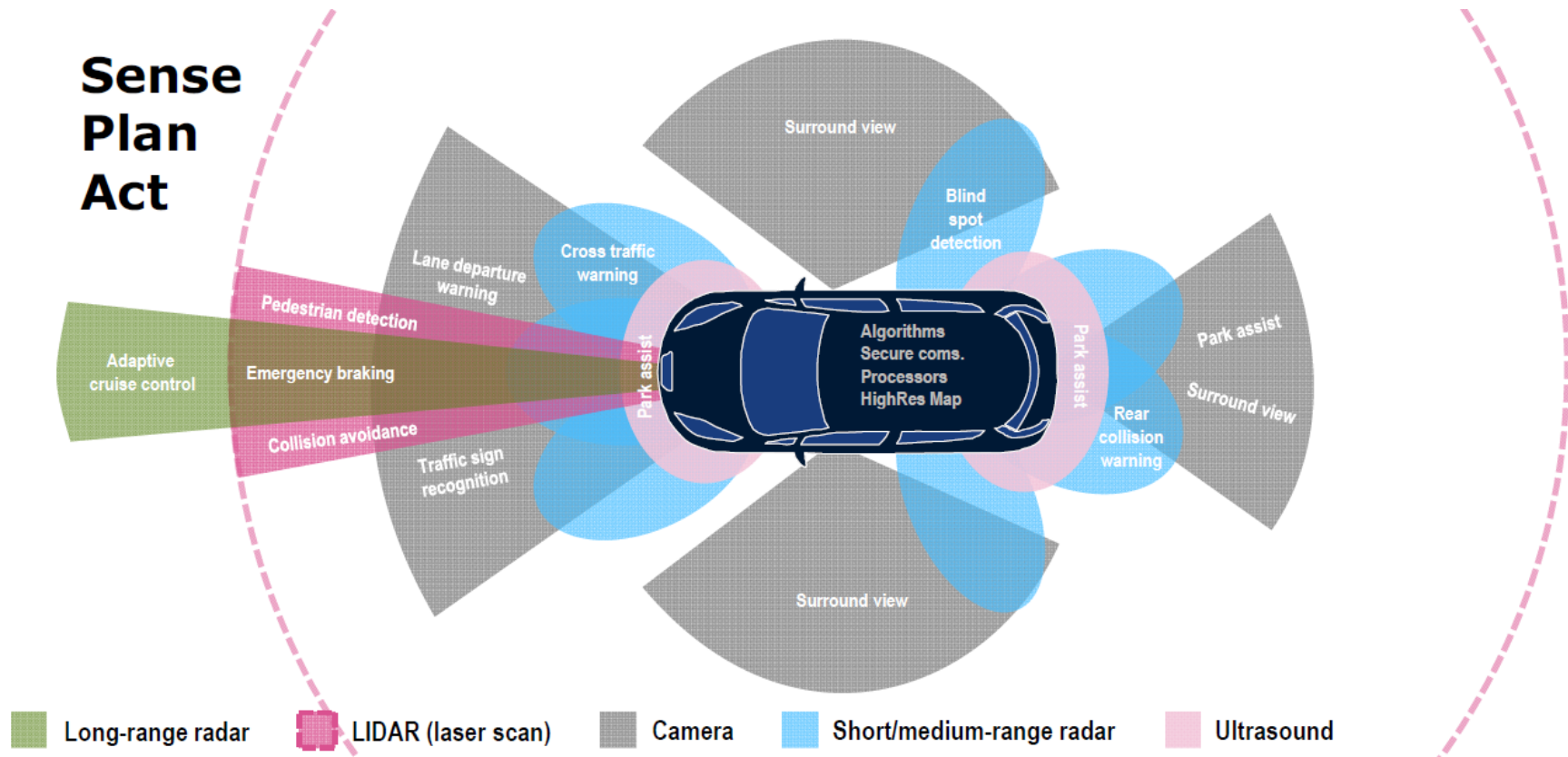
- Regulations and liability
- Interaction with humans (driver & other)
- All roads or only motorways? Congestion?
- Lane changing?
- Fog, rain, snow?
- Tests on public roads or closed tracks?
- Dedicated (new) roads or digital infrastructure?
- Stand-alone or cooperative?
- Safety versus velocity?
- Compliance / Consistency?
- Cyber security
- Ethics



Business Now Reading: Driverless Cars Also Struggle in the Snow



Automated vehicle technology



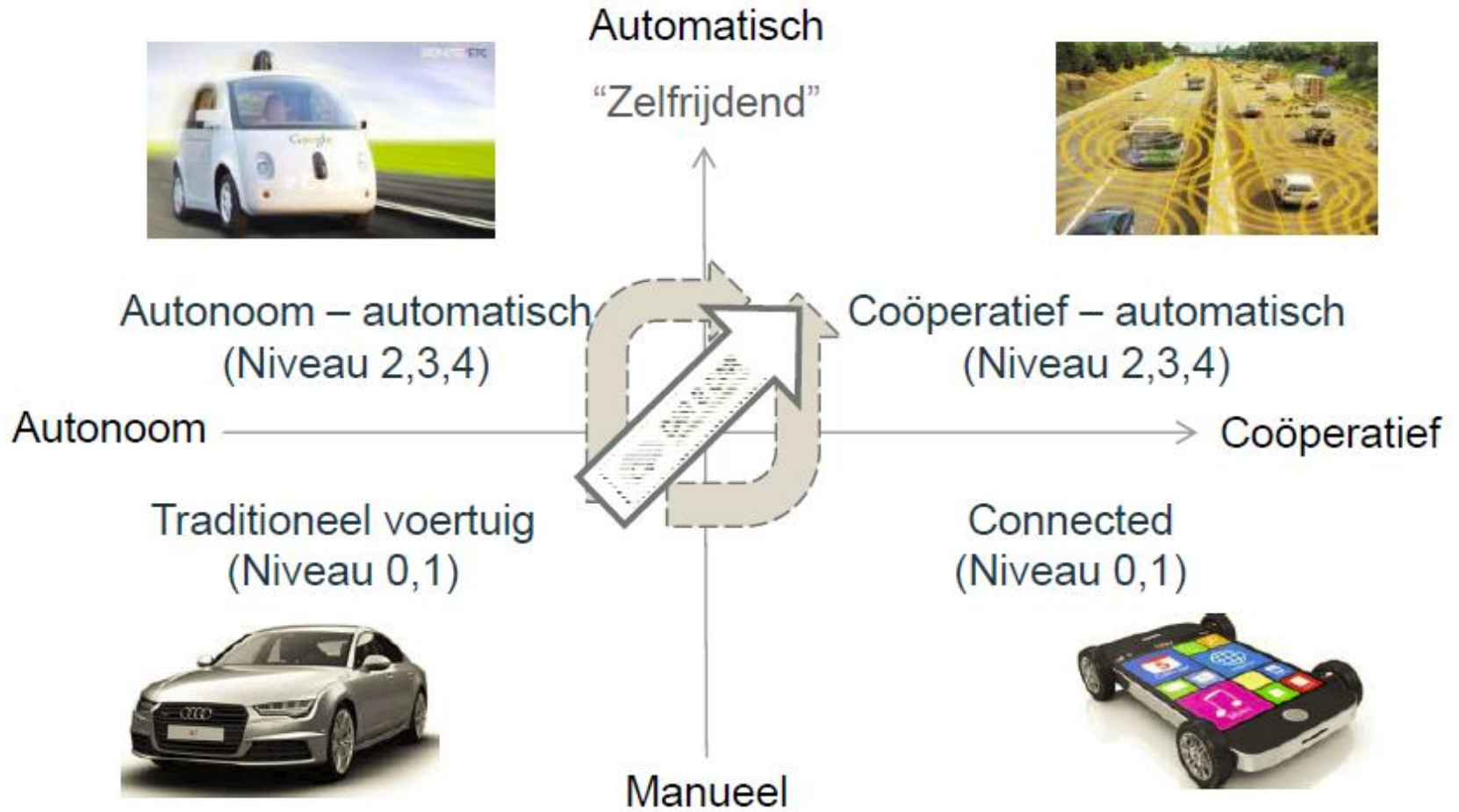
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Landscape



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Connected automation!

Connected Vehicle

Communicates with nearby vehicles and infrastructure; Not automated



Connected Automated Vehicle

Leverages autonomous automated and connected vehicles



Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors



ource: Thinkstock/USDOT



U.S. Department of Transportation
ITS Joint Program Office

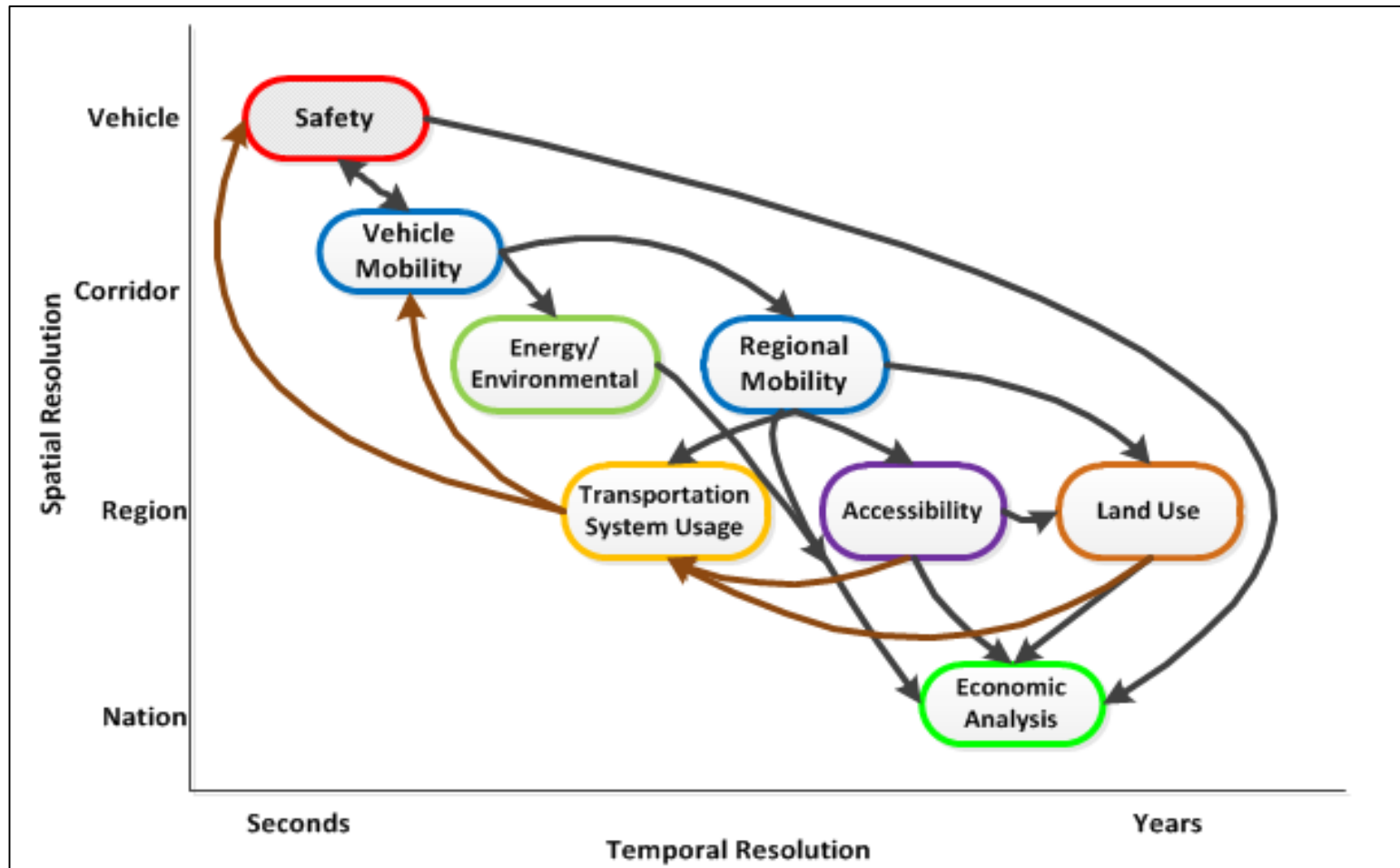
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Impacts of automated driving



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How likely?

This is what cars looked like 100 years ago



Automated driving pilots for about 2 decades

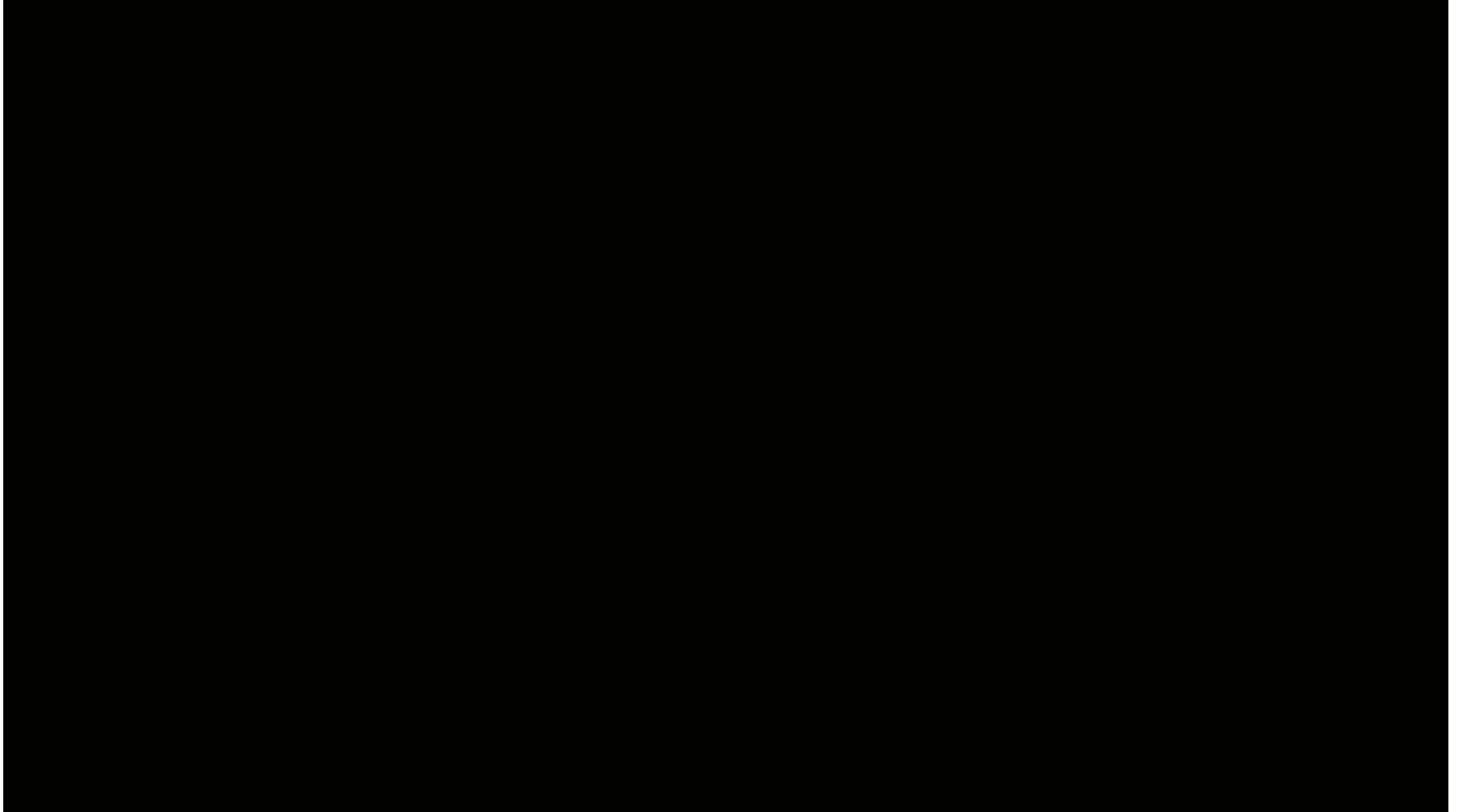
Tesla was founded in 2003, their Model S was launched in 2012



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Soon in your city



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Thank you!

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