



Self Driving Cars

Future has already begun

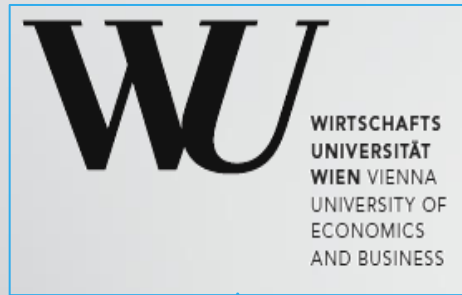
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Institute of Transport and Logistics
Vienna University Of Economics and Business

Workshop: Innovation Platform – e-Mobility

- Organizer: Federal Procurement Agency Austria (BBG)
- Date: May 7th 2015
- Time: 900 – 16:30
- Location: Austria Trend Hotel Bosei, Gutheil-Schoder-Gasse 7b - 1100 Wien, Austria



Collaboration Acknowledgment



Univ. Prof. Dr. Sebastian Kummer
Head of Institute for
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Managing Director
Federal Procurement Agency Austria

A g e n d a

Introduction

- What is Mobility 4.0?
- What is Autonomous driving ?

Need

- Why to shift from conventional cars ?

Technology

- What it takes to make a car "Self Driving" ?
- Combining technologies for better and safer future

Motivation

- What's happening in our surroundings ?

Practical Implementation

- Can AVs reclassify existing mobility?

Opportunities & Hurdles

- What are the potentials and the drawbacks ?

Conclusion

- Comments & Critiques

Experiment

- Tell us what do you think ?

Introduction

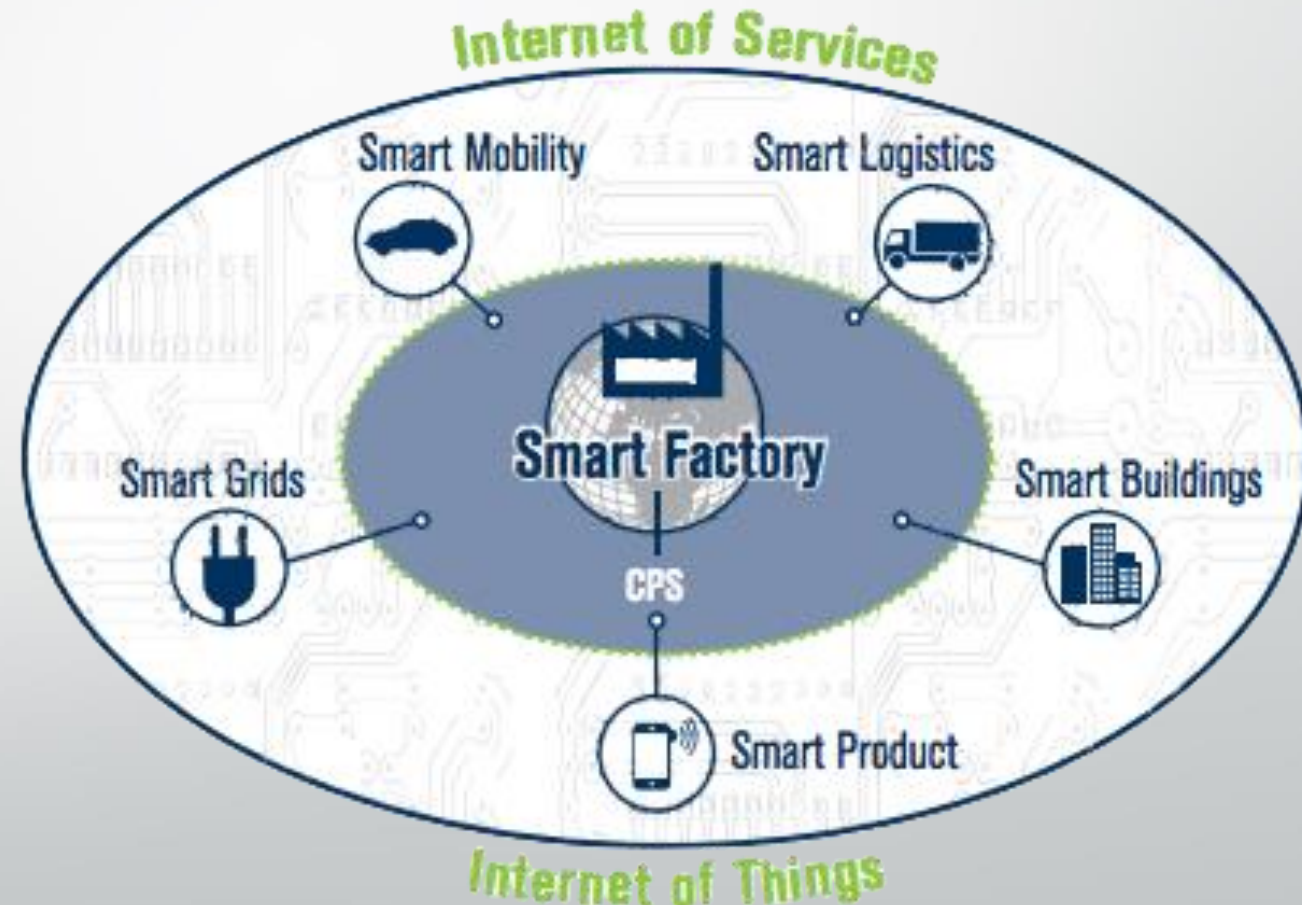
- **Mobility 4.0** Described as smart (intelligent) mobility in the 4th industrial revolution

Focuses on

- Complete automation
- High dependence on Artificial Intelligence(AI) & IT
- On board high tech hardware
 - Sensors, tools & equipment

Aims at

- Accident, emission & congestion free lean and agile individual and public transportation
 - SELF-DRIVING/ Autonomous cars

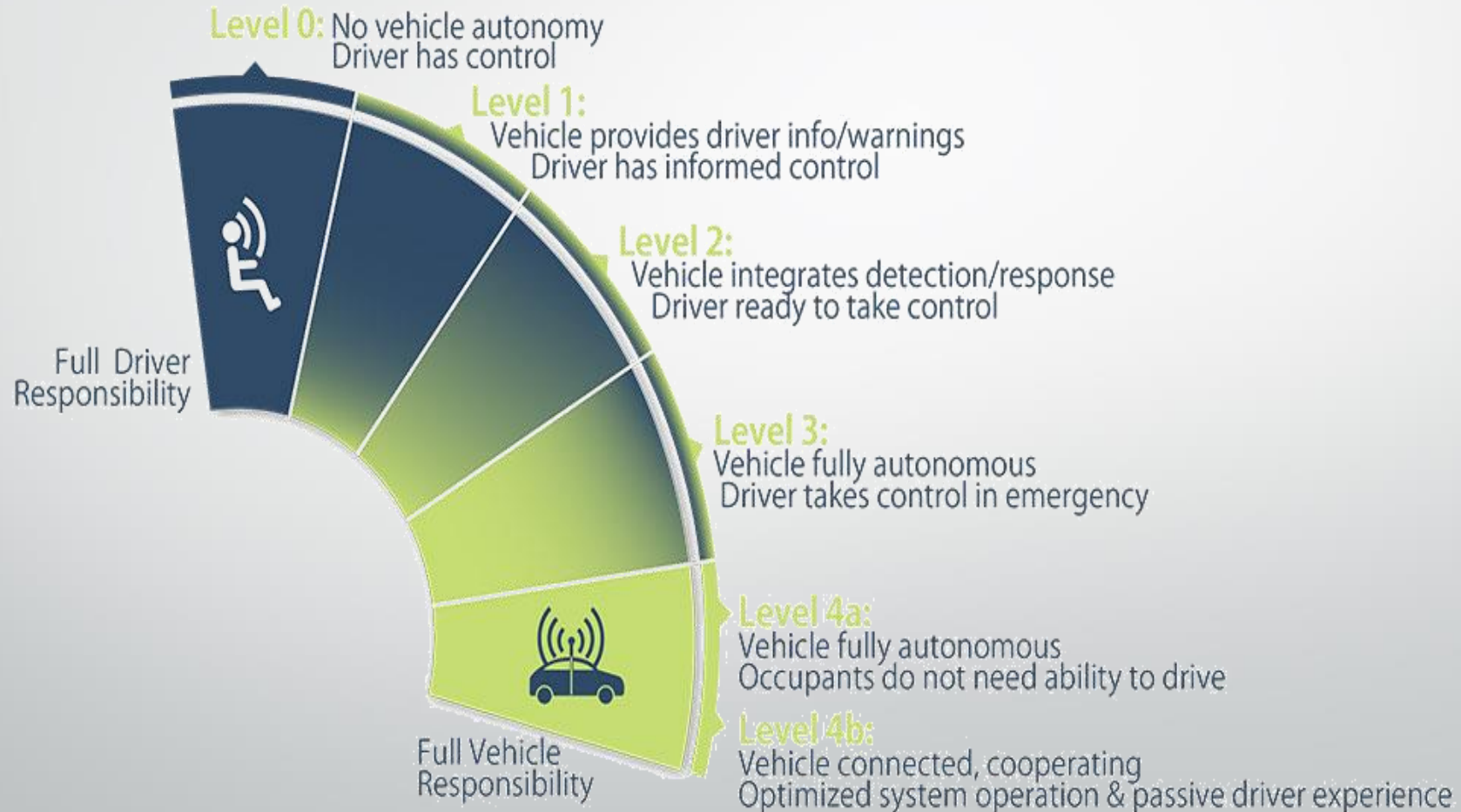


Autonomous Vehicle

- Mostly known as “self driving or driverless car”
- Capable of autonomously
 - Steering
 - Navigating
 - Deciding
 - Foreseeing
 - Act smarter in critical situations
- Best example “Google’s Self-driving car”
 - Operated by Google’s chauffeur (A.I Software)



Levels Of Automation (NHTSA)



What Makes A Car Self-driving ?

VIDEO CAMERA

Mounted near the rear-view mirror, the camera detects traffic lights and any moving objects.

LIDAR

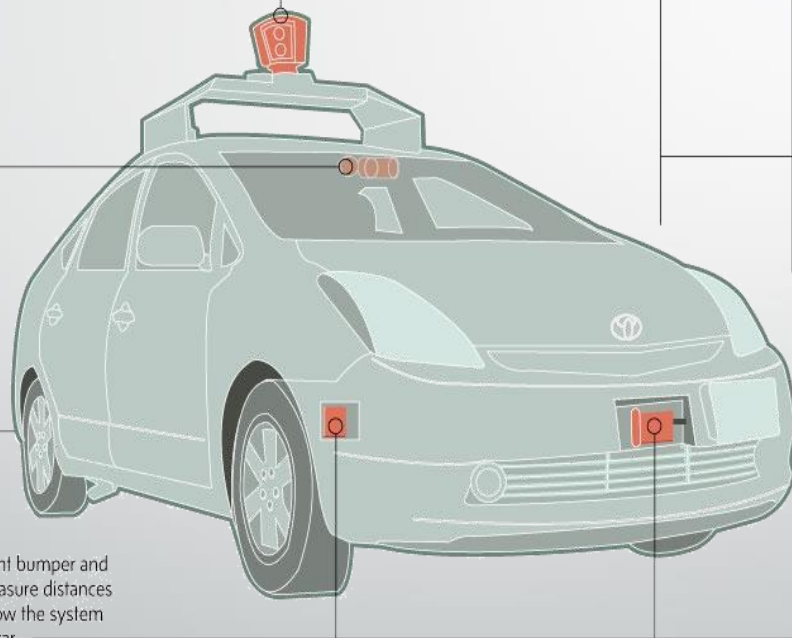
A rotating sensor on the roof scans the area in a radius of 60 metres for creation of a dynamic, three-dimensional map of the environment.

POSITION ESTIMATOR

A sensor mounted on the left rear wheel measures lateral movements and determines the car's position on the map.

DISTANCE SENSORS

Four radars, three in the front bumper and one in the rear bumper, measure distances to various obstacles and allow the system to reduce the speed of the car.



CARRIE COCKBURN/THE GLOBE AND MAIL. || SOURCES: GOOGLE; ARTICLESBASE.COM; WHEELS.CA

• Maps

- Smart navigation
- Syncing real time data to keep updated in case of accidents
- Tracking speed limits
- Car2 X Communication

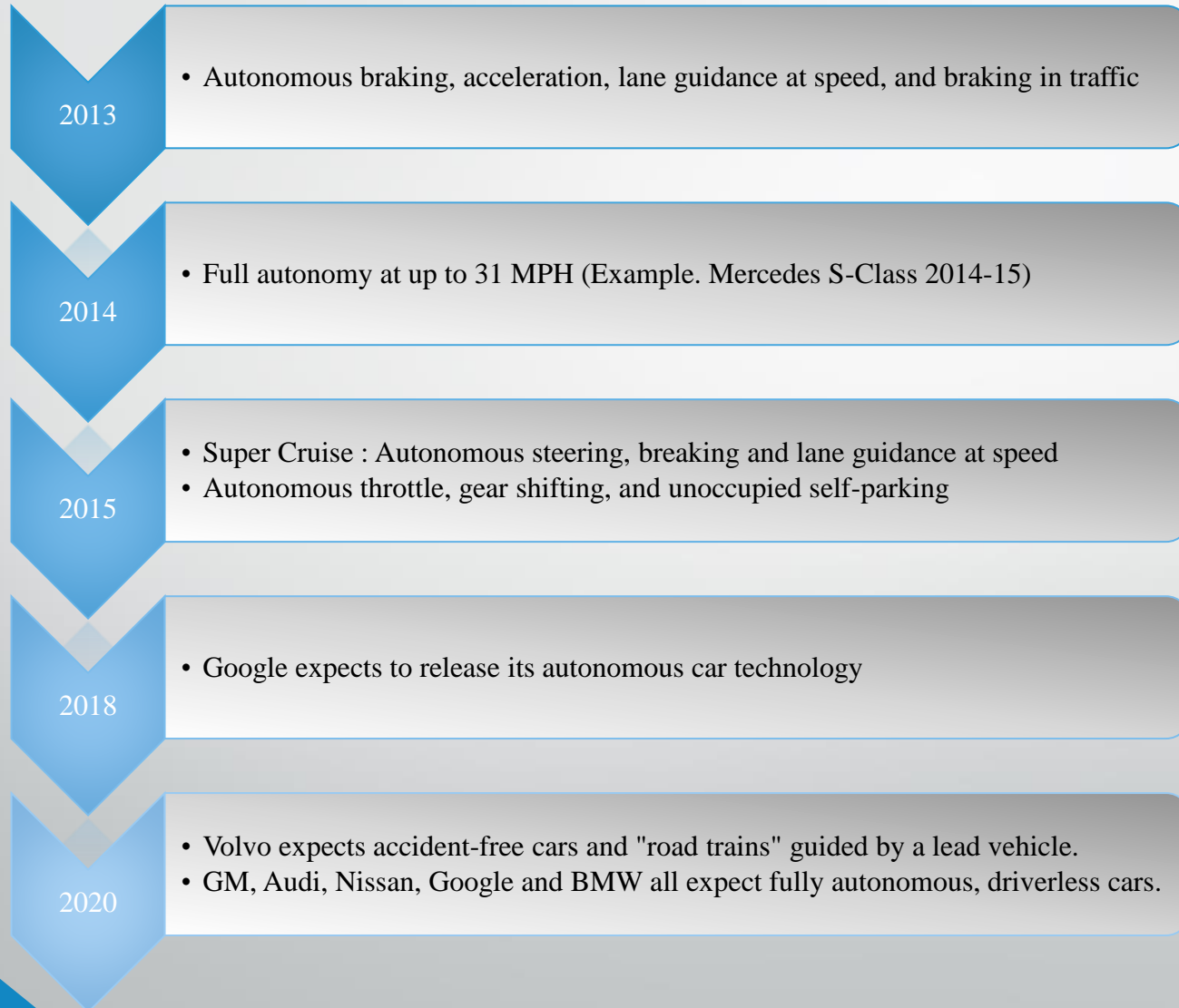
• Hardware

- LIDAR (Light detection and ranging) senses the 360 degree surrounding upto 60 m
- light sensor, RADAR, video cameras, position sensor and calibrator, distance sensor

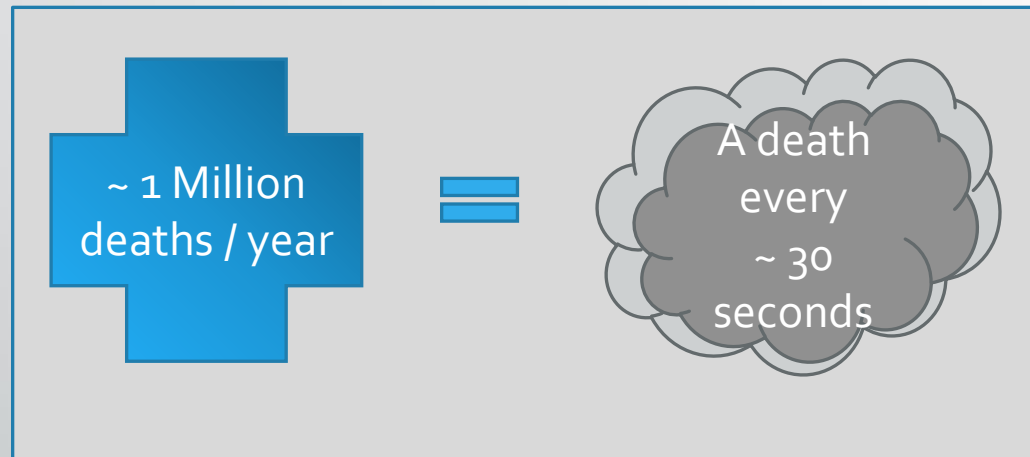
• Artificial Intelligence (A.I)

- Command and control center

Time-Line For Complete Autonomy



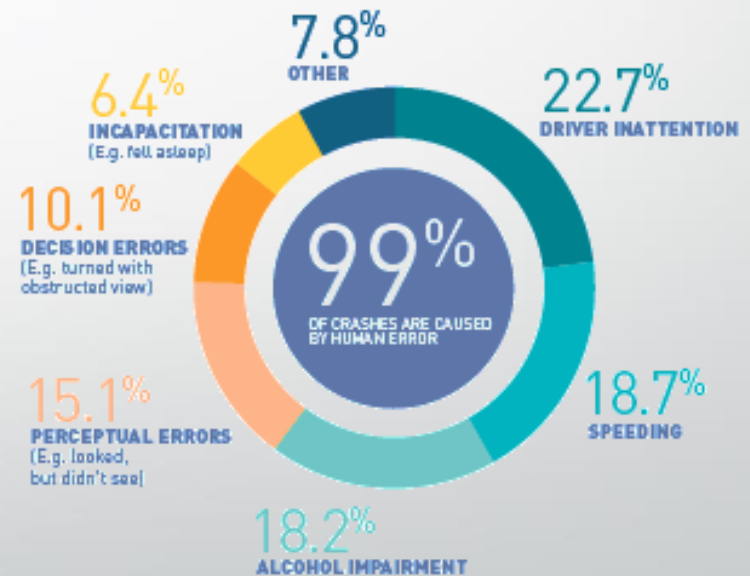
Understanding Need of Automation (Key Facts & Figures)



Over 90 % cases
"HUMAN ERROR"

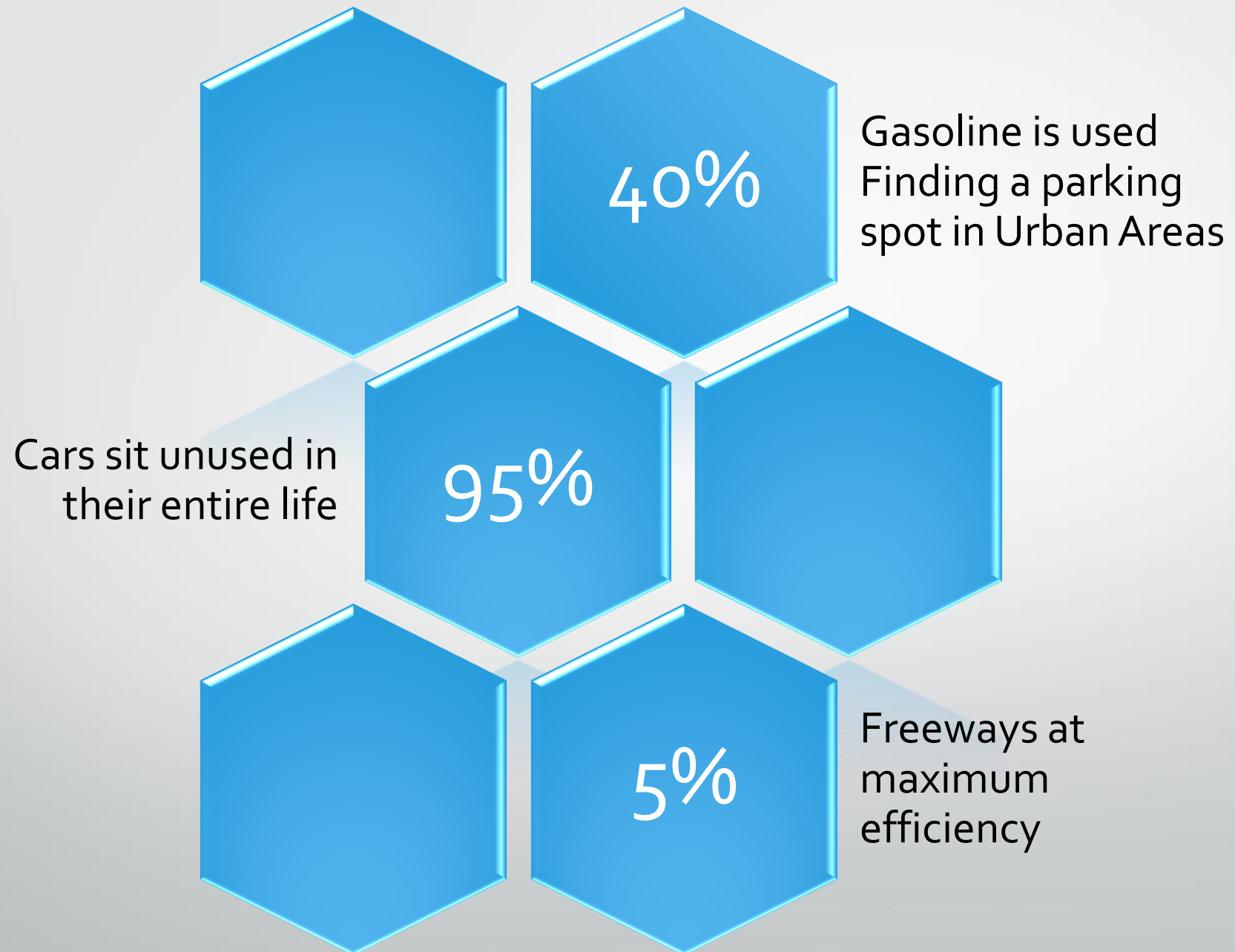
REDUCING HUMAN ERROR

Fully automated vehicles will significantly reduce driving incidents caused by human error. In a study of 723 crashes, driver error caused or contributed to 717*

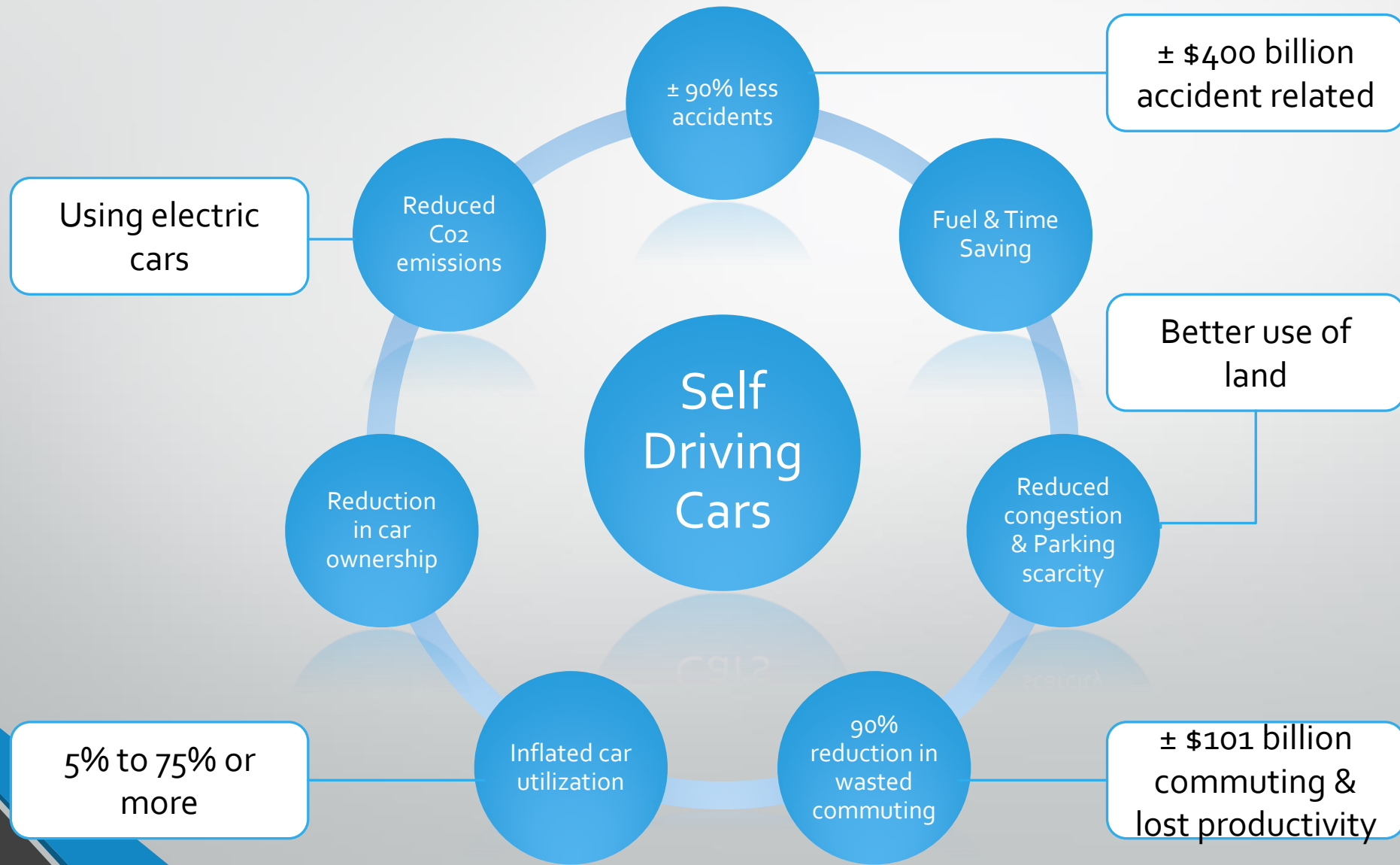


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How could Self-Driving Cars make a difference



Car2 X communication

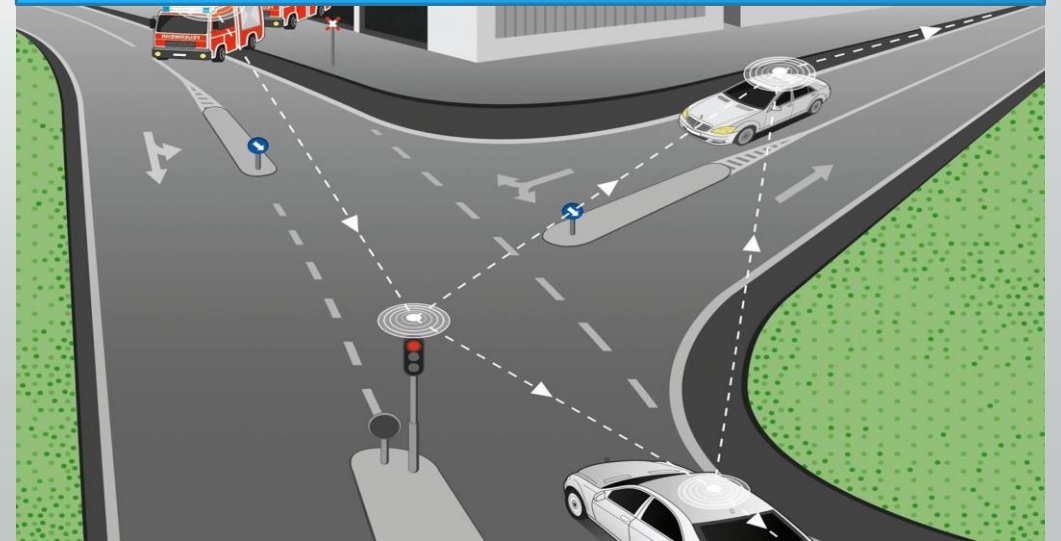
Car 2 Infrastructure

- Better energy management (traffic lights networking)
- Increased safety (obstacle warning, hazard warning)
- Better traffic flow (accidents, building sites, jams, parking slots)



Car 2 Car

- Increased safety (intersection/brake assistance)
- Better traffic flow (bumper2bumper driving)
- Faster pass-through for emergency vehicles (cars are informed in advance)



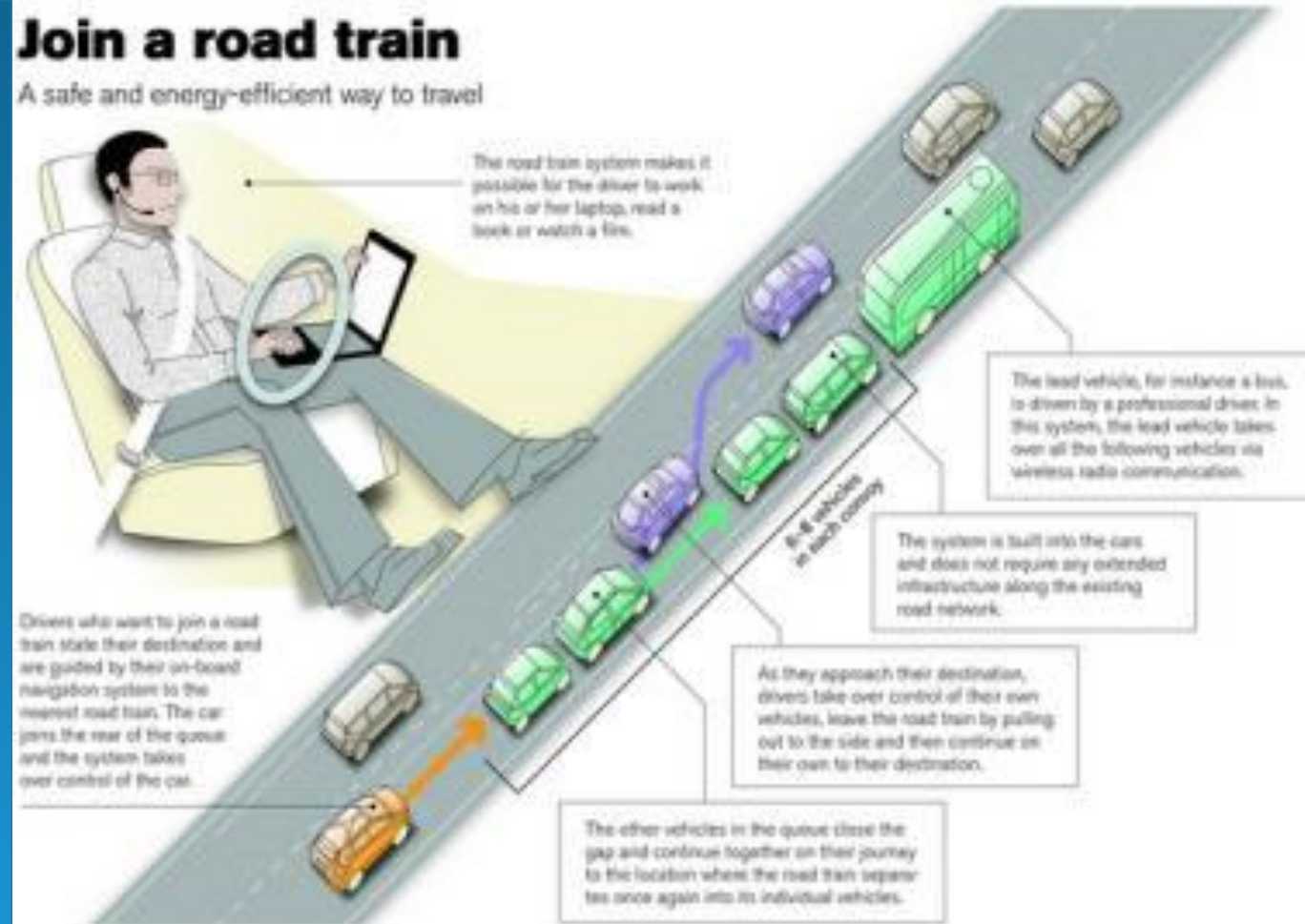
Car2 X communication

Networked Intelligence

- Increase the freeway utilization
- Autonomous vehicles could dramatically increase it by “Car Platooning”
- Minimizing the distance between trucks upto 10m at 80 km/h
- Increasing security

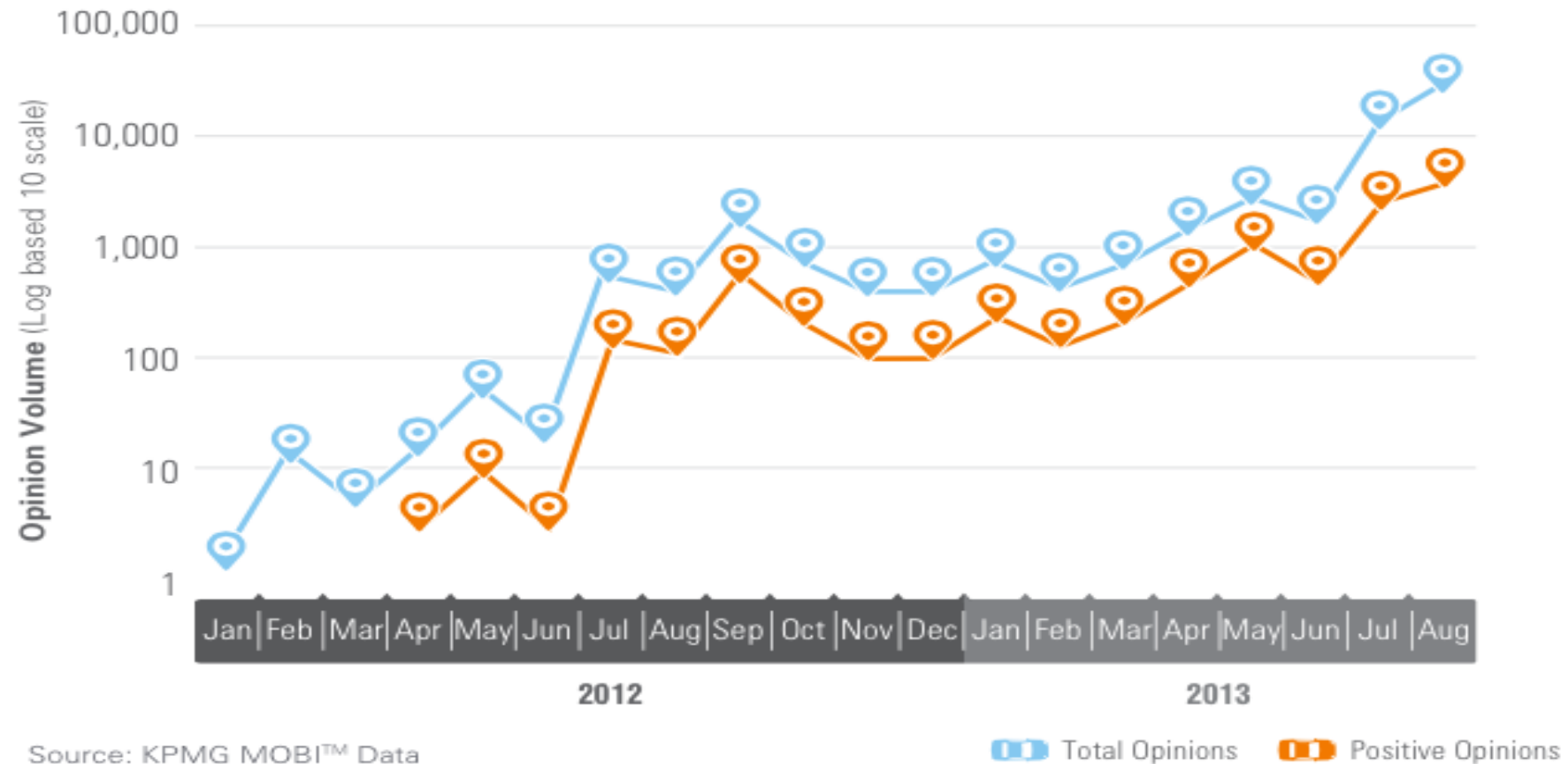
Join a road train

A safe and energy-efficient way to travel

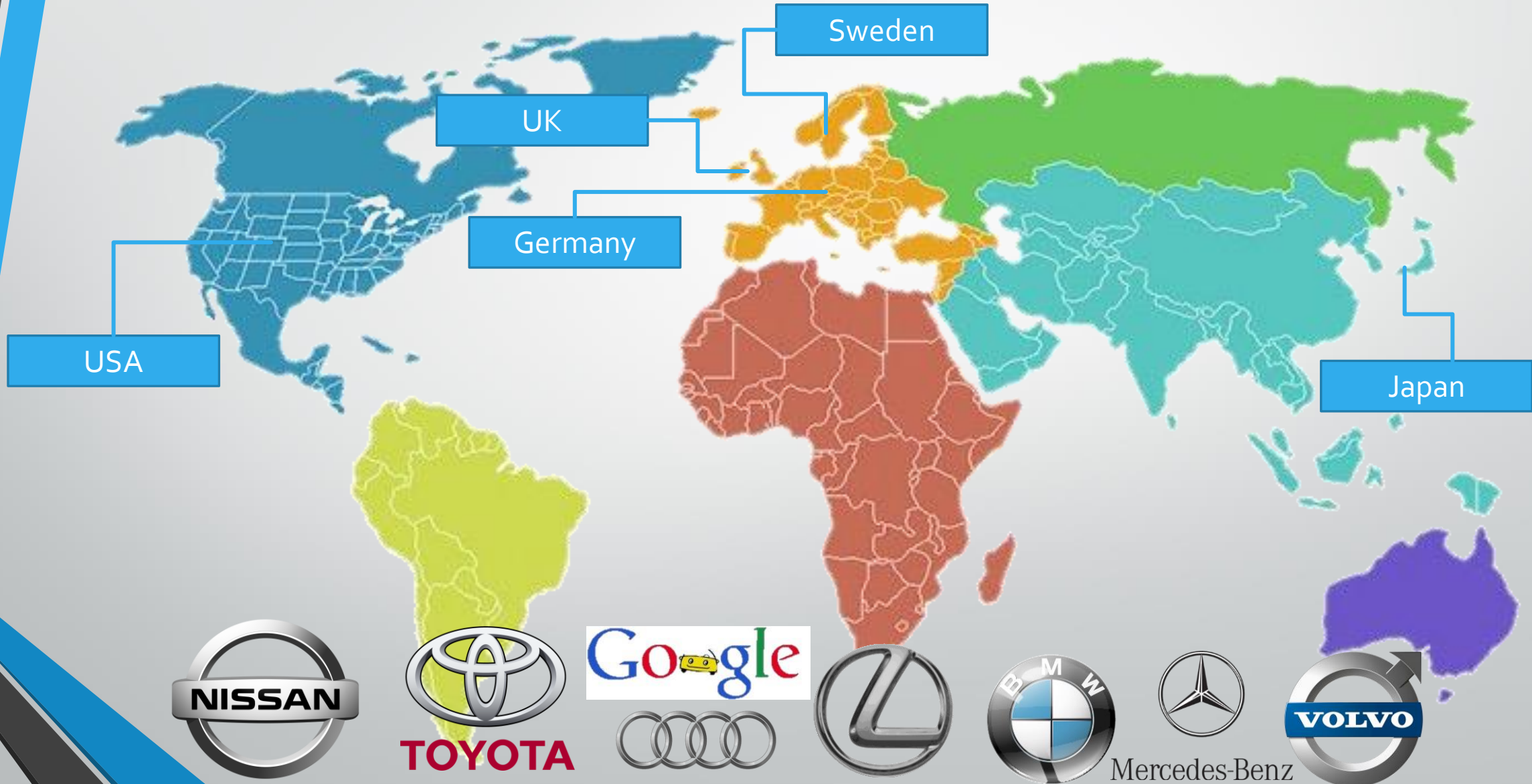


Updates from our surroundings

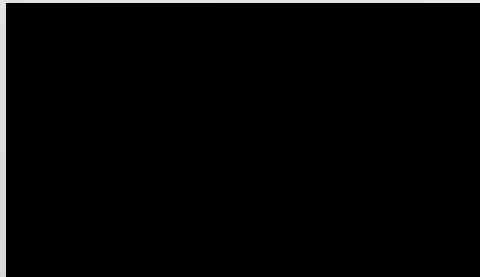
Self-Driving Car discussion is accelerating...



Competing Countries & Companies (Main Players)



Buzz Words / Gossips & Rumors



Luxury In Motion



PROJECT TITAN - APPLE CAR



Drive Me



Reclassifying Existing Mobility

Remote Assistance (Public Transport)

- Coverage in remote Urban and suburban areas (Passenger Collection)
- Integrated mobile technology with autonomous vehicle
- Would reduce need of park & ride complexes (Better Use of Land)

Airport Taxi

- Integrated mobile technology with autonomous vehicle
- Inspired by current business models like Car2Go & Drive Now
- one origin and multi destination (less complex model)



Reclassifying Existing Mobility

3. Floating car (private car sharing for individuals)

- Increase ROI (You buy and let others also use it)
- Increased utilization & productivity of vehicles



Use of
vehicles by
time of day &
vehicle age

Possible interests of states/Businesses to participate

Why Not – WHEN !

- Industry growth rate 16%
- Expected to be over \$1 trillion industry in 2025
- People trend in automation is inclining
- World is looking for mobility 4.0

Interests

- **Extrinsic**
 - Federal funding
 - Early bird in future business - Investment
 - Expertise and infrastructure development
 - employment
- **Intrinsic**
 - Be part of global change and challenge
 - Motivation and proudness of being pioneer



Potentials

Safer & Cleaner Transportation

Maximization Of Car Utilization

Reliable Transportation For Disabled & Elders

Maximize Utilization Of Driving Time
(6 working weeks are wasted annually)

Reduction in wasted commuting
Saving fuel & Land

Drawbacks

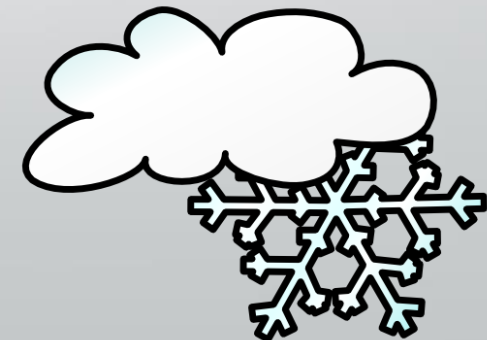
Unemployment Of Skilled Workers (Taxi Drivers Etc.)

Expensive Technology
(LIDAR \$70 K)

Reduction In Taxes & Insurance Collection

Functional dependency
(Weather, AI etc.)

Debate On Laws, Legislations & Insurance Liability

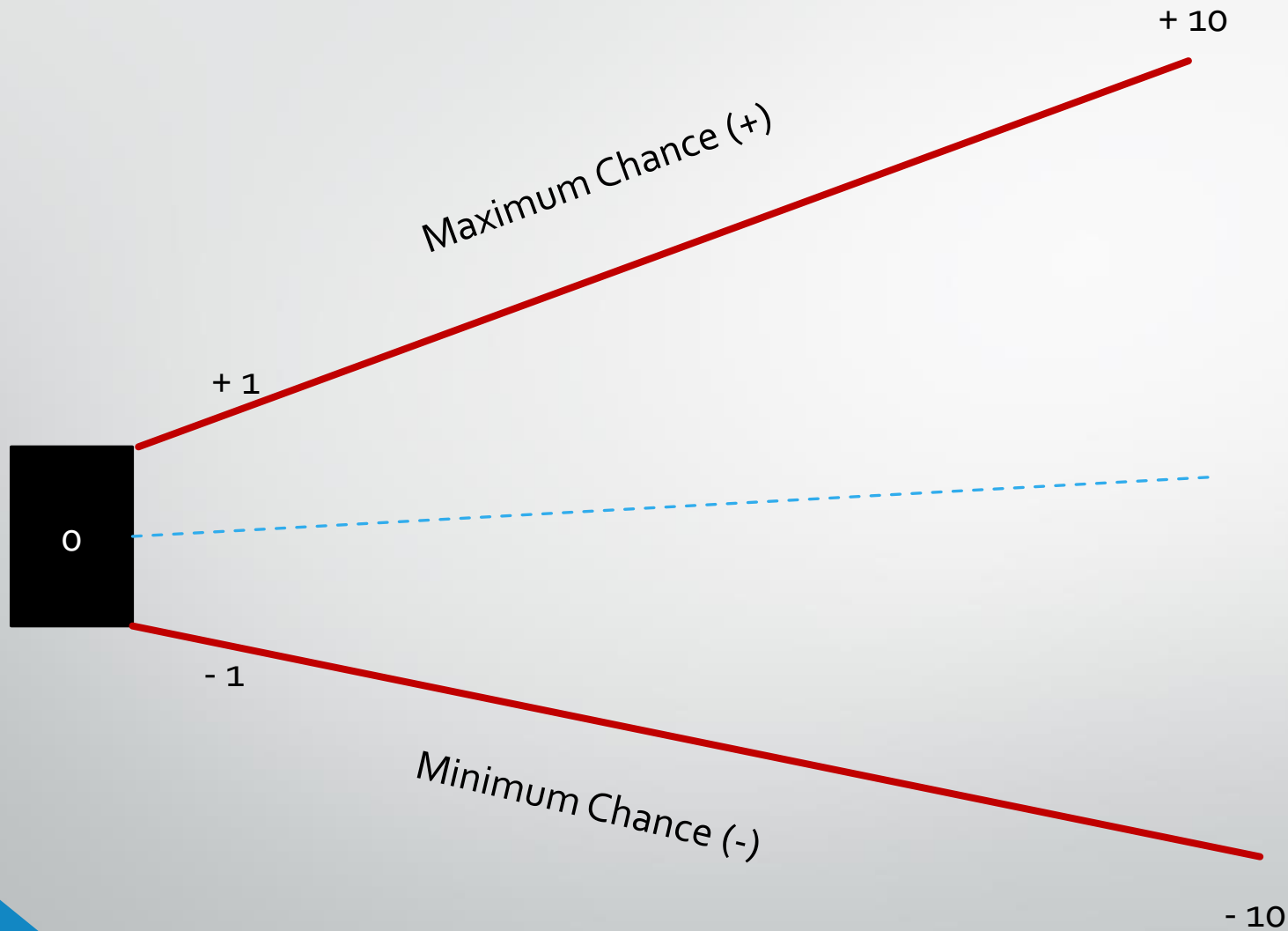


Conclusion/ Comments



THANK YOU

Experiment



Q1 – What do you think is the future of Self Driving Cars

Rate your answers ± 1 to ± 10

Q2 – What is the business prospect with Self Driving Cars

References

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