Mobility-as-a-Service

Will Reduce the Social Costs of Mobility

Johann Jungwirth, Vice President of Mobility-as-a-Service

Social Costs of Mobility With Human Drivers

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1.35 million traffic deaths, 50 million injuries – 94% caused by human errors

1.2 billion cars – less then 0.1% fully accessible & only 55 minutes in use per day

1.1 average seat occupancy – almost no sharing

400 billion hours lost per year behind steering wheel

120.000 square kilometers of valuable space allocated for parking spaces

Mobility Today is Not (Fully) Accessible

About 26% of the adults (in the US) have some type of disability

About 32% of the population has no driver's license

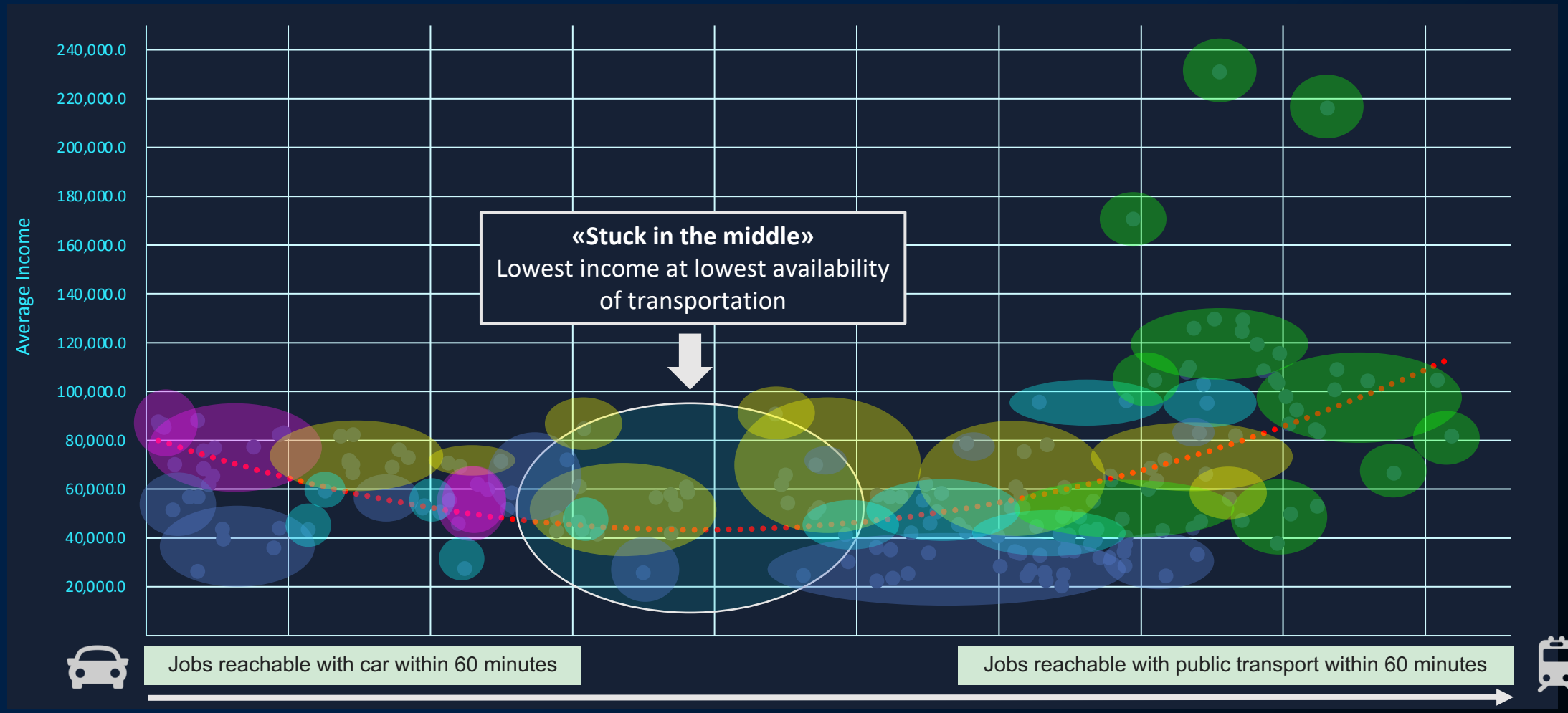
Mobility Today is Limited

Mobility Today is Partially Unavailable

«If I could offer more mobility, I would bring more people from poverty to work and prosperity.»

Mayor of Sao Paulo

Mobility Enables Work



Mobility Enables Prosperity

The Right Thing To Do: Driverless Inclusive Mobility for All!

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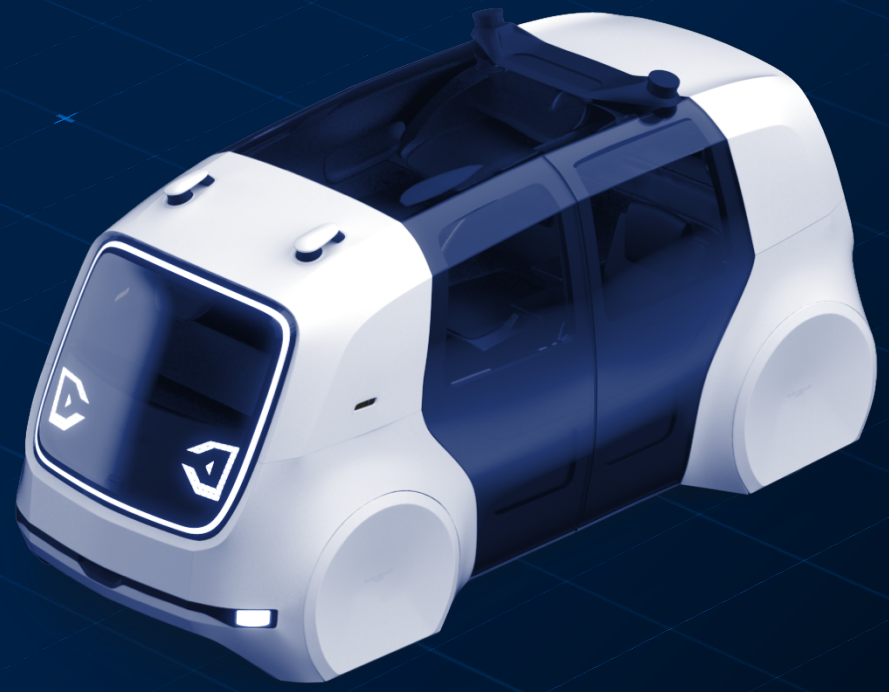
- Safe
- Accessible
- Clean
- Affordable
- Convenient



Higher Purpose: Inclusive Mobility as Basic Human Right

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United Nations – Universal Declaration of Human Rights (1948)
(Article 13)

"Everyone has the right to freedom of movement..."

"...freedom of speech"

"...freedom of religion"

"...freedom of assembly"

...

Social Costs of Mobility Reduced with Driverless Solutions

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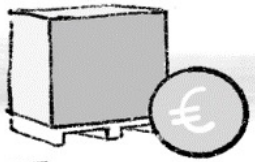
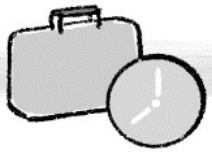
Changes compared to 2020

	Up to 2030 as in the past	Up to 2030 with autonomous vehicles
Volume of traffic	+6%	-4%
Fatal accidents	+4%	-37%
Energy consumption	+1%	-12%
Parking space	+8%	-35%
Freight costs	+1%	-13%
Time in transit	≈0%	-3%

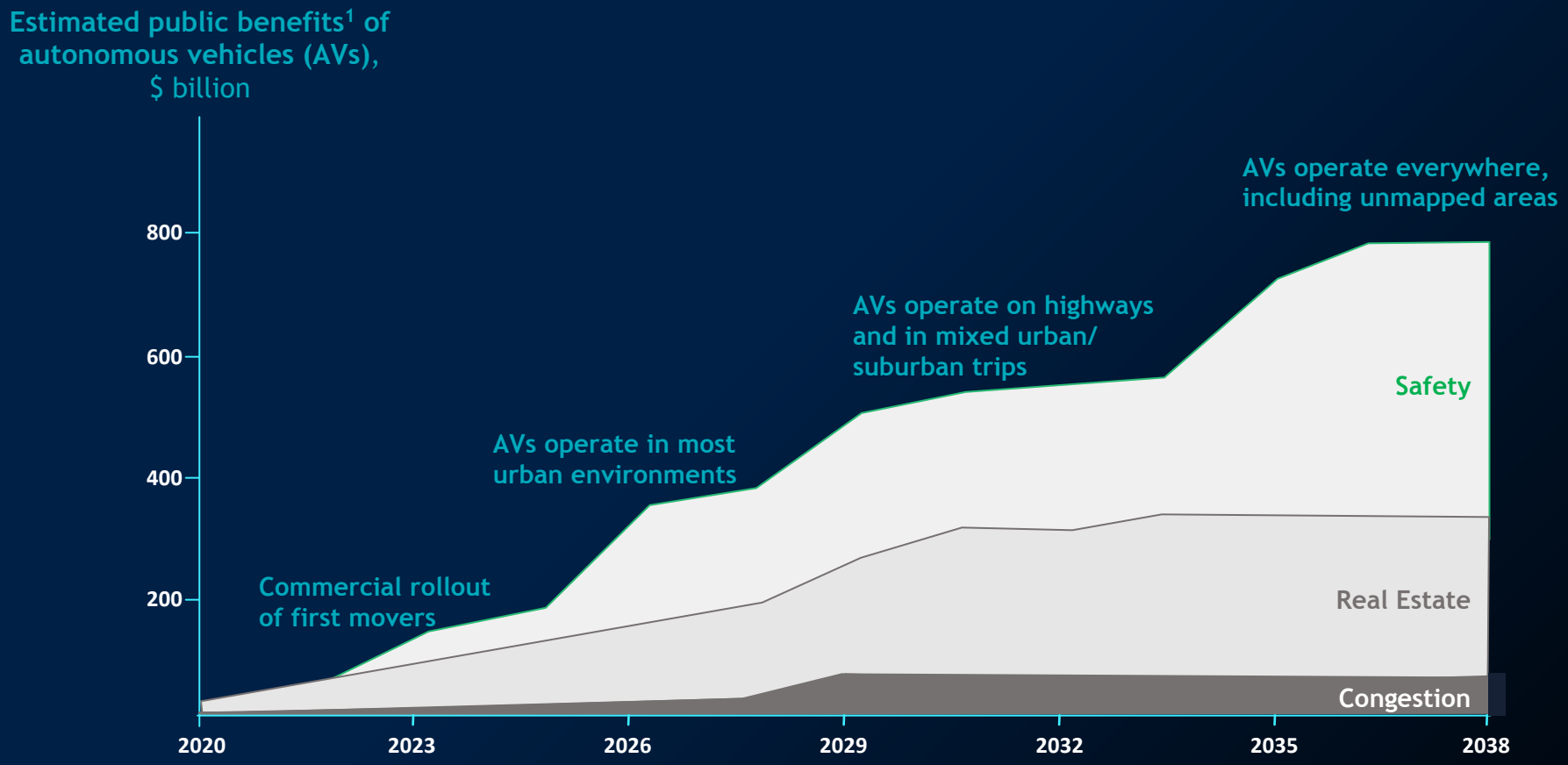




Massive Public Benefits

In the United States alone, if autonomous vehicles were fully adopted, the benefits to the public would exceed $800 billion per year (~4.5% of GDP)



1) Environmental benefits are proportionately small (<$4 billion) and barely visible in the chart
Source: US Federal Highway Administration; McKinsey analysis

Freedom of Time

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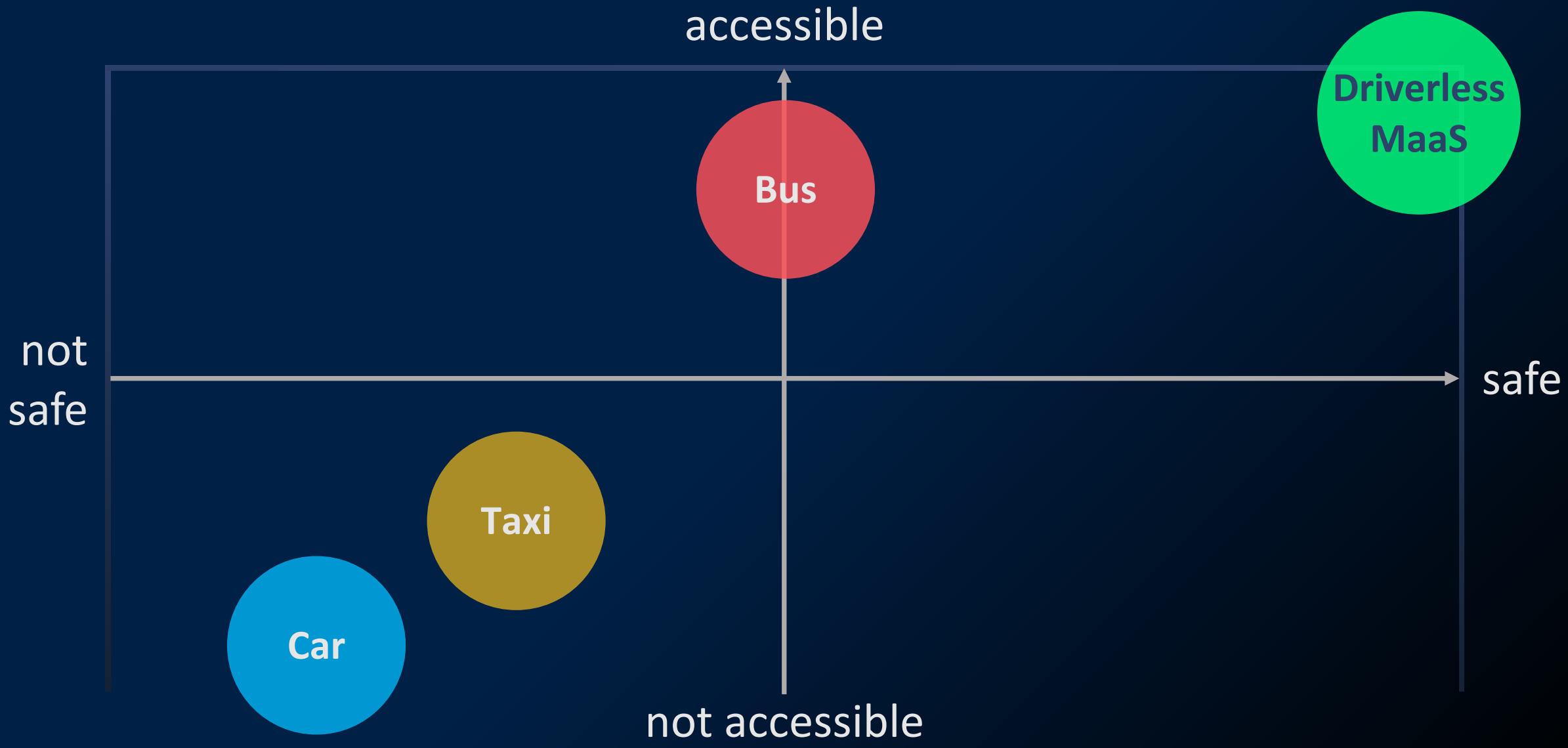
What is the value of 400 billion hours per year globally?

Between $800 billion and $2 trillion

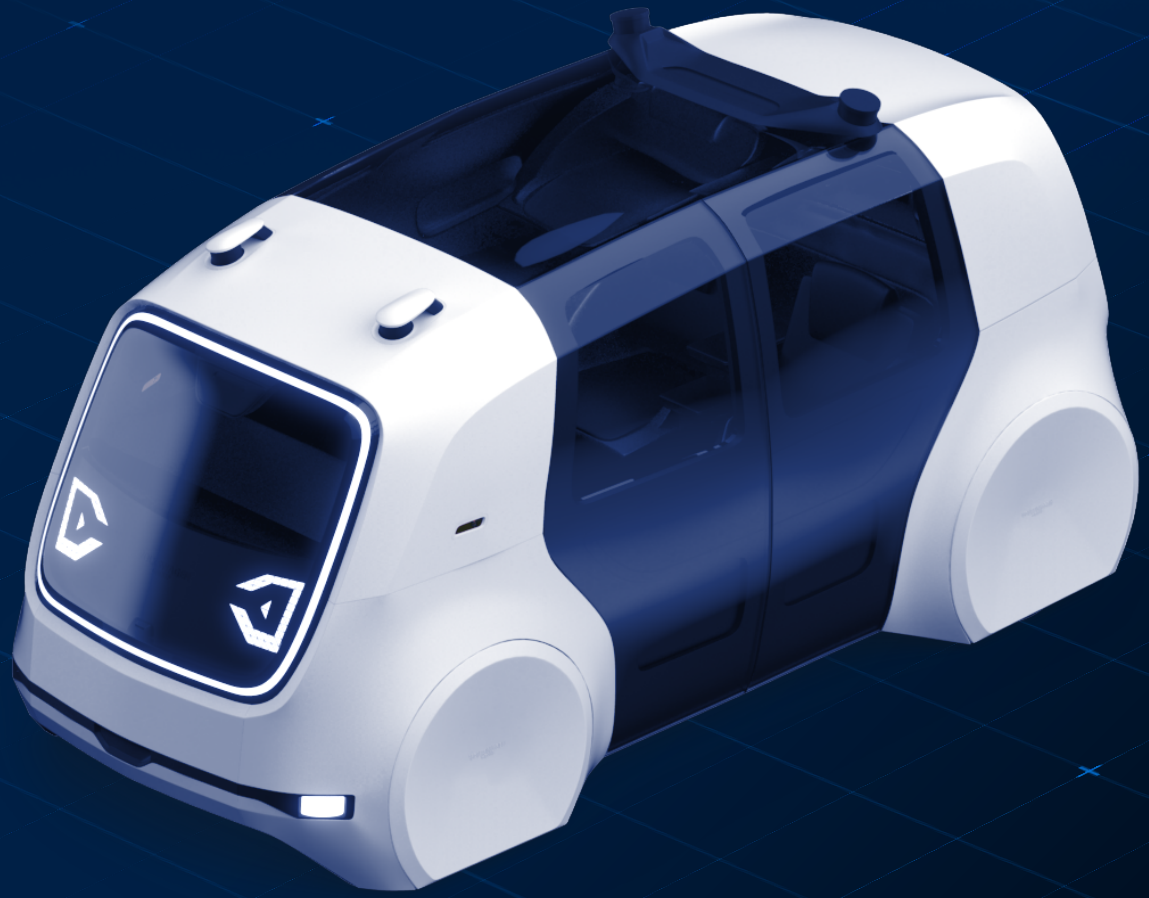
(GDP per hour between $2 and $5)

Driverless Inclusive Mobility-as-a-Service



Accessible for All → Mobility for All

inclusive by design



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The Interior Will Be The New Exterior

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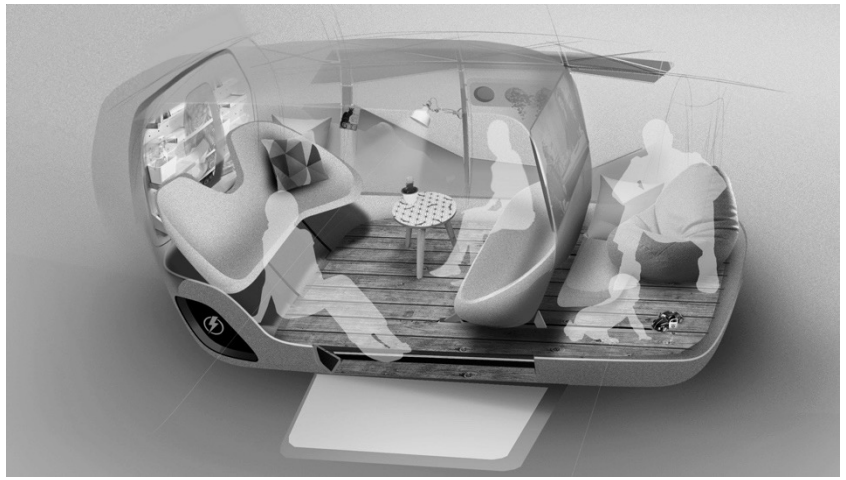
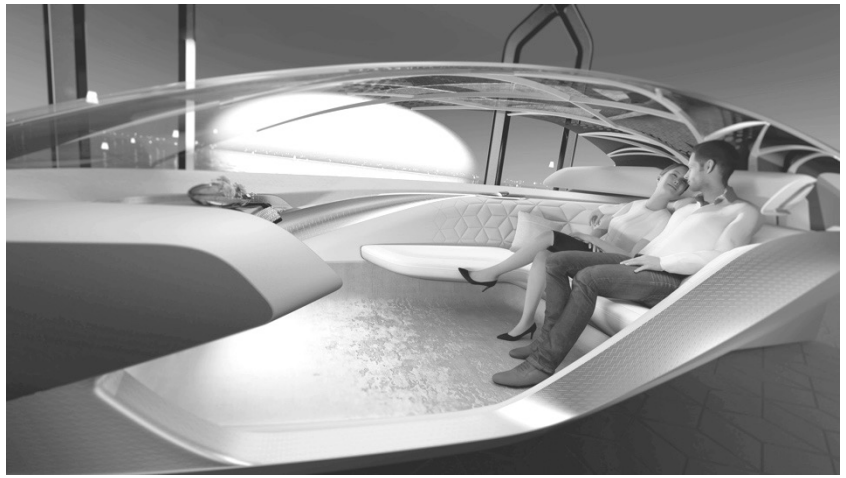
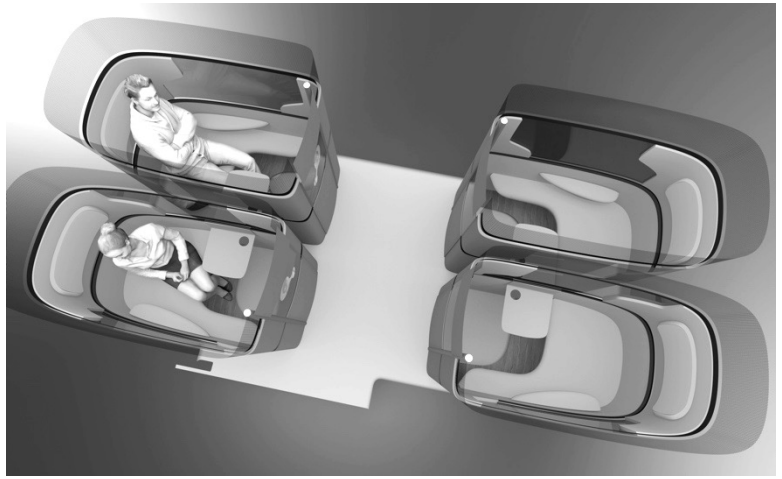
Social & Family



Privacy & Comfort

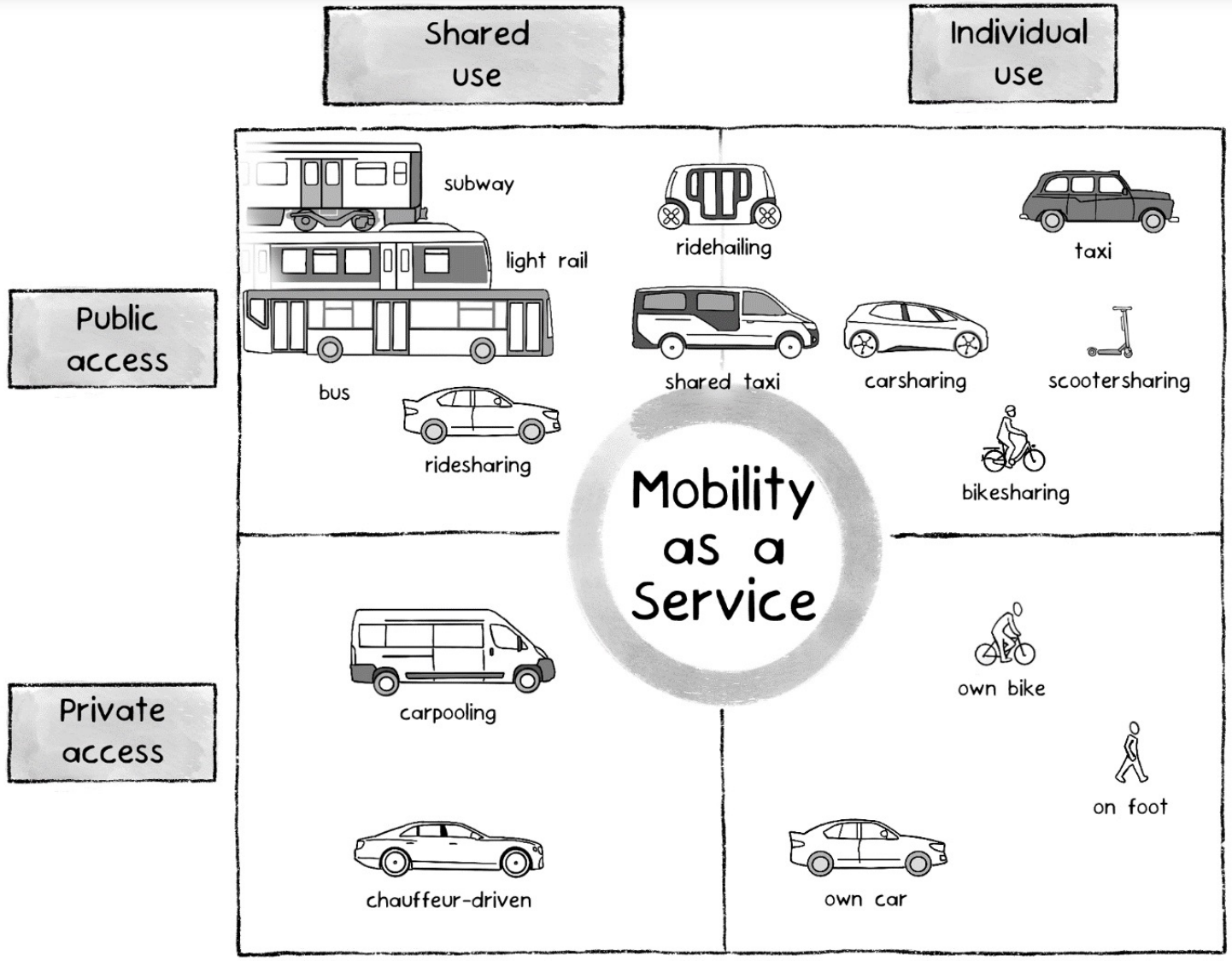




Pod

Shuttle

Behavior Shift with Multimodal Mobility-as-a-Service Solutions



Future of Mobility Is Accessible by Design & Inclusive

door-to-door services

no dependency on driver

ability to stand & sit

fully accessible app

high door opening

voice control & directions to find vehicle

air suspension

secured wheelchair space

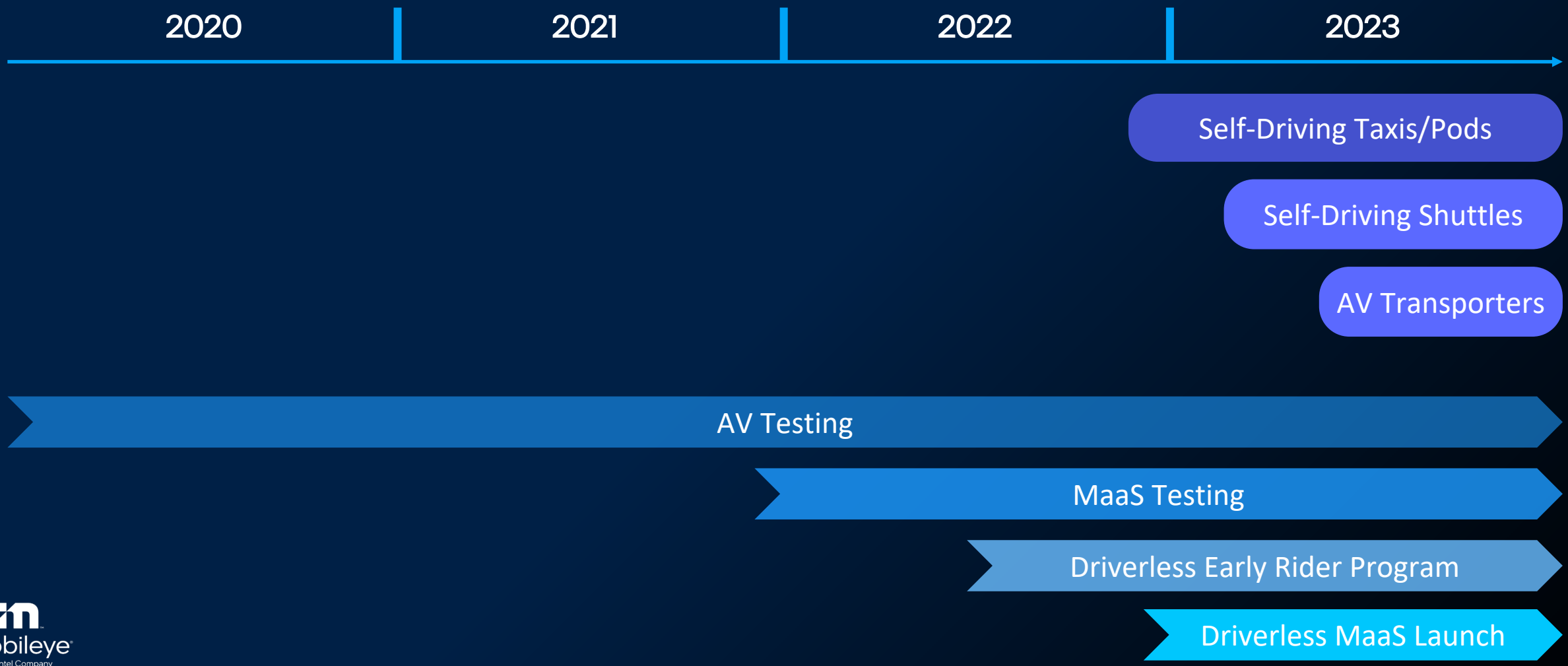
low floor (no under-floor battery)

easy entry/exit ramp

Differentiator: Regular Driving Speed

Schaeffler Rolling Chassis – Driven by Mobileye

MaaS Roadmap in first countries with L4 Legislation & Regulation



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Mobileye AV Everywhere

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Mobility-as-a-Service (MaaS)

Value Layers

MaaS Layer 5	Demand & Rider Experience
MaaS Layer 4	Mobility Intelligence Platform & Services
MaaS Layer 3	Fleet Operations & Tele Operation
MaaS Layer 2	Self-Driving Vehicles
MaaS Layer 1	Self-Driving System

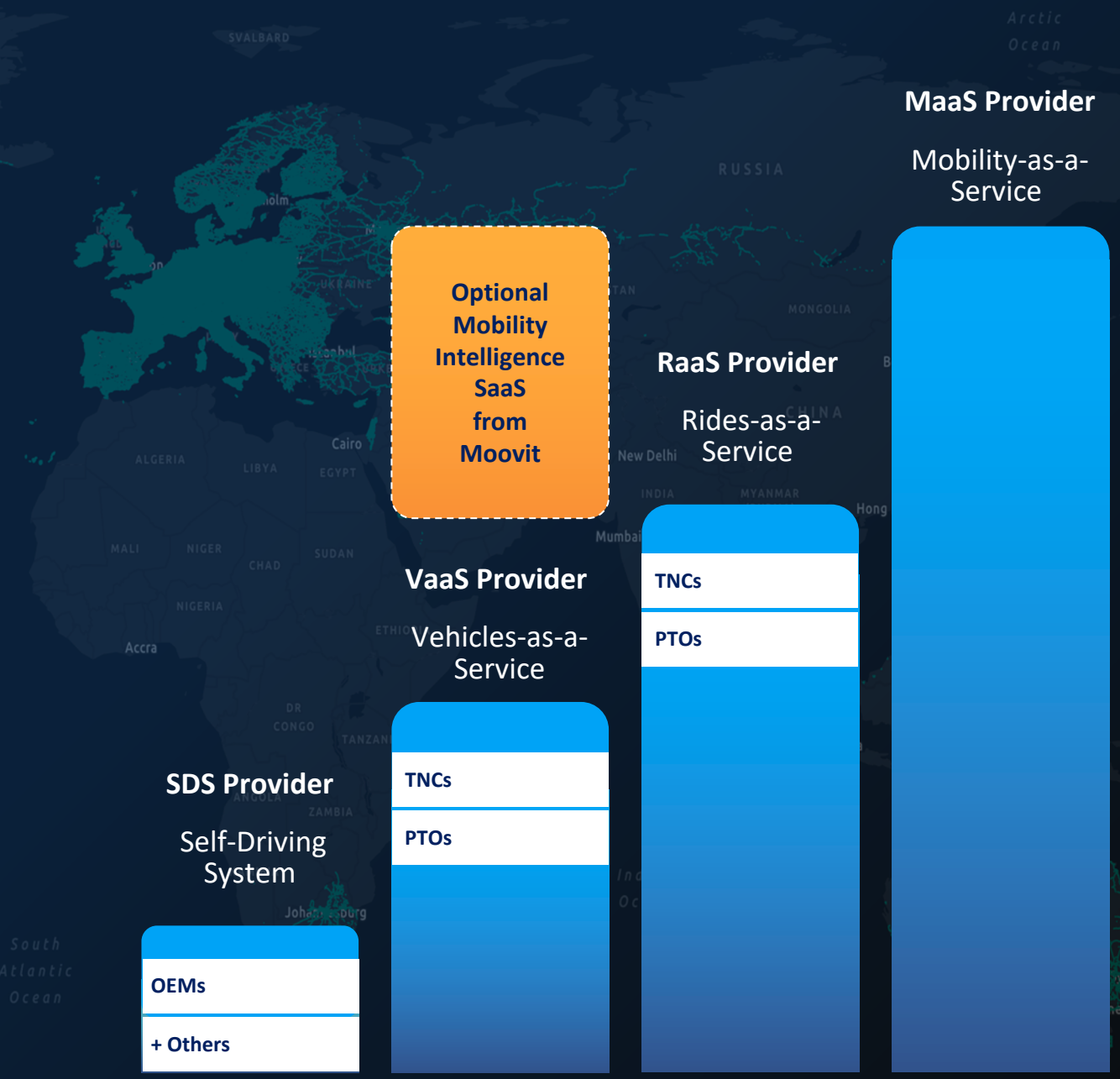




Mobility XaaS

Global Business Footprint

MaaS Layer 5	Demand & Rider Experience
MaaS Layer 4	Mobility Intelligence Platform & Services
MaaS Layer 3	Fleet Operations & Tele Operation
MaaS Layer 2	Self-Driving Vehicles
MaaS Layer 1	Self-Driving System



Mobility Supply is Shaping in Two Main Streams

PRESENT

PTOs

Public Transport Operators

E.g. RATP, Keolis, Transdev, MTA, etc.

FUTURE

APTO

Automated Public Transport Operators

PRESENT

TNC

Transportation Network Companies

E.g. Uber, Lyft, Grab, Didi, etc.

FUTURE

ATNC

Automated Transportation Network Companies

E.g. Waymo, Cruise, Argo, etc.

Asset Light

E.g. Uber, Lyft, Grab, Didi, etc.

Mobility Supply is Shaping in Two Main Streams

PRESENT

PTOs
Public Transport Operators

E.g. RATP, Keolis, Transdev, MTA, etc.

VaaS/RaaS

PRESENT

TNC
Transportation Network Companies

E.g. Uber, Lyft, Grab, Didi, etc.

RaaS/VaaS

MaaS

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Through a diversified XaaS strategy Mobileye-Moovit will serve as the enabler to drive PTOs and TNCs to the autonomous revolution

FUTURE

APTO
Automated Public Transport Operators

FUTURE

ATNC
Automated Transportation Network Companies

E.g. Waymo, Cruise, Argo, etc.

Asset Light

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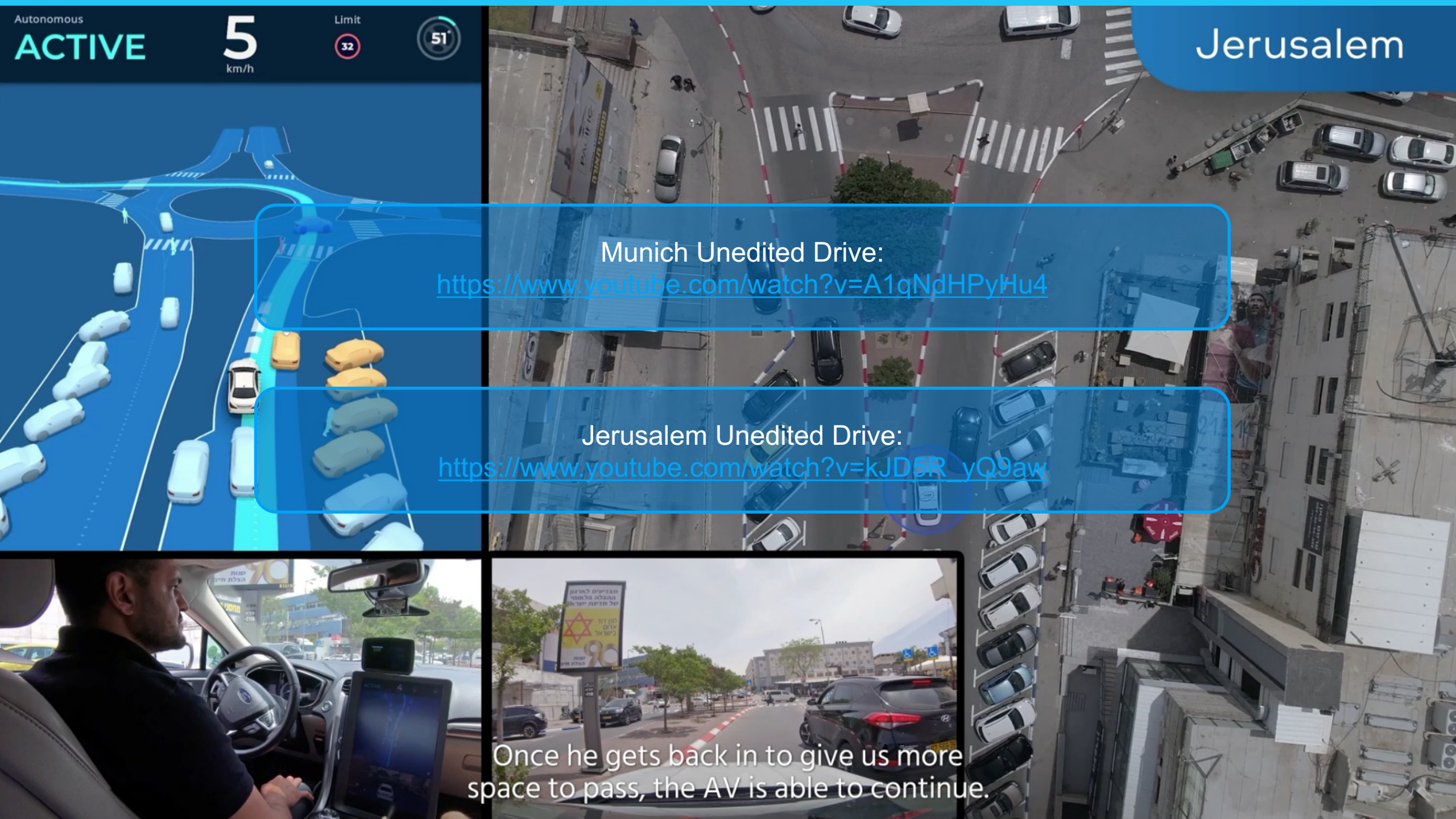

Autonomous
ACTIVE
5
km/h
Limit
32
51
Jerusalem
Munich Unedited Drive:
https://www.youtube.com/watch?v=A1qNdHPyHu4
Jerusalem Unedited Drive:
https://www.youtube.com/watch?v=kJD5R_yQ9aw
Once he gets back in to give us more space to pass, the AV is able to continue.

Under the Hood of Computer Vision

NYC Unedited Drive:
https://youtu.be/50NPqEla0C0

Rain and Night Driving

Challenges:

+ Camera cleaning solution- air+water bursts system
+ Detecting unclassified objects on road (garbage bags)

Unclassified Objects on Road

Challenges:

+ Detecting unclassified objects in the scene (fence on road, rickshaw)
+ Negotiating with cars in the adjacent lane
+ Night driving in NYC- coping with “light pollution”

Mobileye® Drive™

A turn-key self-driving system ready for commercial deployment at-scale for Mobility-as-a-Service, delivery vehicles, and more.

Full sensor suite:

- 11+2 Cameras
- 3 Long-range LiDARs
- 6 Short-range LiDARs
- 6 Radars

L4/L5 compute based on Mobileye EyeQ®5 SoCs

Based on the Mobileye Trinity

→ **True Redundancy™**
Robust perception system comprised of two independent sub-systems (cameras and radars + LiDARs)

→ **Road Experience Management™ (REM™)**
Proprietary, constantly refreshed, crowdsourced AV maps built to scale across the globe

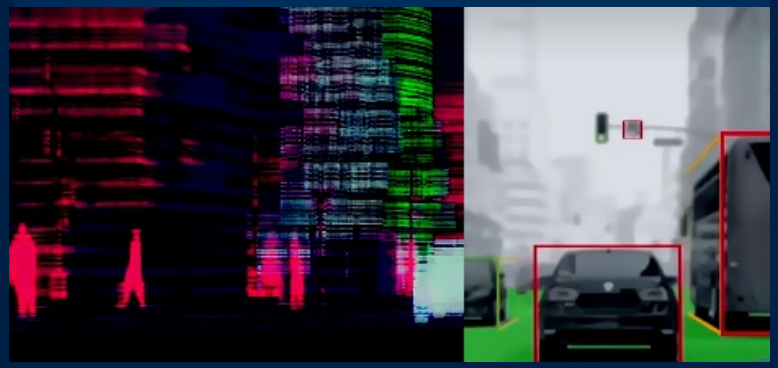
→ **Responsibility-Sensitive Safety (RSS)**
Formal model for AV safety and decision-making

The Trinity of Mobileye's Approach

The ADAS ←→ AV divide NOT range of capability, but MTBF

True Redundancy™

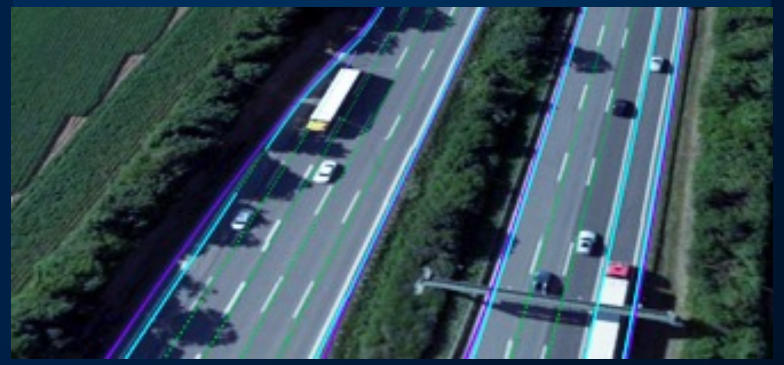
- AV is a system composed of independent subsystems; each is fully handsfree capable
- One of the subsystems is ADAS - we call it SuperVision™



REM™- enabled scalability AV Map Key to High MTBF

REM™-based AV Maps

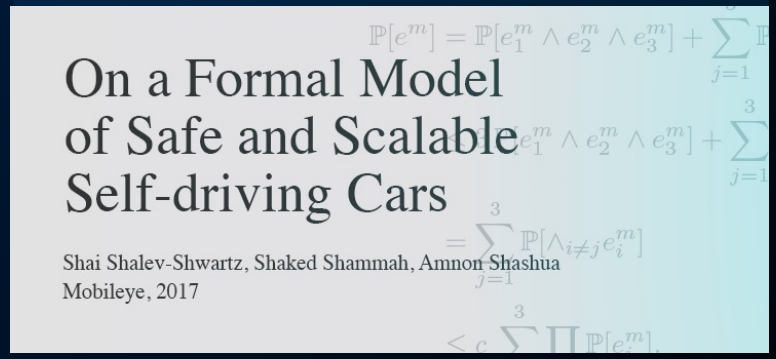
- To make this useful, geo scalability at low cost is imperative
- Crowdsource data collection followed by auto AV map creation in the cloud
- Byproduct: data-driven business



RSS formal safety model Decision-making governance:

Responsibility-Sensitive Safety

- High MTBF is NOT sufficient for guaranteeing safety
- Need to guarantee that AV will not have "lapse of judgment"
- Standardizing human judgement (IEEE P2846)



World Premiere at IAA Mobility 2021: First Mobileye Robotaxi

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Mobileye Drive Self-Driving System L4 ECU

Self-Driving MaaS via Moovit App

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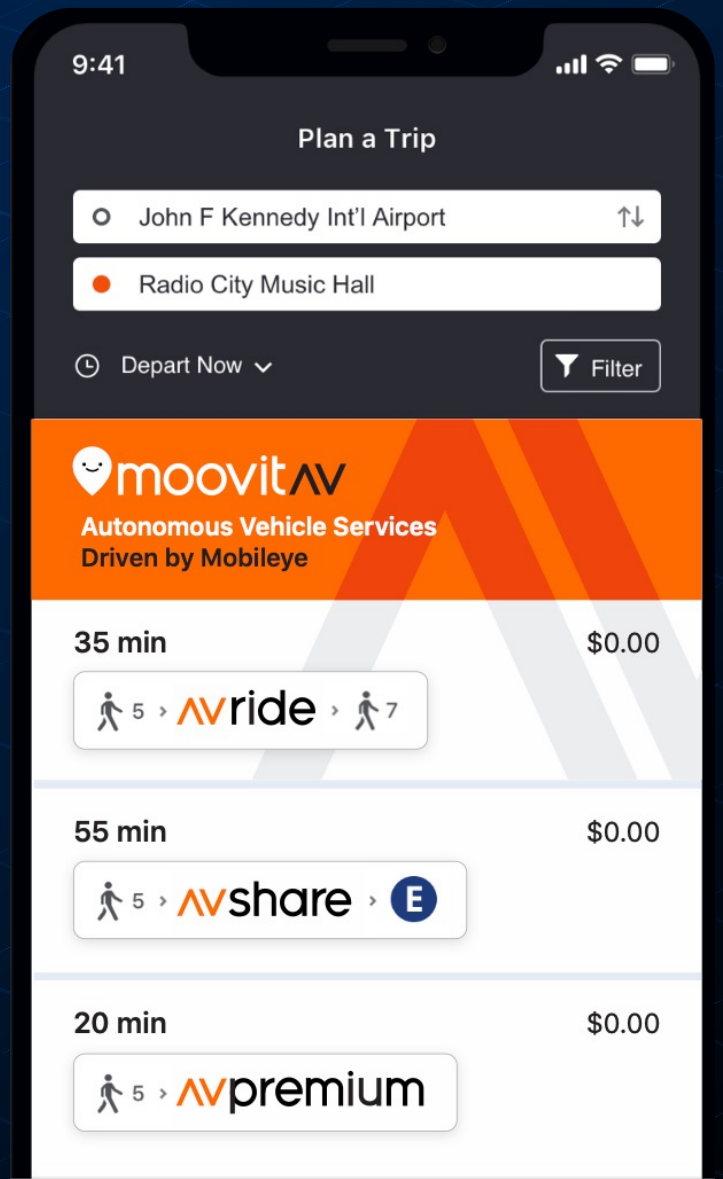

World Premiere of Mobileye Robotaxi
https://youtu.be/ZSihbQDg2HA

Mobileye and Sixt Partnership
https://youtu.be/A4-5jyq9Ssc

THE FIRST AUTONOMOUS ROBOTAXIS IN GERMANY

SIXT | mobileye An Intel Company | moovit AV