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General Motors / Opel

How OnStar and Vehicle Connectivity Shape the Future of Transportation

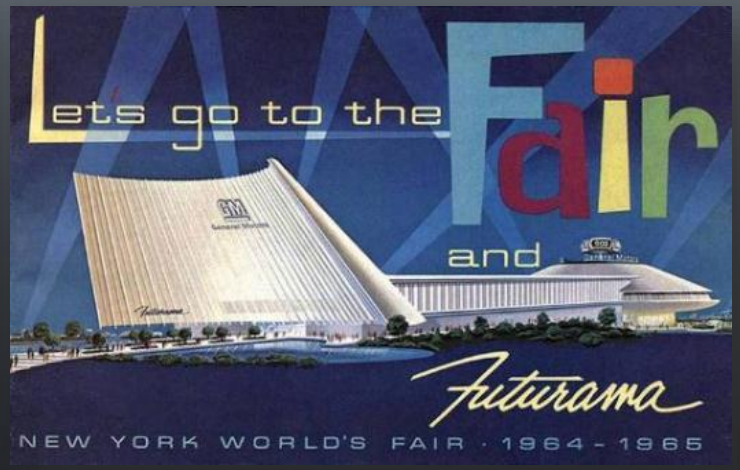
PSCE conference
Athens, Greece
23 November, 2016

General Motors – a history of envisioning future transportation

1964

1964 Futurama II - the "City of Tomorrow" would eliminate all traffic problems

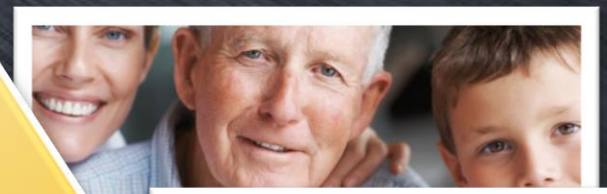
- Urban living centers above advanced freeways
- Computer-guided vehicles would travel swiftly & safely
- Moving walkways would carry pedestrians to shopping areas and other attractions.

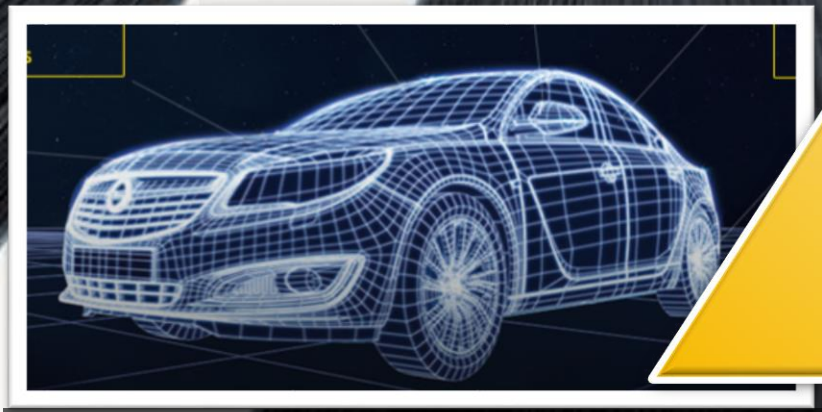


GM / Motorama Exhibition, 1956

The Challenge: It is a complex world

Technology
Vehicle / Sensors /Algorithms





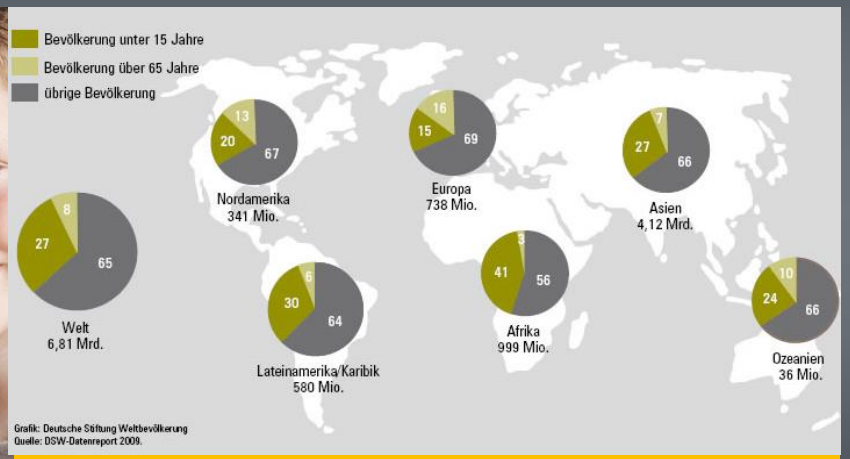
Business Model
Completely novel ideas for Safeguarding processes and Business Models required.

Society
How many accidents have to be prevented, before one machine-caused accident is accepted?

Nobody lives in „Globalia“ …

Example: Demography

Aging Population in mature markets such as Europe, U.S., Japan, and even some emerging markets such as China or South-East Asia



Young, dynamic population in India, Africa, and middle east and parts of USA

Nobody lives in „Globalia“ …

Example: Connectivity

High penetration with smartphone & „fixed-line“ infrastructure in EU and Asia. Expensive old infrastructure needs to be utilized

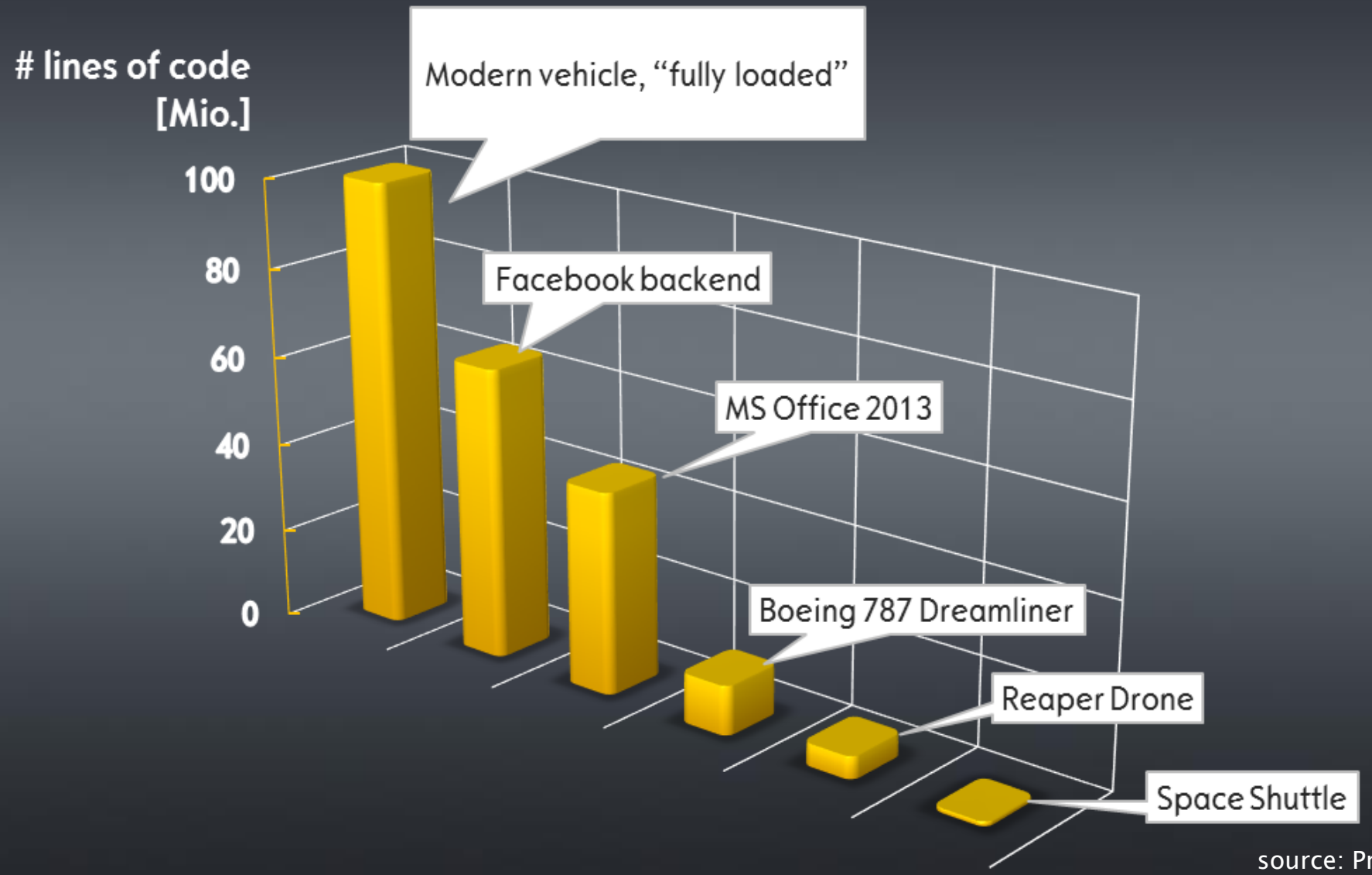
Mobile, open-platform internet concepts replace non-existing, conventional infrastructure in Africa and parts of Asia

Inventions that changed the world …

Invention	Date of Invention	Number of years to reach 25% of households
Air plane1903	64	
Auto	1886	55
Electricity	1873	46
Telephone	1876	35
VCR	1952	34
Microwave oven	1953	30
TV	1926	26
Radio	1906	22
PC	1975	16
Mobile phone	1983	13
Internet	1991	7
Smart Phone*	2007	3

Cooley/Yorukoglu (2003)
*Scholz/comScore (2011) – 25% market share sales

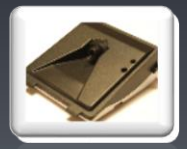
Software Complexity



source: Prime research

Technology Basis: Today‘s Driver Assistance Systems

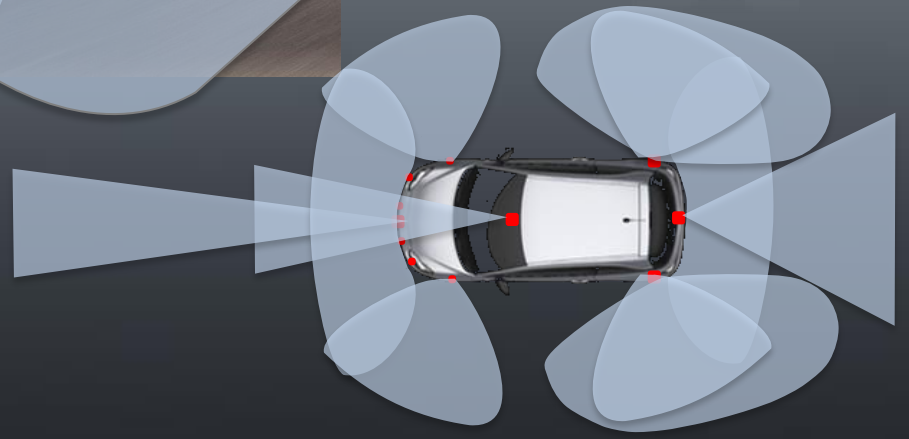
Front Camera



Radar

Ultrasonic

Rear Camera



OPEL OnStar®

Short-Term Intervention

Near Accident Prevention

Gefördert durch:

Bundesministerium
für Wirtschaft
und Energie

aufgrund eines Beschlusses
des Deutschen Bundestages

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Continuous Automation (SAE)

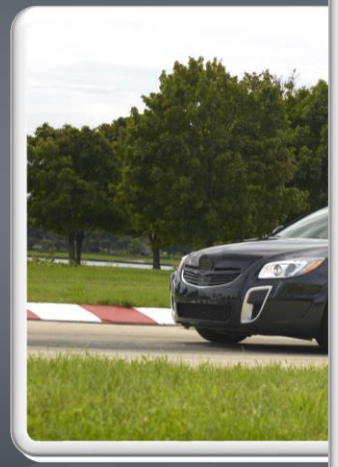
Level	Name	Narrative definition	Execution of steering and acceleration/ deceleration	Monitoring of driving environment	Fallback performance of *dynamic driving task*	System capability (*driving modes*)	BASt level	NHTSA level
Human driver **monitors the driving environment**								
0	**No Automation**	the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a	Driver only	0
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*	Human driver and system	Human driver	Human driver	Some driving modes	Assisted	1
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*	**System**	Human driver	Human driver	Some driving modes	Partially automated	2
Automated driving system **("system") monitors the driving 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*	System	**System**	Human driver	Some driving modes	Highly automated	3
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*	System	System	**System**	Some driving modes	Fully automated	3/4
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*	System	System	System	**All driving modes**	-	

Source: SAE / AdaptIVe

GM/Opel is leading the w

Opel Research project, 2005

Driverless, urban shuttles „EN-V“

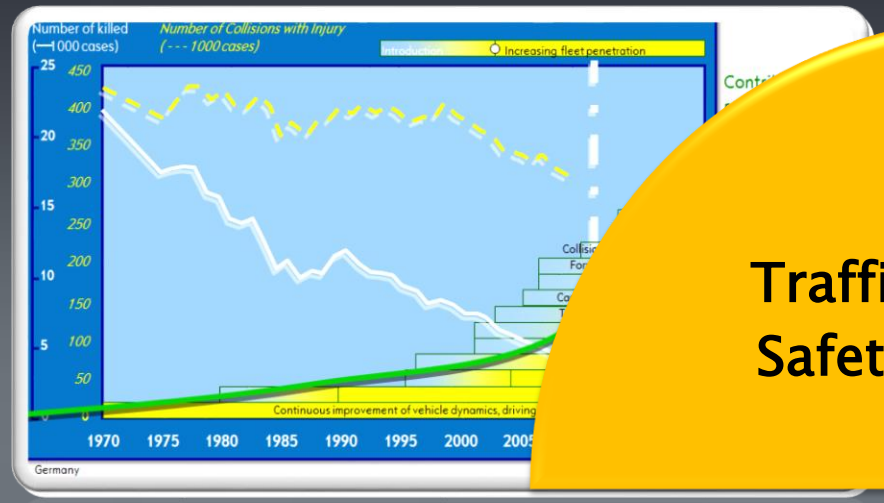


ITS World C

Urban autom

„Supercruise“ Media demonstration, 2013

Why Automated Driving?



Traffic Safety

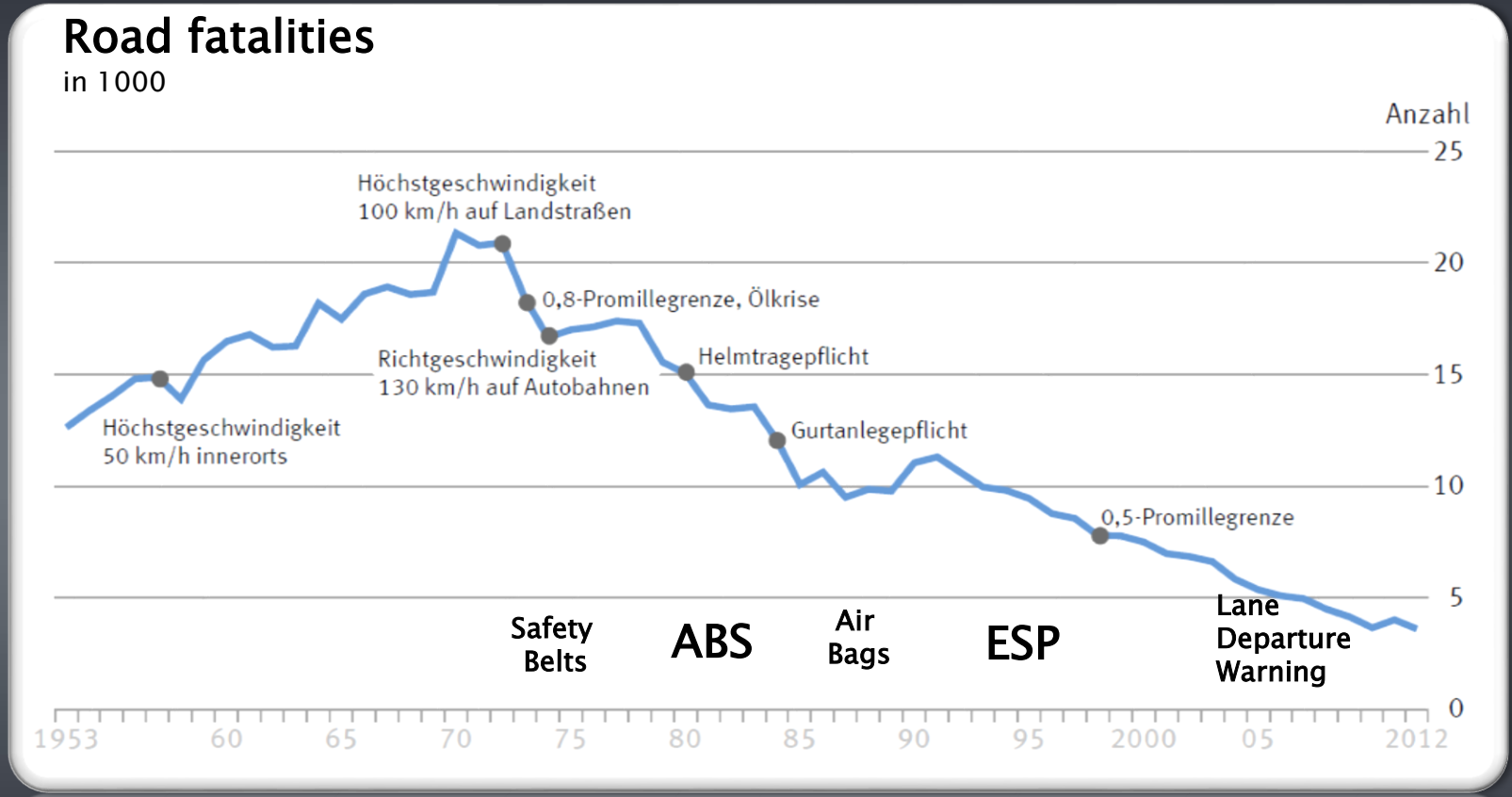
Comfort

Efficiency

Produc-
tivity

Quelle:
flickr.com

Traffic Safety in Germany



Source: Destatis

Quo Vadis?

Traditional active- and passive safety systems are approaching their limits.

A technology step is required

Post Crash Safety through Connectivity (Opel OnStar)

Over 1 billion customer interactions worldwide in over 20 years

Europe (08/15 – 10/16)

- 1.5 million Interactions
- 25.296 Red button presses
- 214 Automatic crash responses
- 15 Stolen Vehicle Assistance requests
- Every other Opel/Vauxhall is equipped with OnStar

Globally (since 1997)

- >1 billion Interactions
- 5.5 million emergency services delivered
- 29.000 Stolen Vehicle Assistance requests

OPEL OnStar®

YOUR PERSONAL CONNECTIVITY AND SERVICE ASSISTANT.

FREE IN YEAR ONE

AUTOMATIC CRASH RESPONSE

› YOUR GUARDIAN ANGEL

DESTINATION DOWNLOAD

› STRAIGHT TO THE POINT

STOLEN VEHICLE ASSISTANCE

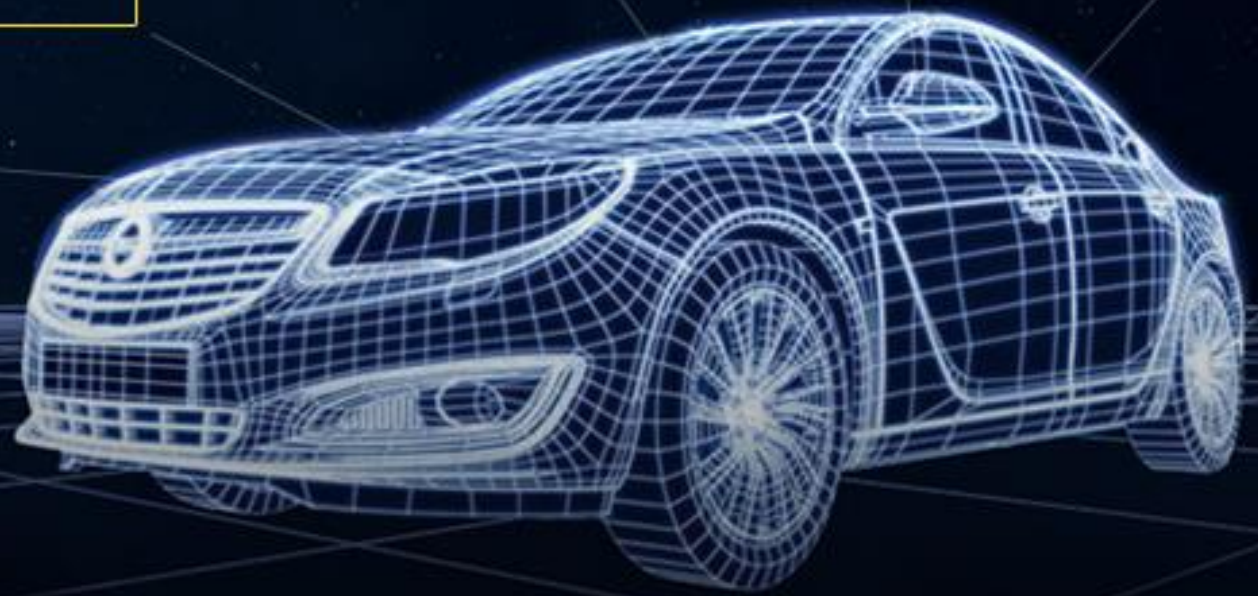
› HOT ON THE THIEVES HEELS

WI-FI

› IN-CAR HOTSPOT FOR ALL

SMARTPHONE FUNCTION

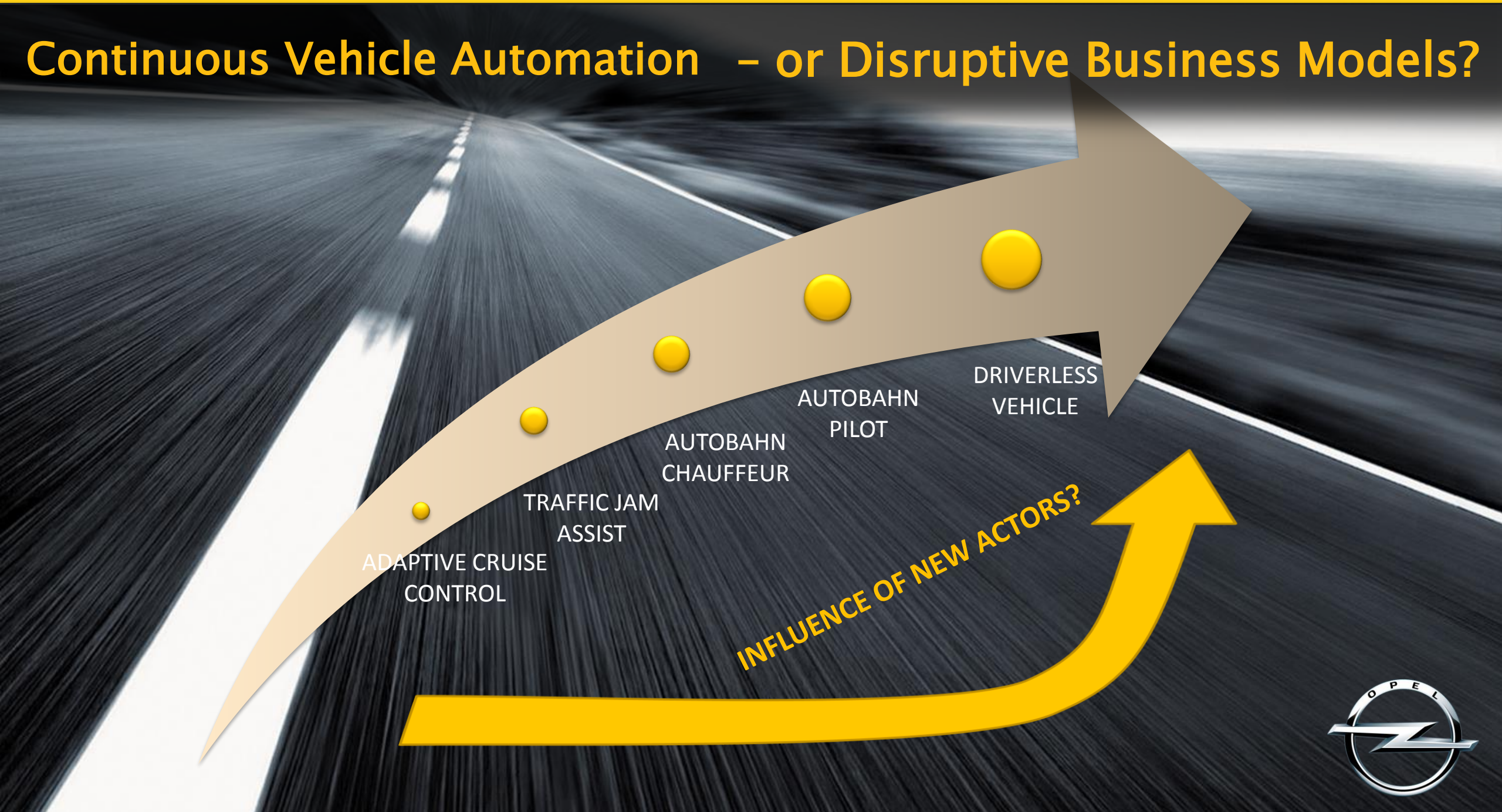
› REMOTE CONTROL FOR YOUR CAR



VEHICLE DIAGNOSTICS

› NO SURPRISES

Continuous Vehicle Automation – or Disruptive Business Models?



But: How will an automated Vehicle cross this street?

Daily traffic in Bangladesch, source: flickr.com

Thank you!