

Advanced Technologies for Reaching Towards Zero Fatalities



Anders Eugensson
Volvo Cars

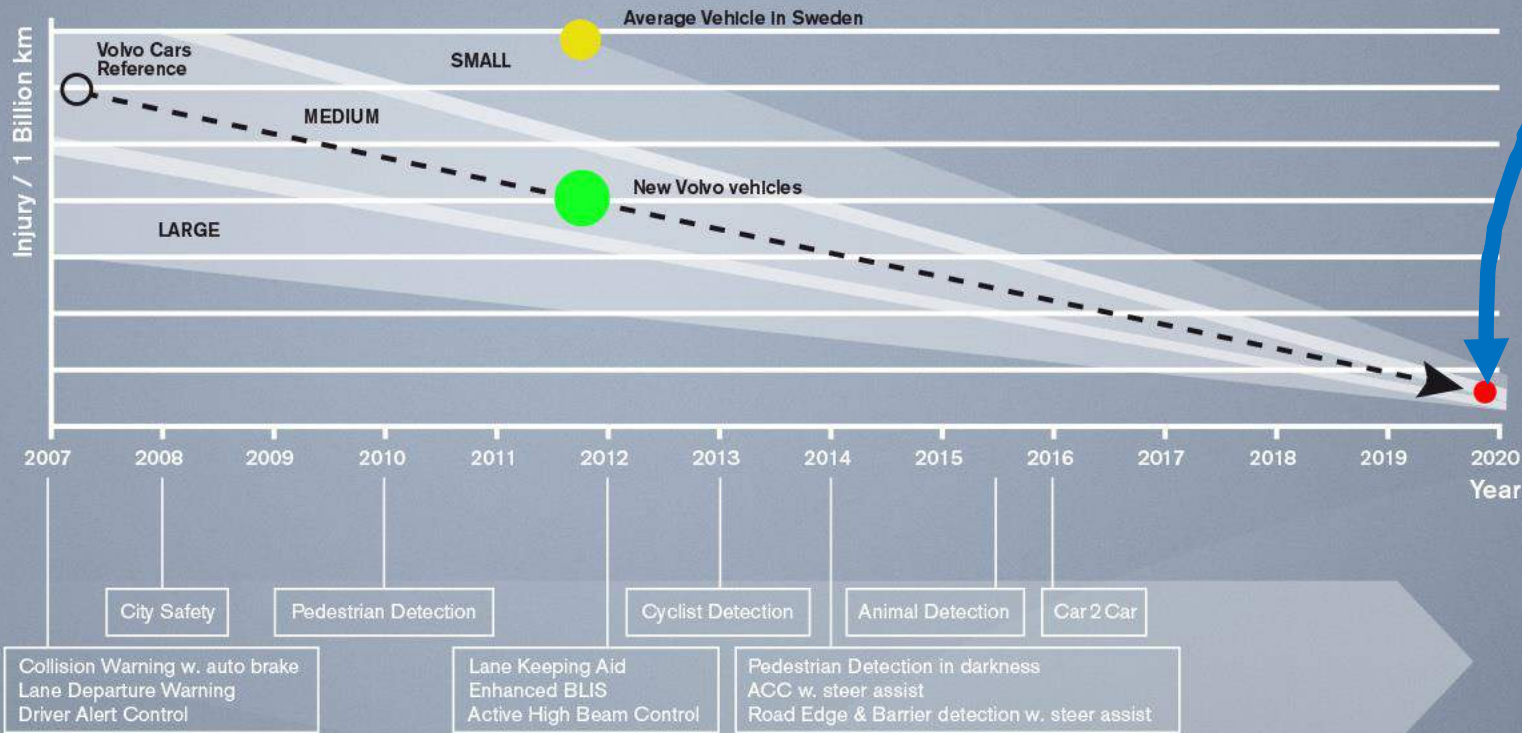


Volvo Vision 2020

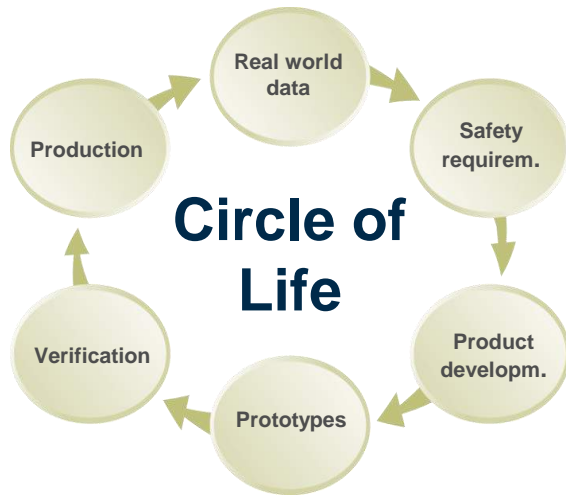
Our vision is to design cars that do not crash

In the shorter perspective the aim is that by 2020 no-one should be killed or seriously injured in a new Volvo car.

The Journey Towards Zero

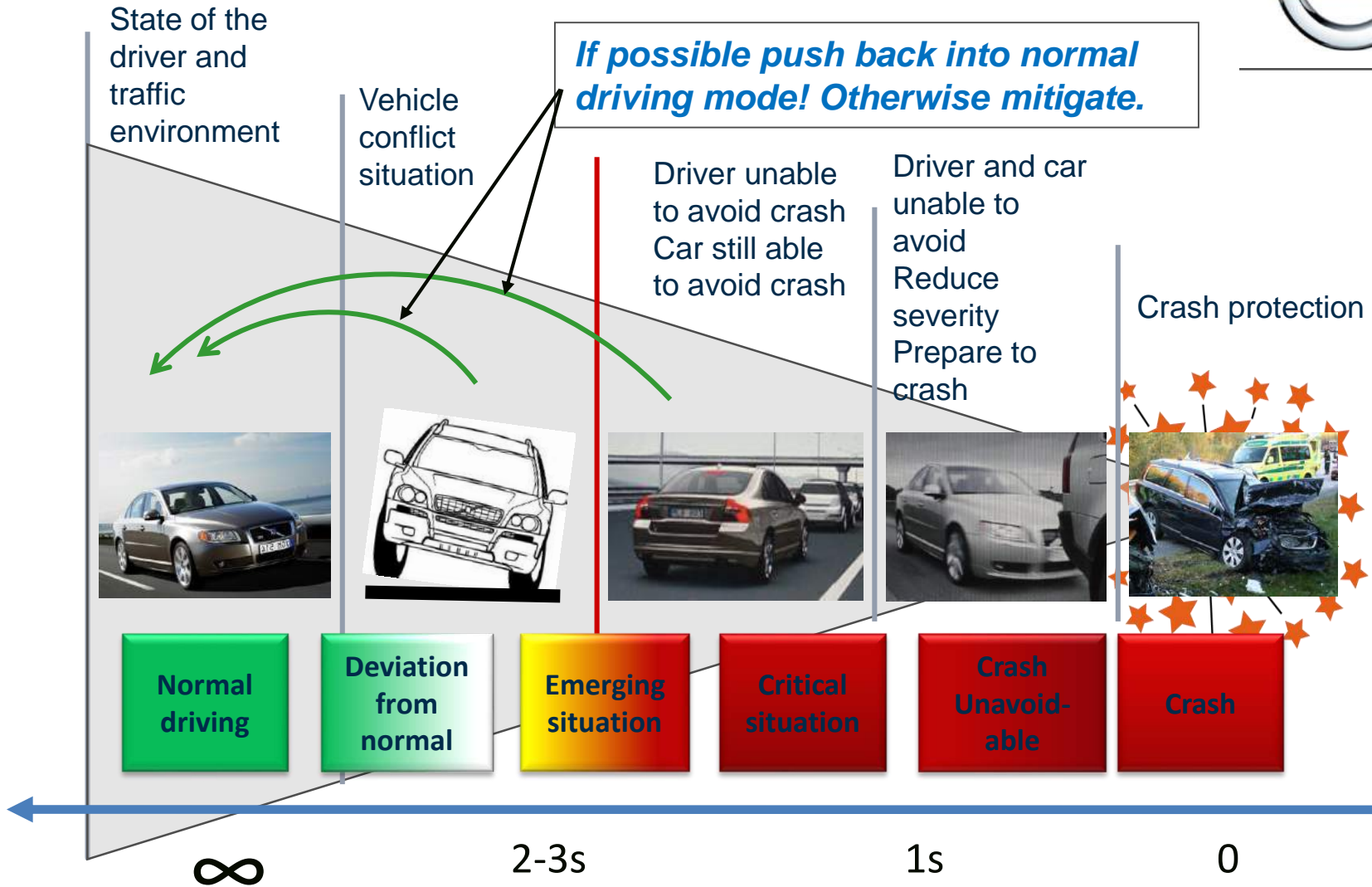


Towards Zero Fatalities – Every Case is Important



Models	Number of Fatalities	Number of Severe Injuries	Number of Fatalities and Severe Injuries	Accumulated Driven Kilometer	Number of Police Reported Accidents
S40/V50	13	119	132	10 395 151 270	1807
S80	6	11	17	5 397 068 320	199
S80N	0	10	10	1 283 631 790	176
V70/XC70	21	265	286	53 751 447 860	4107
V70/XC70N	7	58	65	8 275 289 590	1239
XC60	0	5	5	746 002 240	113
XC90	2	14	16	2 269 784 520	274

Volvo Safety Strategy



Total Safety: active safety systems + passive safety systems

Continuously Improved Crash Protection



- Decoupling of structures
- More use high strength steel
- More efficient restraints
- Non-linear materials

	Mild steel
	High strength steel
	Very high strength steel
	Extra high strength steel
	Ultra high strength steel
	Aluminium

Pedestrian Air Bag



Pedestrian Air Bag



PEDESTRIAN AIRBAG

Testing

Dur: 00:00:35:00

Continuous Development

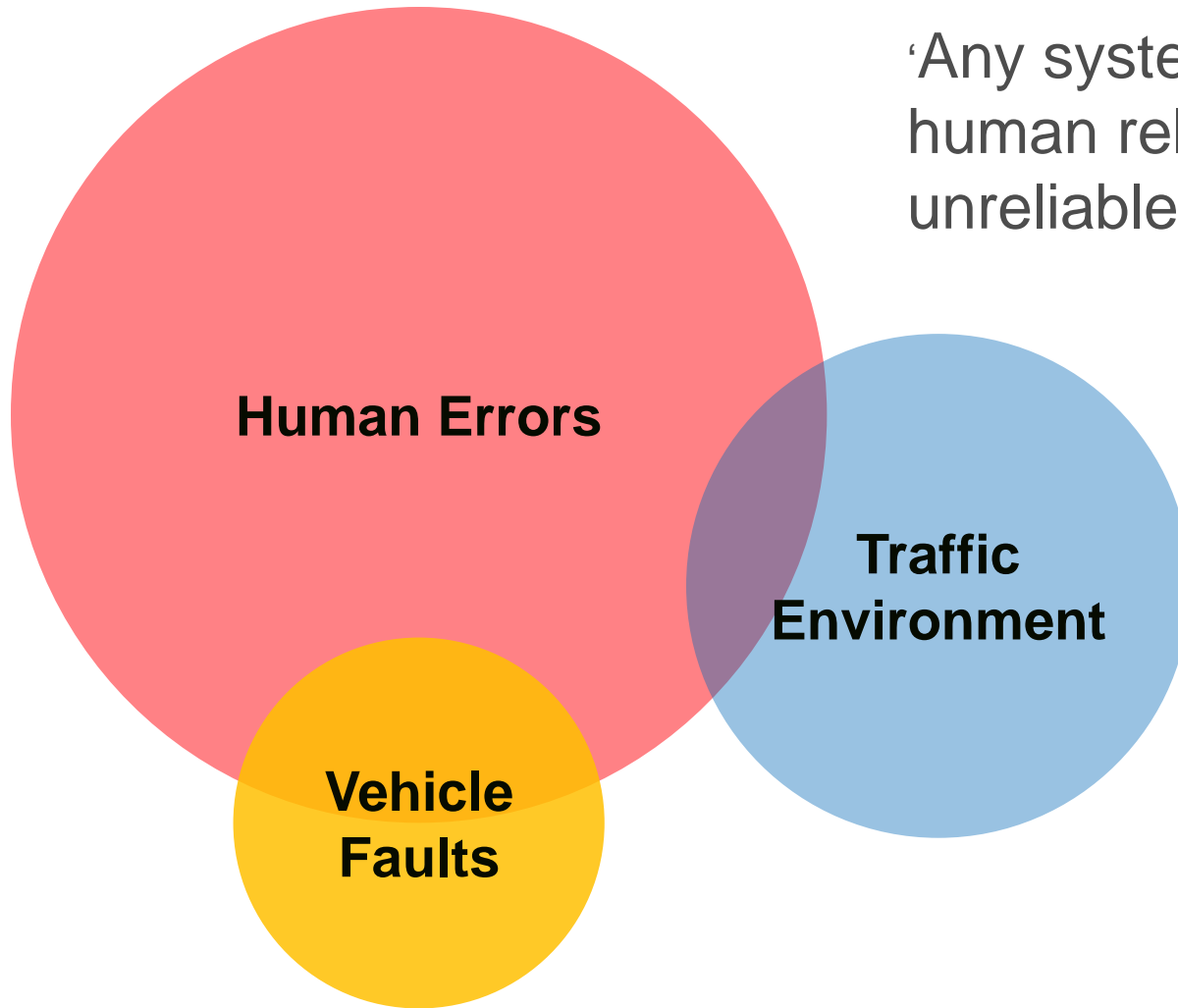


Launched on April 1, 2013

What Causes Crashes?



‘Any system depending on human reliability will be unreliable’



Active Safety Paves the Way

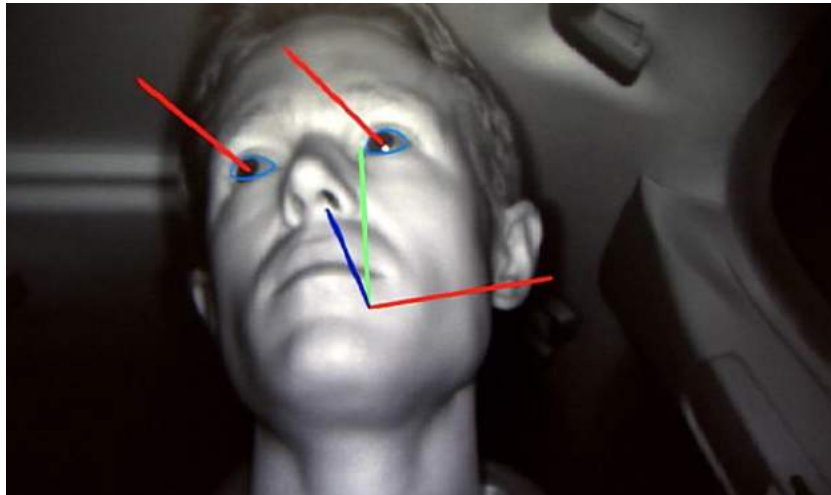


Focus on the Driver – not the Technology



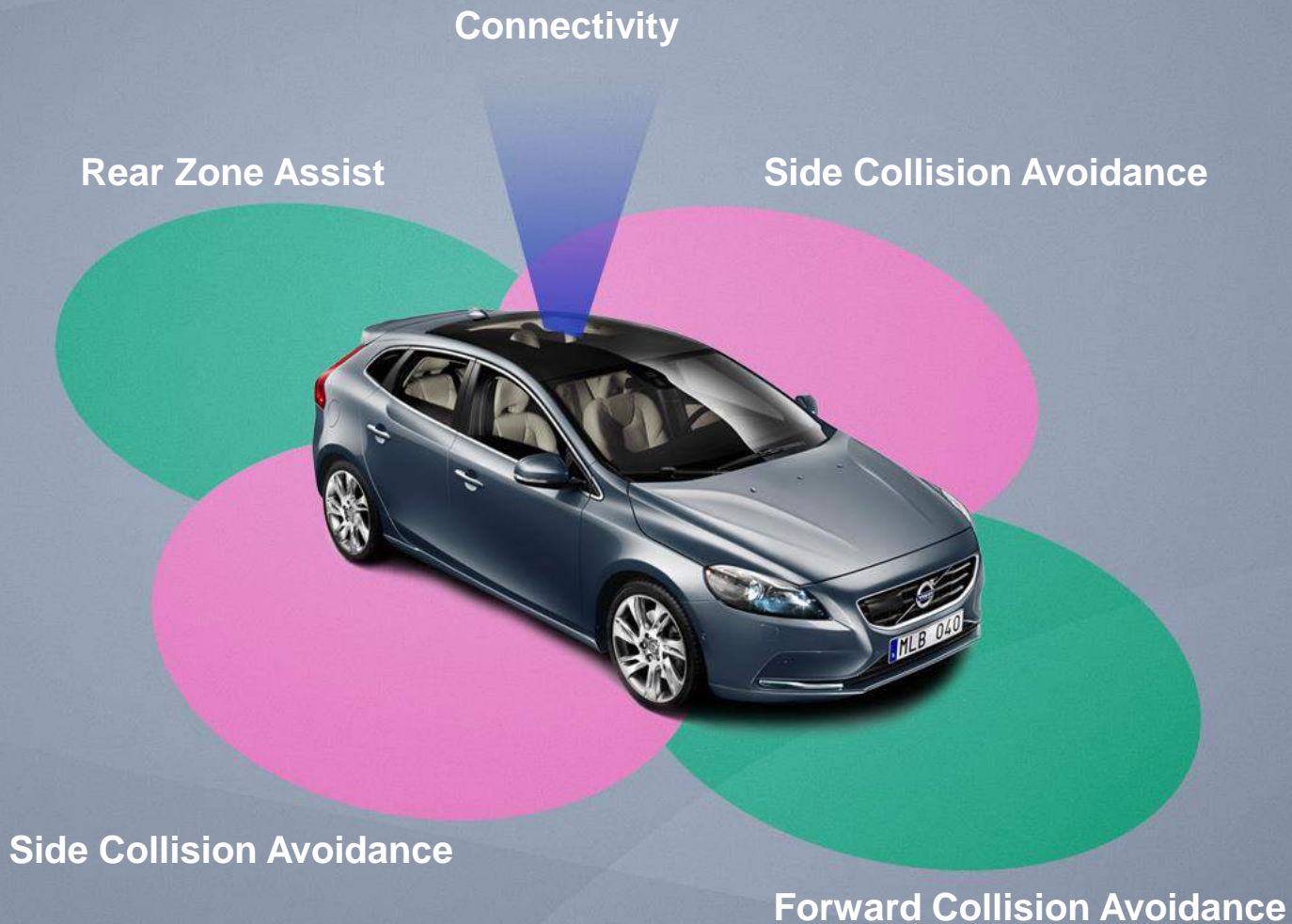
- Monitoring driver attention & assessing driver capabilities
- Brain and workload studies
- ➔ Base for new technologies

Technologies to be '*Designed Around You*'



The 360° Car

(with some help from above)



Auto Brake Technology – Documented Benefits



XC60 City Safety claims vs. other midsize luxury suvs

Property damage liability	-15%
Bodily injury liability	-33%
Collision	-20%



Auto Brake Technology – Cyclists & Pedestrians



VOLVO S60
"Pedestrian Detection
with Full Auto Brake"

Dur: 1.45:00 min

Auto Brake Technology – Cyclists & Pedestrians



Active Safety Technologies in Production



Traffic Sign information



Adaptive Cruise Control

Blind spot detection



Information and Driver Support



LDW and LKA



Automatic braking for pedestrians



Automatic rear-end braking



Automatic low speed braking

Warnings and Automatic Activations



Drowsiness and distraction



Alcohol interlocks

Driver State Measurements

Near Term Active Safety Technologies



**Automatic braking
for more objects**



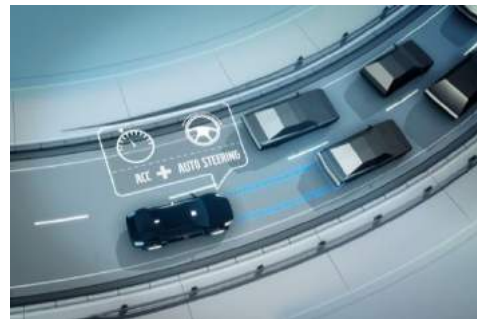
**Automatic braking
in darkness**



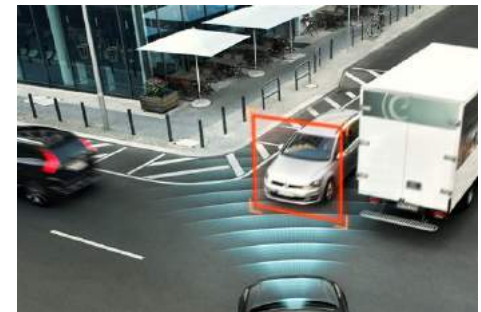
V2V and V2I communication



**Road edge and barrier
steer assist**



**Distance and steering
assist**



**Auto brake in
intersections**

Auto Brake for More Objects and In More Situations



Crash Avoidance by Autonomous Steering



V2V and V2I Communication



Intersection Braking and Multi-Target Avoidance



Total Video Converter
<http://effectmatrix.com>





Autonomous Driving
Offering time, connectivity and a safe ride!

Autonomous Driving Opportunities



Autonomous driving creates opportunities on:

- Safety
- Fuel economy
- Traffic flow
- Improved mobility
- Infrastructure
- Comfort
- Urban planning

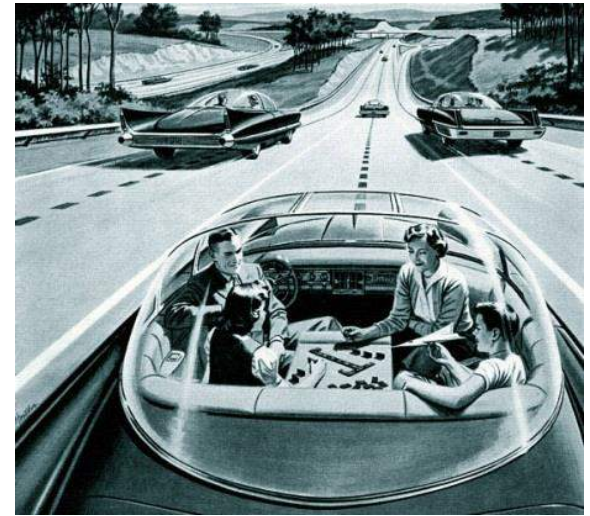


Possibilities from Technical Developments

Until 10 years ago – self-driving cars:
for the long term future.

Development of active safety systems
- created cars that can:

- Sense the surroundings, brake and steer automatically
- Communicate and transfer traffic information
- Adapt the speed
- Keep a distance
- Follow a lane
- Measure the state of the driver



New Generations – New Challenges



- Young people grow up used to being constantly connected.

- Mobility in the future will require connectivity.

➔ Self-driving cars: combine mobility and connectivity.





Why Self-driving Cars?

- Mobility for more people
- Increase comfort, connectivity and better use of the time
- New ways of transportation and flexible individual mobility
 - Self-driving taxis or car pools with home delivery
- Large potential advantages for safety and the environment
- Possibilities for urban planning:
 - More narrow lanes
 - Optimized solutions for different kinds of vehicles



Self-Driving Cars for Sustainable Mobility – DriveMe Project



- The world's first large scale project for self-driving cars
- Project starts 2014
- Self-driving cars on public roads in 2017
- 100 customer cars
- 50 km highway/ max speed 70 kmh
- Automatic parking in 2015
- Project cost: 50 million Euros.



Göteborgs
Stad



TRAFIKVERKET



TRANSPORT
STYRELSEN



LINDHOLMEN
SCIENCE PARK



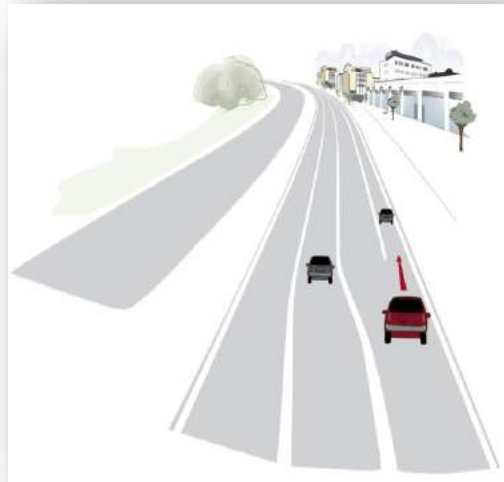
TEST ROUTE

- Typical commuter routes in and around Gothenburg
- Several lanes
- Frequent queues
- 4 tunnels
- Few intersections
- No on-coming traffic

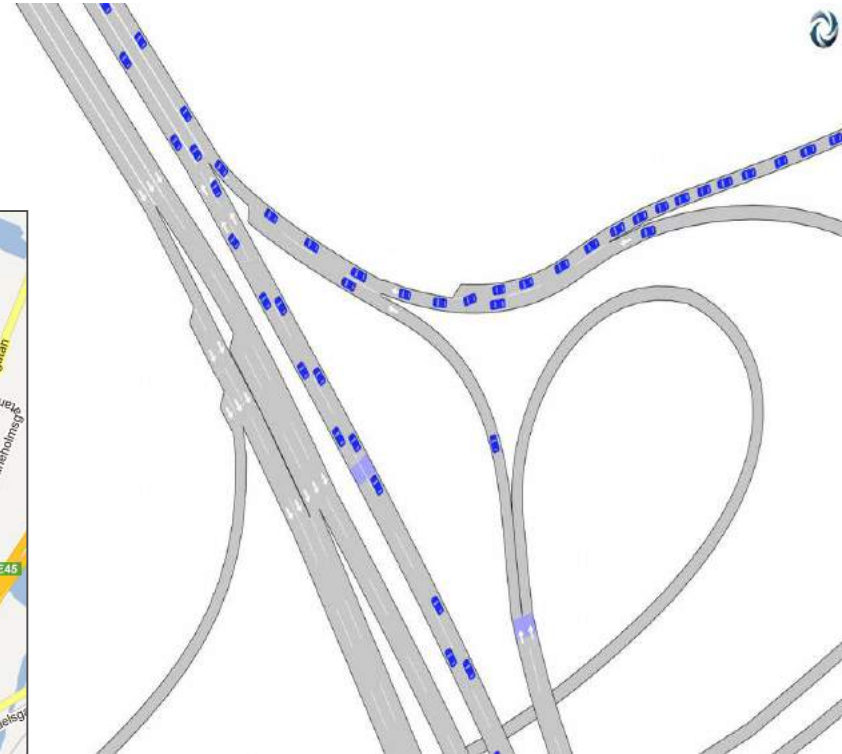
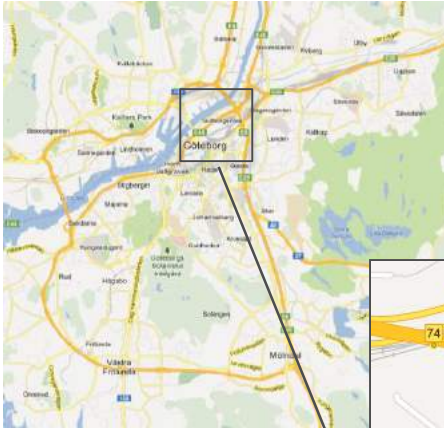
NHTSA Level 3: Conditionally
Autonomous / Highly Autonomous



Alternative Infrastructure Solutions



AD Simulation

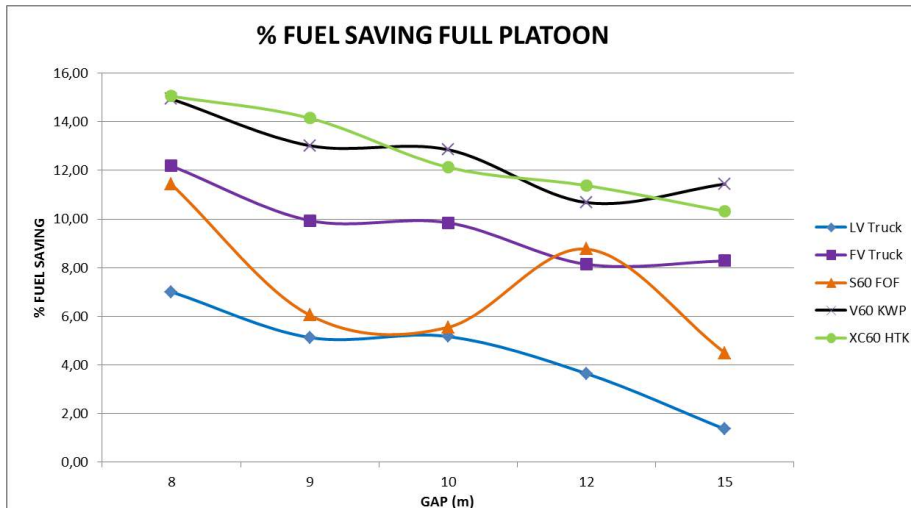


- 30% penetration 85% increased speed
- 100% penetration 30% increase in traffic flow

Road Trains/ Platooning



- **SARTRE** = Safe Road TRains for the Environment
 - Pan European road train project.
 - Based on existing technologies.
 - Significant reduction in fuel consumption:
 - 5% for lead vehicle
 - 14% for following vehicles
 - Add on cost/ car 2000 Euro.
 - Realistic business models



The Car of Tomorrow: Just Like the Farmer's Horse



Can be steered actively with
farmer in full control.

Can handle situation where
the farmer
is out of the loop (i.e. falls
asleep)
and still find its way home.

Will not accept being steered
into a tree or off a cliff.





Thank you!